We studied the 2018 TM112 cohort of about 1500 students. More than half of students were between 25 and 39 years old; 10 students were over 65 years old; approximately 200 were under 21. The female to male ratio is 24 to 76. Race/ethnicity of students (rounded): 89% of students were White, 2% Black, 3% Asian, 1% Mixed, 1% Other and 3% did not specify. 19% of students declared a disability. 16% of students are classified as low socio-economic status by the university, with a further 5% being unknown.

All students (both those who completed and those who did not complete the module) are surveyed at the end of the module (before they receive their results). The response rate for the survey for the April 2018 cohort was 16%. Most students, over 90% agreed with the statement ‘I was satisfied with the quality of the module’ (and less than 5% disagreed). About 80% agreed that ‘My studies have helped me develop my self-confidence’, (less than 4% disagreed). Also, more than 90% agreed that ‘It was obvious how the module materials related to the assessed tasks on this module’, (less than 3% disagreed).

Students who study problem solving and programming (in a language such as Python) at University level encounter a range of challenges, from low-level issues with code that won’t compile to misconceptions about the threshold concepts and skills.

Introducing students to programming (and problem solving) is generally acknowledged as difficult or at least perceived as a significant challenge

We believe that the results provide a good insight into the challenges that students encounter as they learn to program

The Python help forum contained 178 discussions with a total of 1430 posts. The encoding process identified 63 topics within the forum posts: 29 Python-related, 19 on problem solving and general programming skills, and 15 focusing on module-specific questions and issues. The IDE was an issue in 40 discussions (22%). Prominent in these was confusion between how to use the IDLE Shell and the Editor. For example, a student experienced a syntax error. It transpired that they had authored their code in the Shell, saved it as a .py file and then tried opening it in the Editor. Apart from the Editor and Shell, students also wrote code in the browser with CodeRunner. In particular, CodeRunner was used for the module’s formative quizzes involving programming questions. An issue here was students wanting to test their answers in IDLE prior to submitting, a reasonable approach since the quiz penalizes incorrect answers. However, they hadn’t appreciated that the quiz questions may have underpinning supporting code. Generally, some students found it challenging to fully grasp the purpose and details of authoring code using these three different tools.