



Integrated intelligent LEARNing environment for Reading and Writing

D2.1 – Project Presentation and Project Website



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Abstract	<p>ILEARNRW - Integrated Intelligent Learning Environment for Reading and Writing - is a 3 year project aiming to contribute towards a move away from traditional assistive software which uses a computer simply as an alternative to pen and paper and towards developing next generation learning software which uses a computer system to facilitate the learning process for children with dyslexia and/or dysorthographia.</p> <p>This deliverable aims to (i) describe the project concept, objectives and expected results and provide an overview of the work that is planned to be performed within its 3-years duration, and (ii) describe the development of the website ILearnRW.eu.</p>

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Project information

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1. Introduction

The aim of the ILearnRW project is to contribute towards a move away of traditional assistive software which uses a computer simply as an alternative to pen and paper and develop next generation learning software which uses a computer to facilitate the learning process for children with dyslexia and/or dysorthographia.

The ILearnRW system builds and maintains individual profiles for each child (*User Modeling*). The profile should include, among others, the type of dyslexia and the errors the user is most likely to make. The interaction of a child with the learning environment should be based on a *teaching strategy* that supports the individual user in fulfilling his / her specific learning goals.

To improve its usability the ILearnRW system supports *classification of learning material*. Content classification must be a major component in any content management system. To think about it, a tutor helping a child to learn reading / writing always selects appropriate learning material based on the child's needs and capabilities. Additionally, the system produces and maintains an *on-line resource bank*. Coherent collections of data which support specific teaching strategies should be accessible to learners and educators.

Personalized content presentation is also an important feature of the system. If we know the errors the user is likely to make, we can enrich the text presentation with visual cues by combining highlighting, text-reformatting and word segmentation. In addition, the type of dyslexia should also influence the presentation.

Engaging learning activities for children also provided by the ILearnRW environment. High degree of learner engagement is sought in any learning activity. To achieve this goal, we integrate learning activities into serious games. A creative game scenario, coupled with a positive reinforcement mechanism, will extend child's engagement.

Furthermore, the system offers the functionality of the *evaluation of learning*. When a game is coupled with a game usage logging mechanism, data collected related to the user's actions may lead to a quantitative assessment of learning.

The ILearnRW environment will support the English and Greek languages

This deliverable aims to describe the project concept, objectives and expected results and provide an overview of the work that is planned to be performed within its 3-years duration.

With this deliverable we also describe the development of the website ILearnRW.eu and the provision of the project presentation templates.

The full list of dissemination tools so far produced within the project include:

- Project logo,
- Project website,
- Presentation materials (including a general ppt to describe the project)

2. Aim and Objectives

2.1 Aim

The aim of the project is “To develop next generation learning software which uses a computer to facilitate the learning process for children with dyslexia and/or dysorthographia”

2.2 Objectives

Towards that aim, at a high level, the Scientific and Technological objectives of the project are:

1. Development of an Integrated Intelligent Learning Environment for Reading and Writing (the ILearnRW system) which:

- supports user profiling
- incorporates learning/teaching strategies
- supports the classification of learning material based on user profile
- supports personalized content presentation
- supports engaging learning activities
- supports the evaluation of learning
- incorporates an on-line resource data bank.

2. Evaluate the ILearnRW system in terms of its overall success in promoting the learning process of reading and writing through extensive field-testing in different language settings (UK and Greece).

Based on the above high level description, the specific Scientific and Technological objectives of the project are:

To understand and define the characteristics of the ILearnRW integrated learning environment terms of: (i) user's needs (children with dyslexia/ dysorthographia) as communicated by children, teachers/tutors, dyslexia experts and speech therapists, (ii) language learning models regarding reading/writing development and impairments, and (iii) taking advantage of aspects of Ubiquitous Computing.

Towards this direction, the project should:

- Conduct a detailed user requirement analysis
- Develop learning strategies specifications
- Develop technical specification
- Develop detailed test bed specification for trials in UK and Greece.

