Laboratory door opens to non-formal learning communities. Science centres as mediators

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Abstract

The e-KNOWNET is a Lifelong Learning project, which aims to develop an innovative and viable mechanism to facilitate the flow of new scientific knowledge produced in the research laboratory, to larger non-expert segments of society, in forms suitable for non-formal learning, with the use of interactive web-based educational application. This networking and collaboration scheme hopes to provide science centres with learning resources that have been produced based on the latest developments of scientific research, and methodological tools for further production of similar learning materials. These resources will be available on-line and off-line for their visitors.

Keywords: non-formal science learning, science communication and social networks.

1. Rationale and background

In the past 20 years, the rapid evolution of the information and communications technologies (ICT) and the growing public use of the Internet have brought immense changes in the way people communicate, learn, and experience the world. The latest generation of ICT[1] combined with World Wide Web applications create a plethora of new learning environments (web-based collections, on-line exhibitions, simulations, augmented reality applications, wikis, on-line seminars etc), and encourage the emergence of new networks linking physical spaces, users and networked experiences. Boundaries between institutions and disciplines subside, as well as the concept of age-specific learning cohort.

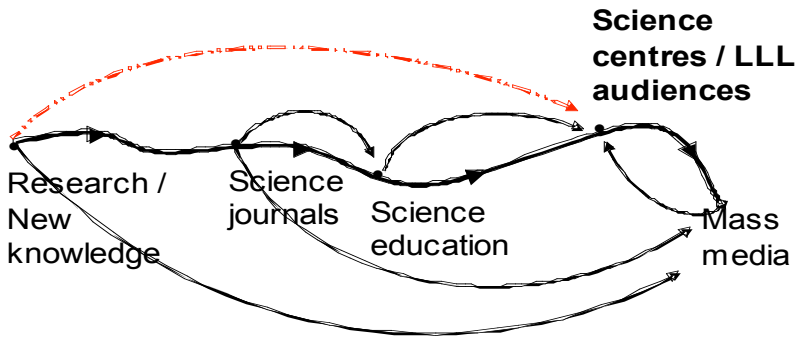
There is no doubt that a certain degree of science literacy is increasingly becoming a necessary condition to function as a citizen, an employer or employee, a participant in social activities, etc. New knowledge produced through research needs to be efficiently disseminated through education and applied through innovation. Information flow from traditional loci of science knowledge production (e.g. research centers, universities, sites of industrial research) to non-expert segments of society can take as long as two decades - about 20 year lagging for nuclear energy issues, 12 to 15 year for informatics, 8 to 10 for biotechnology (Rudig, 1990; Wright, 1986)! In Europe a network of more than 70 EU-funded Innovation Relay Centres, a number of R&D liaison offices[2] and dedicated sites and relevant projects (ISTResults, Technology Market Place cordis.europa.eu/marketplace, EU funded SINAPSE site, DARE programme) circulate information referring to on-going research or research results and encourage relationships between industry and research centres across

[1] A blueprint for a new approach, Science, Technology and Innovation in the Media (STIM), Ministry of Flanders, Science and Innovation Administration, Crete - March 27, 2003.

[2] In Greece there are two main networks: the Innovation Relay Centre and the Innovation Relay Centre Praxis (nonprofit organization under the auspices of Federation of Greek Industries (ΣΕΒ), Federation of Industries of Northern Greece (ΣΒΒΕ) and Foundation for Research and Technology – Hellas (ITE).

member states. This type of network leaves out intermediary organizations such as science centres, which are important players in non-formal science education. As a consequence, science centers have no means to remain informed about state-of-the-art research and technological developments and select their content often most relying on the agenda set by the media which observes the criterion of newsworthiness and public attractiveness and less often that of real scientific value or innovative quality.

