

KNORK Project Objectives

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Abstract – The paper presents the KNORK Project. The objective of KNORK is to develop pedagogical models and technology to support collaborative practices in technology-rich environment. Based on brief introduction to KNORK theoretical foundations, the educational practices in using ICT in education are outlined. Against this background the role of the Technical University of Sofia and the Technological School Electronics Systems in changing educational practices to promote collaborative knowledge creation is highlighted.

Keywords – Collaborative knowledge creation, cloud-based applications, social software

I. INTRODUCTION

Knowledge work in the globalized economy is increasingly done in inter professional teams, mediated by technologies, but in education, the required related competencies are not well addressed.

A current challenge for education is to prepare learners for the emergent knowledge society through appropriate pedagogical practices that promote competencies for sharing, creating and working with knowledge and knowledge artifacts in an innovative way.

Formal education is expected to develop methods that support students in acquiring versatile competencies for knowledge work. These competencies are also emphasized in national curricula.

The current approaches of working with knowledge in educational are still focused on individuals' skills and knowledge structures (knowledge acquisition) on the one hand, or on social and cultural interaction (participation) on the other hand. The problem is that they do not provide sufficient models for facilitating processes of knowledge creation with related technological, practical and organizational means.

Pedagogical methods are still largely based on well-defined problems with known solutions. Educational analysts and industry representatives report that students leave higher education with an underdeveloped ability to solve open-ended problems. Facing with real-world complexity and collaboratively solving complex problems

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are ways of bringing educational practices closer to the requirements of the surrounding society. This is a same challenge for secondary and higher education. Secondary schools should prepare students for the practices of higher education, including demands for more independent studying and managing complex, open-ended tasks, which are not well supported in the rather teacher-centered practices in secondary schools today.

To answer these challenges the KNORK (Promoting Knowledge Work Practices in Education) project [1] aims at developing pedagogical models and technology to support collaborative practices in technology-rich environment. The focus is on supporting secondary and tertiary level teachers to promote students' knowledge-related practices where digital competence is crucial, and to establish collegial and European level practices.

KNORK is a 3 year, EU-funded integrated project with 9 partners from 4 countries. The partners represent the synergies between high education institutions and secondary schools in each country. The consortium is planned to represent different expertise. Researchers representing both pedagogy and psychology define and investigate the models and practices; researchers of technology investigate and develop the technological solutions; school and university teachers participate in co-evolutionary process and contribute to practical implementation of developed educational models and tools.

II. OBJECTIVES OF THE KNORK PROJECT

Concrete aims of the project are the following [1]:

1) To develop pedagogical practices in the participating institutions by a) promoting students' knowledge work and digital competencies following the dialogical learning approach, and b) supporting teachers in re-designing their teaching using dialogical design principles and modern digital technology.

2) To support the creation and establishment of cross-fertilization contacts between secondary and higher education institutions, or between higher education institutions and work life organizations, in order to expose students in authentic knowledge work practices.

3) To support teachers in evaluating, adopting and applying modern online learning platforms, cloud collaboration tools and social software in authentic educational settings in secondary and higher education contexts. 4) To produce cost-effective models for supporting teachers' professional development in secondary and higher education institutions: collegial tutoring practices, virtual workshops and peer-to-peer -contacts will be created and tested so that the innovation, support and dissemination of pedagogical methods and technologies can be actualized locally in the teachers' everyday work.

5) To create online Re-use library material for teachers, educators and researchers to share and further develop pedagogical scenarios and materials. Re-use library will include research-based guidelines and concrete exemplars, toolsets, evaluation questionnaires and templates that can be taken into use and adapted in educational settings. The aim is to incorporate best materials in established national and European level repositories to ensure their availability also after the project.

6) The “Europeanization” of teachers and education: supporting a European network of teachers so that practices can be exchanged and teachers can learn from each other. An online teacher training package will be published to support this aim. The aim is to help teachers with language barriers in sharing best ideas and practices through virtual means for filling the gap between the national practices of the countries involved and to value the diversity.