Develop a model for users with dyslexia/dysorthographia (for English and Greek) that will be utilized through user profiling in:

- selection of appropriate/suitable content for each user,
- personalized content presentation and interface or interaction adaptation.

To develop and implement the content adaptation and presentation mechanisms (which include text-to- speech) which, in conjunction with individual user profiles, will result in content presentation that suits each individual user.

To specify the rules/mechanisms which adapt the ILearnRW user interfaces and game scenarios (based on individual user profiles).

To develop and implement content classification mechanisms that rank content/text appropriateness as learning material for a specific user with reading/writing difficulties (based on her profile).

To design profile-aware game scenarios which induce effective learning for children with dyslexia/dysorthographia.

To design profile-aware game interfaces and interactions.

To design and implement a game usage logging mechanism.

To implement the designed educational games.

To design ILearnRW's system architecture.

To design and implement a knowledge representation and reasoning mechanism supporting user profiling.

To integrate the components of ILearnRW into a fully functional prototype which incorporates a profile aware on-line resource data bank.

To develop an evaluation methodology for ILearnRW's evaluation in UK and Greece

To implement the UK and the Greek test beds, including:

- development of the necessary learning resources
- training of participants
- controlled usage of the ILearnRW environment
- Data collection

To evaluate the ILearnRW system based on the analysis of the data collected during the implementation of the UK and Greek test-beds.

3. Description of Work Packages

WP 1 Project Management

To effectively handle the management, co-ordination and quality assurance activities of the project, ensuring a successful completion of the project goals on time, within budget and with quality standards adequate for European Projects. The WP will be running all along the project lifetime. This general objective is comprised of the following more specific ones:

- Detailed project planning, monitoring and reporting
- Definition and monitoring of the quality standards set for the whole project
- Definition and implementation of the communication procedures to be followed within the project and with external agents.
- Scheduling and organising project meetings

WP 2 Dissemination and Exploitation

To disseminate and exploit the research and development results of ILearnRW by:

- Creating public awareness and scientific interest for the project and its results, and
- Planning and preparing the commercial agreements to ensure a smooth introduction of these results into every day practice.

WP 3 Requirements Analysis and Specification

--To define the characteristics and requirements of the ILearnRW integrated learning environment in terms of:

- Users' needs (pupils with dyslexia and dysorthographia) as communicated by children, teachers/tutors, language/dyslexia experts, speech pathologists.
- Language learning models regarding reading development and reading impairments.
- Taking advantage of the increased computational power and display capabilities of today's computing devices (PCs, laptops, tablets, mobile phones).

--To define the necessary specifications for both the system to be developed (technical specifications, employed learning strategies) as well as for the test-beds that will be used to evaluate the ILearnRW learning environment.

WP 4 Personalization, Interface and Content adaptation

--To develop a model for users with dyslexia/dysorthographia that will be utilized through user profiling in:

- selection of appropriate/suitable content for each user,
- personalized content presentation.

--To develop and implement the content adaptation and presentation mechanisms (which include text-to-speech) that, in conjunction with individual user profiles, will result in content presentation that suits each individual user.

--To specify the rules/mechanisms that adapt the ILearnRW user interfaces and game scenarios (based on individual user profiles).

--To develop and implement mechanisms that rank content/text appropriateness as learning material for a specific user with learning difficulties (based on its profile).

WP 5 Serious games

--To design game scenarios which induce effective learning for children with dyslexia/dysorthographia.

--To design game interfaces and interactions

--To design and implement a game usage logging mechanism

--To implement the designed educational games

WP 6 System development, Integration and refinement

--To design the ILearnRW's system architecture

--To develop ILearnRW's knowledge infrastructure component (designed in WP-4)

--To integrate the components of ILearnRW into a fully operational prototype which incorporates an on-line resource data bank.

--To redesign/redevelop the ILearnRW prototype based on the results of its evaluation (WP7)

WP 7 Evaluation

--To develop the evaluation methodology that will be adopted during the evaluation phase of ILearnRW.

