Chapter XIII

Learning Computer Science over the Web: The ViSCoS Odyssey

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Abstract

Most of Finland’s landmass consists of vast, sparsely populated rural areas. Even though there are high school students in these areas who are interested in computer science (CS), and especially in programming, the educational institutions that they attend in these rural areas cannot offer them more advanced levels of CS studies. To meet this need, the Department of Computer Science of the University of Joensuu, Finland, has devised for such students an e-learning program called ViSCoS (Virtual Studies of Computer Science). This program enables ViSCoS students to study first-year university-level computer science courses through the medium of the Web. A total of 109 students completed the ViSCoS program between the years 2000-2005. The designers of the program concomitantly created a number of digital learning environments that supports ViSCoS learning and teaching activities. The Formative DEvelopment Method (FODEM), an action research-oriented design method used in the ViSCoS program, has enabled gradual development in the program.
Introduction

The ViSCoS (Virtual Studies of Computer Science) e-learning program enables students who would otherwise not have any opportunity to engage in advanced computer science studies to study first-year university-level computer science courses over the Web (ViSCoS, 2005). The ViSCoS curriculum is divided into three main areas: (1) the preliminaries of information and communication technology (ICT), (2) the basics of programming with Java, and (3) an introduction to computer science (Haataja, Suhonen, Sutinen, & Torvinen, 2001). ViSCoS courses require about 600 hours of study (which is equivalent to 25 credit points in the European Credit Transfer System [ECTS]). The courses are undertaken in three half-year semesters. The whole program is designed for completion over one-and-a-half years (Torvinen, 2004).

There were three main reasons why a program such as this was urgently needed. Firstly, many high schools in Finland could not offer university-level ICT studies in spite of the fact that there were students who wanted to study ICT (but most especially programming). Secondly, the Department of Computer Science at the University of Joensuu needed some means of identifying and recruiting talented high school CS students. This was important also from the industrial point of view. Thirdly, the ViSCoS program would serve as a kind of research laboratory for the development of new educational technology solutions for online learning, especially within our own research group (http://cs.joensuu.fi/edtech).

ViSCoS studies became available for the first time in September 2000. The ViSCoS program was the first of its kind in Finland, and the content of the course was entirely original. The course made use of online technologies that made it possible for students to study from their homes or from partner institutions, which were usually schools. This was a distinguishing feature of the ViSCoS program from the beginning: it was designed as an option for students who were prevented by their physical circumstances from studying in person at the university. At first, ViSCoS was offered only to high school students (between the ages of 16 and 18) who lived in the vicinity of Joensuu. Later the program was extended to other parts of Finland. ViSCoS has been offered by the Continuing Education Centre (CEC) of the University of Joensuu since 2004. Now adult students may also enroll for ViSCoS. The entire program costs 250 euros for high school students and 350 euros for other students.

ViSCoS E-Learning Program

An average of 100 students per year enrolled for ViSCoS between 2000 and 2005. One hundred and nine students completed the program during this period. If a student passes the program with sufficiently high marks (i.e., grade 3 out of 5), she or he qualifies for entry into Joensuu University as a computer science major. This makes it possible for high school students who started their university studies through the ViSCoS program to complete their university degree earlier than they would otherwise have been able to do. Almost all the graduates of the ViSCoS program qualified for a direct entry to the university. When students who have graduated from ViSCoS enter the university in Joensuu, they are eligible to go straight into the second year of computer science degree program. Table 1 shows how...