**Teaching Programming at a Distance Using a Virtual Computing Lab**

**Phil**

This research project is investigating innovative technologies and STEM learning, to identify best practice when teaching and learning to program at a distance. This is with the aim of producing recommendations on the use of Virtual Computing Lab environments. Programming started in many C&C modules; however, this project focuses on TM112 the Introductory Computing and IT module. Recent technological innovations have seen a number of online collaborative IDEs emerge. Two of the key players in this technology are Replit and, more recently, Coding Rooms.

These platforms can be considered Virtual Computing Labs because they provide the ability to look over the shoulder of students as they are programming in the same way that it's possible to do so in a physical computing lab.

This research is currently in progress and involves the following procedures. Students who provided a questionnaire which measured confidence in programming at the start of the 22D module. This was done using an adaptive version of the computing attitude survey. Students also had an option to choose if they would like to attend Virtual Computing Lab sessions, using either Replit or Coding Rooms.

TM112 tutors were recruited, Virtual Computing Lab sessions have been arranged with students. During the sessions tutors are able to support students directly within their programs and easily spot common errors such as misspelled variables or incorrect data types. At the end of the module students will complete the computing attitude survey again, as well as providing comment on the perception of using these lab environments.

Feedback from tutors will also be gathered during a focus group. Once the module results are in, data relating to TMA performance in programming questions will be gathered. Following analysis of all the data, recommendations will be made for using Virtual Computing Lab environments in TM112 with further pilots planned for the modules.