UNESCO International Workshop

Quality of Education and Challenges in a Digitally Networked World

30-31 October, 2014
Sofia, Bulgaria

QED

30-31 October, 2014, Sofia, Bulgaria

UNESCO International Workshop

Quality of **E**ducation and Challenges in a **D**igitally Networked World

COMPILED AND EDITED BY:
Eugenia Kovatcheva and Evgenia Sendova

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Organised by

United Nations
Educational, Scientific and
Cultural Organization

UNESCO Chair on ICT in Library Studies,
Education and Cultural Heritage,
State University of Library Studies
and Information Technologies (SULSIT), Bulgaria

with the financial support of:

EE-74 NETT:
Networked
Entrepreneurship
Training of Teachers

LAW AND INTERNET
FOUNDATION
CENTER FOR LAW OF
THE INFORMATION
AND COMMUNICATION
TECHNOLOGIES

Institute of Mathematics
and Informatics
Bulgarian Academy
of Sciences

and the assistance of BRITISH COUNCIL, Bulgaria

COMPILED AND EDITED BY:
Eugenia Kovatcheva (SULSIT) and Evgenia Sendova (BAS)

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PREFACE

The present book reflects contributions (articles and presentations) to the UNESCO International Workshop *QED: **Q**uality of **E**ducation and Challenges in a **D**igitally Networked World,* held in Sofia from October 30-31, 2014.

The QED workshop was organised by the *State University of Library Studies and Information Technologie*s (SULSIT), Sofia, Bulgaria, in cooperation with the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences, and with financial support of the EU project EE74 NETT: Networked Entrepreneurship Training of Teachers, Law and Internet Foundation, and the assistance of British Counsil.

The workshop was a regional event as a follow-up of:

- the EDUSummIT 2013 Research-informed strategies to address educational challenges in a digitally networked world, October 1- 2, Washington, USA and
- the International Conference of the UNESCO IITE and UNESCO Chairs *UNESCO Chairs Partnership on ICTs Use in Education*, June 1-5, St. Petersburg in the frame of XV International Forum: *Modern Information society formation – problems, perspectives, innovation approach.*

The event was hosted by SULSIT which is a unique (in Bulgarian context) research and educational interdisciplinary center integrating studies in the library science, digital technologies, cultural and historical heritage.

It has been successfully implemented and has achieved multi-direction positive results and impact. Useful ideas and practices have been discussed, which will continue to be built up and used in the future including the following ones:

- to establish fora and communities of practice for cross-stakeholder ICT in Education communication
- to develop and establish a repository of open ICT in Education best practices
- to summarise the general ideas, contributions and outcomes of the QED'15 workshop and to submit an article based on it to EDUsummIT'15

- to propose new topics to EDUsummIT'15, e.g. related to the *upbringing,* and the *language barriers*
- to collect feedback from the participants in the workshop
- to advice the school Lyuben Karavelov Secondary School in Koprivshtitsa in its endeavour to become a UNESCO associated school and continue its cooperation with the QED community
- to extend the teachers' sessions in terms of participation
- to start teacher education master programs in ICT with IITE
- to translate in Bulgarian the framework of UNESCO for IT in education
- to provide pieces of advice to policy makers to adapt their strategies for ICT in education according to the best world practices;
- **to bring it back EDUsummIT'17 to Europe (namely – in Bulgaria)** as discussed with its former coordinators Joke Voogt and Gerald Knezek.

Although presented in a condensed form here the contributions reflect the main ideas conveyed by their authors at the QED workshop and they will hopefully serve as an inspirational source for further work towards advancing education into the digital age.

The first feedback:

Mariana Patru

I very much enjoyed attending the workshop, meeting exciting participants, as well as visiting an innovative school. The atmosphere was great and I felt that attendees enjoyed sharing their work with pride.
I believe that the Chair[1] has made very good progress and has acquired an internationally recognized international visibility. I am sure that you will further expand the Chair's international status.

Joke Voogt

The teachers in the poster session of QED'15 showed inspirational use of ICT. They are so creative these math teachers! I really admire them for it. As for the school we visited in Koptivshtica I would have liked to attend a lesson in it. The atmosphere was so warm and good. What a pity that it was a Saturday

[1] UNESCO Chair on ICT in Library Studies, Education and Cultural Heritage, SULSIT (Eds.)

Boyka Dulgyarova – Director of Lyben Karavelov Secondary School

We at the school were honored to meet such distinguished guests habing dedicated their professional activities for bringing the education in an international context in harmony with the UNESCO standards. Together with all teachers, we will involve our efforts in meeting the requirements for becoming a associated school of UNESCO.

A student from that school: *Communicating with the visiors to our school was the happiest day in my life*...

Roumen Nikolov
Eugenia Kovatcheva
Evgenia Sendova

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QED'14 organisation

Organised by the *UNESCO Chair on ICT in Library Studies, Education and Cultural Heritage*, State University of Library Studies and Information Technologies (SULSIT), Bulgaria

United Nations Educational, Scientific and Cultural Organization

UNESCO Chair on ICT in Library Studies, Education and Cultural Heritage, State University of Library Studies and Information Technologies (SULSIT), Bulgaria

with the financial support of:

- EU project EE-74 NETT: Networked Entrepreneurship Training of Teachers,
- Law and Internet Foundation, Bulgaria, and
- Istitute of Mathematics and Informatics, Bulgarian Academy of Science (BAS), Bulgaria

EE-74 NETT: Networked Entrepreneurship Training of Teachers

LAW AND INTERNET FOUNDATION
CENTER FOR LAW OF THE INFORMATION AND COMMUNICATION TECHNOLOGIES

Institute of Mathematics and Informatics Bulgarian Academy of Sciences

and the assistance of British Counsil, Bulgaria

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- Bella Tetevenska, SULSIT

WORKSHOP Agenda

THURSDAY, October 30

08:30-09:00	**Registration** room 309
09:00-10:00	**OPENNIG CEREMONY** *Chair person: Roumen Nikolov*
	Bulgarian folk dances under the artistic direction of **Assen Pavlov**, Sofia National School of Dance Art Welcome addresses: **Stoyan Dentchev** **Official Guests**
10:00-13:00	**PLENARY SESSION** *Chair person: Petar Kenderov*
10:00-10:20	**Mariana Patru, Evgueni Khvilon** Innovative Approaches to Teaching and Learning in Higher Education: The Role of Digital Technologies in Preparing Students for Lifelong Learning and Successful Careers
10:20-10:40	**Blagovest Sendov** Education and Knowledge
10:40-11:20	**Joke Voogt, Gerald Knezek** Making Technology Work in Education: Outcomes of the EDUsummIT 2013
	Chair person: Evgenia Sendova
11:40-12:00	**Stoyan Denchev, Roumen Nikolov** The UNESCO Chair - a Driver for Research and Innovation Excellence and Sustainable Regional Development
12:00-12:20	**Lyubov Kostova** Science Communication – or Turning Defect into Effect
12:20-12:40	**Alexander Angelov** Creative Classroom
12:40-13:00	**Petar Kenderov, Toni Chehlarova** Mathematics with a computer - a contest enhancing the digital and mathematical competences of the students

14:00 - 17:00 PARALLEL SESSIONS

QED & Young Scientists Room 309		**Teacher's session** Room 104
	Chair Person: Tania Todorova	**Open day of the NETT project:** Networked Entrepreneurship Training of Teachers *Chair Person: Eugenia Kovatcheva*
14:00-14:15	**Evgenia Sendova** *A drunk man vs. a drunk bird:* Developing communication competencies of high-school students for presenting research projects in various formats and settings	
14:15-14:30	**Konstantin Delchev** Science Fair Evaluation Framework: The importance of high school science initiatives	
14:30-14:45	**Milena Krumova, Elena Shoikova** Competence based education	
14:45-15:00	**Anatoly Peshev, Elena Shoikova** Education Enhanced by Cloud Computing	
15:00-15:15	**Oleg Konstantinov, Valeria Fol** The Odrysian Kingdom - an Interactive Multimedia Application for Educational Purposes	
15:15-15:30	**Zlatogor Minchev** Challenges to Future Training with Interactive Intelligent Avatars	
	Chair Person: Elena Shoikova	*continuation*
16:00-16:15	**Maiyana Mitevska** Organisational Values - Multicultural Comparative Analisys at University Level	**Open day of the NETT project**
16:15-16:30	**Katia Rasheva** Continuing education of Librarians in Community Centres - a Factor to Overcome the Digital Divide	
16:30-16:45	**Diman Karagiozov** Harnessing NLP technologies in Content Management Systems	
16:45-17:00	**Todor Branzov & Georgi Gachev** VivaCognita platform	

