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Powering economic growth; Attracting more young women into science and technology

In association with Women Invent Tomorrow at Silicon Republic

Four white line-art sketches of paper airplanes are scattered on the left side of the image. One is at the top, one in the middle, one below it, and a larger one at the bottom right, partially overlapping the woman's arm.A large, solid yellow chevron graphic pointing downwards and to the right, positioned behind the text "High performance. Delivered.".

High performance. Delivered.

Women Invent Tomorrow

As Ireland continues to meet its aspirations to be a world-leading centre for the industries of tomorrow in technology, science and engineering, one challenge that is cited again and again by enterprises, large and small, is that of acquiring and producing the best talent in these crucial industries.

That this talent gap in the knowledge industries is a global one is well documented, but it is also now widely recognised that women are vastly under-represented in the science and technology-based careers that will drive the industries of tomorrow and shape all our futures.

The statistics across the European Union are stark, suggesting that just 6 to 7 percent of technical careers are being filled by women. If we are to meet the grand societal challenges, from climate change to food security, the solutions exist in the science and maths domain. If we leave 50 percent of the talent pool of Europe and Ireland behind, we will not be able to meet these challenges. It is crucial that we encourage young girls to take on maths and science courses and participate in solving these problems of the future.

On International Women's Day, March 8, 2013, the Women Invent Tomorrow campaign was launched by Silicon Republic, with the vital support of industry partners Accenture, Intel, ESB International, the Irish Research Council and CoderDojo. We all believe that we can create a better world –

and country – by unleashing the vision, brains and creativity of women in order to fuel economic growth and drive recovery.

The World Economic Forum's recent Corporate Gender Gap Report 2012 highlighted a lack of role models as one of the greatest barriers to women leaders. As Ireland's leading news source in the areas of technology and innovation, Siliconrepublic.com felt for some time that it had a responsibility to tackle this gender issue. Women Invent Tomorrow is a year-long initiative that highlights the importance of closing the gender gap in the science and technology-based industries, and champions inspirational women as role models in the fields of STEM.

We knew there were remarkable female role models out there that tend to pass below the media radar, and Silicon Republic has been endeavouring to seek these out and profile them throughout the year. This has resulted in over 120,000 page views of content online, specifically featuring inspiring women role models in the areas of STEM.

The career opportunities in the STEM sector are so broad and so exciting, it is disappointing to think that significant numbers of schoolgirls, based on what are often outdated or incorrect perceptions, could be closing themselves off to careers in this area. Accenture has an ongoing research programme into the workforce challenges faced by employers today,

and a stated commitment to developing Skills to Succeed in citizens in Ireland and around the world.

Accenture was therefore delighted to undertake this research which forms a crucial element of the Women Invent Tomorrow initiative – to identify the barriers and challenges facing parents, teachers and young Irish girls when it comes to making early subject choices at school that will, or will not, facilitate their choices when it comes to the jobs and world of work tomorrow, specifically in the areas of science and technology. It is only by measuring and recognising these barriers that we as a country can address this vital issue of gender in the global battle for talent.

We are extremely grateful to our Women Invent Tomorrow partners, Intel, ESB International, Irish Research Council and CoderDojo for their vision in supporting this campaign, and their contribution to this report. Together we are determined to change the ratio.



Ann O'Dea
CEO, Silicon Republic,
co-ordinator, Women Invent Tomorrow



Marian Corcoran
Accenture Strategy

Foreword



The Taoiseach and the Government launched the Action Plan for Jobs in 2012. The Department of Education and Skills and the Department of Jobs, Enterprise and Innovation work together to ensure that jobs are created so that our economy can recover. In my role as Minister of State for Training and Skills, I want to prioritise the removal of any obstacles that may be in the way of our economic recovery. I want to ensure that we have the best talent available. A key concern is the vast under-representation of women, at less than 25%, in Science and Technology based careers.

All stakeholders need to be aware of the ways required to attract more young women to take up careers utilising Science, Technology, Engineering and Maths (STEM) subjects. This Accenture Report is most welcome as it helps to identify the barriers facing Irish parents, teachers and young girls in making career choices.

The report is particularly noteworthy in that it has sought the views of Irish students, their teachers and their parents. Girls are very reticent about taking up STEM subjects because they are perceived to be too difficult and in addition, there is a lack of information on the varied and exciting career options that are available today. This report should help us to break down these barriers and thereby

enable more young girls, as well as the boys, to be confident in choosing the STEM subjects in their post-primary education, thus giving them the option of following a rich, exciting and varied career in the Science and Technology areas.

This Accenture Report is not only important for the education sector but it is also important for industry. It identifies, from both perspectives, what is needed if together we are to remove the obstacles which have so far served to minimise the involvement of young women in the STEM area.

I would like to acknowledge Accenture and its other Women Invent Tomorrow partners who have worked to make this report a reality. Information is power and the findings and recommendations in the Report will inform decisions into the future – not only for me as Minister for Training and Skills, and the Departments of Education and Skills; Jobs, Enterprise and Innovation but also for young people, their parents and teachers and STEM industries based here in Ireland.



Ciarán Cannon T.D.
Minister for Training and Skills

Executive Summary

Ireland is facing a talent crisis: Employers seeking workers with science, technology, engineering and maths (STEM) skills are coming up short. According to the Forfás Expert Group on Future Skills Needs, Irish companies collectively will have an estimated 44,500 job openings for people with high-level information and communications technology (ICT) skills over the next six years—and there is a risk that unless action is taken those openings will go unfilled.

In Ireland, there are roughly 117,800 people working in jobs that utilise STEM skills. The proportion of women employed in such roles hovers at less than 25 percent, according to the Central Statistics Office.

Why are so few women in jobs that utilise STEM skills and what challenges does this pose for Ireland? To explore potential answers to these questions, Accenture sought the views of 1,000 female secondary school students, young women (age 18-23), secondary school teachers and parents with daughters in post-primary education. Our goal was to understand what influences secondary school students' choices of subjects and in particular STEM-related subjects. The reason: Secondary school students' subject decisions affect their course choices at third level and ultimately their career opportunities.