--To implement the UK and the Greek test beds, including:

- development of the necessary learning resources
- training of participants
- controlled usage of the ILearnRW system
- Data collection

--To evaluate the ILearnRW system based on the analysis of the data collected during the implementation of the UK and Greek test-beds.

4. The Consortium

The consortium consists of 7 partners, coming from 4 different EU countries (Denmark, Greece, Romania and United Kingdom).

Five consortium partners are Academic/Research Institutions:

- National Technical University of Athens (NTUA)
- University of Malta (UoM)
- University of Birmingham (UOB)
- Technological Institution of Epirus (EPIRUS)
- Lucian Blaga University of Sibiu (LBUS)

One SME IT expert

- Dolphin Computer Access Ltd (DOLPHIN)

One non-profit organization aiming to provide help to people with have dyslexia and struggle with literacy.

- Dyslexia Institute Limited (DYSACT)

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4. Project challenges and prospects

A new concept: From assistive to learning software for dyslexia and dysorthographia

This is the possibly the most central feature in ILearnRW. A user with dyslexia and or dysorthographia has to be modelled. This involves not only into mapping expert knowledge on these two specific learning difficulties, but also into deciding which part of this knowledge can be effectively (in terms of time) processed on a computer. The AGENT-DYSL project had successfully modelled error types for dyslexia. Now we have to model not only error types, but also different kinds of dyslexia (surface, developmental, deep dyslexia). In addition, we have to process an additional disorder: dysorthographia.

Advanced user modelling (error types and dyslexia types)

For each learner (we have not attempted to model the tutor yet) we will build a profile. The profile will have to be updated during the use of ILearnRW and to reflect the learner's acquired skills and difficulties. Almost everything in the learning environment will be "profile-sensitive", that is, its behaviour will depend on it. The presentation of the reading material will depend on the user's profile. The same holds for the selection of the appropriate teaching strategy, the content classification, the playing experience during a serious game, the search of the on-line resource bank.

Adaptive learning strategies

The ILearnRW brings learning strategies into the learning systems. The educational experts of the consortium will lead the way, by selecting the learning strategies to be considered by the project and, most importantly, by providing the necessary information regarding the adaptation of the learning strategies based on the user's profile. The content presentation had been successfully parameterized by a profile in AGENT-DYSL. Doing the same with a learning strategy is something new.

Content presentation mechanism

The data will be presented in a way that is appropriate for the user. By appropriate, we mean that visual cues will control the reading speed of the user and at the same time will help her to read. The visual cues provided to the learner are again customized based on her profile. Highlighting will be creatively used, in conjunction with text analysis that identifies the challenging text parts which are likely to cause the reader to err.

A Synchronization problem: text-to-speech and highlighting

In order to provide more help to the reader, we decided to make multisensory input available to the user, supported by a text-to-speech system in cooperation with the content presentation mechanism. However, in this way we are possibly exposing ourselves to a small (?) challenge concerning the synchronization between the produced speech and the content highlighting, especially in when it operates in syllable or segment mode. At these modes of operation, the produced speech may not be as smooth as required, especially given the ability of the human ear to distinguish even the smallest irregularities in the sound signal.

Content classification

Content classification and, consequently, profile parameterized text (and media) searching is a valuable feature for a user with a reading/writing disability. In exactly the same way we are able to sort our files based on their size or creation-time, she should be able to list them in decreasing order of

suitability/appropriateness for her profile. This brings into the figure, several new data that may have to be included in a profile: the level of literacy, the size of the vocabulary, among them.

Serious games: a promising delivery mechanism

In order to engage the reader into the learning activities we decided to integrate learning activities into serious games. Game scenarios have yet to be designed and the way the game interface and interaction will be personalized, based on the user's profile, has yet to be determined. It seems that serious games can be the answer to engagement problem. Children prefer to play games instead on doing reading exercises in front of a computer.

Serious game: can they support evaluation of learning?

At the end of a reading session, it should be nice to be able to answer the question "Did any learning take place?" It is our hope that serious games can also provide a mechanism for answering such questions. We will observe (and of course keep a record of) the actions/moves of the user during a game. Our intention is to correlate the actions of the user with the instructions he received in writing. E.g. many failed attempts to correctly follow instructions may not be a good sign...