17:00-18:00 PANEL DISCUSSION: Policies for QED

Chair Person: Stoyan Denchev

FRIDAY, October 31

09:00-10:10	**PLENARY SESSION** *Chair person: Roumen Nikolov*
09:00-09:30	**Alexey Semenov** (canceled**)**
09:30-09:50	**Peter Stanchev** *Open Access*
09:50-10:10	**Georgi Dimitrov -** *E-education - legal challanges and perspectives*
10:10-10:30	**Alastair Clark** BYOD (Bring Your Own Device) Is this a Digital Challenge or Digital Opportunity
	10:30-11:00 Poster Session

11:00-12:30 **PARALLEL SESSIONS**

Room 309		Room 104
QED & Best Practices *Chair Person: Elena Shoikova*		**Teacher's session:** **MaSciL seminar:** Multiplying the Inquiry Based Learning *Chair Person: Evgenia Sendova*
11:00-11:15	**Tania Todorova** Erasmus Intensive Programmes - effective tool for educational and scientific communities	
11:15-11:30	**Georgi Dinitrov, Ivan Ivanov, and Galia Panayotova,** Quality of Education Management System at SULSIT	
11:30-11:45	**Sofia Vassileva** Cultural heritage: multimedia lectures and learning materials - results from one research project	
11:45-12:05	**Eugenia Kovatcheva and Elena Shoikova** The PICTET, SoC and FETCH European Projects	

12:30-13:00	**CLOSING CEREMONY** *Chair person: Roumen Nikolov* Announcing the winner of the *Best Presentation of Young Scientist Award*

WELCOME SPEECHES
(in Bulgarian Language)

- From the Host Institution – Rector of the University
- From the Ministry of Education and Science
- From the Ministry of Culture

От името на домакините: проф. Стоян Денчев – ректор на УниБИТ

Уважаема г-жо Министър,
уважаема г-жо Патру,
уважаеми акад. Сендов, проф. Вухт, проф. Кнежек,
уважаеми колеги и приятели,

Добре дошли на конференцията на ЮНЕСКО, посветена на тема, която вълнува не само всички нас в залата, но и всички граждани. Добре дошли и в новата сграда на УниБИТ, която може да се окаже тясна за всички участници.

Конференцията се организира от Катедрата на ЮНЕСКО на УниБИТ, която е млада (създадена през 2012), но се превръща в един от най-активните членове на мрежата от катедри на ЮНЕСКО. Ние имаме мотивацията да съдействаме на ЮНЕСКО в реализацията на глобалните й цели в един труден за организацията момент. Както знаете, генерален директор на ЮНЕСКО е г-жа Бокова. В същото време, ние съзнаваме нашата отговорност и имаме амбицията да станем катализатор на процеса на подобряване на качеството на образованието в нашата страна чрез ефективно използване на съвременните информационни и комуникационни технологии.

Настоящото събитие, което се превръща в традиционно, е свързано с дейността на глобалното общество от учени, експерти в образованието, преподаватели, политици, и др., които са ангажирани да подпомагат ефективното използване на информационните технологии в образованието – EDUsummIT. В това общество участват и членовете на катедра ЮНЕСКО. Поредната среща се проведе миналата година във Вашингтон, а следващата среща ще бъде в Тайланд през 2015 г.

Въпреки, че информационните технологии съдействат за глобализацията на образованието, образованието се провежда локално и е зависимо от езика, културата, традициите, икономиката и социалните условия във всяка страна и регион. Това е и логиката за провеждането на подобни събития и ние искаме да предложим този модел на ЮНЕСКО и EDUsummIT.

Подобни регионални събития може да се организират на регионален принцип и в други страни.

В допълнение, ние считаме, че катедрите на ЮНЕСКО може да се превърнат в центрове на съвършенство в образованието, научните изследвания и иновациите. Така те ще спомагат на устойчивото развитие на регионите и страните. В контекста на новите политики и стратегии на ЕК подобен модел може да съдейства за изпълнието на Националната стратегия за интелигентна специализация и за ефективното използване на средствата от оперативните програми. На тази тема е посветен и докладът ни с проф. Николов. Искаме да предложим и този модел на вниманието на ЮНЕСКО и на отделните страни. Като член на Управителния съвет на Института по информационни технологии в образованието на ЮНЕСКО, аз вече го предложих на вниманието на колегите в своя доклад на последната конференция, организирана от Института, както и на целия Управителния съвет.

Накрая, искам да благодаря на спонсорите на конференцията – проект НЕТ на ЕК, Фондация Право и интернет и Институт по математика и информатика – БАН. Искам да отбележа и любезното съдействие на British Council и на г-жа Любов Костова и се надявам то да се превърне в дългосрочно партньорство. Отворени сме за партньорство и с много други организации и експерти у нас и в чужбина.

Искам да пожелая успешна и плодотворна работа на конференцията и тя да се превърне в източник на нови идеи, предложения и проекти за подобряване на качеството на образованието в страната. Това зависи от всички нас...

От министъра на образованието и науката в състава на служебното 90-то правителство на България доц. Румяна Коларова

Уважаеми дами и господа,

В качеството си на Министър на образованието и науката, а и като университетски преподавател, бих искала да приветствам участниците в конференцията на ЮНЕСКО, посветена на качеството на образованието и предизвикателствата, които ни предлага новата информационна среда, основана на съвременни информационни технологии. Считам, че тази конференция е съвсем навременна за нас, тъй като може да ни предостави експертна подкрепа в един важен за България момент. Страната е в процес на развитие и реформиране на образователната система в контекста на европейските политики и стратегии. Разработват се и се обсъждат множество програмни документи, свързани с бъдещето на образованието и научните изследвания в България, например:

- Стратегия за развитие на висшето образование в Република България 2014-2020 г.
- Национална стратегия за развитие на научните изследвания 2020
- Стратегия за ефективно прилагане на информационни и комуникационни технологии в образованието и науката на Република България (2014-2020г.)
- Стратегия за развитие на професионалното образование и обучение в Република България за периода 2015-2020 г.
- Национална стратегия за развитие на педагогическите кадри
- Национална стратегия за учене през целия живот за периода 2014 – 2020
- Национална стратегия за насърчаване и повишаване на грамотността за периода 2014 – 2020 г.

Министерството на образованието и науката счита, че ефективното интегриране на информационните технологии в образователната система е гаранция за повишаване на качеството на образованието и за адаптирането му към нуждите на обществото и към пазара на труда. Бързите промени в

информационната среда създават необходимост да се дефинира наново и какво означава да си грамотен в съвременното общество.

Ние си даваме сметка още, че информационните технологии са основен двигател на научните изследвания, иновациите, икономическото развитие и конкурентноспособността на всички сектори на икономиката. Те са много важен инструмент за подобряване на социалните услуги и качеството на живот на гражданите. Иновациите в информационните технологии не само подобряват производителността на индустрията и публичния сектор, но и създават огромен пазар на новаторски продукти и услуги.

Географските граници вече нямат предишното си значение. Появяват се обаче нови граници, които са в умовете на хората и между отделните хора, най-вече между тези, които използват новите технологии, и тези, които остават встрани от тях. За преодоляването на тези граници трябва да се съсредоточат много усилия.

Информационните технологии подпомагат реализацията на концепцията за учене през целия живот, която предполага, че уменията, познанията и способностите трябва непрекъснато да се обновяват, за да могат членовете на това общество да се справят с новите предизвикателства. Качеството на образованието се свързва и с учене в изследователски стил чрез ефективно използване на новите технологии.

България има традиции в образованието и в информационните технологии. Има традиции и в провеждане на мащабни експерименти и реформи в образованието, основани на използването на информационни технологии. Такъв бе проектът на Проблемната група по образоваието, ръководен от акад. Сендов преди около 30 години, който бе включен в международен проект на ЮНЕСКО. Част от присъстващите си помняме и международните конференции *Децата в информационния век*, подпомагани от ЮНЕСКО. Вярвам, че настоящата работна конференция ще възроди тези традиции и ще ни помогне да осъществяваме процеса на трансформация и реформиране на образователната система на България върху основата на най-добрите световни постижения и практики.

От министерството на културата

РЕПУБЛИКА БЪЛГАРИЯ
МИНИСТЕРСТВО НА КУЛТУРАТА

ДО
ОРГАНИЗАЦИОННИЯ КОМИТЕТ И
УЧАСТНИЦИТЕ В МЕЖДУНАРОДНИЯ СЕМИНАР
QED'14: „КАЧЕСТВОТО НА ОБРАЗОВАНИЕТО И
ПРЕДИЗВИКАТЕЛСТВАТА В СВЕТА НА
ЦИФРОВИТЕ ТЕХНОЛОГИИ"

УВАЖАЕМИ ГОСПОЖИ И ГОСПОДА,

Най – сърдечно Ви поздравявам по повод провеждането на Международния семинар QED'14: „Качеството на образованието и предизвикателствата в света на цифровите технологии".