Our research findings suggest that female students and their parents are struggling to make informed decisions when it comes to choosing subjects in secondary school because of a number of barriers. These barriers are ultimately contributing to the shortage of women with STEM skills in the workplace.

Key barriers include:

- Negative stereotypes persist that STEM is more suitable for boys, and perceptions exist that STEM subjects are overly difficult
- Parents lack information on STEM career options, yet parents are the main influencers when it comes to advising their daughters on how to define educational and career paths
- There is fragmented information available about STEM careers, making it difficult for students and their parents to evaluate options
- A disconnect exists between industry's skill needs and students' subject choices for their Leaving Certificate Examinations

With the unemployment rate at about 13 percent, STEM skills offer great potential for reducing unemployment and driving economic growth. Jobs are readily available in companies requiring STEM skills but businesses are having difficulty filling them. By fostering an interest and curiosity among female students in STEM subjects and career opportunities at an early age, Government, Academia and Industry can begin to get the STEM talent pipeline flowing, which in turn could power our technology economy.

Businesses and government agencies in Ireland acknowledge the need to fill the STEM skills gap. However, much of the

effort to address the problem focuses on retraining and reskilling. This emphasis potentially leaves teenagers and younger children, especially girls, untapped as a potential pool of future STEM talent. Accordingly, this report concentrates on strengthening STEM's attractiveness to these young women.

One crucial problem identified by this study is that parents, teachers and students may be uninformed about career opportunities available in STEM sectors. The nature of jobs requiring such skills is changing so fast that students today are developing skills for jobs that may not yet exist. This makes it difficult for parents and young people to define and follow a structured career path. To fill the STEM talent pipeline, parents, teachers and students need a better understanding of what such work has to offer.

The gender gap in STEM-related work will continue to pose a major problem for Ireland's economic growth in the decades ahead. Without enough skilled workers in science, technology, engineering and mathematics roles, Irish enterprises will lack the key talent required to compete domestically and globally.

The good news is that Ireland has a major opportunity to develop a domestic STEM talent pool and to maximise the size of this pool by encouraging young women to build STEM skills. In this report, we draw on our survey findings to examine barriers to girls' studying for and moving into STEM careers. And we propose recommendations for how key stakeholders can help to break down such barriers.

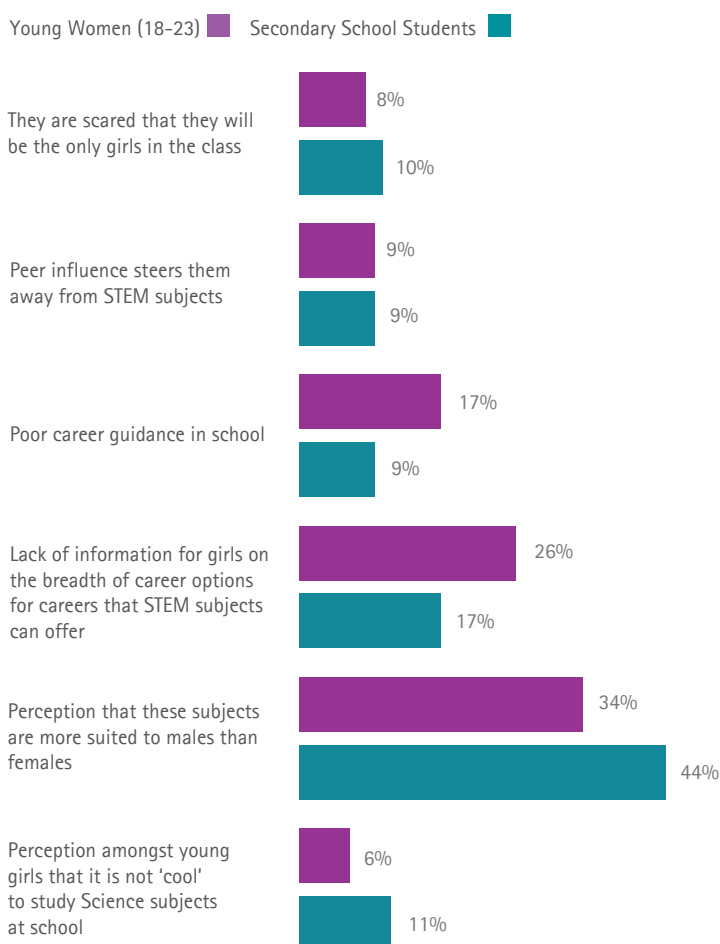
Barrier 1:

Career stereotypes and negative perceptions about the difficulty of STEM subjects run deep

When asked why girls constitute a minority in STEM courses, as many as 44 percent of the secondary school students in our survey cited the perception that these subjects are more suited to males than females. One teacher in four said that the promotion of so-called 'traditional' girls' career paths (such as nursing and teaching) contributes to the stereotype of STEM as more appropriate for boys than girls. The parents and teachers in our study identified the main reason for persistence of this stereotype is a lack of female role models in the sector.

The single science subject that bucks this trend is biology and 77 percent of teachers who took part in our survey believe that more girls choose biology as a school subject because it aligns with what they see as 'girls' career paths.'

Figure 1: We asked secondary school students and young women – 'Why do you think girls are considered the minority in Science, Technology, Engineering and Maths in school and work?'



"I do still see more males interested in technology, but definitely over the last two or three years we are seeing the gender ratio changing. Just look at the technology industry where between 7 and 9% of developers are female now, but then take something like CoderDojo where an average of 30% of attendees are girls.

When it comes to young people and the skills they need, we must remember that kids are now immersed in technology. They will never know the horrors of dial-up. Whatever their interests, whether it be sport or Justin Bieber, the medium by which they are consuming their information is radically different, it is technology-centric. Both boys and girls are becoming more interested in technology, and do see the requirements to get into this area. I think sooner than we think we will see young women dominate this field."

