



Collaboratories – How can Children Learn over the Internet

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Abstract

The two year Colabs Socrates Minerva project's (101301-CP-1-2002-1-HU-MINERVA-M) aim is to set up infrastructure for collaborative work, to provide answers for guiding research questions: with whom, how and what kinds of knowledge should children learn at a distance and how best can they be supported in this learning; and to develop learning tools that can be transferable into several domains. We have developed Colabs portal, games, creative tools, networking microworlds on different themes for children of different age groups to provide activities for collaborative learning. The Imagine course and other support materials, the configuration of the portal's functionality and the on-line mentors provide further support in aiding learners. The paper describes the main features of the project and its present state for evaluation purposes.

Keywords

Imagine Logo, multicultural collaboration, learning at a distance

Introduction

Collaboratories, or for short *Colabs* is a two year Socrates Minerva project that is run by six partners: Eötvös Loránd University, Hungary (Co-ordinator); Comenius University, Slovakia; Logotron Ltd., UK; Cnotinfor- Centre of New Technologies of Information, Ltd., Portugal; Centre for Informatics and Technology in Education, Poland; Cnotinfor Brazil Education and Technology, Brazil; (<http://matchsz.inf.elte.hu/Colabs/>).

Aims and objectives of the project

Our aims are to provide infrastructure for collaborative work; to provide answers for guiding research questions: *with whom, how and what kinds of knowledge should children learn at a distance and how best can they be supported in this learning; and to develop learning tools that can be transferable into several domains.*

The first objective is to develop localised tools for supporting collaborative active web modelling. The Slovak partners have built a new generation of authoring tool, Imagine (published at the beginning of 2001 by Logotron) that takes learners to the leading edge of what is possible with digital technologies. Imagine is an open and flexible learning environment and authoring tool with complex tools for painting, animating, web authoring, creating multimedia, using speech input/output as well as Logo programming.

With whom should children learn? Global connectedness makes possible new types of 'knowledge-building communities' in which children and adults around Europe and beyond



collaborate on projects and learn from one another through distributed learning. We know that children learn by constructing a synergy of different perspectives. But how can these perspectives be brought together effectively across sites and countries? The objective is to set up networked laboratories through which we will exploit the connectivity of the web for collaborative construction; to set-up new multicultural, multilingual and multimodal approaches to computing, learning and communicating.

How should children learn? We know that digital technologies can enable more active and independent learning. The objective is to design tools and activities that have at their heart collaborative construction supported by what we term– the active web. These tools and activities will enable learners to take charge of their own learning, through direct exploration, expression, and communication with others through constructivist methodology.

What should children learn? The challenge is to turn information into knowledge, to find ways to exploit the power of digital technologies in general and the internet in particular, to help young people to think, to be able to search out and sift information and then use it interactively to build, try out and debug models of real or imagined systems. The objective is to investigate and evaluate modes of self expression, communication of ideas, and the development of collaborative model building for the benefit of learning through the spectrum of basic skills and aspects of enhanced systems.

How will children be supported? We will work in schools, homes and remote sites and will investigate different ways to promote collaborative model building at a distance. The objective is to investigate: the needs of children learning and collaborating in ‘real’ and in virtual connectedness both locally and internationally; the circumstances under which good practices and quality can arise in children’s progress.

On the long run, we hope to accomplish the following goals:

- Children living at any location and within any culture succeed in mastering not only basic ICT use, but also develop fluency for expressing oneself with the tools, learn basic competencies using innovative tools and methods, as well as learn the basics of learning while collaborating and communicating at a distance.
- To provide methodology: about the needs of children, different methods and tools to develop skills, and to able teachers using, configuring, and even creating smaller collaborative microworlds themselves according to needs.
- To produce a multiplier effect on the broad scale of use for the developed network and tools in widening the area of distributed learning (involving more disciplines and cultures) and invoke changes in teacher education concerning the role of the teacher.

The innovative feature of project

Much is known of how understanding of computational models can be promoted in face-to-face interaction but in many cases the educational system lacks material to postpone the step from concrete to abstract as long as necessary. In an advanced microworld children can manipulate all kinds of concrete representations and have the opportunity to work and explore with others as long as they need to.

