STEMChAT

Resource Package

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Introduction:

STEMChAT – Women as catalysts for change in STEM Education

The STEMChAT Project was initiated and implemented in 2019/2020 when the EPI*STEM Centre in the University of Limerick was awarded funding from the Science Foundation Ireland Discover Programme (SFI Discover). The Science Foundation Ireland Discover Programme aims to:

- Promote and Support STEM Education
- Promote STEM Career pathways
- Increase the general public's engagement with STEM and its importance in society.

The STEMChAT Project contributes to the achievement of the SFI aims by promoting STEM career pathways and increasing the general public's engagement with STEM and its importance in society. The team running this project used an approach that capitalised on the successful partnership between EPI*STEM (University of Limerick) and Johnson and Johnson – the WiSTEM²D Programme (https://www.ul.ie/news-centre/news/more-female-role-models-needed-in-stem), which empowers females studying STEM at third level by increasing their STEM networks, connecting them to STEM industry role models and debating gender stereotypes in STEM.

What is the purpose of STEMChAT and why do we need projects like this?

STEMChAT aims to develop innovative approaches to address the serious under-representation of women in the STEM workforce in Ireland. The Irish central statistics office (CSO) estimates that fewer than 25% of STEM workers are female, which represents an unacceptable waste of Ireland's talent pool. The gender gap problem is often portrayed as a leaky pipeline, with low female participation in second-level STEM subjects leading to similarly low participation rates in third level STEM programmes preparing graduates for STEM-related careers. By creating new, engaging approaches to providing career information for school students and parents, STEMChAT aims to address barriers to STEM careers experienced by females that were identified in the 2016 report on STEM Education in the Irish School System:

- Negative stereotypes of STEM subjects and careers;
- Parents lacking information about STEM Career options;
- Poor quality, fragmented information about STEM careers;
- Lack of connection between industry's skills needs and students' school subject choices.

The EPI*STEM team involved in this project targeted post-primary schools and community settings in the Limerick, Tipperary, Clare and Kerry areas, inviting various schools and community-based educational centres to take part. During 2019/2020, the project team recruited female undergraduate STEM Champions and industry mentors who, together with EPI*STEM team members, facilitated informal, small-group workshops with school students.

How to use this resource pack

This resource package has been developed so that the essence of the STEMChAT project can be replicated and implemented with post-primary school students, to inform them about STEM Education, STEM Careers and the gender balance issues that exist with regards to STEM. This resource package includes a lesson plan and resources to aid the teacher in implementing STEMChAT with a group of students. The lesson plan and resources cover the following:

- What is STEM;
- STEM in schools;
- STEM subjects and careers;
- Gender stereotypes in STEM;
- STEM Higher Education courses.

We advise implementing the session with 2 teachers in a classroom setting in order to facilitate valuable discussions where learning can take place for all students. This resource pack also includes a Frequently Asked Questions section which addresses the questions most commonly asked by students during STEMChAT sessions, as well as the profiles of Johnson & Johnson industry professionals and EPI*STEM STEM experts.

Lesson Plan STEMChAT

Duration: 60/80 minutes
Class Group: 2nd – 5th Year students
Subject: STEMChAT
Topic: STEM Education, STEM careers, Gender Equality and Issues in STEM.

Previous Knowledge and Experience

Over the past number of years, students may have become aware of the gender equality issue that is present in today's society. This lesson aids in informing students in their development and awareness in the topics of STEM Education, STEM Careers and the gender equality and balance issue in the STEM workforce. Students may have experience with STEM Subjects in their school subject curriculums. Students may have first-hand experience with gender-inequality or finding information about STEM Education and careers.

Aim(s) & Objectives:

Aim: To inform the students about STEM education and careers and Gender Equality issues in STEM.

Objectives *{1=Behavioural/Cognitive 2= Psychomotor 3= Affective}*

Objective 1 **Mental Skills** Explain + State + Identify i. Explain what STEM is. ii. Explain what gender balance is and identify examples of issues relating to this. **iii.** State STEM careers and subjects giving examples students will be familiar with.	**Objective 2** **Manual /Physical Skills** Applying i. Participating in class discussions. ii. Relating material to real life. iii. Activities in pairs and as whole class iv. Analysing own thoughts around gender equality and stereotypes.	**Objective 3** **Feeling/Emotions** Motivate + Understand i. Appreciate how important the issue is and the knock-on effect it has on society and the economy. ii. Understand the various subjects and career pathways open to students. iii. Understand how we can aid in changing the Gender Imbalance. iv. Reflecting on thoughts and experiences in STEM to date and in this lesson.
Objective 4: **Problem solving** Teacher-led discussion in solving: I. How can we make small changes as students and teachers?	**Objective 5:** **Differentiation** Goals are to: I. Ensure all students are catered for II. Ensure the lesson is as visual and concrete as possible	

II. Can we identify our own interests in STEM and what STEM is about?	III. All levels of student ability is challenged	

Goals for this lesson

- Students will complete activities around gender equality and balance in STEM.
- Students will engage in discussion about STEM and their thoughts and opinions around STEM.
- Students will build an understanding about STEM careers and college courses.

Subject Matter

- This lesson will focus on developing the students' STEM career knowledge, knowledge around STEM in education and gender inequality issues in STEM.

Time	Student Activity	Teacher Activity	Key Questions/Instructions
5 minutes	***Introduction*** Pay attention Students have pen/paper	***Introduction*** Call Roll Overview of lesson Write goals on the board	***Introduction***
5 minutes	Students suggest what they think STEM is.	Invite students to share their thoughts about what STEM is.	What is STEM?
10 minutes	Students complete Icebreaker on gender traits in pairs/threes.	Put students into pairs/threes and explain matching activity of gender traits	
	Students engage in whole class discussion on gender traits and why matching took place.	Asking Questions. Aiding in student knowledge development of gender traits and students' thoughts.	*Post activity* – how did everyone find that? Why match certain words with male or female? What is the overlap/why?
5 minutes	**Development** Students get into groups of 4/5.	**Development** Puts students in groups of 4/5.	**Development**
	In their group, students discuss what STEM in school means and identify as many STEM school subjects as they can.	Asks each group to discuss what STEM in school includes; how many STEM school subjects can each group identify? Circulates during group discussion.	What school subjects are STEM subjects? How many STEM subjects are offered in this school? How many STEM subjects does each student study? What subjects is each student interested in?
5 minutes	Students share their group's discussion if called upon.		

7 minutes	Pays attention to PowerPoint and ask questions if need clarity, in particular in relation to STEM subjects for the Leaving Certificate.	Calls on different groups to share what they discussed, how many subjects identified, etc.	
	Students suggest STEM Careers	Displays list of STEM school subjects on PowerPoint; were all subjects identified in the group discussion?	
5 minutes	Listen to teacher talking about industry professionals and STEM experts.	Outlines some school STEM projects that run in Ireland. Answers any questions students may have about choosing STEM subjects for Leaving Certificate.	
8 minutes	Ask questions about opportunities and careers they are interested in.	Asks students what STEM Careers they know of – writes suggestions on the board.	What industry professionals and academics do daily in work
	Students watch video and engage in discussion as whole class on how these stereotypes are formed.	Talks to students about the Johnson & Johnson industry professionals and University of Limerick STEM experts.	Use of online links
		Answers students' questions about what to do/where to get information about STEM Careers.	Have you ever heard someone use the expression 'like a girl'? If you hear that expression, does it sound positive or negative?
5 minutes		Play gender stereotype video. Leads whole class discussion on how gender traits and stereotypes are formed. *TV, Media, attitudes, old-fashioned ideas, influences, society.*	Do you think a particular gender has certain traits? Why/why not? Have you experienced or witnessed gender stereotyping? What is stereotyping? How did it make you feel? Where do you think gender stereotypes

