CASE STUDY

STEM Ambassador use of resources for Computer Week

GORSEY BANK PRIMARY, WILMSLOW

all about STEM

STEM AMBASSADOR HUB

STEM Ambassador Hub Merseyside & Cheshire

Context and Overview

Gorsey Bank Primary School is a 420-pupil school in Wilmslow, Cheshire. The school's pupil intake is predominantly White British with very low levels of Pupil Premium. For the past few years, Computing Lead, Jethro Johnson**, has organised a Computing Week at the school, to coincide with Safer Internet Day.**

STEM Ambassador **Marayam Saeidi** had been involved with the event in 2017, when she helped to run Micro:bit activities with KS1 and KS2 students. In 2019, she wished to get involved again but needed to source some kind of resources or equipment, around which she could build an activity to offer to the school. The regional STEM Ambassador Hub in Merseyside and Cheshire was able to assist by loaning a set of Lego Mindstorms.

Maryam has an MEng in Control Engineering and has worked as an automation engineer, a research and development assistant and has five years computer programming experience. She has been a STEM Ambassador for just over two years. Whilst studying at University, she was encouraged by her tutor to join the STEM Ambassador Programme and took part in various events as part of the university's outreach projects, before branching out into other activities.

As part of her studies, Maryam spent time researching uses of artificial intelligence to support children with autism and, during her initial Computing Week activity at Gorsey Bank in 2017, as well as delivering a Micro:bit activity for Y2 students, she also did some focused work with a child with autism.

For the 2019 Computing Week, Maryam again offered to run some Micro:bit activities for KS1 but she also wanted to deliver some more complex coding activities with the older pupils. Earlier in the year, HUBMC had acquired some Lego Mindstorm kits from STEM Learning, and had run training sessions for STEM Ambassadors to enable them to take the kits into schools to run activities. Maryam requested loan of the kits and then developed a series of activities to support Y6 students to understand the Mindstorm software then build, and programme their own robot. The kits were then left with the school for a week for the students to develop their learning. As well as delivering her actual activities, Maryam also supported the content of Gorsey Bank's Computing Week by making contact with local primary school **St Anne's, Fulshaw**, who had recently won, for the second time in three years, the regional heat of the First Lego League Competition at STFC Daresbury. Maryam organised for their students to visit Gorsey Bank to show off the amazing work they had done in designing their winning robot. She also arranged for local company Dicey Tech to provide a 3D printing demonstration for students.

Maryam's activities formed part of the whole-school programme for the week, organised by Mr Johnson, details of which can be seen on the school's Twitter feed and via the hashtags #gorseystem #gorseycomputing

Year Group	Computer Week Activity
Reception	Skype activities with another school in the Multi-Academy Trust (MAT)
Y1	Micro:bit activities with Maryam
Y2	3D printing with Dicey Tech
Y3	E-Safety Play-in-a-Day
Y4 & 5	Robotics activities delivered by a secondary school in the MAT
Y6	Lego Mindstorm activities with Maryam

Impact on young people

Mr Johnson's objective for the school's Computing Week was for the children to have the chance to access and use resources that they hadn't experienced before and to bring coding/ programming to life, away from the screen, using practical robotic resources. As in many schools, the coding typically taught is iPad-based, so in Mr Johnson's words:

> *The children see the results of their work but without truly experiencing them in front of their eyes.*

Maryam's activities, and others she helped facilitate for the school, enabled the students to see the practical application of the computing curriculum covered by staff throughout the year and enabled them to work with kit and resources they had not previously experienced.

Mr Johnson commented that:

> *The boys and girls really enjoyed the activities. They were so excited as they had never seen or done anything like it before!*

The feedback from students and the photographic and video evidence collected by the school and shared on their Twitter feed (#gorseystem #gorseycomputing) illustrates the evident enjoyment experienced, and active engagement shown, by the students.

Video footage available on Twitter:
https://twitter.com/GorseyY6/status/1095329223823093763
https://twitter.com/GorseyY6/status/1095319771351080960
https://twitter.com/GorseyY6/status/1092439679067193350
https://twitter.com/GorseyY6/status/1095709854931578880

The STEM Ambassador activities provided students with the opportunity to try something new and to put their theoretical knowledge into practice. Whilst Mr Johnson admitted that it was difficult to assess the academic progress made by the students within the short-time frame of the activities, they certainly served to introduce students to new skills and knowledge and the application of these. The pride the students felt as a result of the success they achieved is evident to see in the school's recording of the activities and indicates that they provided a really positive STEM enrichment experience for the children.