A major challenge of ICT and ODL in the 21st. century is to achieve similar development at a distance; that is to find ways to support children in building and testing models collaboratively across European cultures and beyond, where they will not just talk to each



other across the net, or simply share information but be engaged in long term planning, construction and debugging. Communication plays an important role in collaboration, thus the elements, ways, methods, and forms have to be mastered in order to facilitate self expression. The need for new multicultural, multilingual and multimodal approaches to computing, learning and communication is crucial. We will research a model of e-learning platform and produce active web materials that will provoke children, teachers, tutors and parents to act collaboratively on a networked learning environment.

The main pedagogical and didactical approaches and concepts promoted by means of the project

Our basic philosophy for the design of our pedagogical framework is to engage Logo philosophy, embedding “constructivism” and “learning by doing” to be used with the developed tools for multidisciplinary creations and self-expression. Developed tools need to be open, flexible, extendible, modifiable “by the children themselves”, so that the line of motivation and interest of children would convert into a spirally growing creation curve, which involves much more talents and skills than any single educational program (LCSI, 1999). The rich active web materials shall offer to the students the discovering and development of their reasoning capacity, memory, critical spirit, moral sense and esthetical sensitisation, also promoting their individual fulfilment in harmony with the social solidarity values.

The form of community learning within our project is based on individual and group-learning described as “collaborative learning” as a personal philosophy of intra-group interaction imposed on not too well structured domain, where each member equally contributes whilst problem solving. One of the main stimuli of our project is belief that collaboration and communication create new relations between children and teachers, support better understanding between nations and countries (Strijbos, J.W., 2000).

The needs analysis was provided by a pilot project involving children from tele-houses, learning communities in Hungary which has been in progress for two sessions with an “action research” process that aimed to build a suitable model extendable to the whole network of tele-houses in order to contribute to the introduction of capacity building through distance education for underdeveloped regions. The project used two Web Based Learning materials developed the Hungarian partner and mentored by future informatics teachers. Both materials were based on a constructivist approach and allowed different learning styles to emerge (Turcsányi-Szabó, 2003).



The Colabs portal

Description of functionality

After thorough analysis and evaluation of different distance learning frames, we (Hungarian partner) have decided to implement and configure our Colabs portal (<http://colabs.ini.hu>) using PHP-Nuke (www.PHPNuke.org), based on the needs (functionality, services, authentication, multilingual support, etc.) and possibilities (freeware, accessibility, etc.) required by the project. A lot of the modules were rather buggy and lacked proper functionality, so we had to go through the pain of debugging and extending the code to suit our needs. We shall continue this process until a properly working system is sustained. We have configured the following functionalities and services:

Staring page – users find a start-out point where they can select their preferences according to age and interest, guiding them on further progress.

MY PAGE:

Home – Starting page with advised path for novices.

Your Account – Area where user can configure own profile.

My works – Personal upload area for works created by user.

Help – A guiding help to acquaint user with the basics of Colabs portal, where to find different functions and how to use them.

COLABS:

Brainstorming – Asynchronous collaborative area for Internet Collaboratories, in this case, Imagine microworlds on different topics which invoke explorations and the expression of individual opinions, elaboration in form of stories, and give ideas on further development of microworlds or tools needed. (*For elementary age*)

Creative tools – Asynchronous collaborative area for Internet Collaboratories, in this case, Imagine tools on different topics which facilitate interactive learning, creative expression, and provides forums where the creations can be uploaded and commented. (*For elementary age*)

Exchange games – Asynchronous collaborative area for Internet Collaboratories, in this case, Imagine games which facilitate interactive learning, encourages the creation of interchangeable elements and provides forums where the add-on elements can be uploaded and commented. (*For upper elementary age*)

On-line Games – Synchronous collaborative area for Internet Collaboratories, that is, Imagine microworlds on different topics which allows on-line play, exchange, modification, and construction. (*For elementary age*)

Stories – On-line story construction area for young *children of kindergarten and lower elementary age*.

Fractions – Interactive microworlds for exploration of fractions *for lower elementary grade*.

Maths – Interactive microworlds for explorations in mathematics *for secondary grade*.

World-Wide Encyclopaedia: Picture/animation encyclopaedia of words that could encourage international communication of *young children*.