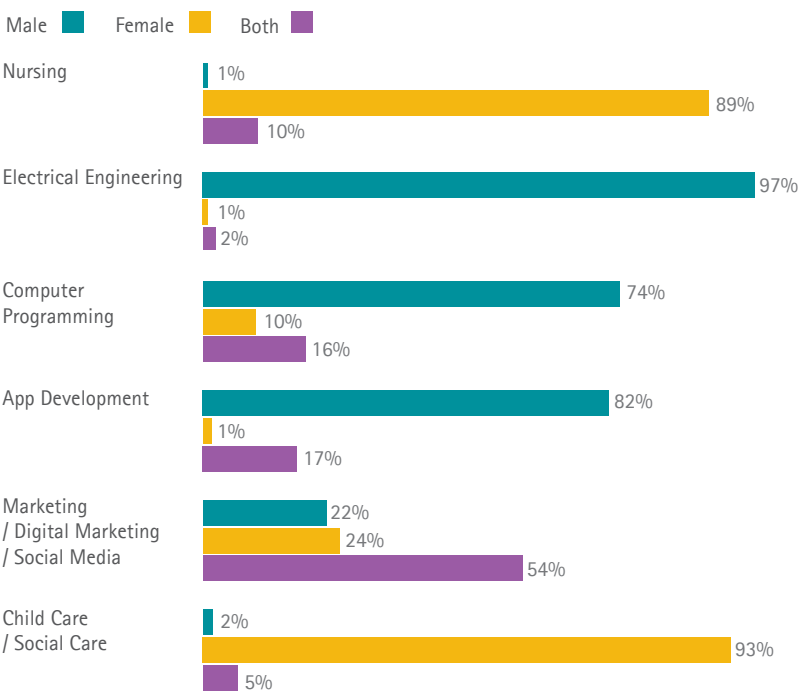
James Whelton
Co-founder, CoderDojo

We also asked teachers to identify career trends where they saw a growing level of interest among students and to select whether they saw more interest from boys or girls in the specific career trends.

Teachers in the survey identified only a small number of female students showing an interest in taking up certain STEM related career options in comparison with males e.g. App. Development (1 percent), Electrical Engineering (1 percent), Aeronautical Engineering (8 percent), Computer Programming (10 percent). Yet, they identified girls as being very interested in the stereotypical female career choices including Child care/social care (93 percent), Beautician/Hairdresser (95 percent), Nursing (89 percent) and Teaching (48 percent).

These rather startling trends identified by teachers in the survey suggest that the stereotypes that exist for male and female career choices are well embedded. It is noteworthy that App. Development – a new career – appears immediately to be boxed into a 'male' career track.

Figure 2: We asked teachers to identify trends by gender from an extensive list of career options. Some of the key findings are presented in this chart.

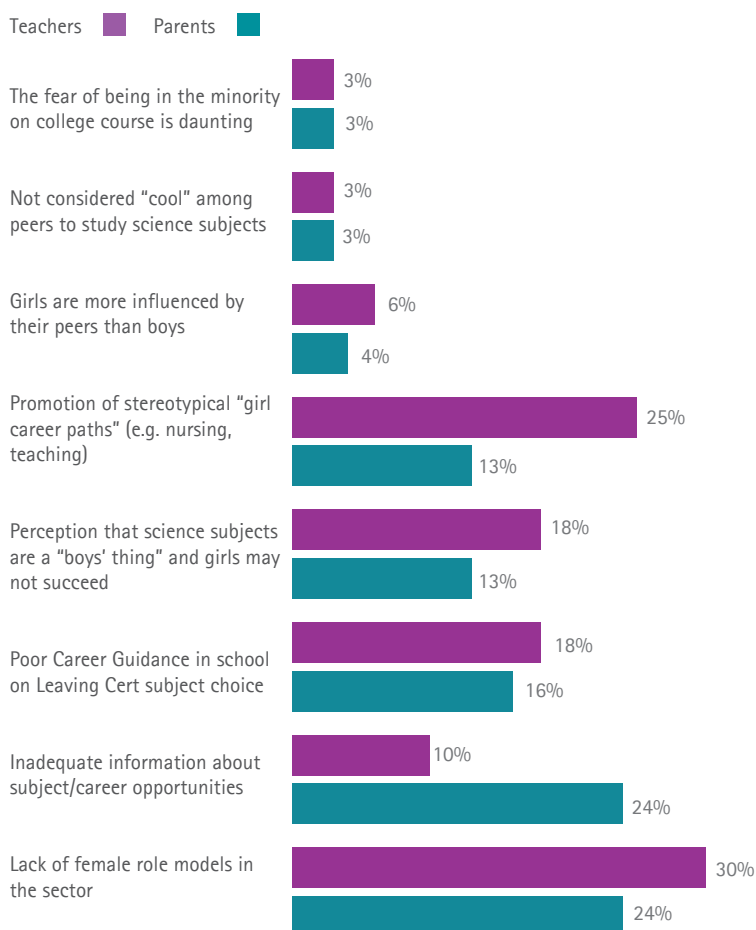


Students' perception of how difficult a school subject is also reflects the negative perceptions of STEM. Ninety-two percent of the teachers in our survey believe that girls see biology as an easier course of study than chemistry or physics.

The high level of interest by girls studying biology is not replicated for physics. Of all students that took physics higher level paper in 2013, only 26% were female, representing a drop of 3% on the previous year. If this trend continues, it will present serious challenges for industry in filling jobs that require a talent pool with physics knowledge and skills.

In relation to maths, 31 percent of the young women (age 18-23) surveyed said they studied higher level maths but changed to lower level within six months of taking the Leaving Certificate Exam or before starting their final year in school. Of those, 56 percent said that they made the change because they believed there would be too much work to earn a good grade at the higher level. When the parents in our survey were asked why maths and science subjects are perceived as more difficult than other subjects, 34 percent said it's because these subjects 'are more difficult.'

Figure 3: We asked parents and teachers: Why is there a gender gap in Science, Technology and Engineering careers?



"Over the past 15 years in the Galway Education Centre, we have worked to provide a conduit between enterprise/industry and education in the areas of STEM. This has involved translating the needs of enterprise to match the syllabus of various curricula. It has been, and continues to be, a learning journey for all of us involved.