Maryam commented:

> *Children are like a sponge when it comes to learning, however they need the tools and direction. I believe by starting a new activity, of which none of the children had previous experience, we are opening a door to a new work. It is clear that they cannot master something like robotics in one hour but, with the tools and direction provided, and the excitement created around the robotic activities, the children found it more achievable than they initially thought.*

The students worked on the Mindstorm activities in groups of six, giving students an opportunity to practice broader employability skills. They had to discuss and plan their project together, taking turns to try the app and develop the code to program their robot, before presenting their completed work to the class.

Mr Johnson stated that the activity was:

> *A nice context for the children to develop skills like teamwork, communication, problem-solving and resilience. And because the activity was so engaging for them, they made good use of the skills and worked really effectively together.*

Evaluation Data

Students were asked to complete a pre- and post- activity survey, asking the same questions before and after they had taken part in the coding activities. Questions focused on their enjoyment of activities, their desire to take part in further activities both inside and out of school, their perceived competence around coding, their awareness of coding-related careers and their desire to follow such a career-path.

The results were favourable and showed a positive improvement across the board, with the exception of the students' desire to do more computing activities outside of school.

There was an increase of:

- **3%** in the number of students who strongly agreed that they enjoyed computing in school
- **16%** in the number of students who strongly agreed that they would like to do more computing in school
- **5%** in the number of students who strongly agreed that taking part in computing activities is enjoyable
- **5%** in the number of students who strongly agreed that they knew what coding was
- **11%** in the number of students who strongly agreed that they were good at coding
- **12%** in the number of students who strongly agreed that they would like a job that used coding

The data illustrates particularly that Maryam's STEM Ambassador activity, as part of the school's Computing Week, had a positive impact, particularly on the students' desire to do more computing, their own sense of their coding competence and their future aspirations.

---

1. I enjoy computing in school

Rating	Pre Survey	Post Survey	Difference
Strongly Disagree	0%	0%	-
Disagree	0%	0%	-
Neither	5%	1%	-4%
Agree	32%	33%	+1%
Strongly Agree	63%	66%	+3%

2. I would like to do more computing activities in school

Rating	Pre Survey	Post Survey	Difference
Strongly Disagree	0%	0%	-
Disagree	0%	0%	-
Neither	10%	0%	-10%
Agree	32%	26%	-6%
Strongly Agree	58%	74%	+16%

3. I would like to do more computing activities outside of school

Rating	Pre Survey	Post Survey	Difference
Strongly Disagree	5%	0%	-5%
Disagree	11%	16%	+5%
Neither	16%	21%	+5%
Agree	26%	26%	-
Strongly Agree	42%	37%	-5%

4. Taking part in computing activities is enjoyable

Rating	Pre Survey	Post Survey	Difference
Strongly Disagree	0%	0%	-
Disagree	0%	0%	-
Neither	5%	0%	-5%
Agree	42%	42%	-
Strongly Agree	53%	58%	+5%

5. I know what coding is

Rating	Pre Survey	Post Survey	Difference
Strongly Disagree	0%	0%	-
Disagree	5%	0%	-5%
Neither	11%	11%	-
Agree	42%	42%	-
Strongly Agree	42%	47%	+5%

6. I am good at coding

Rating	Pre Survey	Post Survey	Difference
Strongly Disagree	11%	5%	-6%
Disagree	11%	6%	-5%
Neither	11%	17%	+6%
Agree	28%	22%	-6%
Strongly Agree	39%	50%	+11%

7. I know what jobs people who code might do

Rating	Pre Survey	Post Survey	Difference
Strongly Disagree	5%	0%	-5%
Disagree	16%	5%	-11%
Neither	16%	21%	+5%
Agree	26%	27%	+1%
Strongly Agree	37%	47%	+10%

8. I would like to work in a job where I used coding

Rating	Pre Survey	Post Survey	Difference
Strongly Disagree	16%	5%	-11%
Disagree	21%	16%	-5%
Neither	21%	16%	-5%
Agree	21%	30%	+9%
Strongly Agree	21%	33%	+12%

Support for children with autism

Following Maryam's initial Micro:bit activity at the school in 2017, the mother of the child with autism contacted Maryam to say thank you. Her son had been formally diagnosed when he was 6 years old with his difficulties so severe at times that they had resulted in an inpatient admission. He suffered with anxiety and was finding social situations, including the school environment, challenging. He struggled to manage in class with his peers and often worked separately with his one-to-one support. He was also unable to read and write and ensuring his attendance at school could be problematic at times. However, Maryam's research enabled her to successfully engage the child in the programming activities that she was delivering and he remained in class, working with other children as they practised following orders with each other (to illustrate the purpose of code) and then programming a Micro:bit to show a happy or sad face.