7) To produce research-based knowledge of the appropriateness of the tested pedagogical methods for promoting students’ knowledge work and digital competencies in secondary and higher education as well as the effectiveness of the new models for educating teachers in adopting knowledge work practices and digital technology in their teaching

III. INNOVATIVE CHARACTER

There is an emergent trend to highlight knowledge creation practices as a basis for understanding modern knowledge work, but fewer pedagogical approaches for promoting related competencies.

Often the focus is still on the individual acquisition of domain knowledge, although increasing amounts of study programs are based on modules including distance learning, group work or web-based discourse. Besides these monological (acquisition of knowledge by individuals) or dialogical (participation in social interaction) models, there is a need for practical examples of supporting “trialogical” learning (collaborative knowledge creation): processes where the aim is to develop new products and solutions as in real knowledge work [2].

In order to achieve this aim, it is essential to increase cross-fertilization between schools, higher education institutions and professional organizations. Students on all levels need to apply their expertise in interdisciplinary, goal-oriented projects that go beyond separate, single study units.

In the KNORK project, the idea is to use the triological approach as a “vehicle for change”. Pedagogical principles, models and technologies based on the approach will be developed to inspire and guide teachers to more systematically include new technologies and creative pedagogies in the curriculum to address knowledge work and digital competence. Such key competencies are most effectively acquired through collaborative learning practices around shared advancement of knowledge objects referred to as “trialogical” knowledge creation.

Basic communication tools (e-mail, file sharing) and VLEs (Moodle and other) provide only limited support for collaboration because they are designed for discussion and

information sharing with static artefacts. They support peer communication, but not necessarily flexible team interaction and co-construction of artefacts.

In the KNORK project, teachers will be supported to use modern cloud collaboration tools and social software that better afford flexible and effective sharing, versioning and co-construction of knowledge. Teachers, educational researchers and technical partners will together test, adapt, and integrate collaboration tools in ordinary classrooms.

The project emphasizes teachers’ professional development and sustained pedagogical improvement by fostering them in multiple levels: providing methods for collegial tutoring, institutional-level practices, and cross-national as well as cross-cultural sharing and interaction.

IV. EDUCATIONAL PRACTICES IN USING ICT

The development of schools through the introduction of information and communication technology (ICT) is a central focus of educational discussion in Europe.

New strategies are needed because research results indicate that pedagogical change in schools through ICT has not actualized as expected. Teachers often reproduce practices focusing on content learning rather than use technologies to foster higher-order innovation skills.

Teacher training is a major vehicle through which a change in education can be initiated. Typical teacher training courses are not effective enough in promoting ICT-based pedagogical change, and new practices do not easily pass from one teacher to another. Teachers benefit from concrete examples of advanced but realistic pedagogies in real classroom settings, the combining of technical and pedagogical training as well as support in situ in their everyday work. New models for teacher training are needed, such as reciprocal peer-learning and collaborative project teams and school level networking at university level [3].

Bridging the gap between teachers’ and researchers’ communities through cultivating innovative knowledge practices is one of the central conditions of success of the KNORK project. The challenge is:

- to transform the teacher’s traditional role as an individual professional, who is mainly learning from his or her own experience, to a participant of inter-professional teamwork and
- to make the most important aspects of teachers’ collaborative designing, managing, and evaluating activities visible for the fellow teachers (and partially also to students).

The secondary schools and especially Technology school “Electronic systems” have experience in collaboration with higher education and the use of learning technologies sufficient to prepare them for their role in the project while also having a need and intention to improve their pedagogy when using ICT to support learning.

Technical University of Sofia will contribute to the project by sharing its expertise in close collaboration between secondary and higher education and will help in school level implementation of new practices to prepare secondary students for the practices of higher education.

