Western Sydney High School

This case study describes the implementation of the STEM Community Partnerships Program (STEM CPP) at a high school in Western Sydney, focusing on 2023. The STEM CPP aims to create strong partnerships between local schools and industry, with the goal of highlighting local STEM careers and opportunities and providing avenues for students to develop their STEM skills in an engaging and rewarding way.

Context

The high school that is the focus of this case study has chosen not to be identified; it is located in the Greater Western Sydney region of Sydney. The school offers years 7 to 12 and school enrolments were less than 1,000 in 2023. The school's ICSEA[1] value is over the Australian median of 1,000. The school first became involved in the STEM CPP program in 2022 and is currently involved in a number of other STEM or STEM-related programs and activities. The school took part in most aspects of STEM CPP including the student inquiry project, student showcase, and industry mentor. At the school in 2022, only year 9s were involved in STEM CPP, but in 2023 students from years 7, 8, 9, and 10 participated. STEM CPP is run outside of class time on a voluntary basis, primarily due to the school's unique timetabling (four sessions a day). The lead teacher is hopeful of establishing a STEM elective in 2025.

Case study questions and methodology

The questions that this case study sought to answer included:

- What outcomes did STEM CPP contribute to for students, teachers, and the school?
- What factors contributed to the program's success?
- What barriers and issues were experienced?

This case study is based on semi-structured, face-to-face interviews with two teachers implementing the program at the school and CSIRO program team feedback. In addition, 11 students responded to the STEM CPP evaluation survey. The industry mentor did not respond to requests for an interview.

Findings

Based on feedback from the two educators (interviews), 11 students (surveys), and program staff (feedback), it was clear that STEM CPP contributed to a number of changes and outcomes, with many directly attributable to STEM CPP. The following two pages summarise the key findings in three areas: observed changes, what worked and facilitating factors, and barriers and issues. Evidence for these findings are outlined in the Appendix.

Conclusion

A common theme running through the school's involvement in STEM CPP is growth: the program and the inquiry project led to growth in student skills and engagement, growth in the number and type of connections to the rest of the school and community, and growth of interest from under-represented groups. The connection to real-world STEM and local community issues was also a highly valued and engaging feature of the program. Despite some challenges connecting with the industry mentor and communication technology issues, educators and students reported that STEM CPP is achieving intended outcomes, assisted by a number of facilitating factors and the local environment.

Acknowledgements

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1   ICSEA is the Index for Community Socio-Educational Advantage, which provides an indication of the socio-educational background of students attending that school. The median ICSEA value in Australia is 1000.

NSW GOVERNMENT

SCIENCE AND INDUSTRY ENDOWMENT FUND

CSIRO

STEM CPP outcomes

The outcomes that STEM CPP seeks to achieve or contribute to are:

1. Students have increased knowledge and understanding of STEM

2. Students have increased interest in STEM

3. Students have increased confidence in STEM

4. Students increase their transferrable skills

5. Students have increased awareness of STEM pathways and careers

6. Teachers have greater confidence and skills to teach STEM through inquiry-based learning methods

7. Council and industry develop challenge scenarios that reflect their local needs

8. Schools, councils and industry engage more with one another

9. Students have an increased aspiration to study STEM

10. Students have increased awareness of available STEM education pathways

11. Schools develop a culture that promotes and supports students to study STEM

12. Students are more engaged with community issues

13. More students choose to study STEM after Year 10

14. More diverse students choose to study STEM after Year 10

15. More high potential students choose to study STEM after Year 10

16. Council and local industry increase investment in activities that promote and link students with STEM-related careers

17. More students pursue NSW-based STEM education pathways post school

18. More students are STEM literate in their education and careers post-school

19. More students are employed in STEM roles
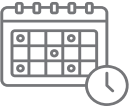
Observed changes

	KEY CHANGE	STEM CPP DIRECT OR CONTRIBUTION TO OUTCOME[2]	OUTCOMES CONTRIBUTED TO:	DESCRIPTION
	More diverse participants involved	Contribution	2, 14	Educators observed more interest and participation from girls and students that were more 'mainstream' (not in the highest academic levels and pathways).
	Improved student engagement, confidence, and resilience	Direct	3, 4	Educators observed, and students self-reported, increased levels of engagement, confidence, and resilience due to involvement in STEM CPP.
	More parental engagement	Direct	11	Educators reported that parents were supportive of, and highly engaged with, their child's involvement with STEM CPP.
	Peer support	Direct	11	Educators observed that students (including from different year levels) were helping each other with inquiry projects.
	Broadening view of what STEM is	Direct	1, 5	STEM CPP was reported to have increased student awareness of the diversity of STEM careers and options available.
	Student collaboration and school pride	Direct	4, 11	Educators reported that students collaborated with each other as result of the inquiry projects, and that the projects led to larger, school-wide activities.
	Improved real-world skills	Direct	4	The inquiry projects were reported to have led to broader school-wide work that involved real-world skills, such as grant writing and critical thinking.