7 minutes			comes from? Where might they exist? Are gender stereotypes changing? Think about your grandparents' time. What can we do about gender stereotyping?
5 minutes	Students pay attention to the instructions.	Explain card game about careers – split students into groups of 4/5 and hand out cards.	
8 minutes	Students play the traits game in their groups.	Monitor class Help students Ensuring all team members are contributing – encouraging. Give them tips/guidance	Students are developing their thoughts and knowledge around gender equality and experiences in STEM.
5 minutes	Students share their thoughts and the answers they provided in groups to the teacher.	Teacher writes each group's answers and ideas on the whiteboard for entire class.	
	Students provide answers and engage in class discussion on why we think and have these ideas around STEM Stereotypes.	Teacher leads discussion on STEM stereotypes: What do the students think of when they hear STEM?	
	Students look at the images and think about who they would sit next to. Raise their hand for passenger they would most likely sit next to. Explain their choice.	Bus activity – display images of passengers and ask for students to raise their hands for the passenger they would be most likely to sit next to on a bus. Why did they choose to sit beside someone? Why would they not choose to sit beside someone?	
	Students follow teacher's instructions on the unconscious thoughts activity and complete	Discuss what unconscious thoughts are. Introduce next activity on unconscious thoughts.	

	this as a whole class while discussing their ideas on each. Students discuss gender equality and in pairs list one or two questions they would love to ask someone in college or industry if they had the opportunity.	Teacher asks about answers students are providing. Discuss the effect of bias flowing from the unconscious thoughts. Explain what gender equality is and how important it is. Teacher shares students' questions on board they would ask industry professional or student in college. Provide resources and links for students for more information on college courses and the FAQ with the resource package for common questions answered.	
2 minutes	**Conclusion** Students complete reflection exercise where they write down one thing they learned about STEM in the lesson.	**Conclusion** Explain reflection activity – each student individually writes down one thing they learned about STEM in the lesson. Organise clean up.	**Conclusion**

		Thank students for their engagement in the class.	

Resources:

PowerPoint, Projector, visual images, whiteboard, markers, resource cards, sheets of blank paper.

Assessment:

Cognitive:	***Psychomotor:***	***Affective:***
Ability to recap and quality of answers. Ability to link their interests and STEM and analyse people's attitudes towards STEM and how things are changing for the better with gender equality.	Interaction with material Class Discussions throughout.	Observing and monitoring students' progress throughout. Ability to link topic to real-life examples. Students' attitudes & interest towards lesson. Reflecting on their self-development post-lesson – what have I learned?

Mixed Ability Considerations

- Varying questioning to different students
- Scaffold answers if a student is having difficulty answering
- Challenge stronger pupils
- Have extra questions in reserve
- Ensure to have extra ways of explaining for those have difficulty understanding, for example have a real life example for clarity
- Ensure students are not losing concentration and are engaged by introducing new material and activities as planned in slide show.

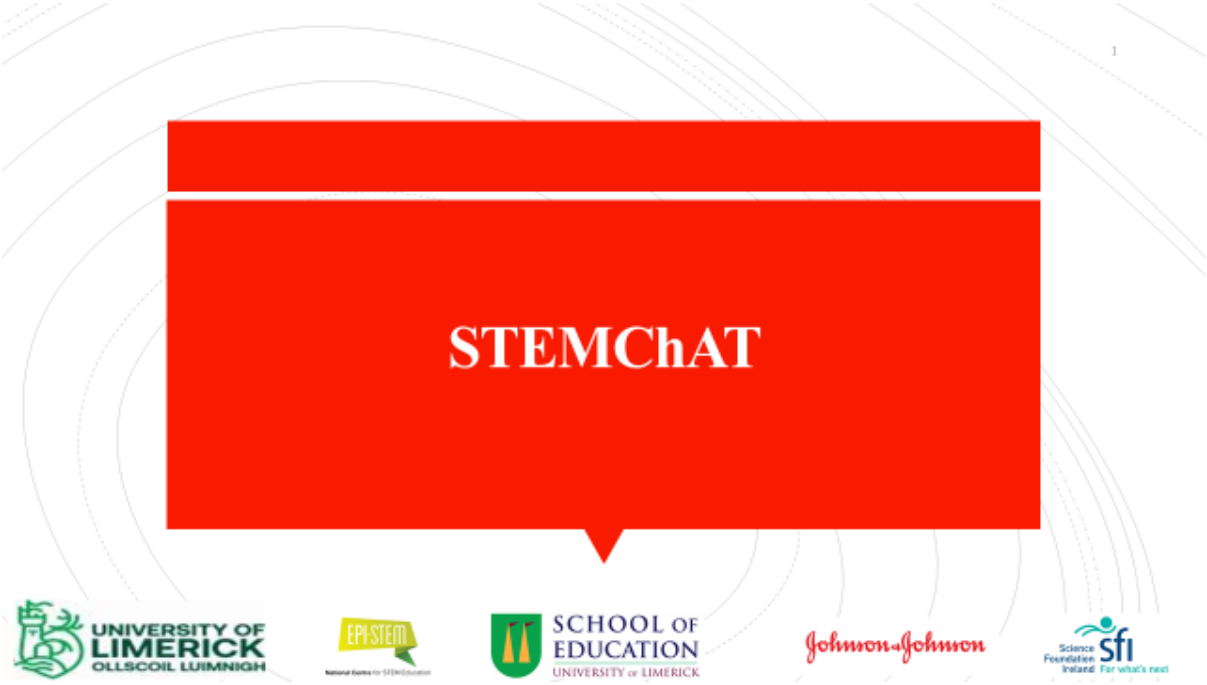
Health and Safety

- There is no real issue with health and safety here as the class is a discussion class happening in a normal basic classroom.

Possible Key Questions:

- Do I need Maths to do a STEM Course in college?
- What subjects should I do to get into college?
- Is college expensive?

Slides accompany Lesson Plan:




