

An Implementation of the Cloud Based School

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Abstract

Recently, cloud computing switched from being an experimental technology assisting everyday users through various cloud based applications. In a similar fashion, the use of cloud computing can improve the logistic infrastructure of the school computer labs and promote the introduction of innovative educational practices to the teaching of computer science related courses, as well as courses of different disciplines. Due to the economic crisis faced by many European countries, Greece included, the cost of continuously upgrading school computer labs, in order to follow the latest technological trends, is forbidden. Cloud computing provides an affordable solution to this problem by enabling the reuse of the existing computer equipment of the school computer labs and investing exclusively to the cloud computing infrastructure, an investment which is much lower than that of upgrading all school computer labs. This article presents a proposal of an implementation of the cloud computing based school. The conducted experiments indicated that this implementation could support the teaching process with respect to Computer Science, Information and Communication Technologies applications for Secondary and Primary Education schools.

Keywords: Cloud Computing, Education, School Computer Labs, ICT, Open Source Software

Unfolding the Curriculum: Physical Computing, Computational Thinking and Computational Experiment in STEM's Transdisciplinary Approach

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Abstract

The aim of the present article is to analyze the relation of physical computing with the computational thinking dimensions and the transdisciplinary approach of STEM epistemology in inquiry-based learning environments, when the methodology of the computational experiment is adopted. We argue that computational science and computational experiment can be applied in connection with STEM epistemology, when physical computing activities are embedded in the curriculum for Higher Education students. In order to implement this connection, we present software applications that combine algorithms and physical computing. We believe that engaging students through their existing STEM courses in physical computing - in the form of the computational experiment methodology- is a strategy that is much more likely to succeed in increasing the interest and appeal of STEM epistemology. Different learning modules were designed, which covered the combination of easy java simulations (Ejs) with Arduino and Raspberry pi.

Keywords: computational experiment; computational thinking; STEM epistemology; physical computing; Arduino; Raspberry pi; Ejs

Introduction to robotics for novice users: A case study from summer schools in Greece

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Abstract

The paper conveys experiences and conclusions from the organization of three summer schools aiming at introducing novice users to robotics programming. Issues related to teaching material, teaching approaches, challenges in the classroom and participant's acceptance are all examined in dedicated sections of the paper. The teaching staff's impressions as well as the conclusions drawn from the course evaluation by the participants show that the robots can be successfully employed for introducing novice users, especially schoolchildren, to software development as well as robotic principles.

Keywords: STEM, robotics, mBot

The implementation of augmented reality applications in education

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Abstract

In this paper, we present augmented reality applications implemented by students and teachers of the 5th Vocational High School of Heraklion in Crete, within the context of informatics courses. The applications aim to enhance the traveling experience of the visitors of Heraklion city, exploiting the global spread of smart mobile devices in contemporary societies and the facilities they provide. The whole project was accomplished in a collaborative manner and focused on the provision of information about museums and monuments of Heraklion city. The applications have to be installed on the smart mobile device of the user.

Keywords: applications for tourism, augmented reality, smart mobile devices.

Utilization of web-based services and applications for educational purposes in Vocational Education and Training (VET)

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Abstract

This paper introduces new web-based tools that can assist the teaching of Informatics courses in a Vocational Education and Training (VET) environment. In order to be able to utilize those tools for educational purposes, a web-based informative system needs to be created (analysis, design, implementation, check). Such systems take advantage of already available on-line software which does not require an installation on a localized server, thus installing software at school Informatics laboratories, in an effort to meet the educational needs of the courses, and avoid possible malfunctions. The tools we introduce can thoroughly cover the educational needs of modern Informatics courses which are taught during Vocational Training in accordance with the analytical schedule of the last three grades of Lyceum as well as afterwards.

Keywords: TVET, educational resources, informatics innovative learning methods, laboratory practices.

Perceptions of Informatics Teachers Regarding the Use of Block and Text Programming Environments

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Abstract

In this paper we investigate teachers' perceptions regarding the use of block and text programming environments in the class. The survey targets teachers of informatics in primary and secondary schools in Greece and attempts to answer research questions regarding the suggested duration of block-based programming practice and the difficulty of students' transition from block-based to text-based programming. In contrast to the majority of research works that consider students' opinions, in this paper we investigate the perceptions of their teachers and take advantage of their experience on the taught subject. Although the curriculum mandated by the Ministry of Education provides no specific directive, teachers agreed that block-based environments are appropriate introductory tools to programming. One of the primary tasks of this work was to determine the recommended age for students to move from block-based to text-based programming. The analysis of the collected data clearly indicated a specific age for this transition: teachers believe that students in primary school and the lower secondary school (ICSED levels 1 and 2 respectively) should use a block-based programming environment and should be introduced to text-based programming during the upper secondary school (ICSED level 3), after the age of 14. The findings of this study can be useful when designing new Informatics curricula for the secondary education, all-over the world.