The Robotics Ireland programme is an excellent example of the type of events that can help encourage young people learn about and strengthen STEM skills. Hosted by the Galway Education Centre, Robotics Ireland comprises several components, Junior FIRST LEGO League, FIRST LEGO League and the Irish Mini Sumo Robots Championship.

As a country we have to continue to develop young people who are innovative in thought, willing to try new ideas and will take their ingenuity and apply it to settings that cause 'disruptive innovation'. We need students who will bring new ways to develop technologies and pathways so that those who are underserved, in particular, are able to access the services many of us take for granted. To achieve this requires real partnership and dialogue. Let's get listening and talking."

Bernard Kirk
Director, Galway Education Centre

Our findings suggest that traditional stereotypes and negative perceptions of STEM subjects as prohibitively challenging still exist, affecting girls' study choices. And apparently there is a persistent opinion—among parents, teachers and young women alike – that STEM subjects and careers (including new ones such as mobile applications development) are more suitable for males than females.

Secondary research echoes our findings. According to the OECD, in 2012 only 5 percent of girls on average in OECD countries expect to have a career in engineering and computing, while 18 percent of boys expect to find long-time employment in these fields.

Our survey findings are also consistent with the broader picture across Irish society. According to the Central Statistics Office, in 2011 more girls earned an A or B on the higher-level paper in the Leaving Certificate Exams in English, Irish, French, Biology, Chemistry, Art and Music. Meanwhile, more boys got an A or B on the higher-level paper in Maths, Physics, Construction and Engineering Exams.



"It's very important that we dispel the myths about science and maths being difficult. Like any other subject, if you have an interest in it to begin with, it is easier to learn. So we must try to create a culture of curiosity. Rather than focusing on career, if we can garner general interest in these areas, those perceptions will change over time.

Ten years ago we would not have known what an App developer meant, so we have no idea what the jobs are going to be in ten years time – but we know they'll be exciting. So if we can foster curiosity, as a precursor to science, engineering and IT; if we can create that environment where parents and children have the opportunity and courage to ask questions, I think we're on to a winner. If we can really focus on the base skills of problem-solving and questioning, then we'll all become better thinkers, better innovators."

Ellen Byrne
Science Communications Specialist
Co-founder, Festival of Curiosity

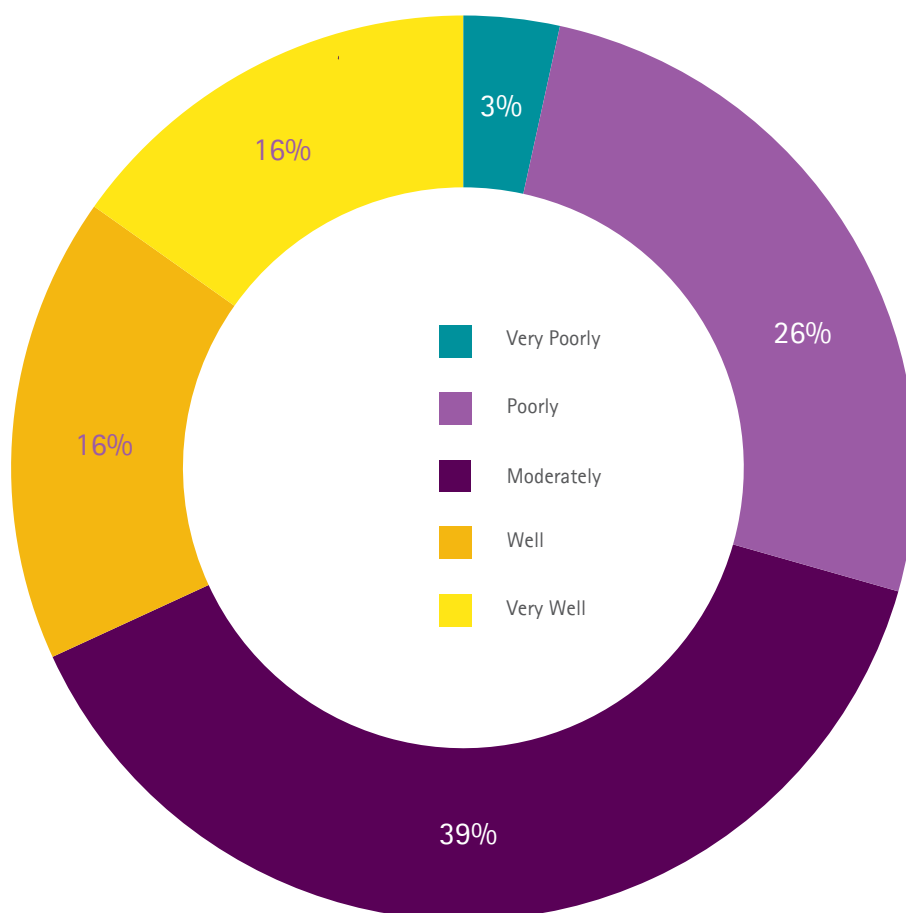
Barrier 2:

Parents are the primary influencers but have difficulty advising their daughters on STEM-related career choices

Major portions of the groups taking part in our survey (56 percent of students, 48 percent of young women, 49 percent of parents and 31 percent of teachers) identified parents as the key influencers in students' Leaving Certificate subject choices. However, 68 percent of parents in our study reported feeling 'moderately,' 'poorly' or 'very poorly' informed on career opportunities and industry needs relating to skills/knowledge of STEM.

Moreover, 45 percent of the parents said that they thought the key influencing factor for students in selecting subjects is career choice. Forty-nine percent of the teachers echoed that sentiment. However, 25 percent of the parents said that the Leaving Certificate Exam is about getting maximum points and studying the subjects that will make this goal achievable. Yet, there is an awareness that job opportunities are emerging in STEM and, though feeling poorly equipped to advise their daughters, 55 percent of parents do believe that their daughters are 'likely' or 'highly likely' to choose a career in an industry or area that requires STEM-related knowledge and skills.