Приветстваме усилията и последователността на организаторите на Университета по библиотекознание и информационни технологии да отразяват най – актуалните образователни тенденции, като неслучайно форумът е посветен на този светъл празник, на който отдаваме почит на народните будители.

Стремежът към образование е характерна черта на човешкия напредък. Познанието е сила, а универсалният достъп до информационните и цифрови технологии са белег на свобода и демокрация, чрез които се стимулира развитието на гражданско общество.

Убеден съм, че споделянето на опита в областта на цифровите технологии, ще бъде полезно за всички, ще разкрие нови хоризонти за взаимодействие и ще подскаже нови аспекти за интервенции в образователната система в страната и Европа.

Приемете нашите най-сърдечни пожелания за здраве, успехи и плодотворна работа.

На добър час!

ЗАМЕСТНИК-МИНИСТЪР:

БОЙЛ БАНОВ

KEYNOTE
PRESENTATIONS & PAPERS

Innovative Approaches to Teaching and Learning in Higher Education:
The Role of Digital Technologies in Preparing Students for Lifelong Learning and Successful Careers

Mariana Pătru, Evgueni Khvilon
UNESCO, MSPU, Russia
m.patru@unesco.org, eakhvilon@gmail.com

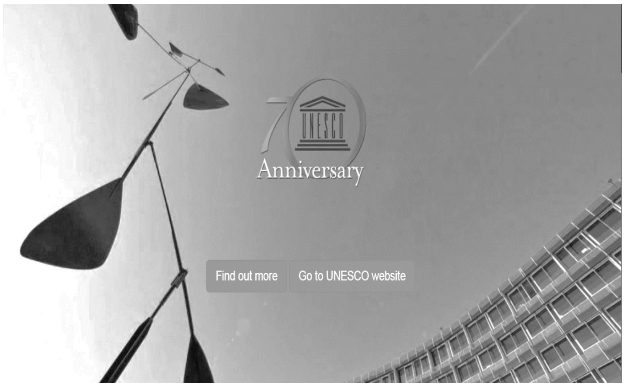
> Today's knowledge societies require talented, skilled and competitive workforces. This calls for robust but also flexible education systems, including higher education, capable of adjusting to meet new expectations and to promote learning that is relevant, accessible and innovative.
>
> *Irina Bokova*, Director-General of UNESCO, Visions for education in the new digital era

UNESCO: Mission and Relevance in the 21st century

Global Trends and Challenges

Access, Equity and Quality in Higher Education

The Future of Education Agenda



UNESCO's Roadmap 2014-2021

- Serving as a laboratory of ideas and generating innovative proposals and policy advice
- Developing and reinforcing the global agenda through policy analysis, monitoring and benchmarking

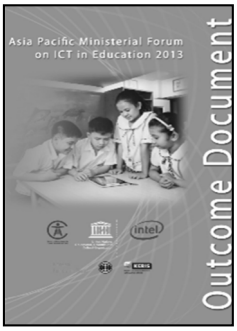
- Setting norms and standards and supporting and monitoring their implementation
- Strengthening international and regional cooperation and fostering alliances, intellectual cooperation, knowledge sharing and operational partnerships

Global Trends and Challenges in the Digital Age

- Drivers of Change
- Democratization of knowledge and access will drive a global 'education revolution'
- Increased global competition for domestic and international student markets
- Digital technologies
- Global mobility
- Integration with industry

(University of the Future:
http://www.ey.com/Publication/vwLUAssets/University_of_the_future/$FILE/University_of_the_future_2012.pdf)

Policy Level Exchange and Dialogue on ICT in Education



- Fostering institutional change with policy interventions
- Scaling up teachers' professional development to support students' 21st century skills
- Promoting exchanges among different education stakeholders at all levels for up-scaling
- Mainstreaming school innovations
- Continue to think beyond borders

The World of Higher Education Is Changing Quickly and Dramatically

Institutions are courting new student populations

Creative financing is needed to balance shrinking budgets

Online learning is the new frontier

http://www.economistinsights.com/sites/default/files/EIU_AcademicPartns_WEBr1.pdf

2014 Horizon Report: Higher Education

Important Developments in Educational Technology for Higher Education

One year or less	Flipped Classroom, Learning Analytics
Two to three years	3D Printing, Games and Gamification
Four to five years	Quantified Self, Virtual Assistants

Significant Challenges

2014 NMC Horizon Report

- Low digital fluency of faculty
- Relative lack of rewards for teaching
- Competition from new models of education (MOOCs)
- Scaling teaching innovations
- Expanding access
- Keeping education relevant

EC High Level Task Force on the Modernisation of Higher Education

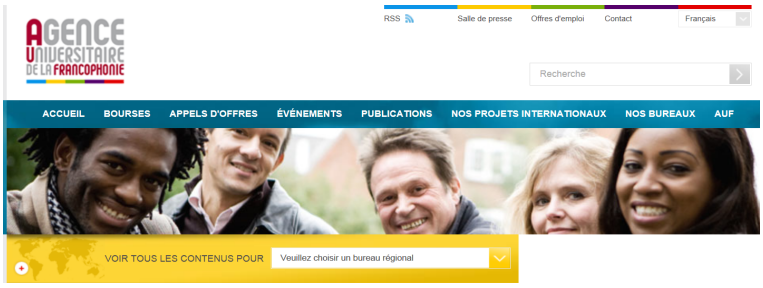
More information:
http://ec.europa.eu/education/library/reports/modernisation-universities_en.pdf

Scaling Up Good Practices through Partnerships and Networking

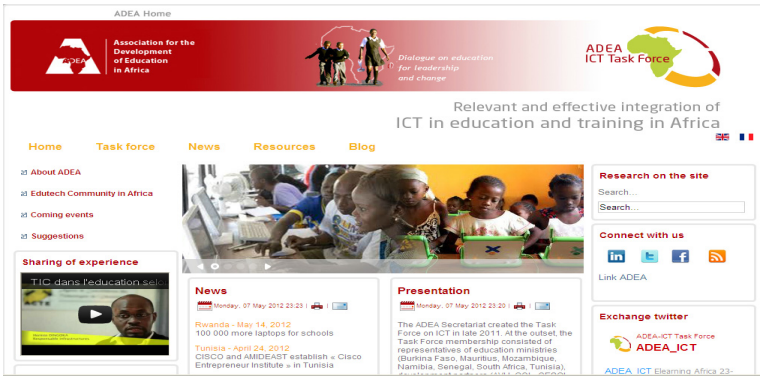
Harnessing new modes of learning and teaching

- The higher education landscape is undergoing significant change as a result of technological innovations
- These new technologies have the potential to enhance the quality and reach of higher education

- Online technologies provide opportunities to learn anywhere and anytime (essential for non-traditional learners, lifelong learning and continuous professional development)
- Digital technologies can underpin national efforts to drive greater collaboration between institutions, combining expertise and delivering greater critical mass

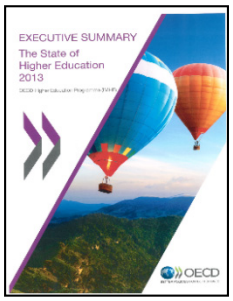


Priority Africa: Improving Access, Equity and Quality of African Education with ICT



OECD: The State of Higher Education 2013

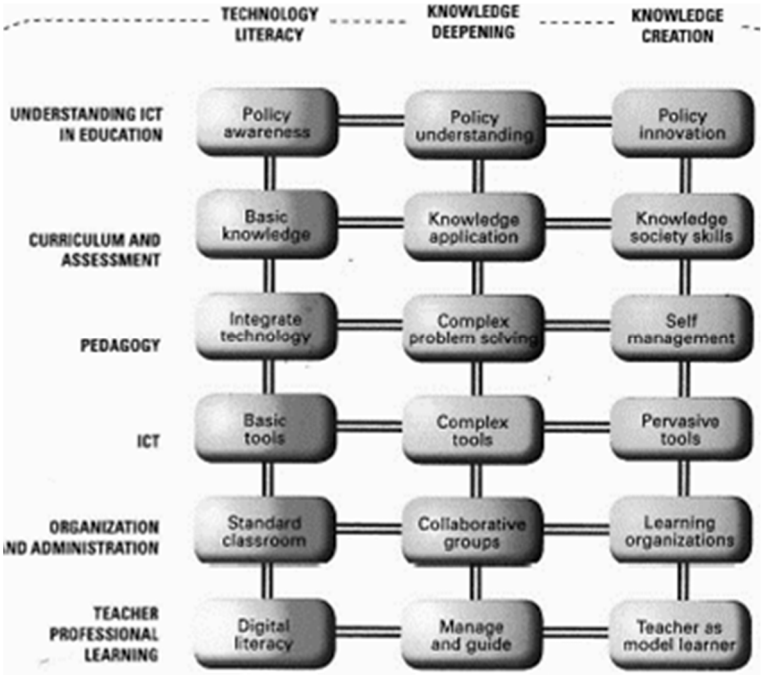
Higher education is increasingly relevant due to the shifting demand in skills



