

Future Thinking Innovators Award 2021

Shortlisted Initiative

British International School Phuket

Overview of the school:

The British International School Phuket (BISP) is a co-educational boarding and day school providing an education to a multi-national student body from 2 – 18 years based upon the National Curriculum of England and the International Baccalaureate Diploma Programme. We are situated on the island of Phuket in the country of Thailand. We are a non-selective school with a diverse student body.

Summary of initiative:

A group of our IB students established a 3D printing project and successfully designed, modelled and printed a prosthetic hand and arm for a 10-year-old girl in Bangkok. The school was contacted by a parent who had read about the potential of using 3D printers for prosthetics. A group of our IB students then volunteered to work on this project as part of their IB CAS commitment. The students then ran this project over a number of months, with the students responsible for leading every stage of the process.

The project culminated in the students being able to provide a personalised prosthetic (chosen by the girl to be pink and purple), and then to also provide after-care support by continuing to provide modifications to help improve ease and comfort of use.

The project was a great success – it provided a significant improvement on the girl's previous prosthetic hand, which she had had since a young child. This had been designed purely from an aesthetic perspective and so the new practical design has opened up a lot more opportunities for using her hand. The project also was very successful in allowing students to take ownership of a design project from the beginning, working closely as a team, overcoming the numerous obstacles and then succeeding in their goal.

How the initiative has encouraged students in lateral thinking for a specific purpose:

This project was a steep learning curve for our students. The child whose prosthetic they provided for suffered from Amniotic Band Syndrome, which had resulted in her left arm being amputated below the elbow. This therefore necessitated the design of both a lower arm connector and also a hand with flexible joint mobility. An added difficulty was making this design suitable for a small child – both in terms of the dimensions required and also the aesthetic appeal. This was a project that none of our students had any experience in and so this required a significant creative approach to research and modify existing methods, to learn about 3D design software, to research the best material for composition – taking in factors such as weight and durability, and to conduct quality tests on finished models.

How the initiative had impact on student learning with potential for longer-term development as a sustainable initiative for the school:

The use of 3D printing to provide affordable and customisable designs is predicted to have huge growth potential in the field of medicine and prosthetics. A prosthetic hand made through traditional means can cost thousands of dollars however a 3D-printed prosthesis can be made for as

little as \$50. This then opens up custom designed prosthetics to people who would otherwise be unable to afford them.

There are currently an estimated 30 million people worldwide in need of artificial limbs and braces. In Thailand the charity Thai Reach works with leprosy sufferers in the North of the country to provide printed 3D prosthetics and here in neighbouring Laos there Thailand there are an estimated 15,000 people left disabled as a result of unexploded munitions. Therefore we believe there is significant potential for long-term development of this initiative across South East Asia.

This initiative has had a positive impact on student learning by demonstrating the importance of digital technology and design technology in future engineering and medical projects. The school is a 1-1 MacBook school and has a strong ethos of digital technology, a very popular design technology department and a STEM club. All these aspects were brought together, alongside the IB students' CAS (community, action and service) commitment to highlight the potential of students to work in these fields both from a charitable and entrepreneurial perspective. This is clearly a sustainable initiative, which the school is actively working on to continue this year.

How the initiative demonstrates student commitment and a rigorous process for effective learning:

The student team were highly committed to this project. As one of the team members Arsenii explained, "The perfect reward for completing this project was knowing that you helped to improve someone's life. Moreover, when you are making a prosthetic arm, you are putting a part of your soul into it, which makes every prosthetic unique." The motivation to utilise their design expertise to genuinely make a difference to a young girl's life meant that they showed a high level of commitment to this project over a number of months. This included working with the family after the prosthetic had been completed to provide additional support over modifications for ease of use and comfort. This approach to prototyping, developing, problem solving and modifying is essential to all good design projects and is a hallmark of a rigorous process.

Arguably the most important skill for students to develop in a rapidly changing world and workplace is the ability to self-teach and master new technologies as they emerge. Our IB student team worked extremely well as independent learners. They adopted a hands-on approach to mastering the new skills of 3D graphical design and prosthetic design and this ensured highly effective learning.

How the initiative includes student voice and/or student action:

The IB team took ownership of the whole project once being informed of the parent request. The students had to maintain a regular dialogue with both the parent and girl in order to get the full specifications of the prosthetic required, to obtain detailed scale photographs, to make modifications based on feedback and to also provide after-care support. The students conducted research online as to the process required to print prosthetic hands, and then were required to modify these designs to fit with the school printing capabilities and also the specific requirements of printing for a 10 year old. The students were then tasked with both learning how to use the 3D printer effectively and also the design technology problem of fitting all components together in such a way as to maintain mobility. The students were then also responsible for writing an article for the local newspaper in which they explained the project to a regional readership. In this article Melanie Preen, one of the participants explained how, "This project allowed me to realise my aspirations to be a female role model for the STEM community."

Sharing beyond the school community:

The students undertook a number of media strategies to raise the profile of their initiative. One of our students (Melanie) took charge of writing a lengthy article for the Phuket News in which the ideas behind their project were explained, the family of the recipient was interviewed and students added their own ideas about the success of the project. This news was also shared across other media platforms – using Facebook and Pinterest. The school has also promoted this initiative through our website and with the creation of a video, which has been shared with the school community. Within school we have made use of digital screens along corridors to share pictures and information about this project with other students in the school.

The students have reached out to other organisations in Thailand to look into continuing this project longer term. This includes disabled organisations and also the charity Thai Reach. We hope to be able to find other people in Thailand who would also benefit from this technology.