#	Tool	Short Description	Main Link
I. PM & Collaboration Tools			
1.	Basecamp:	Basecamp is a Web-based solution that offers the ability to easily collaborate and track progress via any Internet browser. It features a wealth of online tools for communication and collaboration, including a public message board, personal messaging, and automated email notifications that can be triggered any time a change to the project has been made or a communication has been received. Other key features include a central database for project-related documents, personal task lists, time tracking, scheduling, project templates, and multilingual support.	https://basecamp.com/
2.	Zoho Projects	Zoho Projects is a Web-based project management application that allows for time tracking, task management, the creation of Gantt charts, bug tracking, chatting, as well as scheduling through shared calendars. It also offers online document management and a project Wiki.	https://www.zoho.com/projects/
3.	Producteev	Producteev is a leading cross-platform task management application for team and individuals.	https://www.producteev.com/
4.	Trello	Trello is the fastest, easiest way to organize anything, from your day-to-day work, to a favorite side project, to your greatest life plans.	https://trello.com/
5.	Wrike	Wrike is a cloud-based project management application that features affordable pricing plans and a full suite of features. Key features include email task integration, task reminders, scheduling tools, and a document database. It can also be customized to display in Spanish.	http://www.wrike.com/
II EDU/Course Tools			
1.	Fronter	A Virtual Learning Environment (Virtual Classroom)	http://com.fronter.info/
2.	Moodle	A Course Management System	https://moodle.org/
3.	Edmodo	Learning System	https://www.edmodo.com/
III CMS Tools			
1.	Word Press	Content Management System	http://wordpress.org/
2.	Drupal	Content Management System	https://drupal.org/
IV SN Tools			
1.	Yammer	Private Social Network	https://www.yammer.com/
2.	Ning	Private Social Network	https://www.ning.com/what-is-ning/
3.	Google +	Public/Enterprise Social Network	https://plus.google.com/up/accounts/upgrade/?continue=https://plus.google.com/
V Cloud Storage Tools			
1.	Google Drive	Cloud Based Storage & Collaboration System	https://tools.google.com/dlpage/drive
2.	Dropbox	Cloud Based Storage Only	https://www.dropbox.com/
3.	Box	Cloud Based Storage	https://www.box.com/
VI Other Tools			
1.	Padlet	A wall	http://padlet.com/

TABLE I. COLLABORATIVE TOOLS COMPARISON

V. FORMS OF COLLABORATION THROUGH TECHNOLOGY

One central goal in present-day education is to transform technology-mediated practices from acquisition and participation type approaches towards systematic knowledge creation practices. KNORK project seek to create rich and versatile digital tools that includes cloud collaboration and social software to support innovative pedagogical practices for the development of students' innovation potential, their knowledge work capability and their digital competence.

The Technical University of Sofia has expertise in customizing, adapting and integrating existing open source software, social software and cloud-based applications to provide innovative, flexible and needs-based digital

environments for collaborative learning. Various tools were examined and compared (see Table 1). They provide a set of basic features needed to support the distributed and collaborative work on shared objects.

The main tasks are to design, set up and maintain the online environment including

1. Online learning platform
2. Re-use library
3. Collaborative workspace for project work

Technology for creating online learning environments for the pilot courses in test beds includes the tools for collaborative knowledge creation and is based on existing software. Possible teachers' toolkit is shown in Figure 1[4]. The questions are: what are the best tools for collaborative knowledge creation and which of those are needed in the different pilots. Requirements will be defined in collaboration with teachers, students and researchers.