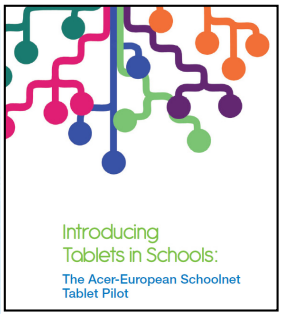
Enhancing Teachers' Competencies to Use Digital Technologies

Supporting countries to improve the quality and impact of teaching

Building a Digital Age Teaching Profession
http://unesdoc.unesco.org/images/0021/002134/213475E.pdf



Canada: Learning and Technology Policy Framework

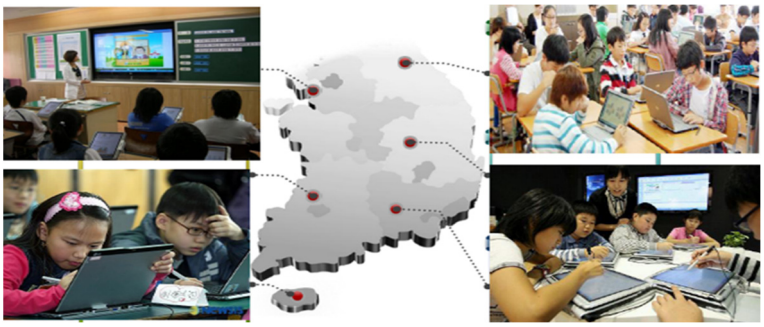


Highlights

- Majority of teachers had more than 10 years of professional experience
- Majority of teachers had at least 4 years' experience using ICT to support teaching
- Half of the participating teachers had used a tablet in the 6 months prior to the pilot

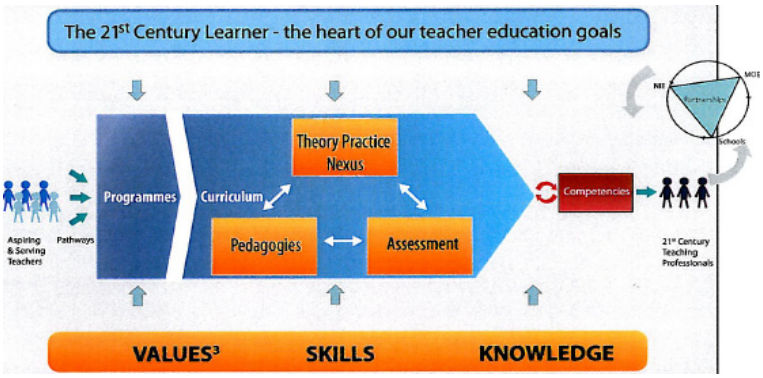
- Teachers feel confident to use ICT for lesson planning and delivery but less so for professional development, lesson follow-up and assessment
- Teachers are competent to use the Internet and general ICT-based applications but fewer feel competent in the use of VLEs and social networking tools

Korea: Smart Education



Singapore: A Teacher Education Model for the 21st Century

http://www.nie.edu.sg/files/spcs/TE21_Executive%20Summary_101109.pdf



Continuous High Growth of Mobile Broadband

- Almost 7 billion mobile cellular subscriptions
- Number of mobile-broadband subscriptions reaches 2.3 billion with 55% of them in developing countries
- Globally, mobile-broadband penetration will reach 32% by end 2014 (Africa leads)
- Fixed-broadband growth is slowing down in developing countries

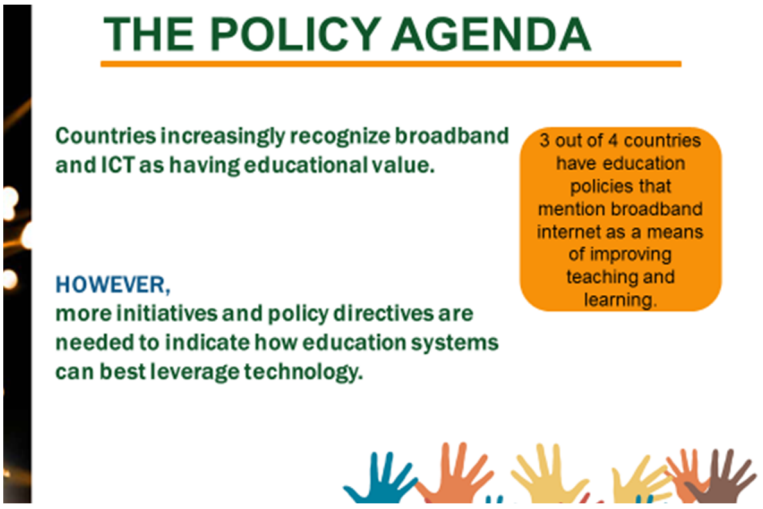
- Almost 3 billion people – 40% of the world's population are using the Internet (but 4 billion not yet using)

ITU, ICT Facts and Figures 2014

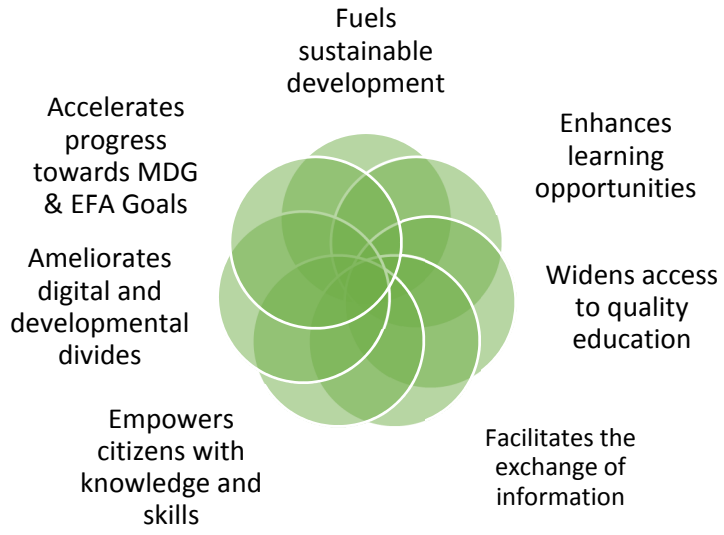
We have seen that countries increasingly mention broadband as a means to improve education. So the good news is that it is on the policy agenda and the term is popping up in education policies and plans.

The downside is that policies still do not provide nearly enough guidance on how to best utilize broadband infrastructure and connectivity.

In sum, there is a recognition that broadband infrastructure is needed and should be built and that it can support education. BUT there is a dearth of policy guidance on how to use this infrastructure to accomplish shared and specific educational goals.



Half of the world will be online by 2017



KEY AREAS TO ADDRESS:

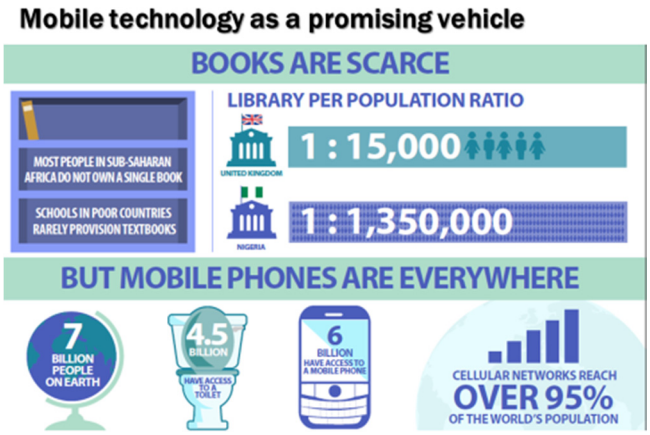
- Reconcile infrastructural deficits
- Train teachers to use new technologies to further student learning
- Promote the use broadband to accelerate and improve teacher training
- Develop and share of educational content with learners and educators
- Leverage technology to improve educational planning and management
- Evaluate and improve the effectiveness of ICT use in educational settings

LOOKING AHEAD

These are the six recommendations made by the report. UNESCO provides support in all of these areas. We have launched numerous publications which provide policy-makers and others practical advice regarding how to implement policies, initiatives and programs to realize these important objectives.

- Increase access to technology and broadband
- Incorporate technology and broadband into job training and continuing education

- Teach ICT skills and digital literacy to all educators and learners
- Promote mobile learning and OERs
- Support the development of content adapted to local contexts and languages
- Work to bridge the technological divide between countries



What they do not have are books or access to traditional face-to-face development.

You would be surprised to find out that in today's world, out of world's estimated 7 billion people, there are 6 billion people that have access to a connected mobile device. To put this figure in perspectives, only 4.5 billion have access to a working toilet. And for every one person who accesses the internet from a computer two do so from a mobile device.