Implementation of game usage-logging mechanism

A game usage logging mechanism will be implemented. The task seems to be easy at first sight, however, several timing constraints have to be analysed and the whole game activity may have to be stored for post-processing.

Making everything available: A profile sensitive resource bank

So far, several resources have been developed (or, better, "described"). All of them are centred on the notion of the profile. So, it makes sense to make everything available on-line. Games, reading/writing resources, viewers, etc. The material is useful to many children with dyslexia/dysorthographia, to teachers/tutors, parents.

Profile sensitive search engines

Everyone builds profiles for everyone else on the internet. Why don't we build a search engine that uses ILearnRW's profiles. It will be helpful to many children, and its implementation may not prove to be so hard.

Modes of delivery: internet, mobile, eBooks

So far we have avoided raising the issue of which devices to view the learning material. To date we have assumed a conventional PC or laptop will play the role of the viewer? However, there are many more possibilities. We can utilize tablets, mobile phones portable video games. eBooks is an interesting possibility; the same holds for a web plug in. Finally, an issue that we have to consider is "where do we store the profile so that it is readily available? A potential solution is to put everything on the "cloud".

Make long term plans: Design long trials.

We finish this section of challenges/ prospects with an exciting opportunity. The availability of the ILearnRW environment at the end of the project will make it possible to make long plans. Studies can be designed that probe many research questions in the field of Speech and Therapy.

6. Expected Impacts

The use of the proposed ILearnRW environment will unlock the potential of the individual child by a stronger and smarter adaptation and personalization of education technologies.

The central theme in the design philosophy of the ILearnRW environment is the notion of modelling.

The system incorporates expert knowledge that models dyslexia and dysorthographia based on a collection of error types the user is likely to make and a classification of the type of dyslexia the user is suffering from.

Based on this information, a user profile is created which will ensure that during his engagement with the system the user enjoys personalized treatment, instantiated through the individualized content adaptation and presentation. The system besides modelling dyslexia and dysorthographia, also models and adopts a large number of teaching strategies, each suitable for users with different profiles. In this way, the interaction with ILearnRW really becomes a unique, custom-fitted to the user, learning experience.

Dyslexia is a persistent reading disability. Over time, dyslexic learners can improve their reading skills, but the gap in reading ability between good and poor readers remains into adulthood. This gap is significant, as it can be observed in Figure 1, and turns dyslexic people into low achievers in education and learning excluding them from several aspects of social living.

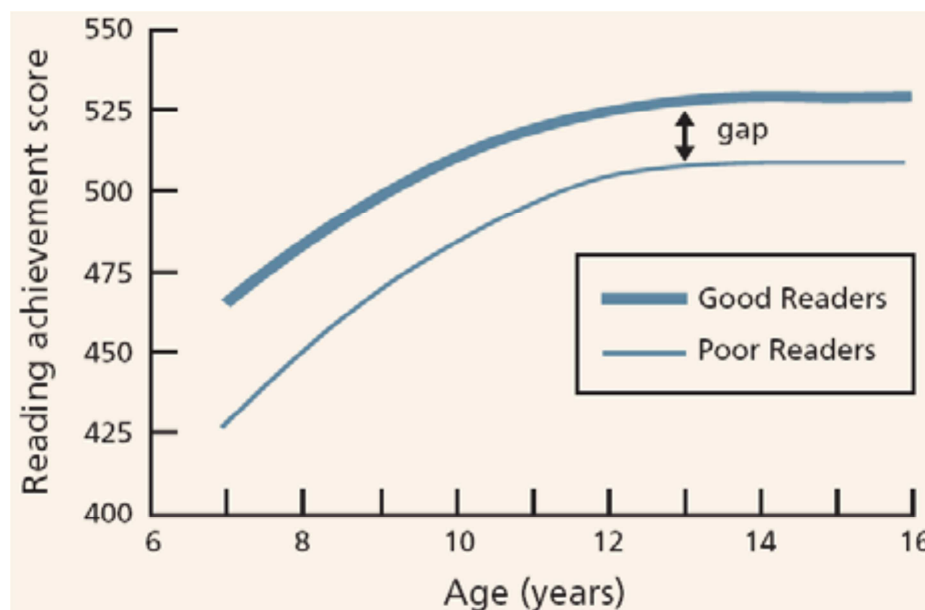


Figure 1: Reading achievements for good readers (normal persons) and poor readers (dyslexic persons). Scores are in the interval between 400 (very low) and 550 (very high achievements).

