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THE PROGRAMMING PROCESS: A SIMULATION

PHILIP WONG

What is computer programming? What does the process involve? How does the computer run its programmes? What are computer languages? These are some questions which students would like to have answers to. Students have heard so much “computer jargon” but know so little about computers. Since only a handful of students have direct access to computers, the computer processes will remain a mystery to the majority.

How can we help to improve the students’ knowledge of the computer processes? This suggested approach to simulate the computer processes, programming and languages will be particularly useful for a teacher to apply in a normal classroom, as no computers are required.

Simulation

In this approach, the concept of simulation is used. Simulation is an abstraction or simplification of some real-life situation or process (Heinich et. al. 1982). Simulation usually involves participants playing roles which may or may not require the use of materials. Some materials are sophisticated and expensive, e.g. a simulated cock-pit for the training of airline pilots; or they may be cheap and simple, e.g. using cards. Taking into consideration the limited budget of schools, this approach to computer simulation requires only the use of inexpensive materials.

Materials

The materials required can be easily and cheaply bought from emporiums. One or two sets (depending on class size) of construction blocks and a sheet of vanguard are all the materials required. These construction blocks are toys for children of ages from three to eight years. A resourceful teacher need not even
have to buy them. He can collect these blocks from his students when his students or their younger brothers or sisters have outgrown the usefulness of these toys.

Accompanying the set is an instruction sheet which illustrates some examples of construction using the blocks. Each illustration can be cut out and pasted on a piece of vanguard sheet. These picture cards, as they will be called, will be used as the “target product” for the simulation of the computer process.

![Fig. 1. Sample of a picture card](image)

**Conducting the Simulation**

The suggested method for conducting the simulation is:

1. Divide the class into groups of four.

2. Ask for one volunteer from each group to play the role of the “computer”. He has to leave the class for 10 minutes.

3. Give each group a picture card and have them write down the instructions necessary to direct their “computer” to assemble the pieces to construct the “target product”. An example of the instructions is:
   - Collect three blue short pieces, four yellow long pieces, two red long pieces and five white short pieces.
   - Assemble one yellow piece on top of the red one.
   - Assemble another red piece on top of the yellow piece such that half of it will jut out.
4 Let the groups work on this for 10 minutes.

5 At the end of the period, ask the "computer" to return to the class. The "computer" must not have access to the picture card.

6 Get a volunteer from among the three remaining members to be the "programmer".

7 Have the "programmer" and the "computer" sit with their backs facing each other. This is to prevent the "programmer" from watching the "computer" in action.

8 The "programmer" will read the instructions for the "computer" to assemble the pieces.

9 If the procedures have been executed well, the "computer" should be able to assemble the figure. However, if there is a breakdown in the communication process or if wrong instructions were executed, the "computer" will not be able to assemble the objects.

The Teacher’s Role

This activity is highly student-centred but it does not mean that the teacher has nothing to do. Far from it—he has two roles to play: managerial and instructional. The teacher has to manage the learning process, organise the students and mediate in the activities. In the instructional role, the teacher has to introduce the concepts and principles underlying the simulation as there is always a fear that students get too involved in the activities, hence missing out the instructional value of the simulation.

To help the teacher in conducting this simulation exercise, an approach based on Joyce and Weil (1980) is suggested. There are four phases in the simulation activity.

Phase 1: To present the broad topic of simulation, the concepts incorporated in the activity, and to explain the objectives.

Phase 2: To set up the scenario, organise the students, provide directions and assign roles.
Phase 3: To conduct the activity and to clarify misconceptions.

Phase 4: To conduct debriefing by summarizing activities, compare the simulation activity (in this case, the programming processes, language used, the function of a programmer and what a computer will be doing) to the real process.

Conclusion

It must be stressed that for a simulation to be effective, careful briefing and debriefing are essential. If the students are to gain the maximum benefit from the learning exercise, they must be adequately prepared for the experience beforehand. It is the same for the debriefing process. Once the activity is completed, the teacher should spend time discussing what has been learnt. Only in this way will the simulation process be meaningful.

Reference