The child's mother explained what a difference Maryam's involvement had made that day saying,

> *He realised that there was something he was really good at. He just 'gets' it. For so long he has said things like 'I'm stupid, I'm not like other children' but now he has discovered the things he is good at. He has strengths. He has stuff he can do.*

Maryam offered to work with the family in a voluntary capacity when time allowed. She contacted Micro:bit and sourced resources for them to use together and, over the course of the following months, Maryam worked with the child to develop his interest and ability in programming. Although he was unable to read and write, he was able to read and write code. Although he was unable to focus on classroom activities, he was able to give his attention to coding activities.

Maryam says:

> *Realistically, it is almost impossible to impress all the thirty pupils in a classroom, in fact, it is not even required. My aim is to introduce coding to every single pupil, even the child who wishes to be a poet in future. However, there are always a few children who show more interest but who seem to believe they need a special talent to learn STEM. My main audience is these kinds of children. It is not hard to spot them. I then spend more time encouraging and challenging them and always offer extra support to the teachers to assist these children with resources where I can.*

Conversations between Maryam, the Hub and the mother of the child with autism have continued following the school's Computing Week with the Hub being able to point to other coding events and resources that may be suitable and provide further support.

Impact on educators

Each teacher at the school was involved in some capacity with the delivery of activities to their classes as part of Computing Week but particular teachers benefited specifically from the support provided by Maryam in her role as a STEM Ambassador. Mr Johnson commented that:

> *Maryam has been invaluable in sourcing the Lego Mindstorms & leading the coding sessions, leading Micro:bit session in Year 1 and sourcing a 3D printing company to give us a demonstration. She helped develop excitement amongst the staff for the Computer Week activities as her enthusiasm is contagious!*

Most teachers at the school were familiar with coding before the event, although they had no experience working with Lego Mindstorms. They were able to up-skill themselves under Maryam's guidance as she led the student sessions. This enabled them to build on the Computer Week activities as the school's loan of the Lego Mindstorm kits was extended into the following week, delivering additional sessions and reporting great success to Maryam!

The connection made via Maryam with St Anne's Fulshaw will hopefully enable further collaboration and mutual support between their staff and those at Gorsey Bank and it has also enabled the STEM Ambassador Hub to build new relationships and promote the wider STEM Learning offering to both schools to ensure they are aware of other support available to them. For example, the Hub has highlighted the availability of **Royal Society Partnership Grants** currently available and focused on computing activities. Maryam is exploring opportunities for supporting the school in delivering eligible activities.

Impact on STEM Ambassadors

Currently in-between job roles, and working around parenthood, Maryam has been able to give a good amount of time to her activity at Gorsey Bank. Her background and experience have enabled her to bring to the table a whole range of skills and connections that have benefited the school, its staff and students. However, she was also clear that her experiences as a STEM Ambassador volunteer have positive impacts for herself in terms of her self-satisfaction, confidence and motivation.

When asked whether she felt her activities with the students were successful she said:

> *Yes! When I saw the interest, and how each group was engaged with the challenge and cheering every successful movement of the robot, I felt so satisfied. This memory would stay in their mind and they will talk about it proudly. And I helped make that happen! I also feel more motivated myself when I watch the children passionately trying to build a robot and showing so much excitement for each achievement.*

Maryam also recognises that her volunteering supports her personal and professional development, stating:

> *Apart from feeling better about myself for doing something for the society, I try to improve my language skills through my involvement in these events. As an immigrant who studied abroad, visiting schools and being in touch with teachers, as well as spending time with pupils, has a great impact on my knowledge about education in the UK and helps me understand the landscape. Fitting my volunteering in around an already busy life-style also helps me to practice managing my time effectively!*

Unexpected Outcomes and Impact

Parents were not directly involved in any of the activities Maryam delivered but, at the school gate, she met a few parents who were excited about the children's experiences during Computing Week and talked about how popular the event was with their children. As a result, Maryam was able to share her experience of being a STEM Ambassador and, to date, two other women have been in touch with the Hub to begin the registration process to become STEM Ambassadors themselves.

Summary

Maryam's involvement in the STEM Ambassador Programme and the support of her local STEM Ambassador Hub has resulted in:

- **A positive impact on students' engagement and application with STEM subjects**
- **Students having increased knowledge of and aspiration towards STEM careers**
- **Access to resources and expertise that the school would not ordinarily have had**
- **Links with other schools and organisations to support the school's work around computing**
- **Specific support for a student with additional needs**
- **New schools linking in to the STEM Learning network**
- **New volunteers recruited to support the STEM Ambassador network**
- **Personal enjoyment and satisfaction for the STEM Ambassador volunteer**
- **Professional and personal development for the STEM Ambassador volunteer**

This impact study illustrates the ripple effect of one individual STEM Ambassador's volunteering and highlights the breadth of influence a single person's giving of their time and expertise can make.