It is just astounding to find out that you have way more mobile phones than you have these teacher training institutes, libraries, books and so on.

Mobile Learning Week, 2015

Therefore, given that mobile phones are so ubiquitous, powerful and applicable, UNESCO felt that mobile phones could be a very promising way to help teachers that are wanting to help themselves, or to help governments figure out new services they can use to improve the capabilities of the working teachers.

Alongside the main pillars, UNESCO hosts an annual Mobile Learning Week conference. UNESCO Mobile Learning Week is a flagship event in UNESCO's ICT in Education. For the entire week, policy makers, experts, researchers and many others come to discuss about the mobile learning past, present and the future.

The theme for MLW 2015 is empowering women and girls. UNESCO will partner with UN Women to raise the visibility and impact of the event. Last year more than 700 participants from over 60 countries attended. We are expecting even better turnout, knowledge-sharing and networking opportunities this year.

The event breaks down into four tracks: (explain in detail)

- Workshop
- Symposium
- Policy forum
- Research seminar

Alongside these main sub-events, there will be exhibitions at the UNESCO Headquarters where some innovative companies showcase their work, technology and services.

MLW 2015 will be held from 23 to 27 February 2015 at UNESCO HQ Paris, France.

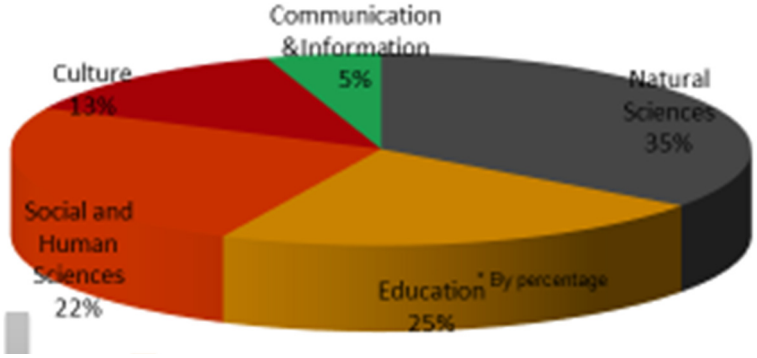
The Programme covers all areas within UNESCO's mandate – education, culture, natural sciences, social and human sciences, communication.

It supports the establishment of UNESCO Chairs and UNITWIN Networks which:

- focus on topics aligned with UNESCO's priorities as defined in the Medium-term Strategy and the biennial programmes
- contribute to strengthening North-South, South-South and North-South-South cooperation, partnerships and networking, and
- may evolve into poles of excellence and innovation at the regional or sub-regional levels.

The Programme is open to:

- universities and other institutions of higher education and research that are recognized
- NGOs
- academic associations
  - inter-university and other academic networks
  - national, regional and international public or private institutions and agencies



UNITWIN/UNESCO Chairs Programme: Chairs & Networks by domains

POST-2015 EDUCATIONAL AGENDA:

ENSURING EQUITABLE QUALITY EDUCATION AND LIFELONG LEARNING FOR ALL BY 2030

(UNESCO, Position Paper on Education Post 2015 http://unesdoc.unesco.org/images/0022/002273/227336E.pdf)

Are universities preparing students for the jobs of the future?

Jobs before 2020 (http://www.futuristspeaker.com/2011/11/55-jobs-of-the-future)

- Augmented reality engineers
- Alternative currency bankers
- Global system architects
- Waste data managers
- Urban agriculturalists
- 3D printing engineers
- Book-to-app converters
- Social education specialists

THE ONLY CONSTANT THING IS CHANGE

Heraclitus of Ephesus, Greek philosopher (535-475 B.C.)

THANK YOU!
БЛАГОДАРЯ!

Education and Knowledge

Blagovest Sendov
Institute of the Information and Communication Technologies
at the Bulgarian Academy of Sciences
Acad. Georgi Bonchev Str. bl.25a, 1113 Sofia, Bulgaria

The Digitally Networked World is a result of the information technology (IT).

Big memory

Fast searching

Visualization

As the process of education involves **information**, it is natural to expect a **radical improvement** of the **quality of education**, using IT.

The potential of IT in this direction is obvious and we expect to hear for some of the best approaches in this Workshop.

How is the quality of education measured?

Education is not only about **knowledge** building by acquiring information.

The education, especially in the publicly funded schools and universities, must be engaged with the **formation (upbringing)** of responsible and loyal citizens.

Upbringing (Воспитание)

*The treatment and instruction received by a child from **its parents**.*

Throughout its childhood,

She had had a Christian upbringing.

Religious upbringing

Military upbringing

Socialist upbringing

What is a democratic upbringing?

In the democratic societies, the upbringing of the children is left to the parents, or to the church.
What happened with the children and teenagers growing in irresponsible families or without a

family? The percentage of such children and teenagers is rather big and going up.
Shall we, in the democratic societies, ignore the upbringing, evaluating the quality of education?
The American thinker
John Dewey (1859-1952) a century ago pointed out in his book *Democracy and Education*, that **the democracy is the best social environment for the quality of education.** But Dewey sees education as the main instrument for upbringing of the children.

We may follow Dewey and declare that the Information Technology is an excellent tool for education. Everybody will agree. The problem is: how to use this tool for the upbringing of the children?

A fundamental problem for every democratic society in the information age is to find **educational models, responsible for the upbringing of the pupils.**

This problem is very difficult to solve, especially in the so called *new democracies*

One of the main hurdles is the powerful tendency to use everywhere the **marked models in education.**

This tendency is strongly supported by the Information industry and financed by the philanthropies. Is it true, that *The democracy and the market are as gin and tonic*.

Is it true, that the market models are the best in all avenues of the democracy?

From the book

W. Carr and A. Hartnet: *Education and the struggle for democracy*. Buckingham, UK: Open University Press; 1996.

> *Any vision of education that takes democracy seriously cannot but be at odds with educational reforms which expose the language and values of market forces and treat education as a commodity to be purchased and consumed.*

The use of the market models in the educational institutes is not a consequence of the democracy. This is the result of the weakness of the democracy and the aggression of the marked.

After decades of successful use of the information technology for education, it is clear that the quality of education depends mostly on the quality of the teacher.

Many ambitious and richly funded reforms in education fail.

> *There is no state that has invested as much time, money, and belief in standardized testing as Texas. The deep belief that regular measurement will produce great results has been a dogma in that state. Its testing regime was the model for* ***No Child Left Behind****, which is now viewed as a* ***failed law*** *that set impossible targets and real punishments.*
>
> [Dallas Morning News], October 26, 2014.

What to do?

There is no easy and simple answer. But one thing is clear.

The pedagogical research is not adequate.

All teachers have to be potential researchers as the medical doctors.

In Bulgaria, for example, we need a Pedagogical institute. I do not understand why such an institute is missing in the Bulgarian Academy of Sciences.

Pedagogy and medicine, as sciences, are equally important. They care about the human beings.

There is tremendous successful business related to medicine.

In the information age, the business related to the education is growing very fast.

It will be a catastrophe, if the medicine and education become entirely a business.

Thank you!

EDUsummIT 2013:CALL to ACTION

Research-informed Strategies to address Educational Challenges in a Digitally Networked World

Joke Voogt, Gerald Knezek
j.m.voogt@uva.nl, gknezek@gmail.com

EDUsummIT - Start – UNESCO, Paris, 2006

EduSummIT is a **global community** of policy-makers, researchers, and educators working together **to move education into the digital age**. The EDUsummIT community recognizes the need to respond to the challenges of a world **transformed by globalization and economic transformation**, caused to a large degree by the development of **digital networking technologies**.