Figure 4: We asked parents – 'How well informed do you feel you are on career opportunities and industry needs in sectors relating to skills/knowledge of Science, Technology, Engineering and Maths?'



"We need not only to direct more young women towards STEM areas, but toward particular areas of STEM. As an engineer myself I know this is an area where, in particular, we continue to suffer from misapprehensions and misconceptions about the nature of the profession. That is something that continues to need attention.

To me it is at least as important to target the parents and guidance counsellors as it is to target the schoolgirls themselves. We really need to bear in mind both those groupings. I think we have a window of opportunity just now. Even over the last 12 months there has been an extraordinary array of Irish women appointed to senior positions in Ireland and internationally. If we get a concerted push to highlight how women can build hugely successful and rewarding careers in this sector, I think we should be able to make considerable headway."

Orla Feely

Chair, Irish Research Council and Professor of Electronic Engineering, UCD

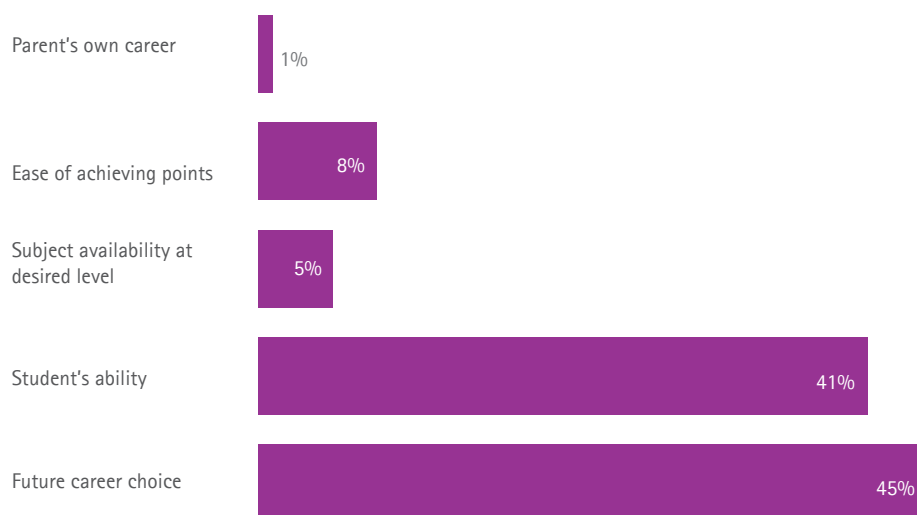
This suggests that when it comes to the Leaving Certificate Exam, a 'points game' mentality appears to still persist among parents and students alike. There is a risk that if young women continue to see STEM subjects as difficult they may continue selecting other subjects. As a result, there will be challenges in getting into STEM-based third-level courses and subsequently advancing into STEM careers.

Parents' perceptions and awareness of career options for their daughters can powerfully influence girls' and young women's educational and professional choices. So too can a parent's own career choice. Research conducted by the University of Illinois in the United States found that students who have at least one parent working in a STEM field chose to major in a STEM subject at higher rates than students without parents in such jobs.

This is a factor borne out by our survey findings, yet underestimated by parents themselves. While only 1% of parents believes their own career is an influencing factor on their children's choices, 73% of parents and 58% of young women (age 18 – 23) stated that they or members of their extended family work or study in a STEM related area.

For parents who do not work in roles that require science, technology, engineering or maths skills, it is even more critical that they receive information about the possibilities offered by such career paths and ways to prepare for such professions. Only then will they be able to advise their daughters on how to define an educational and professional path.

Figure 5: We asked parents – 'Please rank what you expect to be the key influencing factors on your daughter's subject choices'



"The current 'mantra' of primarily promoting STEM as a means of encouraging more people into attaining the acumen and skills required in our economy in my view is questionable and may be counter-productive and evidence suggests is particularly unappealing to large proportions of the population.

What our economy requires throughout is 'smart people with smart skills'. Are we not better to promote ways of branding that indicate the learning and the potential career paths that can be achieved? That certain subject choices / programmes might lead a student to find the cure for cancer, build an international brand company, influence the welfare of others or to be prosperous. While in Ireland we pride ourselves on the numbers attending Third Level our economy is languishing – in contrast, Germany where the majority (60%) progress into vocational / technical opportunities enjoys a buoyant economy and the lowest rate of youth unemployment in Europe.

We need to think again about how we position the opportunities in technology to young people as against what we can offer them: fulfilling lives with prospects and opportunity in the interest of all in society."

Peter Davitt
CEO, Fast-track to IT (FIT)

Barrier 3:

Information on STEM careers appears fragmented and is not resonating with students or parents

In our survey, 92 percent of parents said they believe that a clearly mapped out career path for their daughters is 'moderately important' or 'very important' for making third-level course choices. Such a clear path is critical—and exists—for professions in fields such as law, teaching, accounting or healthcare. It's equally important for STEM careers, but our research suggests that such clarity does not exist for this sector.

As many as 56 percent of the teachers we surveyed used the words 'average,' 'poor' or 'very poor' to describe the overall level of information available to female students on STEM-related career opportunities. For parents, the primary source of information on school subject options is their children (42 percent), yet over 80 percent of them said they thought their daughters are 'moderately,' 'poorly' or 'very poorly informed' about STEM career opportunities and industry's skill needs.

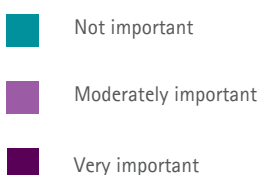
"On the issue of gender diversity in STEM, it is essential that we are all working in unison. Government must create the policy environment that enables equality of opportunities for all. Academia needs to adapt to social, cultural and industrial trends to remain interesting and exciting to young people and to encourage more young women to study STEM subjects. Business needs to ultimately create jobs and ensure that there is no gender discrimination in their hiring policies and also play its role in promoting the importance and excitement around careers in STEM for girls and women.

