Programming is a Basis for IT Education

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1 Introduction

IT Education should be done as a problem-solving education. In many cases it is done as"tool education", that is, the training of the usage of some specific application softwares. However, such specific skills or knowledge will soon be useless in "information society" where technology continues to be changed in a short time. We will discuss in this paper IT Education which brings up general ability of problem-solving in the real world and can be the alternative to widely spread "tool education".

2 IT Education as problem-solving education

A model of IT Education as problem-solving education is given from the methodolog of software engineering. In this methodology, the process of problem-solving consists of these four steps.

1) Defining the problem
2) Designing the process of the tasks needed to solve the problem
3) Implementing the process as a program
4) Evaluating the performance of the program

We argue that this software engineering process can be applied to problem-solving in general and to learn it surely gives opportunities to bring up ability of problem-solving.

3 Programming as a problem-solving activity

We believe that programming is the best way to practice problem-solving according t the process mentioned previous section. Programming experience gives opportunities to learn empirically what is needed to solve a problem.

So far, programming has often been taught just as a technique. Most teachers teach syntax and semantics of a programming language which are relevant only to the implementin step. However, programming education as IT Education should start from regarding programming as a problem-solving with the four steps mentioned previous section.

4 Programming education using a natural language

In the process of programming as a problem-solving activity, the use of a natural language is quite important. From this point of view, competency of natural language must b emphasized in programming as IT Education. To write comments in a program is an effectiv way of bringing up such competency. Below is a part of a sample program with comments. Italics parts show each names of three typical types of comments that we recommend.

/* Drawing a house */ ------>"*Headline Comment*"

```
#<sfc/turtle.h>              /* Using Turtle Graphics */ ------>"Line Comment"

main(){
    int i;

    initturtle();                    /* Initializing Turtle */

    /* Drawing the roof */ ------>"Block Comment"
    rt(30);
    for(i = 1; i <=3; i++){
        fd(100); rt(90);             /* Drawing a side of a triangle */
    }
    lt(30);
```

To practice writing comments surely helps bringing up the ability of expressing ideas appropriately with a natural language. Moreover, it gives the opportunity to train judgment i the situation of no absolute correctness. We believe that these abilities are what is needed generally in the society and take much part of our intellectual activities. Therefore, we also believe that programming education described above is of certain importance as a general education.

5 Conclusion

In spite of the general recognition that IT Education for ordinary people should be the training of some application softwares, we have argued that this should be carried out as a problem-solving education which enables the learners to experience the process of problem-solving up to finding out a satisfactory solution.

More concretely, we have pointed that the methodology of software engineering provides a good model of such education and through the practice of programming can be learned the essence of this methodology. The importance of the use of a natural language in the process of programming is also argued and writing comments in programs as an effective way of practicing it is introduced.