What is STEM?
STEM stands for Science, Technology, Engineering and Mathematics
Everyday in society/ school/ home life – we see STEM
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OLLSCOIL LUIMNIGH
EPI-STEM
SCHOOL OF EDUCATION
UNIVERSITY OF LIMERICK
Johnson & Johnson
Science Foundation Ireland
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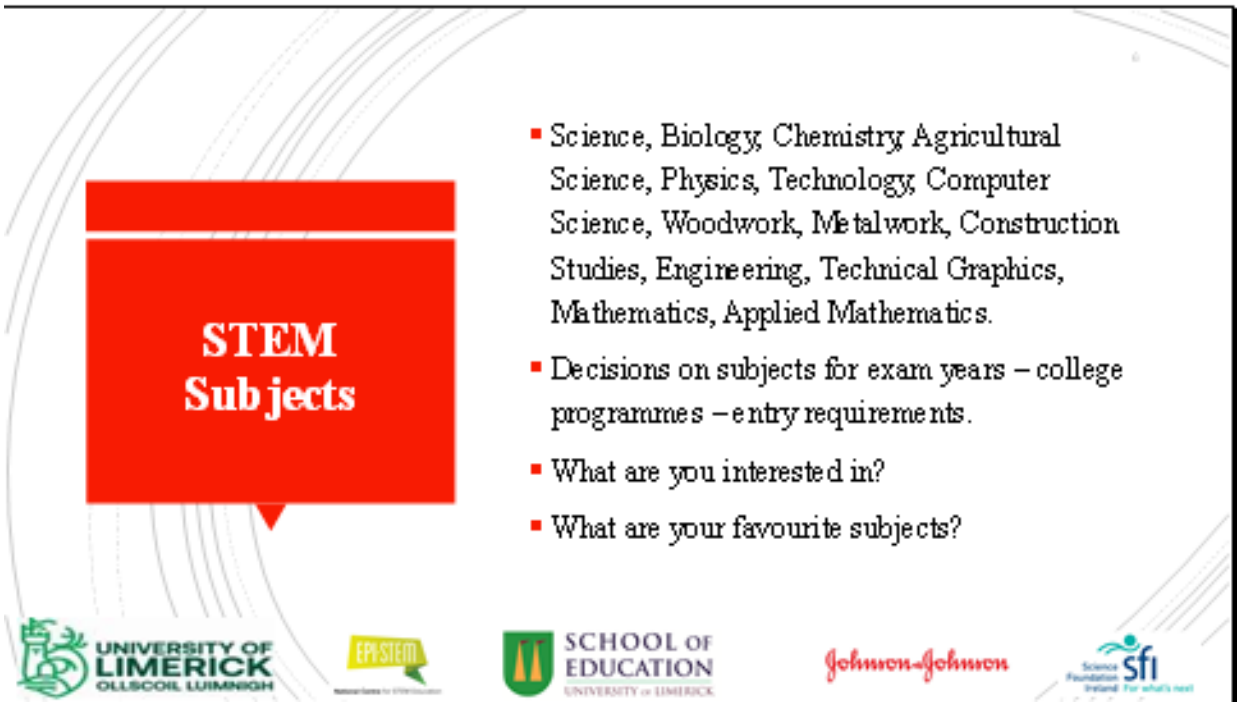
STEM Subjects
Science, Biology, Chemistry, Agricultural Science, Physics, Technology, Computer Science, Woodwork, Metalwork, Construction Studies, Engineering, Technical Graphics, Mathematics, Applied Mathematics.
Decisions on subjects for exam years – college programmes – entry requirements.
What are you interested in?
What are your favourite subjects?
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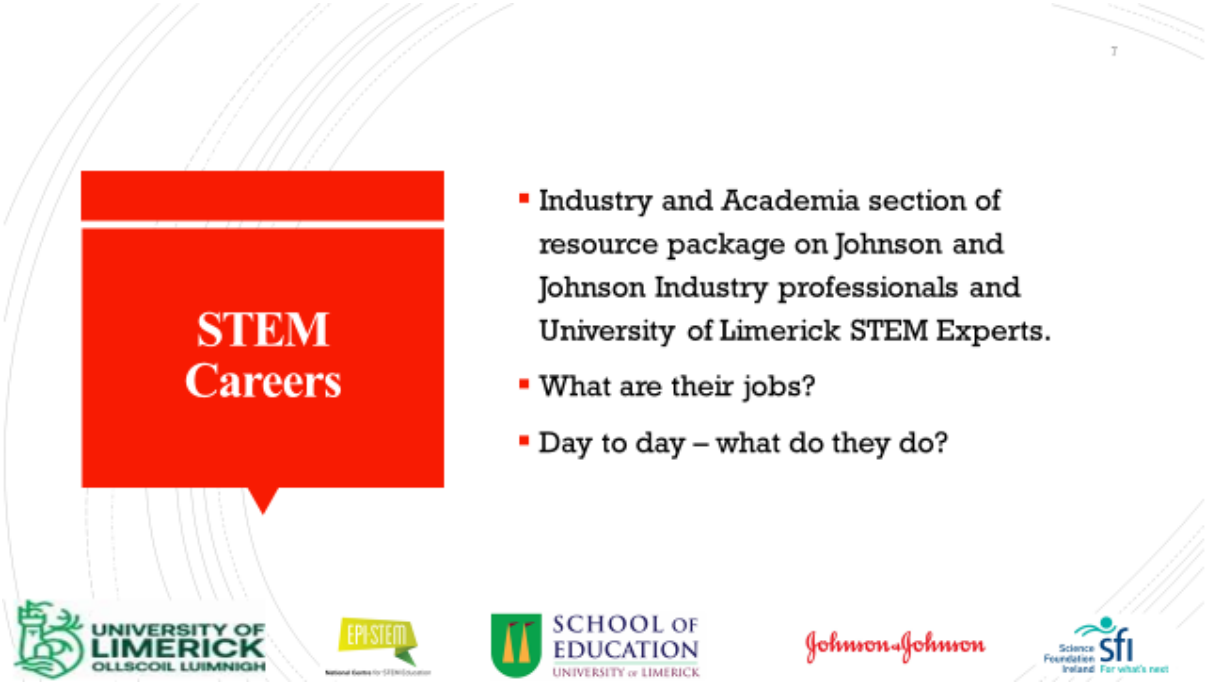
STEM Careers
Industry and Academia section of resource package on Johnson and Johnson Industry professionals and University of Limerick STEM Experts.
What are their jobs?
Day to day – what do they do?
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For what's next


Gender Stereotypes
Video Link: #Likeagirl Link
https://www.youtube.com/watch?v=XjJQBjWYDTs
Discussion:
How are gender traits and stereotypes formed?
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For what's next

Video Link: #Likeagirl Link

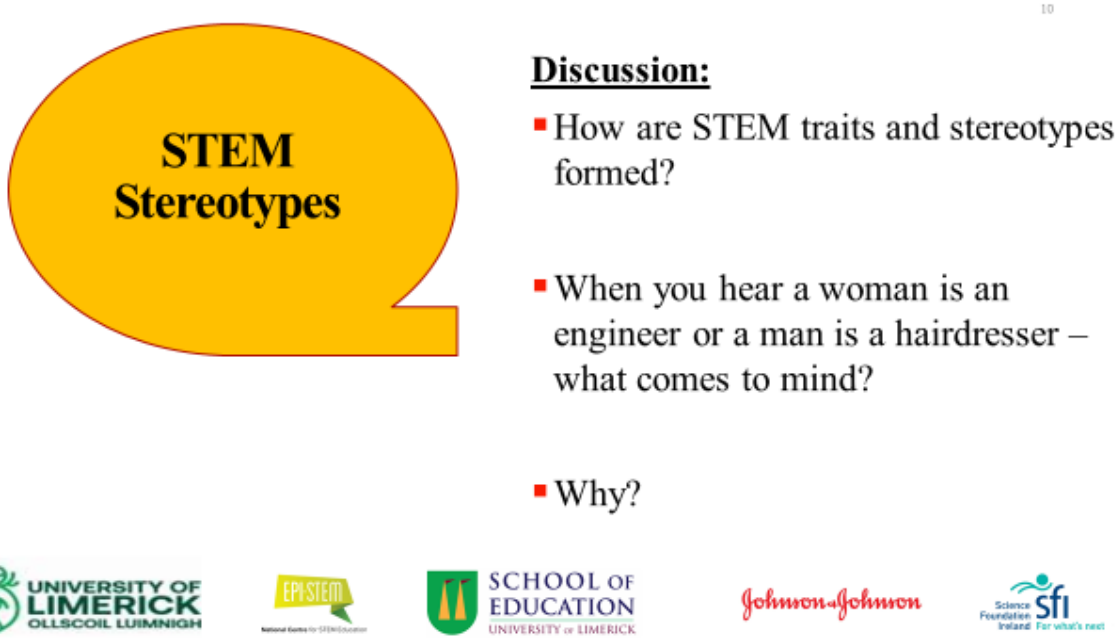
https://www.youtube.com/watch?v=XjJQBjWYDTs

Discussion:

How are gender traits and stereotypes formed?

Card Game Steps

- Select a card with a career. Do not show your card to your table.
- Select 4 words to describe the type of person who does this job.
- In your groups, read your words out loud and each group member has to guess the career.
- Write the words used for each career on the whiteboards.
- What words were used most often for each career?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STEM Stereotypes
Discussion:
How are STEM traits and stereotypes formed?
When you hear a woman is an engineer or a man is a hairdresser – what comes to mind?
Why?


Who would you choose to sit beside on the bus? Why?
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Who would you automatically assume is driving the bus? Why
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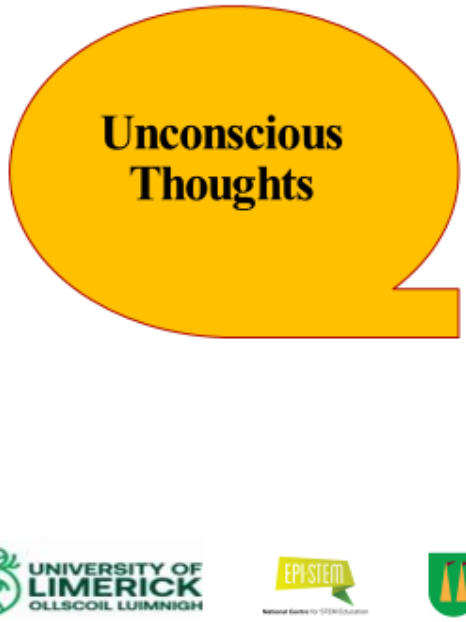
STEM College Courses
Where to get information?
FAQ Outlined at the back of resource package.
Web links
Ask for information – those in college or jobs you are interested in!