Finally and crucially, the parents of Ireland need to play their part in breaking down some of the barriers around the suitability of STEM careers for their daughters, by removing the stereotypes and encouraging their daughters participation in STEM studies and careers from a young age."

Brendan Cannon

EMEA co-ordinator, Intel's Girls and Women initiative

Figure 6: We asked parents – 'How important is it to you that there would be a clearly mapped out career path for your daughter based on their third level course choice (for example, in a way one might expect as a lawyer, teacher, nurse, accountant, doctor)?'



"It's vital that girls, as much as boys, are in a position to take advantage of the rich array of career opportunities that are there. Our system of education should be one that enables all children to flourish in whatever area is of interest to them.

Those of us that have been actively involved in STEM education for years know there's a systemic disparity between young women and young men taking up STEM careers, and we need to find ways of addressing that. It will be a key consideration in the review of STEM education that I'm chairing at the moment for the Government.

We realise it's a complex, multi-faceted issue but that just reinforces the fact that all the stakeholders have to be involved in this to get it right, and it's clearly not right at present.

We have to address it, particularly in the light of a knowledge economy where many of the exciting jobs have STEM elements underpinning them. It doesn't mean you can only enter these careers with STEM, but we should ensure young people have the STEM literacy to enable them to make judgments. It is in all our interests."

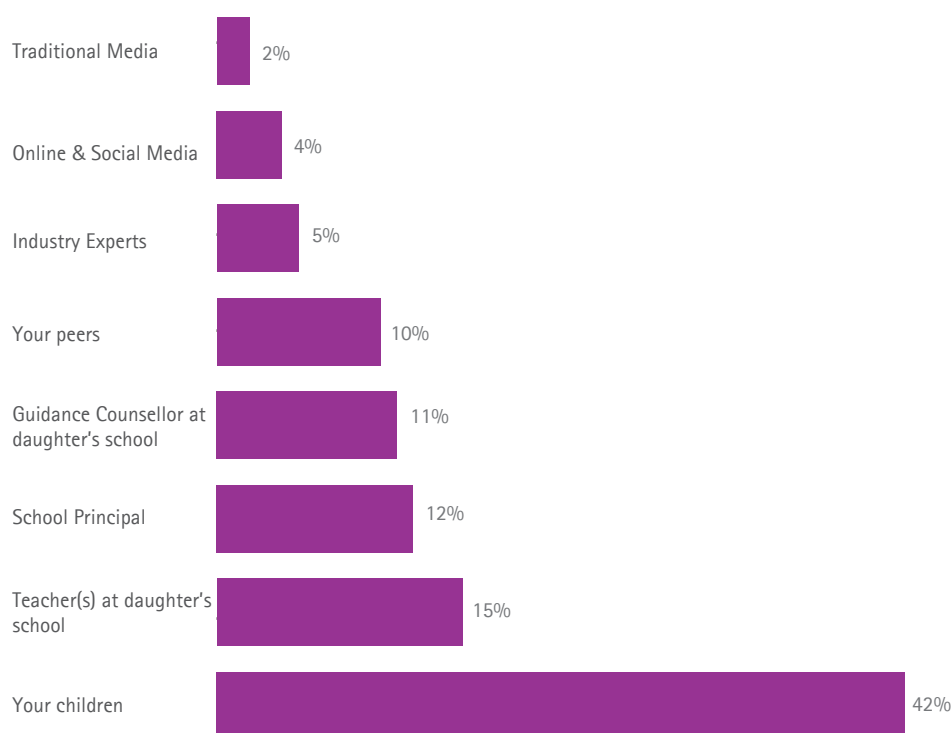
Prof Brian MacCraith

President, Dublin City University
Chair, STEM Education Review Group

One might think that online and social media could serve as a good alternative source of information on STEM subjects and career opportunities. However, less than 4 percent of the parents in our study cited these as sources of such information, and only 5 percent of the teachers selected 'view on-line' and 'social media' as an influencer of students' choice of subjects and career paths. These two figures are low, but each is higher than respective figures for traditional press.

Parents who lack awareness of the opportunities for STEM careers and the variety of jobs available in these fields may be more likely to encourage their daughters in a different direction—further widening the STEM skills gap facing Irish companies. To be sure, there are a number of excellent programmes, initiated by Industry and Government, under way in schools to promote careers in STEM for women. However, these programmes do not seem to be resonating with parents or their daughters, as evidenced by the Accenture study. To correct the situation, Industry and Government need to scale these programmes and consider how best to ensure widespread access, availability and increased effectiveness for female students and their parents.

Figure 7: We asked parents – 'What are your primary sources of information on school subject options?'



"As parents we only want the very best for our children.

We try to help them develop the skills and qualities that will serve them well in life.

When it comes to education, we want to help them select those subjects most suited to their ambitions.

Our increasingly digital world has made it far easier to access information and, through the internet, skills like problem-solving and creativity are ever more greatly valued.

Our perspectives on subject and career choice are all too often coloured by what we ourselves experienced, making us less likely to encourage our children, particularly our daughters, to explore science, technology or engineering options – where many of the best and most exciting jobs are to be found.

I believe these subjects also hone the 'problem-solving' skills that will help our young people make the most of their lives.

Education is the crucial investment in our children's future – they only get one shot, and it's up to us to ensure they make the most of it.

This report can help us make far better informed decisions."