In the countries of the e-KNOWNET partners, and according to data referring to Europe, scientists are often reluctant to share with non-expert audiences the product of their work in a comprehensible way, probably in an effort to defend the conventions and principles of the scientific method and the integrity of the scientific results[3]. Restriction of knowledge within isolated "islands" is a hindrance to innovation holding back the potential of societies to advance their learning environments, and improve their information and educational resources and practices. Therefore, there is a need for efficient networking among the major stakeholders of production and dissemination of new scientific knowledge through non-formal education, in order to accelerate the circulation pace of specialized information and minimize the influence of extra-scientific factors upon the development of information and non-formal educational resources which reach the citizen.



The "adventures" of new science knowledge before it reaches the non-expert

2. The Project

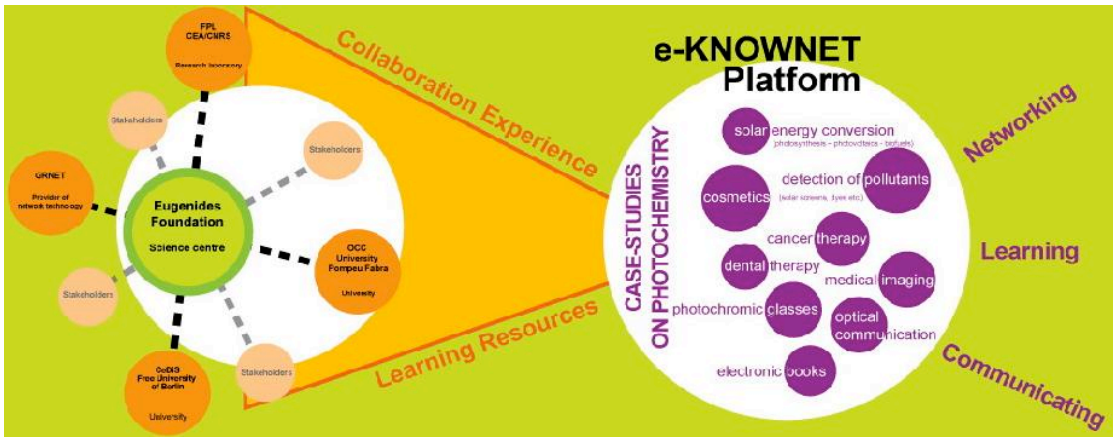
The project promotes networking and cooperation in the field of lifelong learning among complementary knowledge-based organizations such as research institutions, universities, science centres and museums, and also between communities linked to formal and non-formal education, practitioners, as well as experts in learning and communication sciences, technology-enhanced learning etc. The network brings together 5 complementary institutions associated with knowledge and learning (e.g. universities, research laboratory, technology provider to academic and school communities, and a science centre), with diverse experience of ICT-mediated learning, aiming to develop new, demand-driven insights and know-how on ICT-enabled science learning in non-formal environments. The network with the use of ICT enables the direct cooperation between knowledge producers (researchers), transformers of this input (educational experts) and its end-users (learning communities).

[3] CREST Report on Science and Society (CREST 1206/01), "Science, Society and the Citizen in Europe", SEC (2000) 1973.

The partners of the project are: Eugenides Foundation, Athens, Greece (coordinator); Greek Research and Technology Network (GRNET), Athens, Greece; Free University of Berlin – Center for Digital Systems, Competence Center e-Learning/Multimedia, Berlin, Germany; Francis Perrin Laboratory - Commissariat à l'Énergie Atomique / Centre National de la Recherche Scientifique-CNRS, Paris, France; Science Communication Observatory / Universitat Pompeu Fabra, Barcelona, Spain. The Educational Portal of the Hellenic Ministry of Education and Religious Affairs (www.e-yliko.gr) participates as silent partner.