Unconscious Thoughts
We often sort people into groups very quickly based on stereotypes.
Our unconscious thoughts happen much quicker than our conscious ones (About 250 milliseconds before our conscious processes).
System 1: Fast thinking (automatic)
System 2: Slow thinking (reasoned)
Lets test your fast thinking. Choose whether you associate each word with (i) male or (ii) female.


John


Mary


Family


Career


Wedding


Office


Plumber

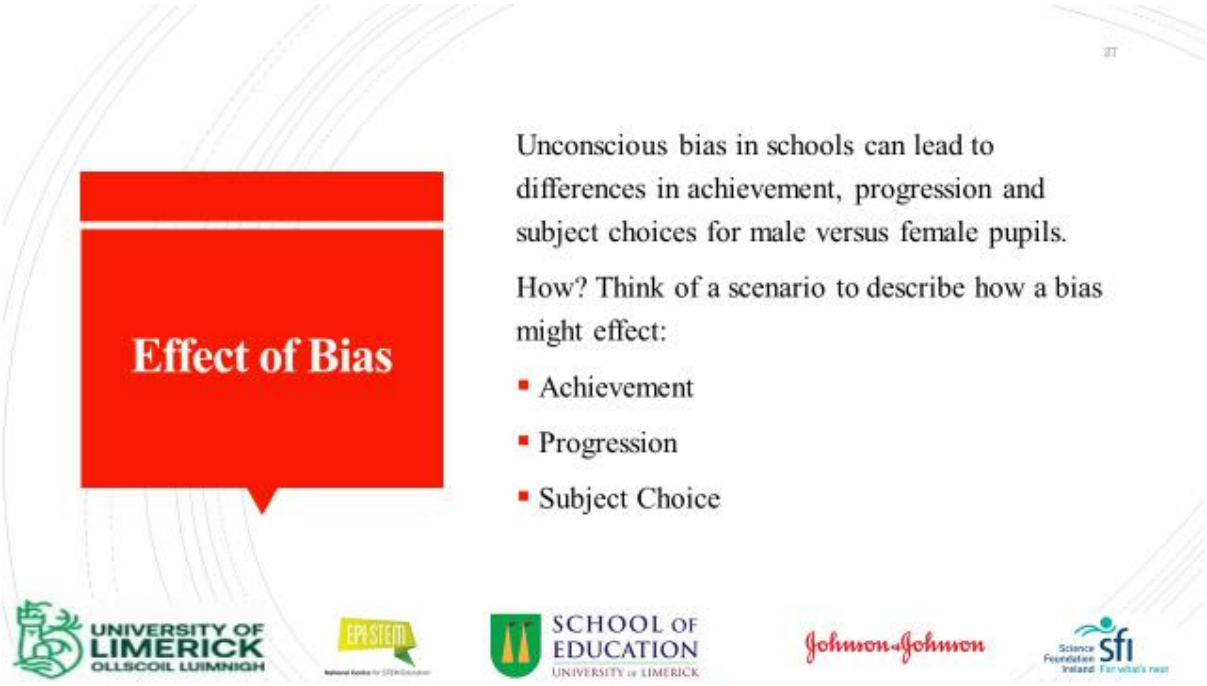

Doctor


Hairdresser


Mechanic


Surgeon


Beautician


Effect of Bias
Unconscious bias in schools can lead to differences in achievement, progression and subject choices for male versus female pupils.
How? Think of a scenario to describe how a bias might effect:
Achievement
Progression
Subject Choice
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Johnson & Johnson
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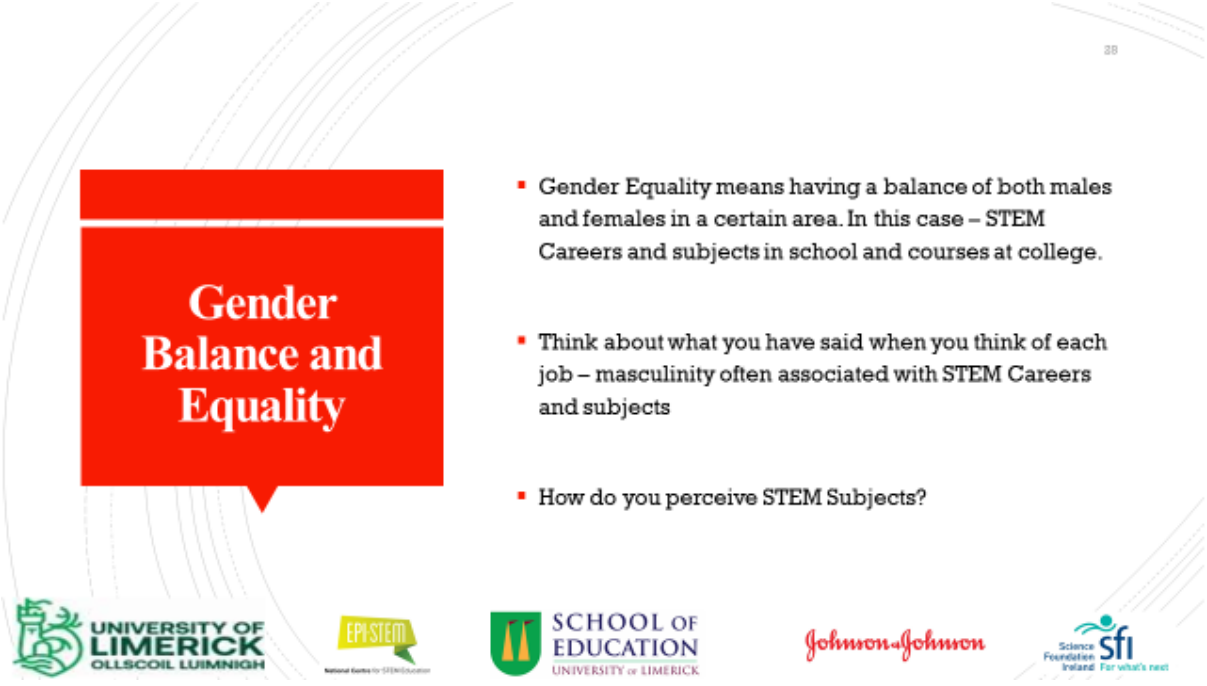
Gender Balance and Equality
Gender Equality means having a balance of both males and females in a certain area. In this case – STEM Careers and subjects in school and courses at college.
Think about what you have said when you think of each job – masculinity often associated with STEM Careers and subjects
How do you perceive STEM Subjects?
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In pairs:
Activity
If you had the opportunity to ask a college student studying in STEM or an industry professional who works in STEM everyday, what would you ask them?
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Reflection
Write down one thing you learned bout STEM today.
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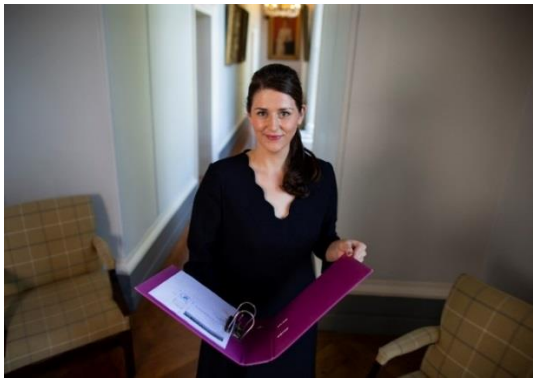
Academia Profiles:



Dr Regina Kelly

Dr Regina Kelly is a Lecturer of Science Education in the School of Education at the University of Limerick

I am responsible for teaching science pedagogy to students studying to become science teachers. I also supervise students on school placements, supervise research projects, engage in research in science education and source funds to support my research.

