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cMinds Project Newsletter

Special points of interest:

- cMinds introduces a pedagogical framework that combines virtual experimentation, serious games, project–based, and story telling approaches, mostly graphically-based aiming at overcoming language barriers expected in the targeted age group.
- Proof-of-concept learning tools allow students to cultivate analytical, critical and structural skills.
- Evaluation activities of pilot applications are underway at schools in Greece, Sweden, the Czech Republic and Romania.
- cMinds will be presented at ONLINE EDUCA 2011 Conference taking place in Berlin, Germany on December 1-3, 2011.

Inside this issue:

Editorial

With the cMinds project 10 months into its implementation period this newsletter aims to provide insight into developing activities to the project's wide audience. The current issue covers all aspects of the cMinds implementation from theoretical background and learning tool design to validation of project outcomes and dissemination. This issue targets teachers, policy makers, the academic community, the lifelong learning community, and the general public. The presented information can be used in a variety of ways but could be particularly useful as a discussion of good practices on the use of technology enhanced learning activities in primary education.

The project aims to develop analytical, critical, and structural skills through advanced explorative and collaborative didactical frameworks that take advantage of information and communication technology and specifically visual programming concepts. In order to meet the project objective the implementation team is developing a range of virtual learning tools that can be deployed in the classroom as discussion initiators.

In the context of cMinds virtual experimentation refers to online educational applications that are designed to be delivered as part of wider blended learning delivery that involves in-class instruction, site visits, internet-based exploration, and distance learner collaboration.

The proposed didactical model has been developed by an interdisciplinary team consisting of teachers, didactical process design experts, and technology providers over a period of several months taking into account related past research and best practice reports. The result is a framework that combines virtual experimentation, serious games, project–based, and story telling approaches, mostly graphically-based aiming at overcoming language barriers expected in the targeted age group of elementary school children.

Learning tools are developed according to a "top-down" approach that guides children through the step-wise solution of a problem from the beginning to the end. To achieve this objective, the cMinds demonstrator starts by introducing children to basic programming concepts, then allows them to explore the solution to a wide range of logical problems through visual programming, and concludes by enabling children to compare their solution to "optimal" algorithms.

After the stage of familiarization, students can select a problem among a range of logic problems (pattern problems, transport ones, quizzes and mind games). The selected problems are logical, mathematical and close to activities already taking place in classrooms in the context of mathematical and science education.

cMinds understands the importance of facilitating the integration of the proposed methodologies and technology into teaching. The educational process is supported through instructional aids targeting teachers in the form of learning sheets describing suggested class activities, wikis, application manuals, and videos demonstrating the use of pilot applications.

To ensure European-wide relevance of project activities, cMinds foresees 5 validation sites in 4 countries that cover the north, south, east, and west of Europe. Specifically, cMinds demonstrator is currently under validation in classrooms in Greece, Sweden, the Czech Republic and Romania.

Pilot applications will help children to engage in analytical thinking and problem solving practices

In addition wide dissemination is actively pursed through conference presentations, internet publications, local media including newspapers, thematic network presentations, and industry presentations.

Learning Requirements Definitions for Pupils

The particular vulnerabilities of young children who are still developing physically, socially, and emotionally in conjunction with children's exposure to modern ICT products and services have been considered in the design process of learning scenarios and activities.

The pilot applications have been developed aiming at meeting learners' perceived evolving needs and children's technical skills. Specifically, some of the factors that have been taken into consideration while designing the content of cMinds educational methodologies, tools, and learning activities are:

- Existing wide rage and diversity of children's experiences with ICT in school and at home.
- Hiding of computational complexity that is not appropriate for the targeted age group through mostly graphical interfaces that visually present important concepts that constitute the focus of each lesson.
- Integration of an effective, real-time feedback mechanism into the learning design process.
- Increasing motivation and promoting long-term engagement in the learning process.
- Current teacher's instructional practices and problem-solving skills.
- Children's language barriers.