2   As assessed by author

What worked and facilitating factors

	Flexibility of program	Educators at the school appreciated the flexibility of STEM CPP and its ability to fit in with existing school processes, activities, and ability levels, particularly because of the unique timetabling at the school.
	Content, structure, and purpose of the program	The program's focus on local challenges and engaging with local experts, and the inclusion of excursions, was attractive to educators and engaging for students.
	Inclusion of younger cohorts	Educators strongly supported the expansion of the program to Years 7 and 8 students, who may benefit more from the program than older students who have made up their minds about education pathways.
	Excursions and real-world science	Student excursions to real world STEM businesses and sites were highly valued by educators and students. The program's focus on real world science and applications also appealed to participants.
	CSIRO brand and support	CSIRO's reputation and brand awareness made the program more easily accepted, and the CSIRO program support officer was respected by the school.
	Ability to let inquiry projects evolve and connections	Student inquiry projects were the catalyst for wider connections in the community, including with businesses. Also, students were given space for their projects to evolve to meet their interests and address school/community needs (beyond original plans).
	Curriculum alignment	Educators benefited from STEM CPP's alignment with the New South Wales' curriculum, and the program has been part of the rationale for establishing a STEM elective.
	Engaging under-represented students	The school was using several strategies for engaging under-represented students, including not calling activities 'STEM', focusing on hands-on activities, offering opportunities to align with students' interests, and showcasing a variety of people working in STEM.
	Experience and dedication of teachers	As with many initiatives and activities, STEM CPP greatly benefited from the passion and dedication of the teachers implementing it.
	Using technology	Some of the inquiry projects and STEM CPP activities were not feasible using purely hands-on approaches but technology was employed to simulate or replicate hands-on activities.
	School leadership and P&C support	School leadership placed trust in the relevant educators at the school to run STEM CPP and the Parents and Citizens Association (and parents in general) were also very supportive.

Barriers and issues

	The school's timetabling / voluntary and extracurricular program	Due to the school's timetabling structure, it was difficult to include STEM CPP as a part of any classes and so was offered as a voluntary, extra-curricular activity; this had the consequence of some students (mostly Years 9 and 10) dropping out of STEM CPP during exam time.
	Lack of next steps from the program	Educators strongly felt that, although STEM CPP was a high-quality program, the lack of a next step for participants limited its impact.
	Lack of contact with industry mentor	Scheduling difficulties, time constraints, and mis-matched expectations meant that the school and the industry mentor did not establish a strong connection.
	Using MS Teams	The school does not regularly use MS Teams and therefore this communication channel used by program staff was not optimal.

Appendix: Evidence for findings[3]

Observed changes

More diverse participants involved

...for Year 7 this year I had a very mixed cohort, which is fantastic. I did obviously have my gifted and talented students but then I actually had about four or five who were more of the mainstream classes...which is a lot more than usual.

We probably in the seniors have four girls to six boys. In the juniors we have seven girls to the 15 boys. We do have more boys in that one...it's a lot more than I've had in the past, which is fantastic...we actually had a pretty good balance of Year 7s with girls and boys. We are getting there. There's a lot more interest [from girls]...I think that's a generational thing as well as the access.

Improved student engagement, confidence, and resilience

I've definitely noticed a few students coming out of their shells a lot more. Some of the Year 7s, absolutely quiet, barely hear a peep out of them, they were collaborating with their groups, asking questions. One of them has actually moved up in classes, he's not mainstream anymore next year, he's actually moved up. He's definitely grown in confidence.

They're interested and they're really keen, they were doing coding and everything like that. And just watching them. There was a problem and they were like, "How do we fix this?" and going through the little processes and things. Whereas I've noticed a lot of students in my classes, a problem comes up, they just give up. But a lot of these kids [in STEM CPP] were like, "Okay, there's a problem, how do I fix it? What do we do with this and stuff?" There was a lot more resilience I noticed with the students they were developing.