I am passionate about fostering and inspiring excellence in science teaching and learning because I believe every student can understand science in a positive learning environment. My interest in science began outside of the classroom. I grew up on a farm so I had many questions: Why is the milk that comes out of a cow warm? What makes dogs' eyes glow at night when a flashlight shines on them? I wanted to understand the natural world around me rather than ask 'big' questions. This interest in wanting to understand questions about how things worked led me to study Physics at Leaving Certificate level. My interest then moved more towards science education as I wanted to learn how to teach students' about scientific concepts and the relevance of them in their lives. I completed a Bachelor of Science (Education) and then obtained a PhD in Physics Education. I then worked as a Science Project Officer and completed a Postdoctoral Fellowship in Science Education. I always had a great interest in trying to simplify science ideas and enjoy the creative aspect of designing classroom tasks that help students to explore, inquire and connect science ideas.

My goal for the future is to create a culture of accessibility in the sciences by continuing my research into the best practices for inclusive teaching, promoting participation in science and supporting student learning of science. I believe working with science teachers is central to achieving this goal.

Professor Merrilyn Goos

*Professor Merrilyn Goos Chair of STEM Education and Director of EPI*STEM – the National Centre for STEM Education at the University of Limerick*

As Director of EPI*STEM I am responsible for leading an integrated program of research, teaching, and engagement that addresses national and international challenges in STEM education.

I had no idea what I wanted to be when I finished school, but I was reasonably sure that I didn't want to be a teacher. I did want to go to university and keep studying the subjects I had loved at school – mathematics, chemistry, and physics. Because it was rare then for girls to study in areas like engineering that were very male-dominated, I enrolled in a Bachelor of Science degree. When I graduated, I found a job as a food technologist working in Research and Development for a large dairy processing company. But after a few years I realised I wasn't learning anything new, so I left with no plans as to what to do next. A friend then offered me a part-time job teaching food technology in a technical college, where my students were apprentice bakers and chefs. I was astonished to discover that I enjoyed teaching! So I went back to university to qualify as a secondary school teacher of mathematics and chemistry. It had taken me ten years to realise I was *meant* to be a teacher.

But still, my mind was full of questions and curiosity. For example, I wanted to know why some students struggled when faced with complex or unfamiliar problems in mathematics, while others just seemed to know what to do, even if they had never seen that kind of problem before. My wonderings led me back to university again for a Master's degree in education. I was fortunate enough to win a scholarship that allowed me to study full-time, and also to do some teaching at the university. There I discovered the fascinating world of research, which seemed like it might be able to feed my mind in ways that no other job had been able to do. To me, research is the ultimate in learning, because you're making new knowledge, not just consuming knowledge already made by others. I then won another scholarship to help me complete a Doctor of Philosophy degree, which is the qualification you need to become a university academic. When I became a teacher educator it felt like I had come full circle – moving from being a student, to a teacher, to a teacher of teachers. Yet in all of those stages of my life, I was – and still am – a learner. As you can see from my chequered history, it's rare for people to stay in the one career for their whole lives. I see life as an adventure that offers many opportunities and challenges, so the directions you take in life are hard to predict in advance. The most valuable thing to be gained from schooling is not subject knowledge alone, but the desire to keep learning, to keep your mind alive, so you'll be able to recognise and take advantage of all the opportunities and challenges that life has to offer.

Industry Profiles:

DePuy Ireland Unlimited Company

Name: Eveleen Clancy

Job title: Graduate Engineer – New Product Introduction

Courses/training completed: Engineers Ireland CPD Course

College course completed: Bachelor of Engineering in Biomedical Engineering (Hons), Cork Institute of Technology.

Interests/hobbies: One of my main interests outside of work is food – I love cooking, baking and experimenting with new foods and new flavours. I love travelling to new places around the world and trying their cuisine as well as exploring the country/ culture. I am also very interested in road running, music and socialising.

What is involved in your day-today job: I work in New Product Introduction in Depuy Synthes on the shoulder product portfolio. Working in this function means that we work between R&D teams and manufacturing teams to ensure that the product that is designed can be manufactured as efficiently as possible using the equipment and processes that we have specified and developed. Within this team, I am involved with the porous coating process, which allows bone to affix biologically into the porous coating post implantation. I am helping to develop fixtures, procedures and test methods to ensure the coating we apply meets the required specification. I am also involved in verification and validation activities to demonstrate and document that the processes, procedures and test methods we use in this process are effective.

Extra-curricular activities you are involved in: Since I started working with Depuy Synthes, I have taken the opportunity to get involved with as many extra-curricular activities as possible. One such initiative is the STEM (Science, Technology, Engineering and Mathematics) Academy, where we visit primary school students and teach them about 3D printing, 3D scanning and what a career in STEM may look like. I am also involved with our Women Leadership and Inclusion group which promotes women in leadership in STEM and organises various networking events for women on site. I am also part of the DePuy Synthes organising committee for the iWish 2020 event that will be held in Cork City Hall in Q1, 2020. This event enables Transition Year students to explore various career options in STEM and invites students to talk to those who are currently working in STEM activities.

What motivated you to follow a STEM Course and/or career: I always had a keen interest in maths, science and how things work. I initially thought a career in the healthcare sector would suit me best, and I considered medicine and physiotherapy as options. However, I was afraid I would not spend very much time using maths and physics (my two favourite subjects) in these careers. It was nothing short of a lightbulb moment the night I found Biomedical Engineering – it incorporated my love of maths and physics with my interest in the healthcare sector.

EMEA Development Centre

Name: Michelle Finnan

Job title: Senior Software Development Manager

Courses/training completed:
- SAP 4.6 MM Application Consultant Certification
- ITIL Version 3 Foundation Certification
- Certified Scrum Master

College course completed: Bachelor of Business Studies (BBS), University of Limerick

Interests/hobbies: Reading and Reformer Pilates

What is involved in your day-to-day job:
- Defining and setting the strategic direction for the EDC software development teams.
- Lead collaboration with Program Managers and Product Development Managers to identify skill sets and resource needs to deliver our SAP Software Products.
- Design and create a learning environment and encourage meaningful growth by empowering development team members to take ownership for their own progress.
- Create and optimises teams to align EDC capacity and capability to demand.
- Facilitate and manage talent and career development of core development team members.
- Responsible for conducting an iterative approach to performance management.
- Lead development teams to enhance delivery processes, ensuring continuous learning, exchange of ideas, information and knowledge.
- Lead common practices through facilitating and encouraging community workshops.
- Lead the creation of a scalable structure and environment by building and fostering a network around collaborative teams and motivated people.
- Collaborate with teams to identify any knowledge and skills gaps and build strategies to take action.
- Identifying and recommending new approaches to AGILE best practices to ensure we drive autonomy, mastery and purpose.
- Lead the main EDC SAP software development service lines.

Extra-curricular activities you are involved in: I am heavily involved in the administration of the Johnson & Johnson UL WiSTEM2D Awards Program in the University of Limerick. The program is open to 2nd & 3rd year female students in STEM disciplines, and offers financial assistance, mentorship by J&J employees, J&J site visitors and networking opportunities. The program is in its 4th year and I have been a part of the mentoring program from the outset.

What motivated you to follow a STEM Course and/or career: In secondary school I was encouraged to take accountancy and business organisation as subjects for the leaving cert. I went on to do a Business Studies degree in UL and my first job was as an Accounts Payable assistant in a start-up software development company called Visio International in Dublin. I quickly moved from Accounts Payable into Accounts Receivable with a bit of Treasury Management thrown in for good measure! I started studying for my ACCA qualifications in the evenings and at weekends. I found this very tough as I never really liked accounting if I am honest. During this time the company I was working for decided to implement a new ERP system called SAP. As a user of the existing accounting system, I had to work closely with the SAP consultants working on the project to define requirements, input to the new system design, test it, document it and train my colleagues on how to use it. I loved it and when I realised I could make a career out of it I decided this was the direction I wanted my career to take. Finance was out and IT was in!

I spent a number of years in different SAP ERP application development related roles: support, business analyst and project management. I decided I wanted to learn more about IT Service Delivery to give me a more rounded view of end to end IT project delivery and so I made the move to IT Service Delivery. I worked in that area for 6 years and learned a lot about IT infrastructure and how the “business as usual” resolver groups supported the SAP projects that I had previously worked on and handed over to them. Again the experience I had gained working in various SAP application development roles really stood to me when I made the move to Service Delivery. Later, an opportunity presented itself in the form of a new SAP Software Development Centre that was opening in Limerick in January 2015. I’m from Limerick so I decided to apply. I started out as an SAP Business Analyst before taking on a role as a Scrum Master. From there I took on a SAP Portfolio Manager role before finally becoming a Senior Software Development Manager.

