How Computing History Can Be Used to Teach Computer Science?

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Abstract

Students' images on computer science is similar to that of sciences or mathematics, which are either difficult or boring. Teaching sciences with historical figures or events may bring students different perspectives on learning computer sciences. When talking about how Alan Turing invented his test on the intelligence of computers, or how the first Apple computer was made in a garage, students usually have their eyes wide open and show great interests on learning further. Learning through history inspires students, help them understand the big ideas of computer sciences, learn how these ideas were invented and evolved, and in turn, understand the nature of science.

We proposed two instructional approaches Interactive Historical Vignettes (IHVs) and Role-Playing Debate to integrate historical materials into teaching the newly drafted Taiwan K-12 Computing Curriculum. The course design of IHVs is to prepare conflicting ideas and challenging questions during the course of storytelling. The computing teacher must interrupt the story at crucial points of conflicts to ask students questions and encourage them express their views. We chose stories from computer science history to develop IHVs as well as deliver important computer concepts, including a compiler, high-level languages, and artificial intelligence respectively. In Role-Playing Debate, students played a role of stakeholders in a debate of an issue and explain different perspectives. In this activity, we taught the fundamental principle of a computer, students were divided into three groups: one group was the inventors of ABC computer, the other group was the inventors of ENIAC computer, and the third group served as the judges of the debate. We conducted these two approaches in a high school to evaluate their effects on students' learning, in terms of achievement, interests to learning, as well as understanding the nature of science. The results showed that learning through history enabled students to develop a view of computer scientists, understand the historical context and take a positive attitude of learning computer.