CHECK IT OUT!:

Games – Different types of on-line games for different age groups to motivate users and raise their interest in using Imagine microworlds.



Gallery – A display of children's works.

Simple games – Different types of on-line games for different age groups to motivate users and raise their interest in creating or modifying Imagine microworlds. Direct links guide users to the necessary pages in tutorial where developmental techniques are explained.

COMMUNICATION:

WebChat – Area where online users can communicate synchronously.

International Forum – Forums where users can create their own themes to exchange ideas, or program elements.

E-Card – An area where users can send electronic cards to Internet addresses. Cards can be pre-made, downloaded from internet, uploaded from own machine or linked from **My works** area, that contains own creations using Imagine authoring tool or microworlds.

Private messages – Users can exchange messages internally.

TUTORIALS:

Imagine Course – A compact beginners course on getting to know Imagine authoring tool.

Imagine Help – Online help for children, where each item can be linked from any material on the site.

Quiz – An Imagine quiz to determine level of knowledge on issues of Imagine authoring.

Networking – Short tutorials on how to use Imagine synchronous games and other issues of networking in Imagine.

SEARCH: Complex tool for full text search on the site.

LANGUAGES: Switching language mode to access site in a different language (access those functionalities that exist within that language).

Auxiliary services

USER INFO: Information on users online and messages arriving to user.

WEBCHAT MAXI: Information on users online within special chat-rooms.

RESOURCES:

Web Links – Collection of useful links on the Internet that are relevant to Colabs activities.

Multi Search engine – Multiple search engines to retrieve information from the Internet.

Downloads – Download area for useful files relevant to Colabs activities.

Upload – Upload area for useful files relevant to the Colabs activities.

Reviews – Area to submit review article on any tool, site, game relevant to Colabs activities.

INFO:

Imagine Webpage – Link to Imagine web page of actual language.

Guestbook – An area to send comments about site.

Surveys – Area for surveys that are to be filled out by users (children and teachers).

Feedback – Area for feed-back to designers and administrator of site.

Recommend Us – Area to send recommendations to friends and acquaintances about Colabs site.

FAQ – Answers to Frequently Asked Questions.



STATISTICS:

Member List – List of members registered to Colabs portal.

Archive – Archives of previously submitted articles or activities.

TOP Forum – List of top 10 most visited pages within Colabs portal.

OTHER:

Content – Map of site.

To do list – Notes of user.

Printed version – Articles and activities designed for printing.

Submit activities – Area to submit activity pages.

SUPPORT:

4nTickets – Submission area for technical problems concerning the site.

CALENDAR: Actual calendar of events online.

Description of main areas of activity

As can be seen, the Colabs portal contains a huge set of activities among which it might be difficult to get around, navigate and find places of interest. The site is configured to hold activities and functionalities in several languages, thus the user can choose to use the language well understood. Yet, it should be noted that each language holds only those activities that have been translated according to the preferences of the person administering the specific language pages. In the **Home** page children are advised different routes to take according to their ages, levels, or preferences. As they navigate through the pages they can find further links to related activities to choose from. According to our previous experiments with e-learning in tele-houses (Turcsányi-Szabó, 2003), the learning process within the portal needs some more guidance and feed-back, which is realised through the following:

- mentors are assigned to different activities, who monitors activities and tries to make changes to suit needs;
- mentors also provide assistance for those who require such: through emails and chat facilities;
- each user has an own area, where files can be uploaded containing works done within activities, which can be monitored by mentors who can provide further advices for users;
- user's activities are logged, so we can trace the hits on pages and the statistics shall confirm the most frequented pages as a preliminary feed-back;
- extracted data from logs shall be used to develop personalised knowledge maps of users and provide adaptive routes for newcomers (Kaszás, Turcsányi-Szabó, 2003);
- all activities can be graded by users, thus on the long run, we shall have a fair statistics on preferred activities and some added comments as well, that shall provide us with feedback to make modifications to improve the portal.

For novices it is definitely the **CHEK IT OUT!** region, where they can get a first impression on the possibilities of Imagine games and activities. This area provides individual activities with **Games** to try out and experiment with: collections of demo microworlds collected from partner's Imagine web pages (www.logo.com/imagine/). Also, to look at **Simple games**,



which lead to the required tutorials to master tricks in producing them, and the works of others in the **Gallery**, which might give further motivation for individuals for progress.