Janssen Sciences Ireland

Name: Christine O'Carroll Ph.D.

Job title: Scientist, BioTherapeutics Development (BioTD), Analytical Development
College course(s) completed:
Ph.D. Biochemistry, University College Cork
BSc. Biomedical Sciences, University College Cork

Interests/hobbies:
I am a huge sports fan with particular interest in Kerry GAA and Munster Rugby. Outside of sports I enjoy cooking and getting outdoors hiking and trekking at all times of the year.

What is involved in your day-to-day job: My current day to day role is as a Scientist in the analytical development department within Janssen Sciences Ireland. Here we support the development and testing of new drugs that are going through clinical trials ensuring their quality, safety and efficacy is to the forefront as they go through clinical phases (Phase I - III).
More specifically, I am a bioassay technical specialist that supports the laboratory scientists execute routine testing of samples that are manufactured at Janssen. I provide technical support when issues arise with instrumentation, scientific methods that we use to test drugs, in addition to supporting the general running of the laboratory environment ranging from reagent ordering to general safety practices.

I also work as a Stability Lead for a number of products in our Clinical Portfolio. This role is heavily project management focused. Some of the key day to day I activities that I am involved in include data collation, performing statistical analysis on the sample results that are tested in our labs to ensure their they are stable throughout prior to their expiration. In addition, I must present my work regularly at various management and portfolio meetings to provide program updates to meet project goals & timelines. My role involves working with several different departments at Janssen in Cork in addition to collaborating with colleagues in Europe and the US within multidisciplinary teams such as manufacturing operations, quality and regulatory affairs.

Extra-curricular activities you are involved in: In addition to my day to day job, I am heavily involved in WiSTEM initiatives and Mentoring Programmes with the local universities. As part of these programmes I support students who have an interest in pursuing a career in research & industry and provide guidance on career direction, CV and interview skills.

What motivated you to follow a STEM Course and/or career: My favourite subjects in school always had been the STEM subjects. I was not good at languages or any other core subject however Maths, Chemistry and Biology always sparked an interest. As a transition year student I completed work experience in the hospital labs. It was my real first exposure of the work a Scientist could do in the "real world". The relevance it had to patients and working in a hospital environment really resonated with me and it was this that was the real driver for pursuing a Science degree (specifically Biomedical Sciences).

Janssen Pharmaceutical Sciences Unlimited Company

Name: Sandra Smith

Job title: Quality Control Analyst

College course(s) completed: Bachelor of Sciences (Honours) in Pharmaceutical Biotechnology from Cork Institute of Technology as well as a master's degree in Pharmaceutical business and technology from Griffith College Dublin.

Interest/ hobbies: I enjoy travelling, listening to music, reading and watching movies.

What is involved in your day-to-day job: I am responsible for performing various scientific analyses to evaluate the quality of raw materials, intermediates, and finished goods and ensure compliance with established standards. Also partake in project to improve the reliability and efficiency of the quality control Lab.

What motivated you to follow a STEM Course and/or career: As a child I always knew I wanted a career where I could help others or change the world for the better. When the time came to decide what career path I would follow, I knew the field of study I was most interested in was biology. I enjoyed biology and of all the subjects I studied in secondary school I was most excited in biology class. I did a lot of research and found out that there were so many courses out there and the career prospect was endless. I spoke to my career guidance counsellor about my choices and surprisingly was very encouraging of my decision to study a STEM related course. This motivated me and further fueled my decision to study Pharmaceutical Biotechnology in the Cork Institute of Technology which was an amazing choice.

I graduated from CIT in September, 2016 and started working at Janssen pharmaceutical immediately after till date. The career prospect are endless in the field of STEM. STEM provides a variety of courses which gives a list of options and has an extended list of job opportunities. I would recommend studying a STEM related course because not only do you get to impact other people's live, you also get to transform and make a change in the world we live in either by dealing with patient or client directly or indirectly delivering the best medical or technical support available to achieve a common goal - saving and restoring lives.

Janssen Sciences Ireland Unlimited Company

Name: Siobhán Murphy

Job title: Medical Advisor Haematology

College course(s) completed: BA (Mod) in Natural Sciences and MSc in molecular medicine both from Trinity College Dublin and a PG Dip in Management and Marketing from DIT.

Interests/hobbies: Theatre, music and yoga.

What is involved in your day-today job: My role is to be the scientific and therapy area expert for some of our haematology products. This involves keeping up to date with all the clinical and scientific data for our products as well as our competitors. I do this by attending international congresses, medical education meetings, talking to our health care professionals (HCPS) and of course a lot of reading. My job is to then feed this knowledge and any insights I gain back into the business as well as training the sales and marketing teams. Another very important part of the job is interact with HCPs working in myeloma to educate them on our products (those that are on the market as well as those in our pipeline) and to work with expert consultant haematologists in setting up investigator initiated studies (these are small local clinical trials), establishing compassionate access programmes where necessary and responding to any query's they may have on our products. I am also responsible for the development of the haematology medical education plan for the year, this involves some event management skills to set up various meetings and events throughout the year.

Extra-curricular activities you are involved in: I'm a member of a theatre company and play piano.

What motivated you to follow a STEM Course and/or career: Biology and chemistry were my favourite subjects in school, so when it came to choose a college degree science for me was the obvious choice. After I completed my masters I decided that working in lab was not for me so I investigated ways to combine science and business together and joined the pharmaceutical industry. I initially started working as a sales rep working on products for GPs, I then progressed into hospital sales working on more technical products. Working in sales was an excellent way to gain a deep understanding of the pharma industry and how it works as a business. I then decided to pursue a qualification in business and did a post grad diploma in management and marketing in DIT. After this I wanted to incorporate my scientific background and business experience together more and started working in Janssen as a Medical Scientific Liaison Manager. I started as an MSL working in immunology and 5 years later I am now the medical advisor for Haematology. Science opens a wide range of opportunities and career choices in the lab and out!!

Johnson & Johnson Vision

Name: Ciara O'Donovan

Job title: Automation Engineer in JJVC, Contact Lens manufacture.

College course(s) completed: Bachelor of Engineering in Electronic and Computer Engineering in University of Limerick

Interests/hobbies: In my spare time I enjoy playing Badminton with UL, Limerick and I recently got the opportunity to captain the Irish team in an international tournament. My other hobbies include surfing, tag rugby and Gaelic football. I live for my family and they have had a huge influence in my career decisions.

What is involved in your day-today job: My day-to-day job involves me troubleshooting issues in the software and coming up with creative solutions. I also work on large scale projects which involves taking a production line from the design phase and installing it to create lenses to sell to our customers. I mainly work with PLC Programming as well as Robot communication and Human Machine Interfaces as part of my role.

What motivated you to follow a STEM Course and/or career: When I was very young my dad and uncle designed websites for fun and I had a little stool that I sat on in between them while they coded HTML so I always wanted to learn more coding languages.

The second reason was that when I was in secondary school the whole school got fitted with projectors in the classrooms, when there was an issue with these (as there often was I would be called over the intercom to come to the Principal's office. From there I would be sent out to the various classrooms that needed assistance getting them working.

I joined the graduate program in Johnson and Johnson in September 2018. It is a 23 month program and since joining I have received professional development training (Insights Discovery, Time Management, Project Management etc), as well as the training needed to do my day-to-day job. I have also received a mentor as part of this program who helps me get the best out of my career and advises me on how to do this.

As someone who is early in my career I would definitely recommend starting out in a graduate program, it gives you the chance to develop your skills in your chosen area at the same time supporting you through the learning curve by providing help and training.