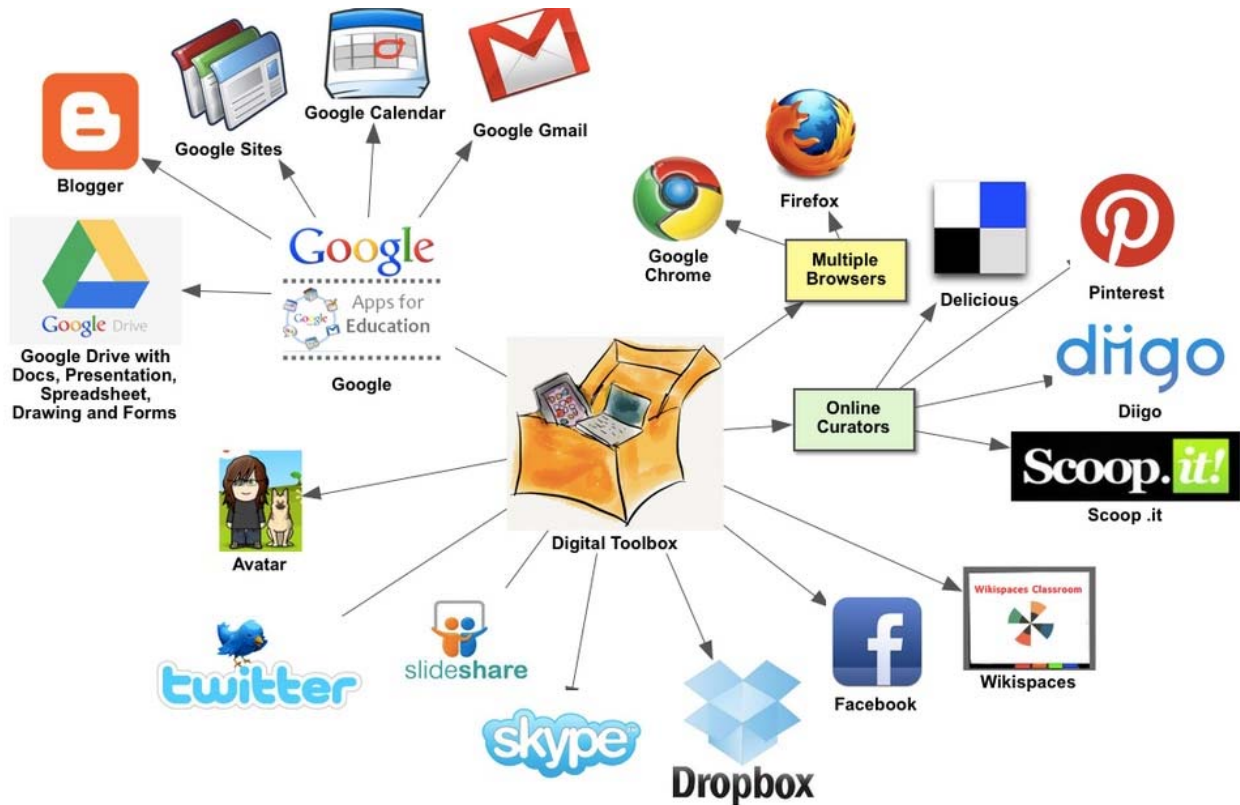


Fig. 1. Teachers' toolkit

Re-use library is a Web repository for the re-usable materials produced during the project – e.g. pedagogical and technical guidelines, course examples, templates. It will be implemented using popular content management system – WordPress (free and open source).

Collaborative workspace will be implemented using the same content management system as the Re-use library. It need to ensure sharing of materials needed to carry out the project, linking to tools for collaborative production of content, easy sharing and management of documents, separate spaces (folders) for WPs, access by chronological order.

To apply KNORK objectives to engineering education our primary goal was to investigate and develop pedagogical practices that support students' knowledge work and digital competencies using the triological learning approach to technical subjects. Several engineering courses at the Technical university of Sofia and Technology school "Electronic Systems" were re-designed using triological design principles and modern digital technology. The courses were restructured from traditional face-to-face to project oriented adopting and applying modern online learning platforms, cloud collaboration tools and social software.

Pilot courses were conducted in both institutions, so increasing cross-fertilization between school and university. Overall, the triological approach was accepted well and considered as an appropriate path for transforming students' individual course work into more collaborative activities.

VI. CONCLUSION

The KNORK project seeks to create models and practices for bringing cultures of schooling in a closer contact with universities. The project explores knowledge practices and innovative cloud and social software in creation and transformation of shared knowledge artifacts and social practices.

The KNORK project provides easily applicable pedagogical approaches supporting novel knowledge work and digital competencies. In the project, we develop and test pedagogical methods, digital tools and teacher training models to improve these competencies and practices in secondary and higher education.

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