

PROGRAMMING TO GET YOU IN STITCHES

Margaret Low shares the value of programmatic embroidery, a cross-curricular activity linking maths, computing, and textiles

Physical computing is widely recognised as a useful and engaging way of introducing programming to children. However, I've found that the opportunities for creative activities sometimes take a back seat to technology. To combat this, we started using TurtleStitch (turtlestitch.org) in our outreach activities with local schools. This freely available software links maths, computing, design and technology, and textiles, and we've found that it supports a different kind of physical computing.

TurtleStitch is written in Snap! and interprets its pen module as a needle. Snap! is a block-based language and environment similar to Scratch. Children give instructions to a turtle, moving it around and turning it to create their desired pattern. The designs are

then transformed into file formats for digital embroidery machines. Children can create designs that can be stitched within a few minutes, quickly bringing a tangible product, which can then be incorporated into other products, into the physical world.

Getting started

To support the use of TurtleStitch in the classroom, we've created free sets of resources (covering basic TurtleStitch skills and maths skills) and lesson plans (helloworld.cc/warwickturtle). We also regularly offer teacher CPD sessions (helloworld.cc/turtlecpd), which are open to anyone who is interested. For example, when Coventry became the UK City of Culture in 2021, we offered our Stitch in Time project to local primary schools, linking to Coventry's history of textiles and ribbon weaving (helloworld.cc/stitchintime). Children created patterns on a theme of the school's choosing, inspired by the city, and their work was exhibited at the University of Warwick's Resonate Festival in 2022.

The feedback has been very positive, with teachers reporting strong student engagement. They've found TurtleStitch supports the application of functional maths skills, such as geometry, ratios, and exploring shapes and coordinates. It gives students a reason to care about maths and how to apply it. TurtleStitch makes it easy to test, amend, and rerun code, encouraging children to explore code and check their understanding. They also get to experience the entire manufacturing process, going from their initial design, to writing the code, to seeing their design physically created.

I encourage you to explore the creative possibilities of using TurtleStitch in your

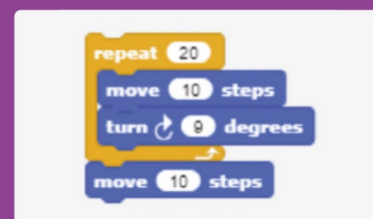
EXAMPLE PROJECT

TurtleStitch project: create a critter

Aim: make a finger puppet

Materials: two pieces of felt

1. Using TurtleStitch, create an outline for a creature, making sure its body is wide enough to fit around a finger. Keep the pattern smaller than 10 cm x 10 cm.
2. Use the commands in **Figure 1** if you want to make a rounded head.
3. Stitch your design onto two layers of felt.
4. Cut around the stitches, adding hair or other features.



■ **Figure 1** Commands for a rounded head



■ Some of the work created by children in the 'create a critter' workshop

classroom. It's quick to stitch patterns (compared to 3D printing, for example), and gets great engagement from young and old. Happy stitching! **(HW)**



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