Cerenovus Neuravi

Name: Mairsíl Claffey

Job title: Director, Clinical Science and Strategy Ischemic Stroke

Courses/training completed: Over the last 28 years of work I have benefited from many training and learning opportunities. In the two years after leaving college with my initial degree I was able, through work sponsored courses, to develop my knowledge of Quality Management. This training included – Lead assessor qualification, Ford courses on Statistical Process control, Corrective and preventative actions and Design control training. I also completed a course in supervisory management. Following that, my career moved into the Medical industry and I attended assorted training programs on biocompatibility, regulations and clinical studies. I also undertook training on "Finance for non-financial management" run by the Irish Management Institute .

College course completed: BSc Polymer Science (hons) graduated 1991; Post grad. diploma Clinical Research (first) graduated 2019.

Interests/hobbies: Reading, yoga, art, walking, sea swimming.

What is involved in your day-today job: I liaise with physicians and colleagues to develop and support design and execution of J&J's Ischemic Stroke focused clinical studies'.

Extra-curricular activities you are involved in: Member of the Plastic Free Kinvara group, campaigning for the reduction of single use plastics. I'm married with two adult children and one child in national school, time with my family and friends is my favourite extra-curricular activity.

What motivated you to follow a STEM Course and/or career: At the time of my choosing the initial college course Ireland was in a deep recession. I hoped to follow a practical career path, with employment prospects, which might offer an opportunity to make a positive difference to the community.

I telephoned the two factories involved in processing plastic in my hometown, and organised visits to them. In one of these, a medical supplier, a production supervisor kindly shared with me a copy of the thesis generated by a work placement student from the college in Athlone. Reading it, I could see the nature of the science involved and found it accessible and interesting.

I brought the polymer course curriculum into my school and consulted with an excellent science teacher there on the employment prospects for that course relative to general science or

engineering degree. In the end, the specialism appealed as I thought it would provide a more direct path to the workplace than reading a more general degree in University. I ascertained, through questions to the college, that the graduates' salaries were, at the time of my entering the course, similar to those of university graduates, and I checked what the employment rate for the Athlone graduates was. The location of the college meant attending was more affordable than living in either Dublin or Galway. These were the factors in my deciding on the specific course I chose.
The industry in which a STEM graduate works determines whether there are career growth opportunities. Early on, I identified I wanted to work in the Medical industry and moved from a Quality Management role in a car parts manufacturer, to a Quality Engineering position, with less reports, in the Medical industry. My career evolved through several companies and from an initial post graduate role as a process engineer into Quality and then, with the release of the EU Medical Device Directive, expanded to include Regulatory Affairs which I thoroughly enjoyed.

In working with smaller Medical Research and Design companies, clinical studies were an important component of the regulatory product approval process, and I became responsible for these. With the support of my previous employer, I pursued, on a part time basis, a post graduate Clinical research diploma in NUIG. The clinical research expertise available through this was a valuable resource for me and informed the clinical strategy I developed for the company I was then working with. The company, Neuravi Ltd., was subsequently acquired by J&J and I am happy to be able to continue my career in this environment.

FAQ – Teachers: Most Common Questions Asked:

STEM Questions

1. *What jobs can you do after completing a STEM Course?*

STEM Courses are broad concerning the opportunities – they are endless! There are many routes you can take and are not stuck in one job forever. There are always opportunities for training and changing areas within STEM Careers. Have a look on the UL Website at the following link: https://www.ul.ie/hr/courses/ courses are broken down in this section with all aspects including job opportunities from each course.

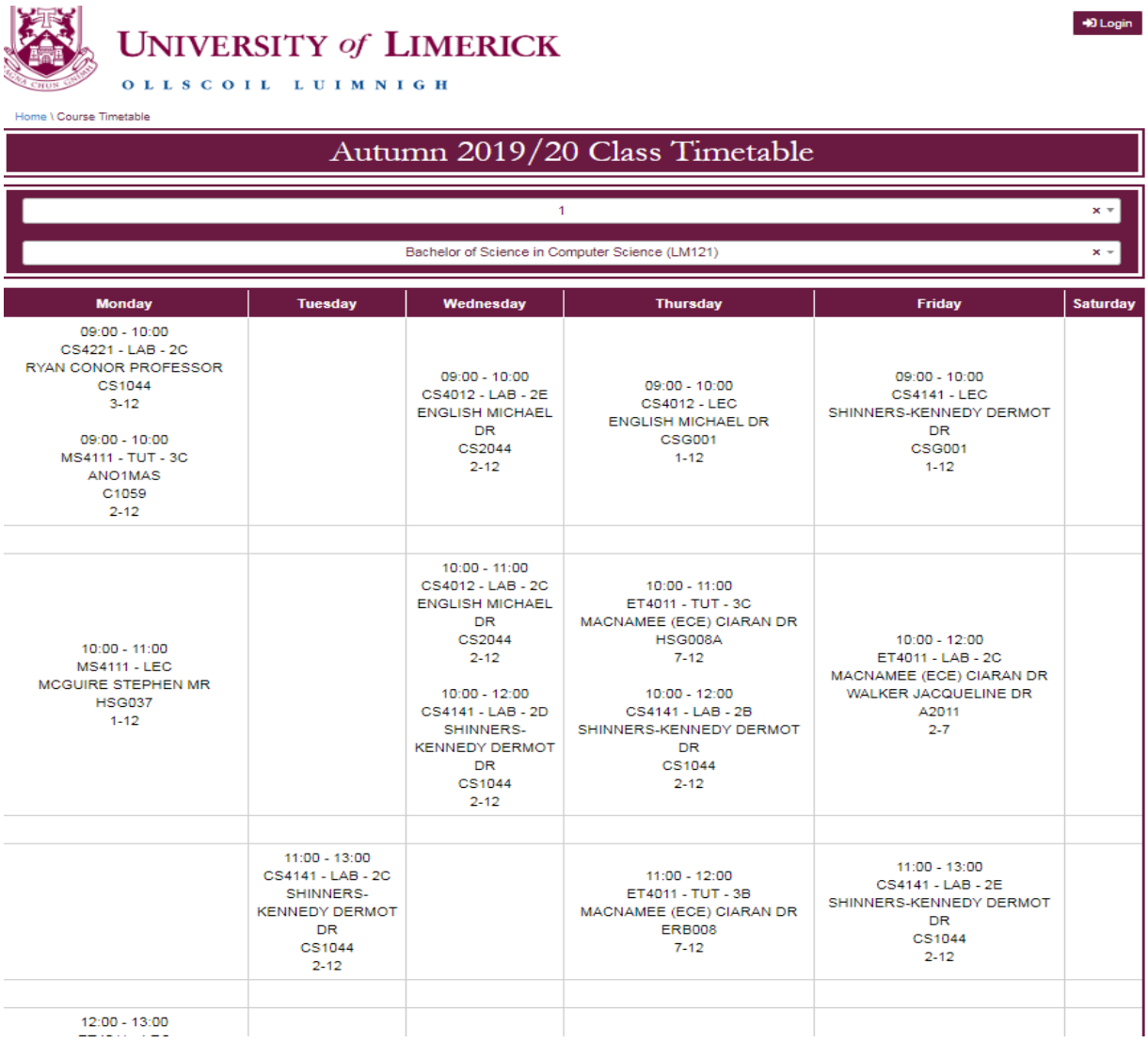
Information on all types of careers can be found by following the link: https://careersportal.ie/

2. *Do I need a language to do a STEM Course?*

In many of the STEM Courses, they look for the following: "Subjects must include Mathematics, Irish or another language, and English." Each course has requirements to enter the course. Look at the UL Courses at the following link and investigate what is needed for each course: https://www.ul.ie/hr/courses/

3. *Do you have many hours in STEM Courses per week?*

Each student's timetable is different. Some courses have 12 hours per week in college time, whereas others have 23 for example. This is an example of a college timetable for a STEM Programme for some of the week:



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Home \ Course Timetable

Autumn 2019/20 Class Timetable

1

Bachelor of Science in Computer Science (LM121)