Keywords: Block-based programming, Text-based programming, Age transition, Teachers' perception, Curriculum.

Monitoring Students' Perceptions in an App Inventor School Course

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Abstract

MIT App Inventor is a block-based programming environment for children and teenagers that sets a “low floor” for allowing creative app building while engaging students in complex computational thinking activities. The present study aims at (a) monitoring students' perceptions on ‘popularity’ and ‘perceived difficulty’ of certain activities/lessons through the implementation of an App Inventor course in a Greek lower high school, (b) detecting any course design or activity/lesson plan and implementation factors that affected students' perceptions and finally (c) evaluating their experience with App Inventor in contrast with their previous experience with MicroWorlds Pro and Scratch. Our study confirms students' positive perceptions such as positive task value beliefs and self-efficacy, identifies features of successful “resources learning” in competence-based learning and finally offers a students' comparison between App Inventor, MicroWorlds Pro and Scratch.

Keywords: MIT App Inventor, block-based programming, students' perceptions, school course

Students' attitudes towards discovery learning / constructivistic approach using computers as cognitive tools in higher Mathematics Education

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Abstract

This paper analyses the discovery learning / constructivistic approach using cognitive tools in higher mathematics education and focuses on electronic worksheets designed and implemented in Mathematica. Moreover the paper presents empirical research results concerning the approach's application at the Department of Statistics and Insurance Sciences of the University of Piraeus. The paper focuses on research results on students' attitudes towards the approach, concerning: a) the cognitive tool used (Mathematica), b) the approach's discovery learning and constructivistic characteristics and c) the development of higher order thinking skills supported by the approach. Regarding factors that could influence students' attitudes, gender and experience in using computers are investigated. This paper uses quantitative methods in analyzing data collected via the use of a questionnaire and the research approaches used are the descriptive / investigative and the correlational approach.

Keywords: Cognitive tools; Discovery learning; Constructivism; Social Development Theory; Higher order thinking skills.

Universally designed educational material for students with and without disabilities: Would it's development be possible without the contribution of IT applications?

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Abstract

The Institute of Educational Policy, seeking to realise inclusive policies and practices planned the project: "Design and Development of Universally Accessible Educational Material." Its objectives are the development of universally designed digital educational materials for nursery primary and secondary school students with disabilities or special educational needs. The project focuses on developing new open source digital educational material and software for special education in Greece, adopting and using the popular platform OpenEdX of asynchronous e-learning that allows the organization of Massive Open Online Courses (MOOCs), aimed at distance learning and training of the teachers of general and special education

Keywords: ICT, Universal Design For Learning, accessibility, disabilities

Educational Multi-Sensory Game for Students with Mental Retardation

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Abstract

In this paper a game has been developed using the Scratch platform and its aim is to lighten the learning difficulties resulting from Mental Retardation (intellectual disability) and enhance the students' understanding. Through the use of a multi – sensory method, an alternative way of teaching is proposed suitable for students who need a differentiated education. Basic meanings are explained in a theoretical level, as well as the steps followed for the design of the game.

Keywords: Mental retardation, educational game, Scratch

Visual Programming Tools Implementation for Educational Cultural Heritage Promotion

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Abstract

Nowadays, mobile devices are considered to be a powerful and portable tool for assisting people dealing with daily life issues. With the advance of mobile technology, the issue of mobile learning has been broadly explored in e-learning research. Several researchers and educators use pedagogical and technical strengths of mobile technology into learning environments. In this paper, an educational mobile-based application is described in order to promote Corfu's Old town cultural heritage. The proposed educational mobile based application was pilot-tested in forty-five postgraduate students at Ionian University during cultural heritage courses. The students used a mobile based educational environment in order to augment their heritage cultural perception and knowledge. The case study results suggest an enhanced perception of the educational content as well as a significantly increased acceptance of the education approach within the role of mobile technology in higher education.

Keywords: Adult learning, mobile learning, cultural heritage, mobile applications