According to Dyslexia Research Institute, ten to fifteen percent of the US population has dyslexia, however only five out of every one hundred dyslexics are recognized and receive assistance. Experts also, estimate that 6 to 10 percent of the school-aged population in the United States is learning disabled. Furthermore, approximately 60% of individuals diagnosed with attention deficit hyperactivity disorders are also dyslexic. In U.K., according to British Dyslexia Association, 10% of the British population is dyslexic, while 4% of them are facing severe difficulties. Also, new statistics indicate that about 47.5% of the disability population relates to individuals with learning disabilities

and approximately 85% of all individuals with learning disabilities have difficulties in the area of reading. Other statistics indicate that 35% of students with learning disabilities drop out of high school, a percentage which is twice the rate of their non-disabled peers. Of those who do graduate, less than two percent attend a four-year college, despite the fact that many are above average in intelligence.

(Source: National Longitudinal Transition Study)

ILearnRW addresses the problems of poor reading and writing skills. Improving the reading/writing skills of a child will enable it to study other topics and improve its written performance in exams. Reading is such a basic and necessary skill that, if ILearnRW is successful, users will be able to go on to reach their full potential.

The use of the proposed ILearnRW environment results in a significantly higher level of effective, personalized, ICT-based tutoring, leading to its wide-spread penetration in schools and at home.

As already stated, ILearnRW is an ICT-enhanced learning tool that endows the capabilities of a user. Its state of the art modelling capabilities and personalization features make it appropriate for widespread penetration in schools and at home. Its on-line resource bank, provided that it is populated with high quality learning material will further reassert this.

The acceptance of ILearnRW and its potential wide spread market penetration may result to significant savings. According to Dyslexia Institute⁷² the poor literacy and basic skills as a result of undiagnosed dyslexia costs the UK economy £1bn a year. It can be mentioned that the cost of fighting dyslexia in a treatment centre is about 2000 € for a period of 9months. Only in U.K. about 6 million people are dyslexic, and the treatment for just 40% of these (severely dyslexic) is approximately equal to 5 billion Euro.

The use of the proposed ILearnRW environment may result in the emergence of a new learning model.

It may be premature to predict the emergence of a new learning model from the use ILearnRW. However, the learning environment supports many new features, especially with respect to user modelling and personalization, so that is likely that a new learning model, or at least, new teaching strategies will emerge. Verifying this kind of finding requires studies spanning a long period of time; significantly longer than the 6 month evaluation period with children in UK and Greece.

However, the educational partners see this project and the proposed development as an opportunity to initiate long term research that studies children with dyslexia/dysorthographia during their development. It should be noted that, even though it may be too early to talk about an emerging learning model, we can definitely talk about a new way of evaluating learning through the employment of serious games. At the end of the project, we should have clear indications on whether this is a viable methodology. The reason that this contribution requires a European approach is due to the fact that modelling of dyslexia and dysorthographia is language dependent. The ILearnRW will be fully developed for the English and the Greek languages. The language dependent tasks will be clearly identified and an accurate estimate of the time required for their development will be gained. This will facilitate the extension of the system to other languages.

7. Project Logo

The ILearnRW logo is represented by the project acronym and an arc of stars often associated with the European Union.

The idea was proposed by the website coordinator at Dolphin Computer Access.

Several logo options were circulated for feedback and the consortium members agreed on the final logo by vote.