This direct cooperation accelerates the circulation pace of specialized information which reaches the citizen and limits the influence of extra-scientific factors upon the selection of scientific information and transformation into educational resources. A dedicated e-platform will act as the virtual depository for – and as the hub for redistributing - popularized new science knowledge available in resourceful forms beyond the conventional. A series of pilot learning electronic resources and services available through the Internet or locally at science centres (i.e. science web content, e-exhibits) will be accomplished utilizing popular applications (e.g. Video Web casting, Video on Demand, Grid Computing, etc.). Science centres are expected to act as catalysts in this process of knowledge sharing and circulation considering their significant outreach potential and public appeal. There is nowadays an evolving convergence between the traditional learning resources and the new ICT which combined with web application may be a major support in the teaching of science content (e.g. the laws, theories, facts) and scientific processes (e.g. measuring, recording, processing data) through simulations (i.e. models that are created by others) and / or modelling (models created by pupils). Science centres can encourage their visitors to profit from ICT–enabled life long learning activities. ICT has increasingly entered the field of science museums and centres, furthering the attractiveness of the visit for visitors of all ages (web-based collections, on-line exhibitions, simulations, augmented reality applications, wikis, on-line seminars, etc). Simulations and modelling used in science exhibits incorporating ICT offer a wide range of learning opportunities by either describing reality or by simplifying it to aid conceptual interpretation (Boohan, 2002).

The e-KNOWNET will offer pilot learning activities which will be customized along the different pedagogical profile of each learning audience. e.g. Dialogue with users with special and demanding needs, will be established in order to ensure that their requirements are met. Specific actions to achieve this are the following: Technical meetings with representatives of such groups, provision of consultancy in the form of project management assistance and technical advice, to help in establishing particular network configurations. Well tested methods and practices of science education in life-long learning contexts, will be employed in this phase. The piloting activities will focus on fast developing topics of Physical Chemistry and will be adjusted to fit real learning needs of the users. Lastly, e-KNOWNET has a dual concept: a) the human network dimension, meaning the a network of institutions, partners, stakeholders and LL – learners (study visits between partner organizations, peer-training workshops on the production of material suitable for ICT supported life-long learning) and b) the ICT dimension which means as a portal will be the test bed of the knowledge - sharing network.



A graphic representation of the concept of the e-Knownet project

3. Aims and objectives

The project will develop an innovative and viable ICT-enabled mechanism for fast and efficient sharing of new scientific knowledge among larger, non-expert segments of society. The "show case" of the project will be an e-platform focusing on Photochemistry (European Photochemistry Association is a privileged stakeholder of the project which is going to actively contribute offering knowledge input, supporting for awareness-raising purposes, holding a strong participant role etc.) that will function as a virtual depository and as a redistributing hub for the dissemination of popularised new scientific knowledge. The platform will also act as a virtual meeting place for a variety of learning communities. In this distributed learning environment science centres are seen as catalysts that promote the use of ICT for life long learning among the general public.

More specifically, e-KNOWNET main objectives are the following: a) to produce an innovative model of a European knowledge-sharing network enabled by information and communication technologies, b) to use ICT tools to promote knowledge-sharing, collaboration and networking, c) to promote the educational role of ICT in non-formal environments and encourage digital literacy, across the lines of gender mainstreaming, d) to trigger new dynamics in ICT-enabled life-long learning, through linking up fields that traditionally have been working in isolation, i.e. scientific research institutions, communities of pedagogical science experts and science centres, e) to enhance the quality of educational services provided in non-formal environments, such as the science centre/museum, f) to offer new incentives in science learning (on selected topics of Physical Chemistry), g) to expand the human network involved in the e-KNOWNET (exploitation phase), h) to promote and make known the e-KNOWNET to learning communities and stakeholders through awareness raising and dissemination activities (launching and closing conference, two press conference, 5 science cafes, 2 awareness-raising workshop with key stakeholders, Science Cafes, press briefings and press releases) and i) to promote equal opportunities in informal learning for the disadvantaged, offering learning opportunities to remote, isolated or secluded populations, and people with disabilities, through the application of special assistive technology tools.

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