Learning Requirements Definitions for Teachers

Recognizing the importance of supporting the teaching process, the project takes into consideration teacher needs and potential skill enhancement required for incorporating the proposed analytical skill development methodologies into already well developed teaching practices, including inquiry-based didactical approaches, deployment of ICT services, widening of digital skills, and more. To this end, cMinds proposes good practice guidelines and strategies for instructor professional development. The recommendations focus on facilitating the smooth integration of project outcomes into the classroom.

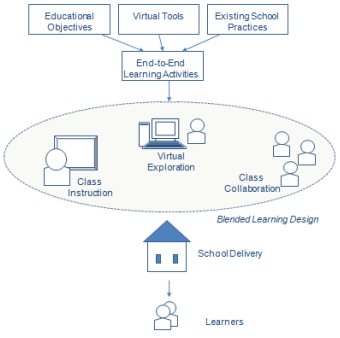
Teachers develop discussions with children that participate in the cMinds educational network

Some of the tools that have been developed aiming at meeting teachers' needs are:

- Descriptions of basic programming concepts that are the focus of the cMinds learning activities and tools.
- Presentations of visual online tools or environments that foster the development of analytical thinking through programming.
- A forum for know-how and information exchange among teachers.
- A bug and enhancement logging tool that encourages teachers to provide feedback in an on-going manner.
- Services for uploading, exchanging, and hosting content related to cMinds activities.
- A wiki for publishing easily texts, articles and other material in an informal manner.

The pedagogical methodologies underpinning cMinds

cMinds project is based on the premise that educational experiences must not prepare students for a static world. To achieve this aim cMinds proposes a learning intervention that exploits new technologies and uses a didactical framework which builds on inquiry-based learning approaches, problem-based learning, analytical thinking practices, collaborative, and project-based learning.



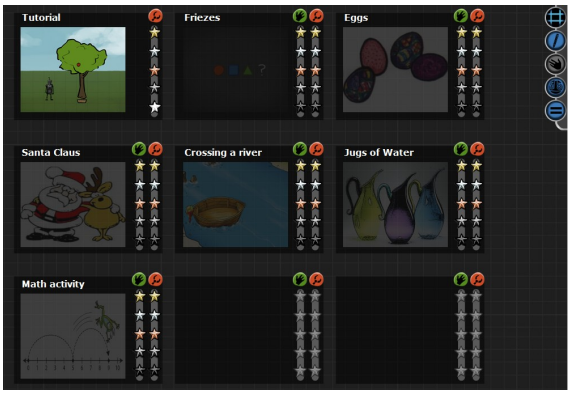
cMinds Blended Learning Delivery Approach

The previous figure demonstrates a blended learning design that embodies in-class lectures, on-line experimentation, and class collaboration towards collective knowledge building in a group of learners and their teacher is suggested.

The cMinds Demonstrator

The cMinds consortium reached the final design outcome after many considerations and reconsiderations. The rationale underpinning the design of the cMinds demonstrator though did not change.

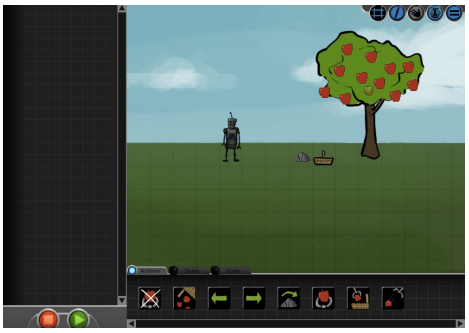
More specifically, a virtual learning demonstrator has already been developed aiming at introducing an environment in which children build through experimentation and application of programming concepts their analytical thinking skills.



cMinds virtual learning demonstrator

In brief, the demonstrator consists of the following learning areas:

- A tutoring environment, which corresponds to practical training with the function of specific programming constructs.



