By embedding physical computing into their practice, educators can provide engaging, relevant, and inclusive learning experiences. Such experiences can help learners to develop and apply their programming skills and comprehension while they are being creative and collaborative.

Physical computing is a broad term to describe activities where learners write programs to interact with the real world using specialist hardware. While there are many examples of physical computing devices, they are typically able to do a combination of some, or all, of the following:

- Control a simple output component, such as lights and buzzers
- Measure or record the environment in some way, including through sensors, buttons, and switches
- Drive and control motors to create movement

To help educators understand the different features of devices across this ecosystem, Hodges (et al)⁴ present a categorisation taxonomy which provides a broad distinction between devices. When considering what device(s) to work with, educators should review the features, connection method, and means of programming, as well as the flexibility that each device provides.

### What is physical computing?

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In addition to the engaging nature of physical computing, there is emerging evidence of its learning benefits within computing and beyond. Learners typically experience programming by using high-level languages and producing screen-based applications, independent of the hardware on which they run. Physical computing can promote a broader perspective, bridging learners' theoretical knowledge of how the hardware works and their program writing skills.

There is some evidence that physical computing activities can support a learner's program comprehension\(^2\), particularly in relation to the purpose and function of a program. The physicality of the project provides clues as to the intended purpose of a program, as well as how it is likely to work.

Depending on the context and the approach of a project, learners are also able to develop broader, more holistic skills that involve collaboration, communication, design, and prototyping. Physical computing projects are typically situated within meaningful contexts (e.g. plant monitoring, social enterprise, or even performance), which helps learners to develop their understanding of subjects beyond computing.

Getting started with physical computing can be a rewarding experience for learners, but it is not without its challenges. Educators should consider the following:

- Start small. Focus on a small cohort, an individual concept, or a single activity or lesson.
- Is there suitable content that already exists and is available for you to use and adapt?
- Is there any training available to support you?
- Are there other educators locally who you could collaborate with or observe?
- With the above in mind, which devices would best suit your immediate needs and allow for maximum future flexibility? Can you borrow the equipment before you buy it?

As an educator, adopting physical computing can be an engaging and highly beneficial experience for your learners. While this journey is not without its challenges, there has never been as many device options, support, or content available as there is today.

References