...they're really amazing kids, to be honest. I think confidence was a big thing. We have a few that I think struggled a bit with the showcase, they were very nervous. I think it's easy to forget that as a teacher. I talk to so many people every single day, I forget it can be scary to talk to people that you don't know. They start off with nerves, but then they were just amazing. They broach that, talk to people.

More parental engagement

Yeah, they [mainstream students] absolutely love it [STEM CPP]. You also get a lot of buy-in from the parents as well for those students because...these kids do miss out on these opportunities because it seems that every time we think STEM, we think gifted. There's a lot of buy-in and support from the parents which is fantastic but there are some of my most enthusiastic students, yes, super keen. We've created a garden of native bush plants, like bushtucker plants and things like that and that was run by kids who were in the mainstream.

Probably three quarters of our students had parents attend the showcase...and the ones that didn't, all made contact at some point with me to let [me] know that they were working, they couldn't go, and that's obviously completely understandable.

Peer support

Having the blend of the year groups was actually really good. We had Year 9s working with Year 10s. We had Year 7s working with Year 8s and just collaborating, and that was really good.

Broadening view of what STEM is

Definitely [students] think it's [STEM] nerdy, 100% yeah. A lot of the parents as well, the ones that I've been working with have realised it is pretty good. But some of the parents think STEM is science competitions, maths competitions. They do the competitions; they win the high distinctions. They get all this ICAS, big science, all that stuff which I had done competitions in the past...and then some kids get involved in these [STEM] programs, and they're like, "Oh, it's a little bit more than that", which is why we're looking at maybe doing some more snapshot activities next year. But we're definitely moving away from only nerds do it.

...working with the student support officer, I'm actually looking more at how we branch [out into] the trade aspect, more hands-on aspect of it to support students who maybe don't want to do the full-on academic year...side of it...I think as we get traction, I've been able to get more of these things up and running.

I've got other ones [students]; they actually work more with the teamwork aspect of STEM and the communication aspect of STEM. I had a Year 7 girl, she's amazing, but she said, "Oh, I'd like to be a politician. I know they have a lot of bad raps about them and this and that, but I think I could do real well for people and things like that." She's very socially minded, the recycling aspect that she focused on [in STEM CPP] was very much what she was about. Yeah, it's actually been really good to see their different strengths come out. I think in some way or another they'll end up in a STEM background but I think some of them don't realise what they're looking at as a STEM background at this point.

Student collaboration and school pride

There is a definite change in the students that I find in collaboration and I think pride in the school. They were talking about creating an environmental and sustainability club next year because we've got compost set up because we actually applied for some donations from Bunnings. We've got a native bushtucker garden that we started and we also have some compost that we started, and it's got the ball rolling, the kids are really into it. They're even telling their friends; their friends come up and they get involved with it. More hands-on. The robotics team, the Year 8s, they just want to take it so much further. We're actually starting a STEM thing for robotics next year.

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3   All quotes are from the semi-structured interviews with school staff.

Improved real world skills

I think they [the students] *also get a little bit of an idea in how the world works a little bit as well, when they're talking about grants. Because I went through the grant application with them as well. The Year 7s, trying to get them to justify, "Okay, well why are you doing this? What are you doing it for? We need to write this," and getting them to actually be a little bit more focused and work out, like actually if I want this, I need to justify what I'm doing. I need a list of my equipment," rather than just being like, "Oh, I know what just happened."*

...this isn't that kind of program, this isn't school, and this isn't class where your teacher brings in all the resources, what do you need?" I think that [the inquiry project] *was really good for them, even just researching like "Okay, well I need this series of equipment or if I want to do this, I need to actually work with this and these are the materials I need. This is actually how much it's going to cost, so here's my budget." I think that was really good with them, it developed, and problem solving was a big thing, yeah. The whole problem solving, critical thinking communication, that was improved significantly with all of them especially Year 7s, I think, the younger ones. And Year 8s actually, the coding did work, they were really good with like, "Okay, wait, how am I going to fix this, go back, do it again."*

Yeah, I know that's a big thing for me [accepting failure as part of science]. *Any one of my classes will know that I'm like, "The only way you failed is if you don't take this as a learning opportunity." We just change the plan and do it again and see if it works.*

What worked and facilitating factors

Flexibility of program

Running a full program considering we don't have a STEM elective is not really feasible for us at this point. I was looking for something that was a little bit looser on its requirements from us as a school rather than saying: "You must run this program in a class setting." It was more like: "Okay, we'll run a STEM initiative and it's your choice on how you do it." We'd been doing a few bits and pieces and I was just looking for something more flexible...and something we could do at our school.

