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ORIGINAL ARTICLE

Multimedia application for educational purposes: Development of algorithmic thinking

Eva Milková *

Department of Informatics, Faculty of Science, University of Hradec Králové, Rokitanského 62, Czech Republic

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Abstract This paper is based on many years' experience with multimedia applications supporting the area of computer science education and it could serve as an inspirational material directed to all educators developing students' algorithmic thinking. Education of subjects related with computer science is from the perspective of other for centuries taught subjects, still in its infancy. Even nowadays a teaching method aimed at developing algorithmic thinking of students is still the subject of extensive discussions and teachers are looking for different ways on how to access it to students. Next to the educational approach to this base of computer science it is also important to find a suitable support for students' self-learning. Multimedia applications give teachers an excellent chance to demonstrate and visualize the subject matter more clearly and comprehensibly, as well as also enabling them to prepare study material for students which optimizes their study habits. Along with large software products developed by a team of professionals there are also various smaller programs dealing with objects appropriate to course subject matter created on a script given by the teacher with regard to students' needs. In the paper such application prepared

* Tel.: +420 493331337.
E-mail address: eva.milkova@uhk.cz
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to intensify self-preparation of students in subjects developing algorithmic thinking is introduced and its benefit discussed. Animations useful to be used as an introductory complement to lectures are introduced as well. At the end advantages of the professional virtual learning environment containing such study material are mentioned.

1. Introduction

The area of software development has passed a rapid expansion and this trend continues so far. Each developer has to learn constantly and master new technology. Crucial role is played by the basis which developer gains at the beginning of his–her career. Thus an essential part of studies at faculties preparing students in the area of computer science is the development of student's ability to think algorithmically. Students must be able to create various algorithms solving given problems starting with easy ones and consecutively increase their algorithmic knowledge and shifts during studies till the level where they deeply understand much more complex algorithms.

Multimedia applications have substantially influenced education. They give teachers an excellent chance to demonstrate and visualize the subject matter more clearly and comprehensibly, as well as also enabling them to prepare study material for students which optimizes their study habits. Along with large software products dealing with a wide spectrum of objects developed by a team of professionals there are also various smaller programs dealing with objects appropriate to course subject matter created on a script given by the teacher with regard to students' needs. The author of the paper has prepared with her students such multimedia applications for many years.

In the paper one application and animations prepared to intensify self-preparation of students studying the subject *Algorithms and Data Structure* are introduced and their benefits are discussed. At the end advantages of the professional virtual learning environment containing such study material are emphasized as well.

2. Algorithmic thinking development

There have been still long discussions regarding what kind of programming is suitable for beginners (cf. e.g. Horák and Mitrovič, 2012; Guniš and Šnajder, 2012). Protagonists of object oriented languages argue that students beginning with structured programming acquire habits that cause big problems for them when using object oriented languages.

Our approach that we have been using for many years in the subject *Algorithms and Data Structures* is based on an imagination of a brick-box, where only several base elements are available from which children are able to create incredible