

STEM²D Subjects in Second Level Schools

How could second level schools present a better image of STEM²D to their current students? How can the availability of STEM²D subjects be improved in second level schools?

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Abstract

We investigated how to encourage more second level students to study STEM²D (Science, Technology, Engineering, Mathematics, Manufacturing and Design) subjects, how to make it easier for them to do this and how to increase the availability of such subjects in second level schools.

As part of this project, we have recognised that a buddy programme or even a Q&A session between third level students studying STEM²D courses and secondary school female students interested in studying STEM²D would be very beneficial in encouraging more students to study STEM in college. This finding is backed up by research. For example, Mitchell, 2018 [1], found that mentoring relationships between women empower them and encourage career success by providing relatable experience and help them navigate glass barriers.

We carried out a reflective analysis by examining our own experiences and we found that there are a lot of preconceived ideas or stereotypes of what certain courses or careers are like and that this impacts massively on people's choices when it comes to studying STEM²D, especially for girls. For example, Van Aalderen-Smeets, Walma van der Molen and Xenidou-Dervou, 2018 [2] found that there is a positive relation between implicit STEM²D ability beliefs and the intention to opt for a STEM²D field bachelor's degree.

Given this positive relation, it is concerning that McCoy, Byrne, and O'Connor, 2020 [3], found that in Ireland there remains a notable difference in how competent girls are perceived to be in mathematics compared to perceptions about boy's performance. These perceptions are so strong that

as early as nine years old, girls' mathematical abilities are being underestimated and it is very likely that this will impact on their subsequent mathematical performance and their career choice. To reduce these harmful stereotypes and misinformation, we feel a mentorship program between third level students and second level female students would be very beneficial.

Banks and Barlex, 2020 [1], provides evidence that if schools can present a better image of STEM²D subjects to secondary school students and improve students' own beliefs, especially girls', of their ability in STEM²D, there will be improved participation in STEM²D subjects and careers. In addition, we identified that WISTEM²D societies in secondary schools, similar to the ones in currently in third level institutions, would be beneficial in encouraging students and introducing them to like-minded people.

Our project relates to the conference title of "Bridging Communities to Foster Innovation" as we would like to bridge the gap between third level students and second level students by helping create a mentoring relationship between them.

We would also like to bridge the gap by providing a platform for STEM²D societies in secondary schools, which would encourage collaboration and innovation between secondary school students. Ideally, we would like to see these societies meet at a county and nationwide level several times a school year as well as at a school level to facilitate networking and sharing of ideas.

For a start, the mentoring programme will be focused on secondary level students as they are

closer to making the life changing decision of picking a college course which ultimately decides their future. As for the third level students participating, they will be both intrinsically and extrinsically rewarded. This work could be noted as volunteering and help them enrich their CV with work experience.

The societies will not only connect and introduce the young girls to the mentorship programme but also provide advice and guides for those interested in subjects that are not available in their school. Furthermore, the mentorship programme will offer insights on courses and other aspects of college and college life, as well as someone to look up to. This will lift some of the uncertainties second level female students have relating STEM²D disciplines and help spread the love for science.

In relation to the connecting nature of our work, we are all from different course backgrounds and different parts of Ireland. From Computer Engineers to Chemical Engineers, Media Design and Maths, each member of our team brought in its own input. Even if we all study in University of Limerick we all come from different places (different counties/countries). This was an asset to our research as we all had different experiences and perspectives to draw on. It helped us consider how our suggestions would be received in different types of schools (urban/ rural, single sex/ mixed).

In addition, due to the COVID-19 pandemic we were all required to work virtually. This necessitated considerable adapting on our part and made carrying out our research more difficult in some respects. However, we adapted to this by regularly meeting over Microsoft Teams and communicating through email.

We feel that our research is innovative as a mentorship program between third level and second level students or second level STEM²D societies do not currently exist. Drawing from our personal experience with college societies we can say that being connected to likeminded individuals encourages people to pursue their interests and stimulates innovation, growth, and sense of belonging. From our research, we found

that these initiatives would be highly beneficial for students.

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