**“If you don’t call it science, how will they know it's science? *and* "How will they recognise its importance in their lives?”**

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**Background**

SouthSci is a participatory science platform in south Auckland under the government's Curious Minds initiative and aims to improve science literacy to prepare students for meeting the needed country's projected STEM workforce (COMET, 2019a). SouthSci funds projects that aim to boost interest in STEM subjects and careers among young people from Year 1 to 13 by enabling them to ask scientific questions that connect to their community and then design and research to answer the questions (COMET, 2019a).

In 2019 various opportunities were provided for schools to delve into scientific projects tailored to the context of their community. In 2019, 10 projects were funded, 600 students and 16 schools participated (COMET, 2019b). The 2019 projects ranged from exploring garden ecosystems, gardening, robotics, technological innovations, water pollution and Polynesian wave science as well as learning about human wellbeing through exploring sleeping habits and the holistic connection of the school environment to wellbeing.

Evaluation is an integral part of SouthSci projects to show the change in perception towards STEM/Science which help SouthSci improve planning for future initiatives and to analyse the projects’ impact on the community. The SouthSci project evaluation process includes requesting participating teachers and students to fill out pre and post-project surveys indicating how strongly they agree or disagree with statements about their enjoyment, importance and knowledge of science.

The difference between the 2019 pre-project and post-project survey answers showed interesting patterns. Pre-project surveys results had more strongly-disagree, moderately disagree and strongly-agree responses while post-project survey results had more neither agree nor disagree and moderately-agree responses*.* Students shifted from both extreme ends of attitudes to more neutral/ neutral-moderately positive attitudes about STEM/Science after attending SouthSci projects.

This case study sets out to explore students’ opinions and perceptions of science collected through interviews to understand further factors that influenced the increase in neutral and moderately positive attitudes towards STEM/Science.

**Methods**

Thirty students were recruited through email, then interviewed with the same set of open-ended questions based on the South Sci project questions. Participants included twenty-one Year 5/6 students from Willowbank School who had not participated in Southsci projects, five Year 7/8 students from Point England School and, four Year 7/8 students from Southern Cross Junior School who had both been a part of SouthSci projects.

**Results**

Students who had participated in SouthSci projects showed greater interest in science and had a more complex, nuanced understanding of science than students who had not participated in SouthSci projects; however, some were still uninterested in science. Students who had done SouthSci projects distinguish various fields of science and recount scientific procedures learnt in class. One student stated, “it depends on the scientist because there are multiple types of them, and each one of them studies different things”. Students showed an understanding of the pros and cons of science-related issues in the world, such as animal testing, sustainable energy solutions, and solving climate change. One student commented, “if scientists were able to find a cure for global warming, it goes down to one person.... cause even if there’s a small bit of pollution, it will change the earth”. Regarding the importance of science in the future, students identified that "it can be different for different people because we do some science every day without thinking about it”. Three-quarters of students wanted a career in science such as Doctor, Neurosurgeon, Astronomer, Environmentalist and Scientist. However, one student who did not desire a career in science commented, "I don't really wanna be a scientist when I'm older because they're too busy not hanging out with their family, their families' are their experiments”.

In contrast, students who had not participated in SouthSci projects had narrower views of STEM/science, showed less interest and were less aware of how science appeared in their everyday life. Their current understanding of science involved biology, chemistry, viruses, cures, astronomy and seemed to identify tech as a separate field. One student said, "I used to think doctors made the antidotes and scientists just did experiments, but now I know that they are very important”. Only one-third of students had a science-related career aspirations such as a Scientists, Computer Programmer, Doctor and “someone who designs apps”. When discussing the usefulness of science, half the students mentioned maths. "Cause it's like maths and you can use it for problem-solving and stuff”. Perhaps students had not been exposed to enough science and used maths to help themselves understand science.

All students commonly stated that science would be their favourite subject if they did more of it at school, however students who had not done SouthSci projects were more likely to mention that science was hard. Furthermore, all students had difficulty recalling meeting a scientist in real life, and of the few who did had done SouthSci projects before and needed prompting to remember.

**Discussion - part 1 From the data: Science as a career path and exposure to scientists in the community**

Due to the lack of science/STEM exposure in schools, even with SouthSci project participation, it may not be enough to change preconceived notions of what a scientist does and who they might look like in the community. This may explain a shift to more neutral answers due to perceived lack of exposure to scientists in the community. Science exposure in school enables students to build a more relatable vision of science and scientists (DeWitt, Archer & Osborne, 2013). Inability to recount meeting a scientist, even for students who had participated in SouthSci projects indicates that students have not been exposed to enough science in schools.

A decrease in strongly disagree and moderately disagree answers between pre and post project survey align with the results that students who had participated in SouthSci projects had more interest in a science career pathway and were able to identify scientists they had met. A less stereotypical image of scientists influences positive attitudes toward science and higher interest in a science-related career (Türkmen, 2008).  Furthermore, repeated experience in science-related topics, experiments, and discussions are needed to develop an interest that will influence future science-related decisions (Krapp & Prenzel, 2011). Thus, initiatives like SouthSci and increased opportunities for students to learn science are needed in school in order to get them interested and prepared for science-related careers.

**Discussion - part 2 From the data: Science as a favourite subject/why not/how much science do we teach in school/what is science know as these days**

Lack of science taught in schools impacts students’ perception of science as their favourite subject. Perhaps being involved in only one SouthSci project a year was not enough to allow students to understand the broadness of science or be as confident with science as they would like and find a topic of science that interested them. Some students who had initially viewed science as very important and interesting may have changed to neutral answers as the activities they participated in weren’t exciting to them. From that single event, they might assume all science is like the limited exposure they have had. If students have attached less value to science for themselves, or students were unable to engage in the particular science project valuably, it reduces the personal value attached to science (Schütte & Köller, 2015). Some students’ exposure to SouthSci project may not have lived up to their preconceived notions of science which reduced their enthusiasm for science. Students’ with limited experience in STEM/science and its applicability to real-life situations differ from preconceived views of science (Schütte & Köller, 2015).

Furthermore, the lack of interest in science and increased neutral post-project survey answers may be due to the limits of what they know science to be. Students' view science were mostly related to chemistry and biology-based fields regardless of being involved in SouthSci projects or not. Sciences like tech, social sciences and coding are not portrayed to students as science topics, and it stops students from having opportunities' to develop an interest in such fields and understanding that they are also science. Science curriculum material is more successful if it aligns with students' perceptions about science and how it is valuable to them (Türkmen, 2008). Therefore, students must be exposed to a variety of meaningful STEM/science opportunities that align with their values to increase interest, personal value, and decrease misconceptions of STEM/science.

**Conclusion:**

Students need to learn basic STEM skills at secondary school to ensure they meet the criteria required for future entry-level jobs and know what options they have. For them to achieve this, data in the current study shows that the perception of science in the community and schools needs to change. Students need to have more exposure to STEM/Science in all shapes and sizes, and we need to overtly recognise scientific skills as scientific. Students exposure to science also needs to be more positive, relatable, useful, and have direct value to people's everyday lives.

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