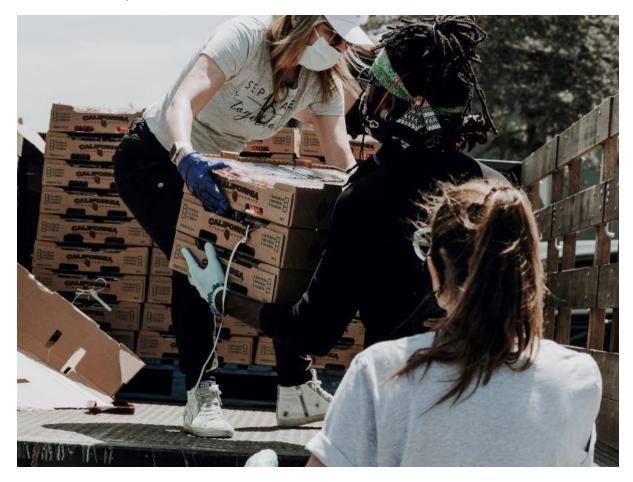# Using community-based research projects to motivate learning among engineering students

Trithos Kamsuwan explains how community-based research projects can be used to motivate students, creating opportunities to apply principles they have learned in class to solve real-world problems

Many students were quickly bored and at risk of disengaging when learning in front of their computers during the pandemic. We decided to use research-based learning, linking classroom teaching with research methodologies, to enable students to develop new competencies and analytical skills. In research-based learning, students are tasked with gathering practical information that links the research to their curriculum content, making them active participants in building the research project.

In Siam University's Faculty of Engineering, we engaged students in a research project that aimed to create a community-run mechanism to develop and drive cultural capital in the Phasi Charoen district in Bangkok. As part of this project, students developed a system for automating garbage and waste collections using Internet of Things (IoT) technology. When

the garbage disposal units were full, inbuilt technology would send an alert via Line – a popular messaging app similar to WhatsApp – to key community members.

Enhance your research through public engagement and collaboration

Embedding social impact considerations into business programmes

How universities can ensure they have a positive impact on local communities

The starting point was to engage with people in the community and learn from them what key problems needed addressing to improve cultural capital in the area. Students then used creative problem-solving to develop a system that would have a tangible positive impact.

There was a notable improvement in motivation and reduction in stress among students once they started working in the community setting, where they were able to meet and engage with local people, rather than being tied to a computer screen or tablet all day.

The benefits of research-based learning:

Research-based learning enables students to test and apply their knowledge in real world settings

For instance, civil environmental engineering students applied the principles of town planning they learned in the classroom when they surveyed the community areas. Backing up the theory with this practical experience improved students' online classroom learning, with more active questioning and discussion about what they had experienced on site and brainstorming to find solutions to the community-based problems.

Research projects encourage interdisciplinary collaboration, with students bringing their specific skills from different specialisms

Such projects support an interdisciplinary approach, enabling students to share their own specific expertise and skills while working with and learning from others across many disciplines in order to advance the projects. For example, computer engineering students set up a software program to control a hardware system. Mechanical engineering students installed a mechanism to automate a trash can. Electrical engineering students designed a system of solar energy for these devices, and civil environmental engineering students planned and surveyed the community areas.

Students have a greater sense of ownership over their work and feel responsibility to the community to make a success of the projects

We held regular meetings with members of the community and students were encouraged to listen and learn and also to share ideas from their studies and individual lived

experiences. This improved students' ability to adapt their learning style to different environments. As an addition to online classroom learning, community-based research projects can help to develop students' social skills – such as effective communication, conflict resolution, active listening, empathy and relationship management – and respect can also be fostered.

Useful techniques for motivating students with research-based learning

Cooperation from all partners

Design and guide the project so that all participants – students and local community members – must learn and plan together. This makes all those involved accountable to one another. We did this through regular face-to-face meetings and collaborative planning. Everyone should work as a team in which all voices are heard and valued.

Devolve responsibility

Students must be supported and empowered to take responsibility for their duties within their project team, as best they can. Their lecturers should be readily available to help out where students need additional guidance or have queries. Students should also be encouraged to take responsibility for helping one another to successfully complete the projects. Encourage a culture of peer support and openness.

Celebrate success together

On the successful completion of the project, which rolled out an effective solution to the community's garbage problem, students celebrated with the local people they had worked with. This helped foster closer ties between the university and community, supporting the continuation of the project which may see the garbage technology extended further and the development of other initiatives to drive cultural capital.

This community-based project proved a highly effective way to encourage more creative and engaging forms of learning among students during a time when generic online learning was predominant. This boosted their inspiration and motivation to study.

By presenting students with real-world problems, you can activate their knowledge in new ways, supporting their intellectual development and understanding of complex issues that extend far beyond their immediate disciplines.

Trithos Kamsuwan is associate dean in the Faculty of Engineering, Siam University.

E-mail: trithos.k@gmail.com