8. Project Website: ILearnRW.eu

The ILearnRW Website has been online since December 2012. It was decided to develop the public website in order to provide information on the project's goals and expected results. In this way the consortium aimed to attract the public's interest and then maintain it by continuously uploading updated information on the project's status.

The website has been structured to immediately provide the most basic information on the project, allowing the user to browse for more detailed information and eventually if he chooses to download public documents such as project deliverables.

Contact details for the consortium are provided in case the users wish to reach the partners. In this way further collaborations are encouraged.

The website content will be continuously updated and enhanced as the project's work advances.

8.1. Website Structure

It was developed using Drupal 7.17 (with modules CK Editor V1.11, Backup and Migrate 2.4). The website is hosted and maintained by Stefan Pearson.

A statistics analyser has been activated.

The goal of the ILearnRW Website is to promote and disseminate all project activities and results (public section) and to satisfy partners' needs (reserved area 8.2).

Currently, the sitemap, proposed is the following:

- Home
- About us (Information on the project)
- Consortium (Description of project partners, with link to single institutions)
- Work Packages (WP descriptions and lead beneficiaries)
- Deliverables (List of all deliverables)
- Publications
- Contact Details

Each partner contributes to the enrichment of the website.

Further developments are foreseen.

The main menu will be developed to include drop down sub menus using a modified version of a default Drupal theme.

The Publications area of the site will be populated with information as and when it becomes available.

Accessibility - ensured that all network users with mobility or visual impairments will be able to access the website's content by meeting the W3C accessibility criteria.



ILearnRW

Integrated Intelligent Learning Environment for Reading and Writing

- Home
- About Us
- Consortium
- Work Packages
- Deliverables
- Publications
- Contact Details

Home

About Us

The aim of the project is "To develop next generation learning software which uses a computer to facilitate the learning process for children with dyslexia and/or dysorthographia"

Towards that aim, at a high level, the Scientific and Technological objectives of the project can be described as the:

1. Development of an Integrated Intelligent Learning Environment for Reading and Writing (the ILearnRW system) which:

- supports user profiling
- incorporates learning/teaching strategies
- supports the classification of learning material based on user profile
- supports personalized content presentation
- supports engaging learning activities
- supports the evaluation of learning
- incorporates an on-line resource data bank.

2. Evaluate the ILearnRW system in terms of its overall success in promoting the learning process of reading and writing through extensive field-testing in different language settings (UK and Greece).