Entering the **COLABS** region already requires a motivation to share and collaborate with others. There are of course different levels of exchanging ideas. On the basic level the **Brainstorming** area provides some microworlds that raise topics to exchange ideas on, write composition about, give ideas for improvements and comments. A next level of collaboration can be attained when entering the **Creative tools** area, where users can express themselves using the tools in various modalities and exchange their works with others to comment. A further level of collaboration is required in the **Exchange games** area, which provides educational games that can be easily modified to change content, topic or subject and thus provide a frame for developing further games on different domains (Réthey-Prikkel, Turcsányi-Szabó., 2003). This area contains links to different entry points within the **Imagine course** in the **TUTORIAL** region, where the steps to produce the techniques of modifications is explained and further Imagine Logo components are provided to ease the creation of more complex microworlds (Abonyi-Tóth, 2003). All **Creative tools** are designed in a standard way, to allow transfer of creations through the Clipboard and ease users by providing nearly the same functionality. However there is also a way to allow change of special functions (rightmost toolbar elements) in which case the tools region changes and becomes different. New tool elements can be downloaded from the server, or a bit more advanced users can create such element and send them to the forum to share with others.

The **On-line games** area (developed the by Slovak partners) requires an advanced motivation for collaboration and some knowledge on setting up the environment, which is described in **Networking** area of **TUTORIAL**. It is definitely worth to go through the pain of setting up requirements, since two-three players can connect through the Internet, play games together, exchange code and actors, or collaborate according to their further knowledge using Imagine authoring tool (Salanci, 2001; Tomcsányi, 2003). Most of the **Creative tools** could also be used in a collaborative way on-line functioning as a white-board, allowing children to exchange functional elements and express themselves collaboratively. The **CALENDAR** region gives some orientation to users on when to find whom on-line for some networking activities or chat.

In the **Creative stories** area (developed by the Portuguese partners) the younger generation is invited for collaboration by proposing reading and writing activities as source of pleasure and amusement. The stories encountered here have meaning and imagination that are able to mobilise the child's attention by giving the text the meaning of an enchanted object and making it as a starting point for other texts and stories to be created by children themselves.

Word wide encyclopaedia area provides a starter set of words in different languages explained using pictures or animations. There is a predefined standard in the definitions since nouns are explained by using coloured pictures, adjectives by black and white abstract pictorial symbols, verbs by animations and prepositions by using black and white symbolic expressions. The collection of words is chosen in order to give a starting set to express an introductory on oneself using international understandable symbolism. The symbols can be further extended by children within the same predefined standard and also used within **I want to tell you** authoring microworld, which allows the production of international "messages" that can be published as Internet pages or within **Mindmapping** tool as associated idea. (Turcsányi-Szabó, Pluhár, 2003)



Fractions provides a series of explorative microworlds for lower elementary age to visualise and fiddle with fractions in different context, level and abstraction. This area also provides an authoring tool for teachers to produce further explorative microworlds configured to different needs of individual children. The tool has been developed collaboratively by the Slovak partner producing the fraction objects (Kalas, 2003) and the Hungarian partner producing the authoring frame and exercises following an internationally accepted curriculum for learning fractions guided by the UK partner.

The **Maths area** contains explorative microworlds to experiment on the boundaries of mathematics and arts, which are advised for secondary aged children (developed by the Polish partners).

The **COMMUNICATION** region provides different forms of communication within the portal. **Web chat** can be used among the users on-line providing synchronous communication, while **International forum** provides asynchronous communication on several user-defined topics. **E-card** is an area which users to send each other electronic postcards predefined or self-made, while **Private messages** allows internal communication of users to strengthen individual collaboration.

The **TUTORIAL** region is designed to hold all tutorials that the site might need in aiding users, teachers and developers to progress with skills to create own developments. The **Quiz** area contains a complex quiz evaluating the knowledge of the user on topics of Imagine. The results of the quiz would give advice to users, where to continue within the course material. The **Imagine course** area contains a beginner's course for using and learning on Imagine and the basic Logo script that is used within. The lessons are well chunked up into smaller units, all defining pre-requisites, content, step-by-step guides, further variations, self-assessment and links to several related areas within the Colabs portal that might raise interest to further activities for users. The **Imagine Help** is stored within an encyclopaedia area, with each title stored in HTML form and ability to link up with it easily. Thus a teacher producing a new unit for activity would be able to link in a few titles from the Help files to aid activities. The **Networking** area (provided by the Slovak partners) contains a few units on how to configure Imagine project for on-line use and interaction.