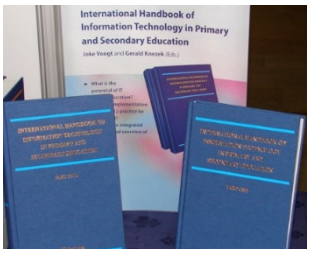
The EDUsummIT seeks to engage educational leaders from across the world in conversations framed around issues and challenges facing education today and through that dialog, develop **action items that are based on research evidence.**

EDUsummIT 2009 The Hague:
Closing gaps between research policy and practice

EDUsummIT 2011, UNESCO Paris
Building a Global Community of Policy-makers, Researchers and Teachers to Move Education Systems into the Digital Age

International Handbook of Information Technology in Primary & Secondary Education

Aim -Synthesis of research on ICT in education from a broad international perspective



Target group

- Researchers
- Policy makers and p
- Professionals

Who contributed

- 11 sections & 76 chapters
- With the help of:
- 3 advisors from Japan, Brazil & the Netherlands
- 15 section editors
- 136 authors from 23 countries

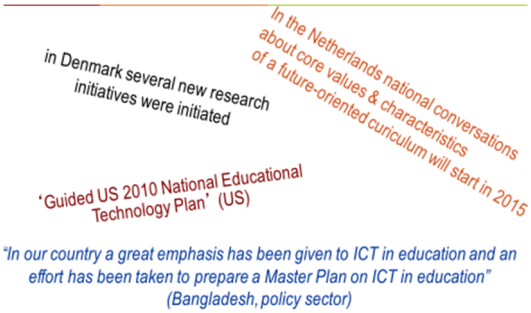
What research has demonstrated

- ICT can enhance teaching and learning
- Under which conditions ICT works (at system, school and teacher level)
- But ICT scarcely finds its way in teaching and learning practice

Research-informed Strategies to address Educational Challenges in a Digitally Networked World

Otputs

Impact



EDUsummIT 2013 Working Groups

- TWG1: Towards new systems for schooling in the digital age
- TWG2: Advancing mobile learning in formal and informal settings
- TWG3: Professional development for policy-makers, school leaders & teachers
- TWG4: Digital equity and intercultural education

- TWG5: Assessment as, for and of 21st century learning
- TWG6: Advancing computational thinking in 21st century learning
- TWG7: Observatories for researching the impact of IT in education
- TWG8: Digital citizenship and literacies around the world

Group members:

TWG1:	Birgit Eickelmann, Germany, Ola Erstad, Norway, Smadar Bar-Tal, Israel, Christine Bescherer, Germany, Hans De Four, Belgium, Koos Eichhorn, The Netherlands, Don Krug, Canada, Hans Laugesen, Denmark, Pamela Moran, United States, Barbara Sherman, Cambodia, Ralph Müller-Eiselt, Germany
TWG2:	Rowland Baker, USA, Bram Bruggeman, Belgium, Rhonda Christensen, USA, Gerard Dummer, The Netherlands, Jörg Dräger, Germany, Cathie Norris, USA, Barry Quinn, United Kingdom, Elliot Soloway, USA, Nicos Valanides, Cyprus, Melissa van Amerongen, The Netherlands, Rivka Wadmany, Israel, Paula White, USA
TWG3:	Peter Albion, Australia, Alona Forkosh-Baruch, Israel, Jo Tondeur, Belgium, Cristiana Assumpcao, Brazil, Sara Dexter, USA, Salome Essuman, Ghana, Jef Peeraer, Vietnam, Juliana Raffaghelli, Italy, Dina Rosen, United States, Debra Sprague, United States, Dana Uerz, The Netherlands, Hans van Bergen, The Netherlands
TWG4:	Paul Resta, USA, Thérèse Laferrière, Canada, Marcus Childress, USA, Gwang-Jo Kim, UNESCO (Bangkok), Maite Smet, OAS, Chad Ratliff, USA, Miri Shonfeld, Israel, Wai Man Tang, Cambodia
TWG5:	David Gibson, Australia, Mary Webb, United Kingdom, Eugenia Kovatcheva, Bulgaria, Cheryl Lemke, USA, Tiina Mäkelä , Finland, Bette Manchester, USA, Esther Marquenie, The Netherlands, Wolfgang Mueller, Germany, Michaela Reich, OAS, J. Michael Spector, USA, Ronald Slomp, The Netherlands, Ruben Vanderlinde, Belgium
TWG6:	Punya Mishra, USA, Joke Voogt, The Netherlands, Petra Fisser, The Netherlands, Chris Dede, USA, Gaber Cerle, Slovenia, Miroslava Černochová, Czech Republic, Kinshuk, Canada, Sarah McPherson, USA, Richard Millwood, United Kingdom, Jon Price, Intel, David Slykhuis, Paolo Tosato, Italy, Tapio Varis, Finland
TWG8:	Bent Andresen, Denmark, Dave Edyburn, United States, Marsali Hancock, United States , Mitja Jermol, Slovenia , Sohail Nusrat, Pakistan, Helen Padgett, United States, Mike Searson, United States, Ben Sirrine, United States, Adriana Vilela, OAS

Action Agenda –issues across all 8 groups

- Identifying what works and what does not work
- Locating best practices to inspire research and practice

- Bridging formal and informal learning
- Developing new forms of technology-based assessments
- Encouraging collaboration within and between constituencies
- Using previously successful collaborative research strategies to foster the integration of IT into teaching and research
- Making research accessible to a broad range of constituencies

Advancing Computational Thinking in 21st Century Learning

- Follow up of EduSummIT2011 (Paris) 21st century learning
  Voogt, J., Erstad, O., Dede, C., & Mishra, P. (2013). Challenges to learning and schooling in the digital networked world of the 21st century. Journal of Computer Assisted Learning, 29,5, 403-413.
- Members TWG 6 EDUsummIT 2013
  Punya Mishra, USA, Joke Voogt, The Netherlands, Petra Fisser, The Netherlands, Chris Dede, USA, Gaber Cerle, Slovenia Miroslava Černochová, Czech Republic, Kinshuk, Canada, Sarah McPherson, USA, Richard Millwood, United Kingdom, Jon Price, Intel(USA), David Slykhuis, USA, Paolo Tosato, Italy, Tapio Varis, Finland
- Pre-and post summit papers
  Dede, C., Mishra, P., & Voogt, J. Advancing computational thinking in the 21st Century, EDUsummIT 2013, Washington DC.
  Mishra, P., Voogt, J., Fisser, P., & Dede, C. (2013). Advancing computational thinking in the 21st Century. Summary Report and Action Agenda. EDUsummIT 2013, Washington

Action agenda TWG 6

- Develop a conceptual framework to define computational thinking and build a common vocabulary around it
- Develop measurable attributes to evaluate and assess computational thinking skills
- Identify research approaches and opportunities, with a particular focus on what aspects of computational thinking transfer to problem solving/ problem seeking approaches in other areas

> Wing's Call for CT
> *Computational thinking involves solving problems, designing systems, and understanding human behavior, by drawing on the concepts fundamental to computer science… It represents a universally applicable attitude and skill set everyone, not just computer scientists, would be eager to learn and use*
> ACM, 2006, p.33

What did we learn from Papert?

- Mindstorms: Children, Computers, and Powerful Ideas Seymour Papert, 1980)
  Through thinking about programming, the students would become adept at thinking about thinking --------- transfer to non-programming contexts both within and outside of the classroom.
- Inconclusive results
- Low and high transfer
  Low-road transfer *encompassed skills that are practiced repeatedly, with the amount of transfer being dependent on the amount of repetition/ contexts in which it is practiced.*
  High-road transfer *encompasses mindful abstraction of the concept or process being learned. High-road requires reflection on the knowledge and opportunities for transfer*
- It is the instruction that counts

Features of CT

- Analyzing problems & artifacts
- Algorithmic approaches to problem solving
- Moving between different levels of abstraction & representation
- Familiarity with decomposition, emphasis on modularity
- Developing computational artifacts
- Understanding of data-structures and information structures
- Design thinking - how it is going to function
- Emphasis on debugging

Programming, Computer Science, and Computational Thinking are not equivalent constructs

The challenge of definitions of CT

Computational Thinking Practices

P1: Connecting computing

P2: Developing computational artifacts

P3: Abstracting

P4: Analyzing problems and artifacts

P5: Communicating

P6: Collaborating

Example: A draft curriculum framework for CT (Advanced Placement Computer Science Principles Draft Curriculum Framework, 2013)

The challenge of definitions of CT

Example: A draft curriculum framework for CT

Computational Thinking Practices

P1: Connecting computing

P2: Developing computational artifacts

P3: Abstracting

P4: Analyzing problems and artifacts

P5: Communicating

P6: Collaborating

Computational Thinking Practices

P1: Connecting computing

P2: Developing computational artifacts

P3: Abstracting

P4: Analyzing problems and artifacts

P5: Communicating

P6: Collaborating

CT in educational settings

Separate Subject (England CS curriculum for 5-16 year olds)

At key stage 1 (5-7 year olds) students should be taught to:

- Understand **what algorithms** are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
- **Create** and **debug** simple programs
- Use **logical reasoning** to predict the behaviour of simple programs
- Use technology purposefully to create, organise, store, manipulate and retrieve digital content
- Recognise **common uses** of information technology beyond school
- Use **technology safely and respectfully**, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.
- Separate subject: Example: England
- Cross curriculum settings
- math (e.g. learning multiplication, charting information, finding square roots), social studies (understanding the assembly line),

language arts (learning grammar), science inquiry and engineering, journalism, robotics in kindergarten.
- Informal learning settings
- learners informally engage in as makers and creators (including Scratch programming, DIY digital textiles, and robotics competitions)

Follow up from the EDUsummIT
- Moving the actions forward
- Article on Computational Thinking in Special Issue of Education and Information Technologies
- Invited chapter in the book Competence-based Vocational and Professional Education in the Springer series 'Education for the Changing World of Work'

Thematic Working Group 2 TW2
Advancing Mobile Learning in Formal and Informal Settings