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
09:00 - 10:00 CS4221 - LAB - 2C RYAN CONOR PROFESSOR CS1044 3-12 09:00 - 10:00 MS4111 - TUT - 3C ANO1MAS C1059 2-12		09:00 - 10:00 CS4012 - LAB - 2E ENGLISH MICHAEL DR CS2044 2-12	09:00 - 10:00 CS4012 - LEC ENGLISH MICHAEL DR CSG001 1-12	09:00 - 10:00 CS4141 - LEC SHINNERS-KENNEDY DERMOT DR CSG001 1-12	
10:00 - 11:00 MS4111 - LEC MCGUIRE STEPHEN MR HSG037 1-12		10:00 - 11:00 CS4012 - LAB - 2C ENGLISH MICHAEL DR CS2044 2-12 10:00 - 12:00 CS4141 - LAB - 2D SHINNERS-KENNEDY DERMOT DR CS1044 2-12	10:00 - 11:00 ET4011 - TUT - 3C MACNAMEE (ECE) CIARAN DR HSG008A 7-12 10:00 - 12:00 CS4141 - LAB - 2B SHINNERS-KENNEDY DERMOT DR CS1044 2-12	10:00 - 12:00 ET4011 - LAB - 2C MACNAMEE (ECE) CIARAN DR WALKER JACQUELINE DR A2011 2-7	
	11:00 - 13:00 CS4141 - LAB - 2C SHINNERS-KENNEDY DERMOT DR CS1044 2-12		11:00 - 12:00 ET4011 - TUT - 3B MACNAMEE (ECE) CIARAN DR ERB008 7-12	11:00 - 13:00 CS4141 - LAB - 2E SHINNERS-KENNEDY DERMOT DR CS1044 2-12	
12:00 - 13:00					

There are hours outside of college for studying, lab reports and assignments where you will need to put some work in.

4. *Do I need higher-level mathematics to do a STEM course?*

Find requirements at the following link for all courses in the University of Limerick: https://www.ul.ie/courses/

5. *Do I need an A1 in higher-level mathematics to do a STEM Course at college?*

It is unlikely many of the STEM Courses would be looking for an A1 in mathematics to complete a STEM Course. It would be advised to have a good level of Mathematics if you are interested in completing a pure Mathematics course. Find requirements at the following link for all courses in the University of Limerick: https://www.ul.ie/courses/

6. *What subjects do I need to do for the Leaving Certificate to do a STEM course?*

Each course has specifications and requirements about what students need to gain a place on the programme, including points. Have a look at courses individually and see what courses you are interested in. If there are a few, have a look at their requirements, discuss with your teachers, and career advisor about subjects' decision for the Leaving certificate. Many students enter STEM Courses with no science subject at leaving certificate for example and learn about this during their time in their college course. It is best to have biology for example if you are interested in Bioscience course.

7. *Will I be the only girl in classes at UL in STEM Programmes?*

There are often courses mixed for modules. For example, Mechanical Engineering 2nd years may be mixed in with Architecture 1st years for a Materials module. There can be male-dominated lectures and few girls in some classes or courses. However, there are many opportunities to meet girls in other STEM Courses and courses in other disciplines through extra-curricular activities.

8. *Is STEM all the subjects together or the individual subjects?*

STEM is Science, Technology, Engineering and Mathematics. At college, you will be in one of these areas but will often learn about all of these subjects in STEM Courses. Have a look at the module breakdown on the courses you are interested in to find out more about the classes you will be studying: https://www.ul.ie/courses/

9. *What is computer science like?*

Find out more about this course at the following link: https://www.ul.ie/courses/computer-science-common-entry

10. *Do you have to be good at maths to do a STEM course?*

No, you do not have to be good at maths to do all STEM Courses. Look at the requirements for courses at the following link: Ask your career advisor about certain courses, you skill-set and your interests. At open days, have a chat with students and lecturers in courses you are interested in and find out about the level of mathematics in the courses you are interested in. Many lecturers will advise having a basic level of mathematics is important to aid with modules.

Higher Education/3rd level/UL Questions

1. *Are there opportunities to go abroad and travel in UL?*

UL offers Placement for students. This can be completed outside of Ireland. There are many opportunities for travelling in UL. There are often seminars and information sessions held regarding J1 Visas, Erasmus travel opportunities and volunteering abroad.

2. *Are there opportunities to do work and go abroad with courses in UL?*

All courses in the University of Limerick involve a co-operative placement. This is work experience for a period – usually 9 months in an area you are interested in from your college course. There are opportunities to do this placement abroad also.

3. *Do I need a language to go to college?*

Each course has certain requirements for students. In order to be offered a place on a course in any institution, students must meet the criteria. Each course is different due to the content being covered. Look on UL Website as an example at the various requirements on the huge array of courses offered. Find information at the following link for all courses offered in the University of Limerick: https://www.ul.ie/courses/

4. *Where do I find information on courses?*

You can find information on courses in UL at the following link: https://www.ul.ie/courses/

For other Higher Education Institutes, you can go directly onto the website and find "Undergraduate Courses". You will find all your information here.

5. *What are the timetables like in college?*

Each timetable is different at college for each course. Have a look at timetables at the following link for examples in each course: https://www.timetable.ul.ie/UA/CourseTimetable.aspx

6. *What happens if you fail a module in college?*

If you fail a module at college, there are opportunities to repeat during the summer. Lecturers and tutors support you during this time. There are repeat exam resources online that you can avail of during your study time.

7. *How do you repeat modules or courses in college?*

There is a repeat process in each Higher Education Institute. You will find more information at the following link for the University of Limerick's Repeat process: https://ulsites.ul.ie/saa/repeat-examinations

8. *Do I need higher-level mathematics to go to college?*

Higher Level Mathematics is not a requirement for all courses in college courses. Have a look at the requirements for the courses you are interested in. this will show if you are required to achieve a particular grade in Mathematics or if you require Higher Level Mathematics to enter the course. https://www.ul.ie/courses/

9. *How do I make friends if I am going to college alone?*

Everybody is in the same boat going to college. Many students are moving out of home and into student accommodation or shared houses for the first time. Colleges have societies and clubs that have people with similar interests and trips away, which make it easier to have circles of friends with similar hobbies or interests. Classes vary in size at college and people make an effort to get to know one another.

10. How will I find places in college?

There are great supports in place in Institutes. In the University of Limerick, students take part in orientation prior to beginning their course. This allows them to learn about the resources, campus and their course along with meeting the others in their course. There is a map online of the campus so if you ever get lost you can always follow. There is always people to help such as the students union, first 7 weeks programme, help desks and the lecturers!

11. Where do I get help and support at college and UL?

There are support centres on campus such as the Maths Learning Centre, the Science Learning Centre, the Writing Centre, IT Centre, clubs and societies, doctor and counselling service. There is a chaplain service on campus also. The library has guides and help desks to aid with resources and books. The UL Student Union is a fantastic place to go and relax as well as getting information on everything. UL runs a First 7 weeks programme to aid students with settling into college, the campus and any issues they may be having.

12. Is college expensive?

There are grants and bursaries offered to aid students in their journey in Higher Education.

Find more information on the following link for the SUSI Grant: https://susi.ie/

13. *Is college difficult?*

College is the most enjoyable time of every student's life. It is a time of growth and development. College takes time and work but with hard work comes results. Talk to people from courses you are interested in at open days to find out more about the students' experience of these courses.

14. *What subjects do I need to do for the Leaving Certificate to get to UL?*

Your career advisor in your school will be able to help you with this. Take subjects you really enjoy and try not to follow friends and their decisions. Look at courses you are interested in and investigate what the requirements are in those courses. From this, it may help you decide what you would like. If you are not sure what you would be interested in doing at college, keep your options open as this will allow you have more time to find information on areas you're interested in pursuing.

15. *What is an apprenticeship?*

An apprenticeship is a system of training a new generation of practitioners of a trade or profession with on-the-job training and often some accompanying study. More information about apprenticeships can be found at the following link: http://www.apprenticeship.ie/en/SitePages/Home.aspx

16. *How do I get student accommodation?*

There are student villages in the University of Limerick where students stay for the semester or year. Student accommodation is usually organised during the summer prior to going to college or returning. There are many areas in Limerick close to the University, Castletroy for example, where there are houses students rent together for the semester or year. More information can be found at the following link for student accommodation details: https://studentliving.ul.ie/index.jsp?p=101&n=116


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