But I think just getting more of a vibe about what our role is as a teacher in the program was really beneficial going to that [teacher professional learning], *because I felt we had to do one topic and that was it. And I found that really hard last year when I tried that, the kids wanted to branch out and I had the feeling I was restricting them and I hate doing that. But then it was like, "Oh no, actually if you want to* [be flexible]," *I was like "Okay, amazing," that made it a lot easier, that was great. I think more insight into what our role was, was fantastic.*

Content, structure and purpose of the program

I think it [STEM CPP] *was very much ticking all the boxes, it was about a local program, problem-solving. There were experts who were from the area. I think that's really important for the students that they are doing things that relate to their local area.*

It does get a lot more buy-in that I've noticed, the little bits and pieces they had done until that point. I was really keen on the fact that it was really based on that, the fact that there was a lot of excursions and opportunities they were talking about. We could go to different workplaces because I found that's where the kids really start to actually go, "This is really good. I'm seeing real-world examples of people working in the field."

[Without STEM CPP], *I would attempt to do it myself, but it does work really well when you have like a supportive organisation behind you. That's why I tend to gravitate towards those more. It does make it a lot easier with obtaining excursions and doing all these things, especially with my time or lack of.*

Inclusion of younger cohorts

We don't always get an opportunity for that [STEM programs] *especially for younger students. It's more like if we're talking about career stuff, we're talking Year 11 and 12, but by then they've already decided on all their subjects and stuff.*

I branched out to 7s and 8s, which I'm also the year coordinator for Year 7. I actually found that really successful. And we're really looking at 2024 because we want to be involved again actually using this as primarily a Stage 4 program and looking at how we can extend the Stage 5 in more like a targeted thing. But no, it was really successful [involving Years 7 and 8 in STEM CPP].

Excursions and real-world science

...we did a lot of the excursions that was provided.

But the excursions we did – like we went to the Sydney Olympic Park, that was really good for the students that were doing a biodiversity topic. We took the Stage 4 students there, because they were doing more biodiversity and recycling. That was really good for them to see the real world, and that inspired some of their projects. That was really fantastic. The Western Sydney Airport thing was fantastic, because we had Year 9s and 10s, I took them. They were doing the Aerotropolis, but actually all those conversations they had with the industry professionals... those opportunities were fantastic. I actually found those a lot more helpful because I...don't like restricting the students too much. There is a bit more guidance with Stage 4 and 5. We actually spent an entire term just learning but I think as they were doing such diverse things, it was great to have the experience to go out. Those were really good.

Our afternoon sessions were actually doing, learning about what biodiversity is and what recycling actually means. And we did bird surveys around the school. We went out and looked at different plant species. We looked at the vegetation at school and noticed how it was mostly invasive. We went to Lake Parramatta as well as a school excursion. It helps I'm an environmental scientist.

Yeah, basically I just walked them around and we talked about how we actually survey places? How we know what species are here? Should we have the species here? And yeah, we looked at that perspective.

CSIRO brand and support

…it's a lot more attractive to do it that way [using a CSIRO program]*…at the start maybe* [using a CSIRO program]*…made it a lot easier for people to say yes to it but I just said CSIRO rules… especially when I walked into my principal's office and said, "We're doing this, is that okay?" And I was like, "It's with the CSIRO," and it was immediately yes. That was really easier, like a lot easier for me which was fantastic…Me, as a scientist myself, it wasn't even a thing not to trust it but everybody else that I talked to were like, "Oh that's really good." And I think it also got people excited, the went, "Oh, wow CSIRO, that's really big and we know it." Yeah, that was good.*

Yeah, that's been fantastic. She's been really good. She was new this year because it was [another officer] *before. She's been really good posting things about the different experiences and excursions. Yeah, that's my fault for not being on Teams all the time that I don't see it. Yeah, even talking to her at the showcase, that was really good talking about what we can do in 2024 because we just did this to see how it would go. Last year it was very much experimental. This year we were definitely seeing some more structured approaches that we were doing to it. Next year, just having a chat with her and talking about what we could do and not only that but what we could do for the students that are now ageing out of it. It was a good opportunity to have that chat with her. I definitely have felt supported. She emails and checks in and sees that everything is okay. No, she's been great.*

Yeah, I think it was the fact there was a lot of support, that connection and saying that "You can ask us, you can talk to us about this," that was something that I think I'd learned from previously, that that's actually going to be really good.