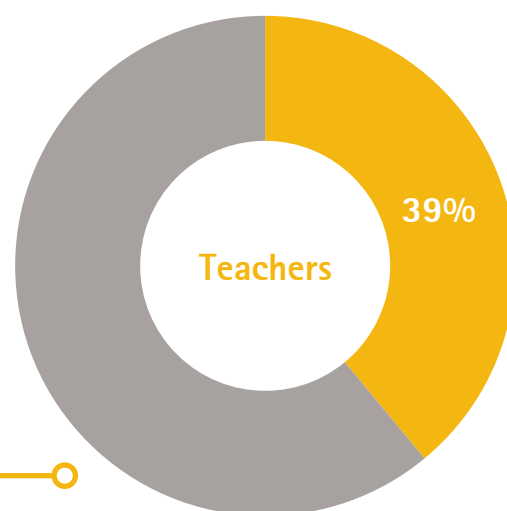
David Puttnam

Digital Champion for Ireland

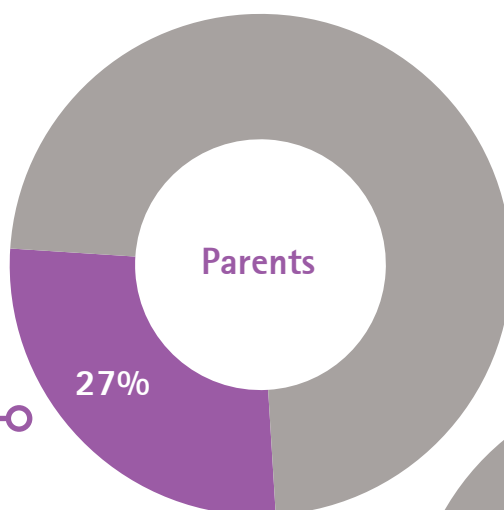
Barrier 4:

There is a disconnect between Industry's skill needs and girls' Leaving Certificate subject choices

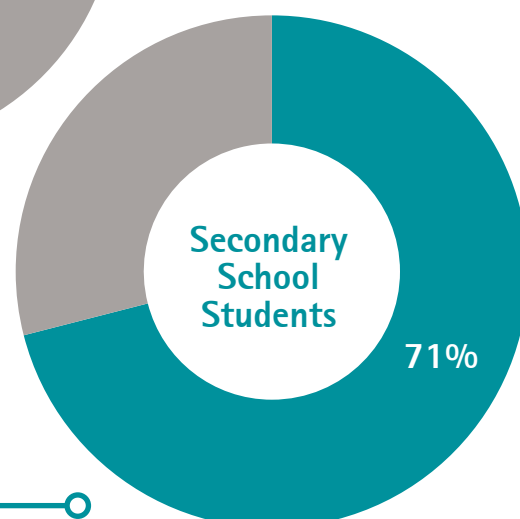
Thirty-nine percent of the teachers in our study said they believe that awareness of possible future career opportunities is the most important factor in encouraging female students to choose STEM subjects for the Leaving Certificate.



Over a quarter of parents (**27 percent**) identified 'work experience placement in a company that uses STEM skills, possibly during transition year' as the number-one option for helping their daughters gain a deeper understanding of, and practical insight into, STEM career opportunities. Eighteen percent of parents cited 'talks in school by industry professionals during school time' as the best way to achieve this goal.



When asked whether they had attended a talk or information session about STEM, **71 percent** of the students in our survey answered 'No'. The equivalent figure for young women surveyed was 62 percent. Teachers' responses present a consistent picture: 53 percent stated that in the past three years, no representatives from any industry visited their school to speak to junior-cycle students.



Clearly, there is a disconnect between STEM career opportunities and future industry needs on the one hand, and the subjects selected by female secondary students on the other. While some larger companies support STEM-awareness initiatives, there may be room for improvement on this front among mid-size indigenous Irish companies through student placements and short work-experience programmes. These can give second-level students a sense of what STEM related work is like. They can also help make students more aware of their subject choices for the senior cycle and how those decisions link with the career possibilities that will be open to them. Companies looking to hire STEM graduates hail from the fastest-growing sectors of the Irish economy. Consider: Eight of the top 10 global ICT companies, nine of the top 10 global pharmaceutical companies and three of the top six global gaming companies all have operations in Ireland.

"Encouraging greater participation by young girls in Science, Technology, Engineering and Maths (STEM) will help support the growing skills requirements in job sectors and industries where females are hugely under-represented. Closer collaboration between the education and technology sectors can help change perceptions, better inform parents, teachers and students about the diverse career opportunities available and inspire them to choose STEM subjects early in the education cycle."

Industry has a crucial role. For example, in February 2014, ESB International will run its annual three-day education programme to give girls an opportunity to understand what life is like working as an engineer. Over time, this activity has proven to play a vital role in encouraging them to study engineering at third level."

Brid Horan

Deputy Chief Executive, ESB International

Next Steps

Drawing on the analysis of our research findings, we believe that there are a number of ways to encourage more young women to have an interest in and to select STEM related subjects in secondary school. This in turn should increase the number of women who make their way into STEM related jobs in companies in Ireland. Executed effectively, the suggestions below could help businesses in Ireland secure the skills they need to remain competitive on the domestic as well as international stage.

- **Maximise the impact of existing Government and Industry funded programmes by creating a more joined up approach between the relevant stakeholders.** We believe that the research points to a need for increased collaboration between Government, Academia and Industry to enhance the attractiveness of STEM subjects at second level, and jobs in the science and technology sector, to young women. Relevant stakeholders, including groups currently working to address this issue, should come together to review the barriers set out in this report and design practical, outcome focussed actions to address the issues raised. In doing so, Ireland could set an ambitious goal to make it the first country to surmount this challenge and in so doing strengthen Ireland's proposition as a global STEM hub and a magnet for talent.

Based on some very clear findings in our research on the barriers to be tackled, actions to be considered could include -

- **Making STEM career information real, tangible and meaningful for parents.** Information needs to be made available to parents on the range of jobs and opportunities in the STEM industries, what these types of jobs and work entail and offer to young women. There is an opportunity for Industry, Government and Education to leverage the power of digital technology to create access, increase availability and improve communication of relevant information to parents. This could highlight, on a national basis, the diversity of jobs available and role models working in STEM-related

careers. This should help parents make informed decisions when it comes to guiding their daughters on their subject choices. There is a need to be innovative in how this information is disseminated to ensure ease of access for parents. We recommend leveraging new technologies and digital channels to share real life stories and up to date information on the types of careers and jobs in the new world of work.