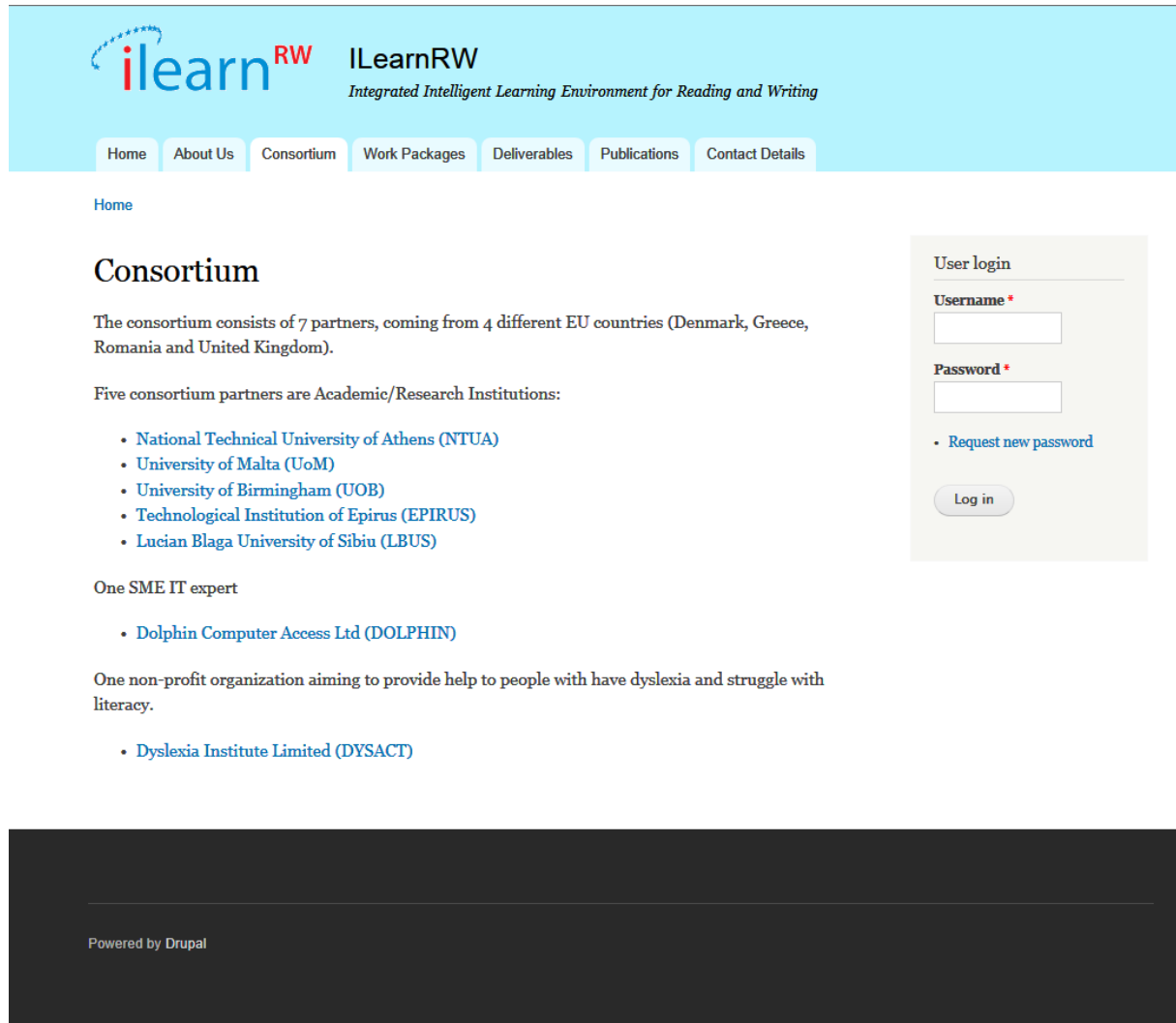
ILearnRW, project number: 318803 (ICT-2011-8) is an Integrated Project of the European Union's 7th Framework Programme: Information and Communication Technologies (ICT). The project started in October 2012 and will finish in October 2015 (36 months). There are 7 participants from 4 countries involved in the project.

User login

Username *

Password *

[Request new password](#)



The screenshot shows the ILearnRW website. At the top, there is a navigation menu with links for Home, About Us, Consortium, Work Packages, Deliverables, Publications, and Contact Details. The main content area is titled "Consortium" and contains the following text:

The consortium consists of 7 partners, coming from 4 different EU countries (Denmark, Greece, Romania and United Kingdom).

Five consortium partners are Academic/Research Institutions:

- National Technical University of Athens (NTUA)
- University of Malta (UoM)
- University of Birmingham (UOB)
- Technological Institution of Epirus (EPIRUS)
- Lucian Blaga University of Sibiu (LBUS)

One SME IT expert

- Dolphin Computer Access Ltd (DOLPHIN)

One non-profit organization aiming to provide help to people with have dyslexia and struggle with literacy.

- Dyslexia Institute Limited (DYSACT)

On the right side of the page, there is a "User login" form with fields for Username and Password, a "Request new password" link, and a "Log in" button. At the bottom of the page, there is a dark footer area with the text "Powered by Drupal".

8.2. Reserved Area

A reserved area, accessible by partners only, has been set up on Basecamp. This will be used to store project documents, WP documents, reports, forms, meeting notifications etc.

9. Presentation Materials

A generic PowerPoint template incorporating the project logo and a PowerPoint describing the project goals and aims has been prepared for the partners' use when presenting ILearnRW on relevant international or national conferences. The information has only been prepared in English, partners presenting will be responsible for translation.

All presentations prepared by the partners will be available for internal use for all ILearnRW members.