Presenters: Ferial Khaddage, Deakin University, Australia

Gerald Knezek, University of North Texas, USA

History

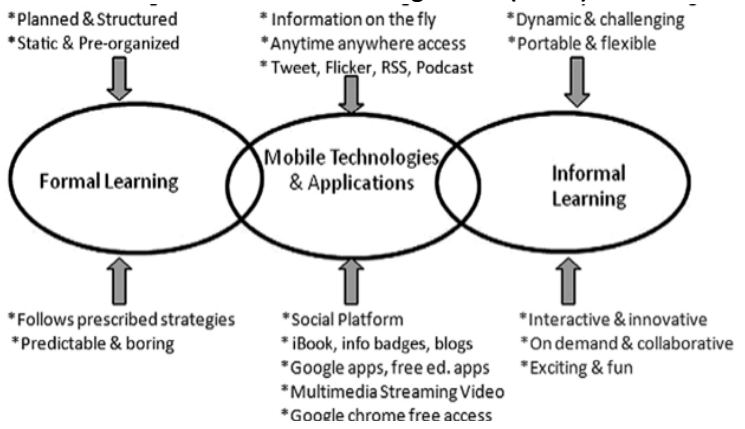
EduSummit 2009 Action Item 1

To establish a clear view on the role of ICT in 21st Century learning and its implications for formal and informal learning

JCAL 2010

Findings from EduSummit 2011
- The emergence of mobile devices with ubiquitous network access has spurred interest in mobile and informal learning as alternatives to traditional formal training.
- EduSummit 2011 Final Report to UNESCO
- EduSummit 2013 Position Paper:
- Blending student technology experiences in formal and informal learning: Implications for Innovation in Policy and Practice
  Kwok-Wing Lai, University of Otago, New Zealand
  Ferial Khaddage, Deakin University Melbourne, Australia,
  Gerald Knezek, University of North Texas, USA

Mobile-Blended Collaborative Learning Model (MBCL)



A Model Driven Framework to Address Challenges in a Mobile Learning

Ferial Khaddage, Wing Lai, Gerald Knezek, Rhonda Christensen, Cathie Norris, Elliot Soloway,

- We are moving, headlong, into the Age of Mobilism (Norris & Soloway, 2011).
- It has been estimated that the number of mobile subscriptions would reach the seven billion mark in 2013, which would be greater than the number of humans on the planet (Faille & Morrison, 2013).
- The growth rates of mobile phone subscriptions in less economically advanced countries were the fastest (Ally, 2013)
- Bridging Formal and Informal Learning Recommendations for action have common themes that acknowledge the need for:
    - **Identifying what works** and what does not work pertaining to the integration of IT in education
    - **Locating best practices** within each thematic working group area to inspire research and practice
    - Bridging formal and informal learning
    - **Making research accessible** to a broad range of constituencies

Recommendations for Action: TWG2

- **Develop criteria for identifying best practices and models of mobile learning** which are evidence-based, culturally sensitive, curriculum centered, flexible and scalable.

- **Develop guidelines and strategies to tackle challenges of mobile learning**, including BYOD, interface design, cross platform applications, assessment, equity, cultural, health and safety issues, teacher preparation issues, and quality of learning outcomes in order to bridge learning across settings and contexts.

Action Plan

- Criteria to be developed for identifying *best practices* and *models* of mobile learning:
  - evidence-based,
  - culturally sensitive,
  - curriculum centered,
  - Flexible and scalable,
  - allow pedagogical changes and student directed learning,
  - applicable in formal and informal contexts.
- Guidelines and strategies be developed to tackle challenges of mobile learning:
  - BYOD,
  - Interface design,
  - Crossptaform problem applications,
  - Assessments, equity, cultural, health and safety issues,
  - Teacher preparation, quality of learning outcomes
  - Bridging learning across settings and contexts.

Challenges Identified by TWG2

- Some schools not allowing students to use mobile devices.
- Policies on students bringing their own devices
- Students not using mobile devices for intentional learning purposes
- The need to change assessment practices
- Equity issues in accessing mobile devices
- Cultural issues in using mobile devices in different contexts

- Cross platform issues in mobile applications
- Design challenges, e.g., size of screen
- Health and safety issues

Policy, Research & Practice Implications

Unresolved Issues

- Shared understanding of mobile learning: What makes mobile learning unique?
- Design and pedagogical issues: Do we know what learning and pedagogical theories/strategies work best with mobile learning?
- Mobile literacy skills: What skills are needed for learners to participate successfully in mobile learning?
- Policy issues: The need to develop policy guidelines for: equitable access, privacy, intellectual property, health and safety
- Evaluation: Mobile learning is about learner control, situated and context-based. How can it best be evaluated, particularly in informal contexts.
- Platform Independence: Ex: US DOD Sharable Content Object Reference Model (SCORM)

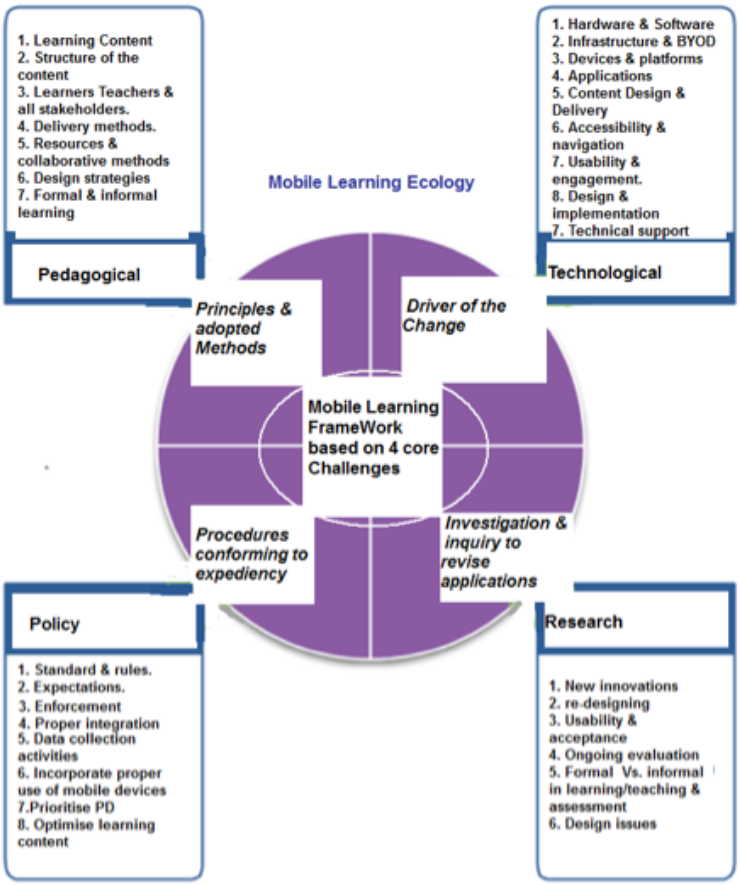
Emerging Issue: Styles of Mobile Learning Implementation

- Problematic: Decision makers at the school district or ministry top level arrange for mass distribution of devices.
- Promising: Parents and teachers foresee benefits, begin grass roots initiative, school conducts needs analysis and pilot test(s).
- Preferable: Ministry sets educational goal, conducts needs analysis and pilot test(s), refines and scales up.

The Case of Nan Chiau Primary School

Nan Chiau Primary School in Singapore, is part of the Qualcomm Wireless Reach WE Learn project.

- Smartphone use for teaching and learning.
- Students are Excited to Share and Learn



Prominent Issues and Opportunities

- Sharp distinction perceived between formal and informal learning
- Tension between traditional classroom learning and open access to knowledge
- Tension between the personalised nature of mobile technology and the collaborative/community aspect of learning with mobile technologies
- Identifying barriers that inhibit bridging formal and informal learning through mobile technologies is a first step toward resolving the current sharp distinctions

EDUsummIT2015

In the Asian Pacific Region

September 14 & 15 in Bangkok Thailand

Chaired by David Gibson (Australia) & Kwok Wing Lai (New Zealand)

In close collaboration with UNESCO Bangkok office

TECHNOLOGY ENHANCED QUALITY LEARNING FOR ALL

In close collaboration with UNESCO Bangkok office

Thematic Working Groups

- TWG1: Smart Partnerships
- TWG2: Advancing mobile learning in formal and informal settings
- TWG3: Professional development for policy-makers, school leaders and teachers
- TWG4: Addressing Gaps and Promoting Educational Equity
- TWG5: Assessment as, for and of learning in the 21st century
- TWG6: Creativity in a Technology Enhanced Quality curriculum
- TWG7: Indicators of Quality Technology-enhanced Teaching and Learning
- TWG8: Digital Citizenship and Cyberwellness
- TWG9: Curriculum - Advancing understanding of the roles of CS/Informatics in the Curriculum

http://www.curtin.edu.au/edusummit/

The UNESCO Chair - a Driver for Research and Innovation Excellence and Sustainable Regional Development