Ability to let inquiry projects evolve and connections

…we had another group of girls who said there's always rubbish around the school. They noticed there was a lot of trash. They did a survey with the whole school. We had posters up and QR codes. And then once these guys started doing this, they said, "Well, why don't we use some of this as a compost."

We've actually applied for grants from Parramatta Council so that we can get more support for the gardens because at the moment it's very hodgepodge and we're just giving it a go… They [the students] *were like, "Let's do some compost." We organised some compost bins and things with Bunnings, and with the grants we'll get some actual or hopefully, some green, yellow, and red bins. Because right now we only have red bins around the school… we also have the prefect, the environmental prefect, she's also visited the kids and talked to them about the strategies. We're also going to get the SLC involved and there is actually also Oaklands P&C. There is a…parent who actually wants to open as primary to get involved with doing some of the stuff we've been doing. It's that whole thing has just evolved from a little idea to now.*

We were really fortunate…the Student Support Officer…has connections with a lot of Indigenous…industries. There is a nursery out in Penrith that is run by Muru Mittigar, and they actually donated 12 native plants to us, bushtucker plants.

But the kids looked at the list, they chose, they looked at what actually attracts bees and unisex as well. They went through and they chose the ones they thought would be most appropriate and then they donated them to us and we planted them as a group which was fantastic.

Curriculum alignment

I definitely think it does [STEM CPP aligning with the curriculum]*… we don't have a STEM elective and we don't do anything across KLA* [Key Learning Areas]*, my setting isn't necessarily setup for it but it is definitely something that we are looking at in the future. It's definitely something that's been flagged with development… my head teacher and the senior executive are very keen on doing a STEM elective. It's actually something that we've been working towards improving. It will be something that will fit a bit better.*

Engaging under-represented students

I guess my biggest thing is how we've been doing it [delivering STEM learning at the school] *is actually not calling it STEM so much. Like doing programs with buy-ins, things they're interested in, maybe like little programs that are fun. And I guess it depends, like I've got some students at the moment they're really struggling with bullying. Like your older version students that really struggle with that. The garden actually provides them with a really peaceful environment. We come out, we do gardening, we talk about the plants. We talk about what's good about them. They tell me about how they watch Gardening Australia with their families every Friday. They don't realise that they're talking about different plants and how they're attracting bees and they don't realise they're doing that but they are. And I guess for them it's providing a different space and a different support.*

One of my other students, she is in mainstream and hers is more literacy issues but every single time that I've gone to an excursion, I've had people come up to me and say, "Is she in your gifted and talented stream?" She just knows facts about everything. And I'm like, "Actually no, she's not, she's mainstream and really struggles. Like you look at her writing and you think that she's not but it's her knowledge." I think giving her lots of opportunities to actually show what they're interested in and what they're doing, more hands-on things is really good. Like if you start them off with research, they're going to turn around and be like, "No, not a chance." Little activities, little bits and pieces that you can do, buy-in about what they're interested in, yeah, those are the things that I've been doing.

I think having role models for them that aren't necessarily what you would think STEM is. I think that's also been really beneficial for me as I've tried to increase the amount of girls involved, being a female myself and being the driver behind it, has also really helped. And obviously the other students who feel a bit different and stuff like that, I don't look like a super nerdy teacher, like I may have glasses but I also have a lot of tattoos and wear colourful earrings and stuff like that. I think it helps to have a variety of people behind what they're doing. But then you can control that, it's just who is doing it, that's doing it but I think that's also been an easier approach for me to get more kids involved in buy-in.

Experience and dedication of teachers

I remember when I first started, I was like, "Oh my God, we must…not deviate, you must do this like that." And I think no matter how many times I've been to TPLs [teacher professional learning] and I have talked to people, companies and supporters and they say, "Yeah, we just want to support teachers and we want you to fill this and that." Until you've done it multiple times, you'll never feel comfortable letting it go. It's a part of being a teacher. A lot of companies ask, "Okay, how do we prepare teachers for this?" Honestly, yeah, I've always been a support there but I think giving opportunities to try things and recognise that it won't work and it will work and things like that, and then being okay with it, that's the biggest thing.

