STUDY ON TAIWANESE MINORITY PROGRAMMING AND MAKER COURSES

YUAN-CHEN LIU

Professor in Graduate School of Curriculum and Instruction, and Communications and Technology, National Taipei University of Education.
E-mail: lIu@tea.ntue.edu.tw

Abstract - Based on the principles of the development of the indigenous science curriculum, this study combines the spirit of Maker in the Collaborative Problem Solving (CPS), design a Scratch curriculum in line with the indigenous elementary School programming course in Taiwan. They are using Scratch programming platform as a research tool, supplemented by a hands-on activity, teaching material for maker education: Arduino Uno. The research object is 17 sixth grade students from Nanao Elementary School and 5 senior students from Jianshi Elementary School. Within five-week programming courses, the learning outcome is analyzed and verified by student implementations of Scratch projects, in-class observations, and student interviews. The study found that in the first week of coding geometry courses, students can use their creative thinking, incorporating their favorite patterns in the background of the project, most students can observe the pattern in the loop, and use the concept of the loop to paint the geometry of the project. In the second week of Scratch's story production, students are less able to understand the application of logical concept building blocks. When encountering multi-level object sorting programs, learning is more difficult. Only some students can complete the flying squirrel code. In the last week, the game is made for the game of flying squirrel, and it is integrated into the teaching material for maker education: Arduino Uno. Combined with the LED light function of the Sensor Board, the program of LED light is used to replace the traditional lamp as the light source for hunting. The production of the flying squirrel game, students are interested in the operation process of Arduino Uno, compared with the general Scratch course, combined with the makers teaching material students are more focused on programming learning, and the use of logical concepts is more familiar than the Scratch's story courses. Most of the students can correctly produce the hunting squirrel game and the LED light code, highlighting the hands-on practice. The actual hands-on operation allows students to operate the course project more specifically and achieve better results.

Keywords - Programming, Computational Thinking, Collaborative Problem Solving （CPS）, Indigenous Culture