All areas of the portal can be further developed by sending in contributions of activities. Once a user possesses the Imagine authoring tool, the portal provide all further tools and methodology in order to enhance users to become developers and contribute to the portal as a student or teacher to widen the scope for further learning. Anyone can upload any type of activity, tutorial module, e-card, game, etc., but the content administrator checks the contents before allowing publication. Areas not indicated otherwise have been developed by the Hungarian partners. The site has been formally evaluated using the guidelines on quality of e-Learning materials (Baker, 2002; Holmes, 2003; National Institute of Education)

MY PAGE contains a short guide for new-comers, while the **FAQ** contains further explanations to common questions arising. The whole site can be searched for any information needed or keywords that might lead to preferred activities, specific requests or information.



Associated research

Our specific research questions are as follows in addition to the global research questions formulated by consortium:

- Are all teachers able to utilise Colabs portal over the network?
- Are all children in the target age group able to master the use of Colabs?
- What kind of support do children need on-line and off-line in using Colabs portal at a distance?
- What kind of support do children with disabilities need on-line and off-line in using Colabs portal at a distance?

Motivation for contribution:

- Does Colabs motivate teachers and learners enough to develop further materials?
- Under what circumstances does autonomous learning develop?

Competencies developed through activities:

- What kind of topics would be popular for contribution?
- What kind of activities do they involve?
- What kind of competencies do these develop?

Communication and collaboration:

- What kind of communicative forms do they involve?
- What kinds of collaborations could emerge between learners, mentors, teachers, participants?
- What are the sparks of emerging collaborations?
- What kind of competencies do these develop?

International level:

- What kinds of activities are possible on an international level?
- What kinds of collaborations could emerge between participants on an international level?
- What kind of support is needed for international activities to arise?

Methods of data collection:

- Locally: formal evaluation, teacher interviews, case studies.
- Local international: case studies and interviews at Eurologo 2003.
- Networked international: through analysis of individual knowledge maps of contributions and interviews.



The initial launching of the site will be between 15 June till 1st August inviting Hungarian schools to participate, after which we shall produce a first evaluation to decide on necessary modifications and adjustments to be made. This shall be the first session of our “action research” process that should lead us in producing an effective and attractive Colabs portal. We shall start a next session within the Eurologo’2003 conference that shall provide international feed-back for our research and development.

Envisaged output

- Didactical material about the method of introducing Imagine and collaboratories into local learning settings.
- Colabs portal, suitable for networked laboratories – collaboratories which facilitates and supports communication within one platform across different languages. If children and teachers are to collaborate across regional and language borders, there must be advanced and sophisticated technology to overcome the language barriers (e.g. national versions of the same programming language for visual modelling or national versions of a script language for creating animated stories and presentation etc.). We will develop and evaluate set of tools to make such communication feasible.
- Technical tools to facilitate and support communication within Imagine across different language versions.
- Microworlds implemented into Colabs portal, support materials for use.
- Collaboratories translated into several languages.
- Imagine platform enhanced by networking & communication functionality to implement generic and organic enhancements of Imagine and other platforms with special emphasis on networking and communication aspects.
- Know-how of microworld development using Imagine & market survey.
- Report on the evaluation of the local and international use of collaboratories.
- Final report on the overall evaluation and future implications for the multiplier effect of Colabs and modes of transferring collaboratories into other domains, environments, languages, and settings.
- Guides of main issues for introducing collaboratories to and teachers.



Conclusions

Our project hasn't yet approached the end of the first year, so we are just about through the main design and implementation tasks. The localisation of Imagine have been finalised in all countries, the microworlds have just been formally tested within local settings and the Eurologo conference is the premier test site of the beta versions. Different papers and workshops intend to give participants the flavour of our vision in realising the project. So there is not much to conclude yet, but we do appreciate feedback from participants as to their view for the values in our achievements as well as critics in order to improve our work for the benefit of the whole European community.

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