2020 cohort

Kate Saunders – Chemistry Teacher

Does teaching STEM careers to Triple Science students increase engagement in STEM careers? Linking lesson content to careers

Introduction

Science is all around us, in understanding the way the world works to developing new technologies and health care. In recent years the UK economy has changed, leading to a technology driven society which has led to a skills shortage across the STEM fields at all levels in the UK[1-3]. It has been estimated that by 2030 over 7 million jobs in the UK will be in science-based industries[4]. Furthermore, participation in STEM has shown to increase upward social mobility and with the increasing advances in science in our daily lives the general public will need to be increasingly science literate if they are to be an active citizen[5-6].

Barriers to Science Careers

Despite these benefits, there is a growing disconnect between how students see science lessons in school and associate them with future aspirations[7]. Students often do not link STEM careers with creativity, innovation, technology or IT skills and often perceive science careers as rather isolated careers without much interaction or collaboration with others[6,8] .

Several key barriers have been identified by studies preventing students from choosing STEM career pathways, these include;

- Limited knowledge of STEM careers and interaction with STEM professional[7,9,10],
- Social inequalities of class, gender, ethnicity and science capital[6,11],
- How science is represented in the media and whether students feel they are 'suited' to science[6],
- Science is only for "clever" people[6]
- Lack of access to Triple sciences at GCSE

Entry for GCSE's and A-level science has increased in recent years[1]. Triple science especially is seen as a fundamental route into STEM careers yet, there is still access problems for the most disadvantaged students[2,12].

This project focuses on whether including career information in science lessons can change the attitude of students towards pursuing a future science career in a medium size academy where 30-40% of each year group are PP students.

Study Design and Intervention

This study introduced STEM career information into our year 10 Triple science lessons for six weeks and observed whether students' altitudes changed over this period. This cohort was chosen as it allowed a control group. This was a mix methods study and students completed a questionnaire at the start and end which was analysed.

The intervention consisted of 2-5 minutes STEM career videos, with a STEM professional discussing their career path and background (https://icould.com). This was shown to one class, the second class, the control group did not receive any additional STEM career information. It should be noted that during the half term of this project, the academy was badly affected by COVID-19 absences and this has likely affected the results of this study.

Results and Discussion

Triple science had previously been offered as an option, after school, this is the first year it has been offered as an integral part of the timetable. Already impacting the number of pupil premium students (PP) opting to take the course from 0% to 12 %, but still not reflecting the average number of PP students per year of 30-40%. What are the perceptions of this cohort of students?

At the start of this study, students were not connecting the impact of science on their daily lives (Figure 1). However, during the study this increased by 21%, with 64% of students believing science affected their daily lives multiple times by the end. With those in the intervention group, showing an increased awareness (Figure 1).

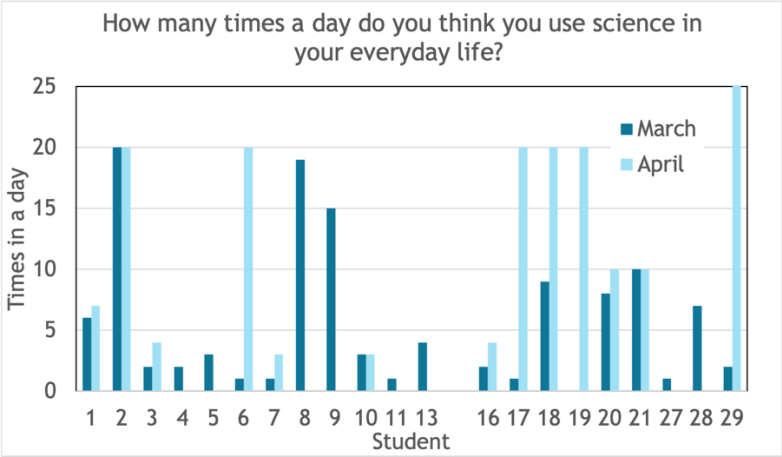

Figure 1. How often does science affect your daily life?

Students consider science is important for a range of reasons including, "*allow us to get a greater understanding of how things work*" or "*a greater understanding of the world*", but few believed it

was essential for a future career. It was notable, post-intervention, that the student's altitudes had changed, the majority still believed science was important, knowledge was still key, but 57%, as increase of 11% considered learning about how the world works was crucial.

Sixty-two percent of this cohort of students are aspiring to a STEM career and this did not change during the project. What was interesting is that by Year 10, these students had a defined career plan in mind. Perhaps the intervention here, was given too late in the student's education to influence their career aspirations and should be aimed at younger students.

To investigate students' perceptions of STEM careers, they were asked to name five (Figure 2) and listed over 40 STEM professionals, the most common being doctor, vet, chemist, biologist and teacher. Post intervention, students still highlighted a similar range of STEM careers. However, what did stand out were that some students in the intervention group, mentioned new careers such as air traffic controller, pilot, engineers, lab scientists, STEM careers they had learnt about in the intervention period. Those who could only name one scientific career at the start, could now name four or five STEM careers showing an increase awareness in STEM careers. Furthermore, during the course of the intervention, students in intervention group recognized that they actually knew more STEM professionals in the community then they believed.

Figure 2. STEM careers as given by Students (https://monkeylearn.com/word-cloud/)

Conclusions

In conclusion, the majority of students here believe science is important for their daily lives, but cannot always recognised the impact science has on their lives or the number of STEM professionals they interact with.

The inclusion of STEM career information in science lessons, did not increase the student's career aspirations, but it did alter some of the student's perceptions on the importance of science in the world around them. Introducing such STEM career information into the lessons did have a positive

effect on some students broadening their perception of how often they use science in their daily lives.

As these students, self-selected to study triple sciences, it could be that the career intervention is too late in these students' education to truly alter their career aspirations at this stage. Earlier placement of such intervention, for example at KS3, may have a greater influence and help to engage more students in the importance of science. Such an intervention may also have a positive impact on the number of PP students opting to take Triple science and moving into a STEM career.

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Websites

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https://monkeylearn.com/word-cloud/