- **A new STEM branding and communications approach for female students.** Awareness and attractiveness of careers in science and technology does not appear to be resonating consistently on a national basis with young women. The positioning of opportunities in science and technology needs to change and consideration should be given to a new branding, positioning and communications approach that takes into account the best ways to engage and inspire millennial women. The exciting careers and lifestyles offered by the sectors should be 'made real' to encourage young women to consider the broad area of science and technology as an attractive career option. This could complement initiatives currently underway such as the development and roll out of a pilot course in data analytics for Transition Year students.

A high profile National Women in Science and Technology Awards could be developed. This initiative would quickly showcase the diversity of jobs at all levels in STEM and highlight role models in Ireland effectively navigating a successful career in STEM industries.

- **Industry continuing to design practical career programmes with school children.** We suggest that Industry continues to deepen its engagement with schools to develop enhanced programmes to make relevant and real the types of jobs and careers available for those with skills in the STEM area. Based on our findings, there is an opportunity to consider programmes that include some element of work experience. Therefore, programmes for Transition Year students could be an effective option. For example, Industry could provide a co-ordinated approach and build on existing initiatives to offer a comprehensive national database of work experience placements available, enabling Transition Year students to access and apply for relevant placements that would help them understand the new world of work.
- **Better support for Teachers and Guidance Counsellors in relation to up to date information on the range of careers available in science and technology.** To keep up to date with the emerging careers in technology and the application of science, engineering and maths in the real world, Industry should establish an ongoing accessible information stream for teachers and Guidance Counsellors. This could provide them with tangible information on the types of new and changing opportunities and careers in the broad STEM industries and the types of skills and qualifications required for these jobs.



Conclusion

Encouraging more young women to have an interest in and to acquire STEM skills and move into STEM-related careers could go a long way toward helping Irish companies secure the talent they need to remain competitive on the domestic and international stage. But to accomplish all this, key stakeholders—including Industry, Government and Educational Institutions—must understand and break down major barriers to filling the STEM talent pipeline with female participants.

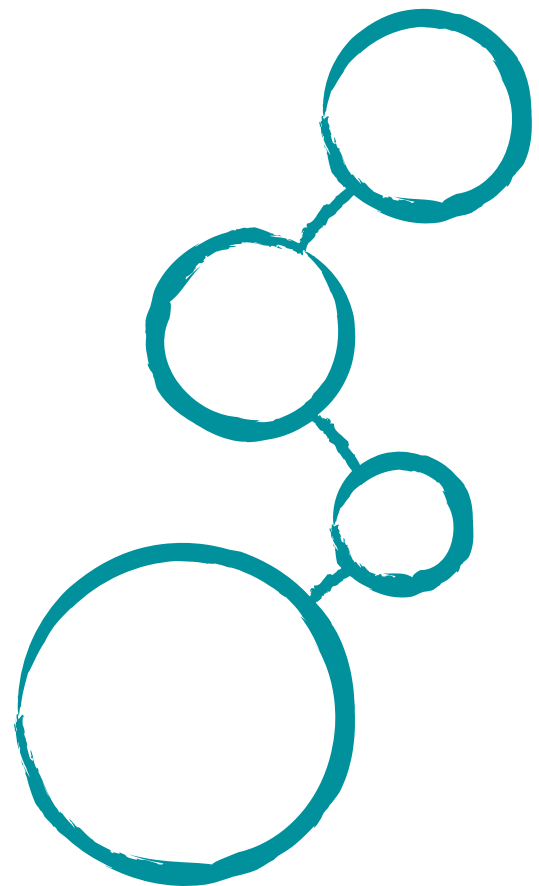
Our research suggests that these barriers include persistent negative stereotypes of STEM and that perceptions of STEM subjects are overly difficult, as well as lack of information about STEM career opportunities among parents of young female students. Additional barriers take the form of fragmented information about STEM careers and a disconnect between the skills that industry needs and the Leaving Certificate subject choices that female students are making.

The STEM sectors are broad and therefore communicating the opportunities and variety of careers available is complex. Careful consideration is needed to help students, parents and teachers understand what subjects young women need to take up at second level to make their desired career choices a reality by showing how STEM skills will provide the gateway to a variety of exciting careers. As Neelie Kroes, European Commissioner for the Digital



Agenda said, “Every digital woman is a triple-win: for herself, for her organisation, for the economy”.

While several stand-alone initiatives are in place to encourage girls to take up STEM subjects, more must be done to eliminate the obstacles. The good news is that stakeholders have powerful tools at their disposal—such as existing networks, initiatives, digital technology and a sincere desire on the part of Government, Industry, parents, students and teachers to open up new opportunities for young Irish women. By working together to create an interest and encourage girls to study STEM-related disciplines and move into careers utilising STEM skills, these stakeholders can help strengthen not only Irish businesses but also Ireland’s overall economy.



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Most importantly, we would like to extend our sincere gratitude and thanks to all who took the time to respond to and share our survey.

Research Methodology

Accenture surveyed 997 female secondary school students, young women (age 18-23), secondary school teachers, and parents with daughters in post-primary education. The survey was carried out via a detailed online questionnaire in September 2013. The research was completed across the Republic of Ireland and responses were broken down as follows: secondary school students (41 percent), young women (15 per cent), parents (21 percent), teachers (21 percent) and other (2 percent).

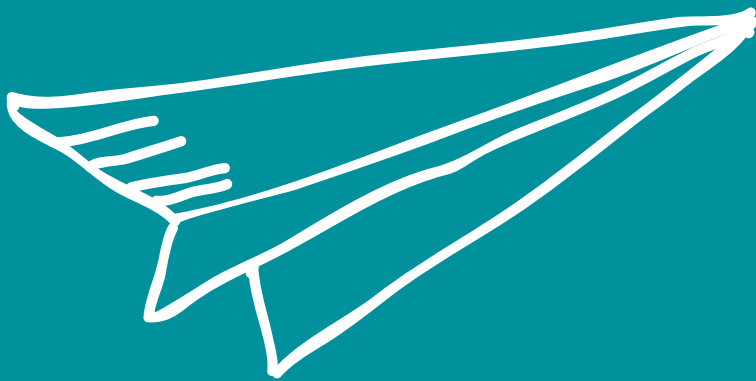
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