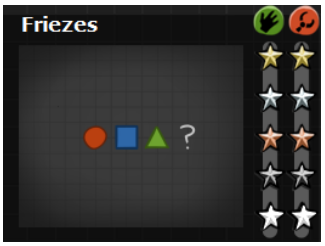
The tutorial area

- A virtual exploration environment, which is called the robot-phase, where students are exposed to programming logic and problem solving through the manipulation of graphical commands.
- A visualization and comparison of solutions environment, where results of a child's programming efforts towards solving a logical problem are visualized and compared.

The development of logic problems and puzzles

After the stage of familiarization, students can select a problem among a range of logic problems that are supported through the cMinds demonstrator as proof-of-concept on the capabilities of the learning environment. The selected problems are logical, mathematical and close to activities already taking place in classrooms in the context of mathematical and science education.

The "Freezes"



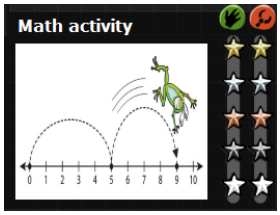
The "Easter Egg" Puzzle: Decorating Easter Eggs

Santa Claus's socks

The "River Crossing" problem

The "Water Puzzle"

Robot's Mathematical Confusion

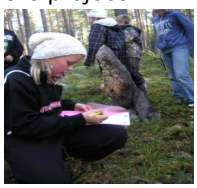


Activities

Learners' first involvement in the project included the development of videos where their school life and characteristic school activities were presented. The presentation had an informal nature; students were free to decide on the presentation style and form.

Teachers guided learners throughout the video development process by introducing a high level structure. The media material has been published online and is accessible through the cMinds website.

The development of the videos took place in the context of an initial "familiarization" stage. This familiarization stage was central to the cMinds' goals as it set a basis whereupon collaborative interactions could occur in the future. Furthermore, this activity encouraged learners to realize their role in the context of a multicultural community in which their collaborative actions will be enacted throughout the project.



Last, this stage aimed at sowing the seeds for building learner curiosity and interest on the project. The teachers, who supervised the whole video development process and had the chance to observe closely the students" reactions, confirmed learner enthusiasm and active participation.

On-going Dissemination

Conferences

cMinds was presented at the Open Source Software (ELLAK) Conference in Athens, Greece on May 20-22, 2011; at the Future of Education conference in Florence, Italy on June 16-17, 2011; at the EduLearn 2011 Conference in Barcelona, Spain on July 4-7, 2011. The project has also been accepted for presentation at EDUCA online in Berlin, Germany on December 1-3, 2011.

cMinds on the Web

An on-line publication has already taken place at the Panhellenic School Network portal, which is a Greek on-line community of all the primary and secondary schools with high participation rates from teachers and students. A second on-line publication is available at the eLearningEuropa thematic portal which enjoys a wide audience in the lifelong learning community.

Finally, cMinds is presented at project partner web sites.

Promotional material

Informational material in the form of a leaflet and a poster presenting cMinds objectives is available online on the project web site.

Future dissemination plans

Additional presentations to conferences, on-line thematic databases, and teacher networks will be actively pursued throughout the project implementation period.

Preliminary stage of evaluation

Validating cMinds methodologies, virtual learning tools, and teacher support material is of great significance for ensuring that outputs meet the needs of the target sector. cMinds evaluation is already under way in the context of a high level strategy that introduces evaluation objectives and success indicators aiming at generating objective feedback in an on-going, iterative manner that allows its integration into interim results.

A first validation activity took place on 7th of September at the 1st Primary School of Volos aiming at demonstrating a 1st beta version of the cMinds demonstrator to the school teachers. The feedback from the teacher was positive and the cMinds demonstrator was considered of great educational potential.

In addition, evaluation is underway at schools in Sweden, the Czech Republic and Romania, all of which are project partners.

The University of Thessaly (CE.RE.TE.TH) is the project coordinator. UTH is the only higher education institution in central Greece. It has 17 departments and 6.000 undergraduate students.

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