…I think it's a lot of self-sacrifice as well a bit. Everyone's like, "Well, why would you do this, you work all the time?" And I'm like, "Well, I actually enjoy this." Like on Wednesday before the showcase I was Deputy, and it was a horrific day and then I just turned around and I was like, "I'm going." And I had all of ten minutes to prepare for the showcase, get on the bus and go. But then at the showcase I was there, so it was a 14-hour day for me but it was rejuvenating seeing the kids and having the parents come up and they're so proud of their children. And it's like this is really what it is all about.

I'm trying to reach out. Over the years of doing these programs and even a big part of Western Sydney women in their Future Is Bright program, working with girls to have STEM mentors and women in STEM programs. I tend to end up, like one of my goals personally has been to get more girls involved because when I first started to do these initiatives, it was just all boys who would want to get involved with it. That's been a real focus. But it primarily ends up being the gifted and talented classes that go for it. I've really been trying to branch out and allowed, like move these programs to the things that can extend some students but also provide an opportunity for more hands-on for other students.

Using technology

Yeah. And some of it's just they're into practical but then when we say, like some people say to them, "Okay, well, you want to do practical, here's a chemistry experiment and here's all these chemicals and there's all this," and they're like, "Whoa, no I meant actually something fully hands-on." I'm really fortunate with Ben as the TES teacher, I don't just have to feel like, "Oh, no we're only doing science stuff." I'm like, "Oh sweet, what can we do with tech." And I'm learning how to do things with robots and coding and stuff like that and it also helps my partner is in IT. But yeah, all those things, I can be like, "Oh, yeah, we can do this and that." We keep it as broad as possible, we more let their interest guide us in what we're doing. But I think that's confidence from doing all these programs over the years.

School leadership and P&C support

I just do these things and then I'm like, "Oh, by the way we're doing this," and they're like, "Oh, that sounds really good." But as far as like if I need to buy anything, they don't have a problem with it. We've even liaised with the P&C for some of the equipment and things like that. They bought us robots; we're

going to do some more robotic related things as well next year. They're really supportive. Actually, the P&C in general is really supportive. The parents are very behind it.

…if I tell my head teacher, I need something or can I have that and stuff like that, they say yes. But it's not really like they seek me out say, "Can you do more programs? Can you do these things?" It's just, I do them and they say yes.

Barriers and issues

The school's timetabling / voluntary and extracurricular program

Yeah, because we have a very strange timetable, we are four sessions a day only which makes us very inflexible for additional things. Because if you take a student out of a class, it could be their only class they have that fortnight.

All of the juniors did [completed STEM CPP]. *The seniors we had a few of them drop out which I think is why the STEM elective would be better* [than a voluntary, extracurricular program]. *As they're older they're committed to a lot more things around the school. It can be a bit time stressful and especially with assessments, they get a bit stressed when they're doing something outside of school. They could be studying and that kind of thing.*

…with less structure [voluntary STEM CPP]…*it can get a bit wayward…*

Lack of next steps from the program

Probably the biggest thing for us with Year 9 and 10 is where to now? That's the thing that keeps coming up with these students… [it's] *incredible but what do we do now?…There's no next step and that's probably not so much for the Year 7s and 8s because we did actually…their projects more school based. But for the 9s and 10s…they've done this amazing amount of research and doing all this stuff. So, that's probably our biggest problem, the where-to-now for them.*

Lack of contact with industry mentor

…not really any [contact with industry mentor]. *No, that's probably been the one frustration I guess, of the program that I've had because we did get paired with* [mentor] *last year and I did find it really hard to communicate…*

Using MS Teams

I'm still learning Teams because…I had about two terms of being really on it with Teams and it's like immediately replying back as soon as I saw something. But then also, we just drifted off, because we don't really use it that much at the school.

…I am not very easy to communicate with. With the Microsoft Teams thing, if we got an email alert out that these things are happening, that would be so much easier for me because we don't use Teams at school. That will be fantastic…

Students' attitudes towards STEM before and after participation (n = 11)

Statement	Before	After
I thought STEM was useful in everyday life	3.82	4.36
I thought STEM subjects were important to my future study and career	4.00	4.45
I would like to have a job work in STEM	3.82	4.27
I expected to do well in STEM subjects	4.00	4.27
I was aware of the type of STEM jobs I could work in	3.18	3.82
I thought STEM was important for society	4.09	4.27
I found STEM subjects exciting	4.36	4.64
I was interested in learning about STEM	4.18	4.73
I found STEM subjects difficult	1.73	1.64

Before After

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