MAKING AND PROVING CONJECTURES: CIRCLES

Eva Tsz Wai, LAM

This study explores how the Sketchpad environment may help in developing students' mathematical thinking in relation to proof. My intention is to create situations in which students make a conjecture from what they have discovered and then try to prove it. This approach is supported by Bell, Mason, Burton, Stacey and Cockcroft (as described in Hoyles, 1997). They all argued that students should have opportunities to test and refine their own conjectures, thus gaining personal conviction of their truth alongside the experience of presenting generalizations and evidence of their validity.

Five Secondary 4 students (age 16) participated in this study. Their mathematics abilities were average. In the workshops, students learnt some basic properties of circles. They interacted with the relevant dynamic figure, then made conjectures and finally tried to prove them deductively. A video camera was set up to record the participants' behaviour. Three sets of worksheets were given to all participants to guide them how to do the task and write their proofs. An in-depth interview was conducted after each workshop. In this study, the following questions were addressed:

1. How do students discover and form conjectures using Sketchpad?
2. How do students prove their conjectures?
3. How do students interact with each other and with the computer?
4. What do students feel about this approach?

From my observations, students went through the following process as they made and proved their conjectures: Intuitive Observation (based on the impression of one figure to make a conjecture), Inductive Hypothesis Making (based on some common properties of many figures to make a conjecture) and Deductive Explanation (based on theorems to prove a conjecture). It was found that Sketchpad can motivate students to learn and helps them to think inductively. However, there was no evidence that Sketchpad can help the students to think deductively. They all needed some hints from the teacher. Moreover, students working as a pair on one computer seemed to have more courage to drag the points around, thus it might be the most effective situation to carry out such activity.

Reference

Hoyles, C. (1997). The Curricular Shaping of Students' Approaches to Proof. For the Learning of Mathematics 17 (1), 7-16. FLM Publishing Association.