Stoyan Dentchev & Roumen Nikolov
s.denchev@unibit.bg, r.nikolov@unibit.bg
State University of Library Studies and Information Technologies

UNESCO Interfaculty Chair ICT in Library Studies, Education and Cultural Heritage

- Start of activities: March, 2011
- Official Approval: 17 February, 2012
- Signing the Agreement: 20 November, 2012

20.12.2012, Paris

UNESCO Chair in ICT in Library Studies, Education and Cultural Heritage

The main objectives of the Chair are:

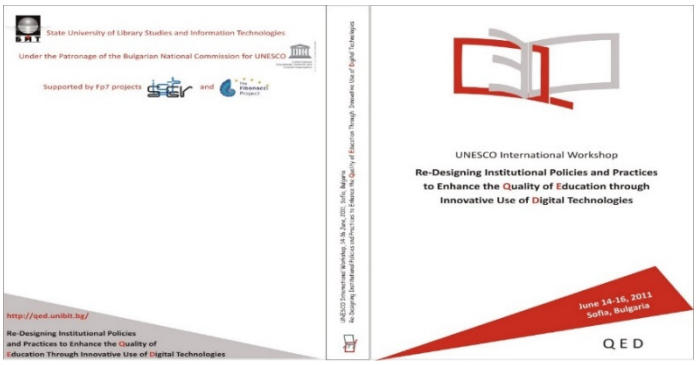
- strengthening inter-university cooperation by facilitating exchange and share of learning methodologies, methods and technologies in education among the UNESCO Chairs and partners;
- Developing an appropriate infrastructure and new institutional relations;
- Enhancing universal access to information and knowledge for students by use of e-learning in addition to traditional face-to-face to and support the collaboration and mobility of librarians,

teachers and heritage conservation professionals between SULSIT and other universities;

- Extending the collaboration and transfer of knowledge with other UNITWIN/UNESCO chairs;

QED 2011, follow-up of EDUsummIT 2011, 8-10 June

QED 2011, follow-up of EDUsummIT 2011, 8-10 June



THE PROMISE

In many instances, the Networks and Chairs serve as think tanks and as bridge builders between academia, civil society, local communities, research and policy-making.

http://en.unesco.org/unitwin-unesco-chairs-programme

> *…the Chair will strengthen the existing networks of partners at regional level (South-East Europe, Danube Macro-Region) and* ***will play the role of a Centre of Excellence and innovation zone*** *in the specified areas…*

31.03.2011, Proposal for UNESCO Chair establishment

INTELLECT: Centre of Excellence in INternet TEchnoLogies and Innovation, Library SciEnces and Cultural HeriTage

Objectives:

- to **establish a Centre of Excellence** (CoE) based on the capacity of SULSIT and its partners;
- to further develop its research and innovation potential in order to position it as a strong research and innovation hub at national, European and international level;
- to qualify as an Associated Partner of the EIT ICT Lab for South-Eastern Europe and Western Balkans (https://www.eitictlabs.eu/)

Partners

- Main partners:
  - Sofia Development Association (SDA)
  - Centre of Technology and Innovation Management GMBH, Munich, Germany (CeTIM)
  - ICT Cluster (ICTC)
  - Cluster Innovation and Culture (CIC)
- **Associated partners** – more than 50 national and international, including: Sofia Municipality, Ministry of Education and Science; Ministry of Economy and Energy, Ministry of Culture, Sofia Tech Park, Milano University, ICT Audiovisual cluster Madrid, Basque Audiovisual Cluster, Honeywell – CZ, Association of the Business Clusters, etc
- Open for collaboration

CoE INTELLECT – Research & Innovation Arm of the UNESCO Chair at SULSIT

Main areas:

- **Research and innovation in internet technologies, library sciences and cultural heritage** – areas where the SULSIT has already demonstrated solid competitive advantage both at national and international level;
- Special attention will be paid on the area of **Future Internet and Web** – area which has transformational impact on society and all industries and provides enormous opportunities for economic growth.
- According to a study of Cisco, the overall Value at Stake of the so called **Internet of Everything** in Bulgaria (both in the public and

private sector) is estimated at $10.4B. The opportunity only for the Capital City Sofia is estimated at $0.81B.

Specific Areas

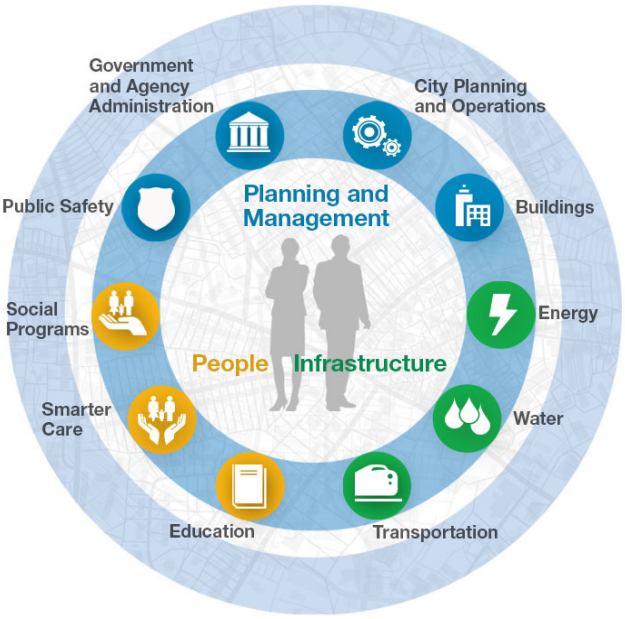
- Future Internet and Web;
- Smart Cities and Communities (Sofia – Smart City);
- Smart X: Culture, Libraries, Education, Energy, Transport, Health, Production, Security, Agriculture, Environment, ……. Smart Society of Smart People;
- Open Innovation and Web Entrepreneurship

Smart City – Definition

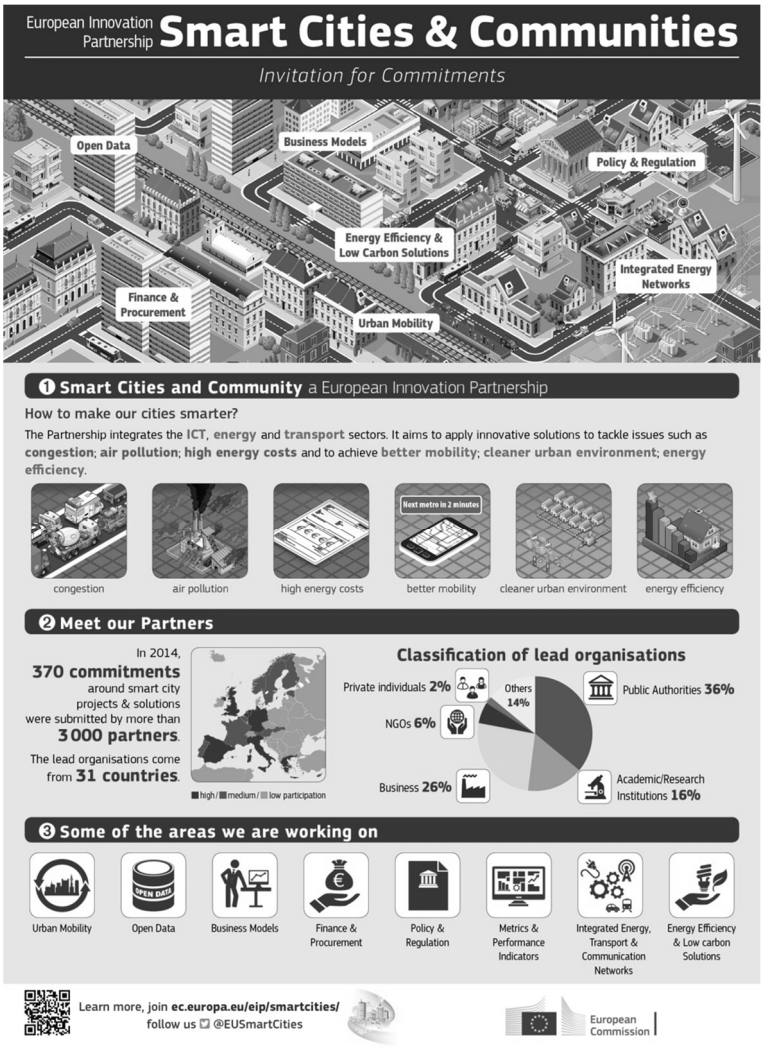
> We have a Smart City ……. *when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources through participatory governance*.

http://www.inta-aivn.org/images/cc/Urbanism/background%20documents/01_03_Nijkamp.pdf

Smarter City – IBM

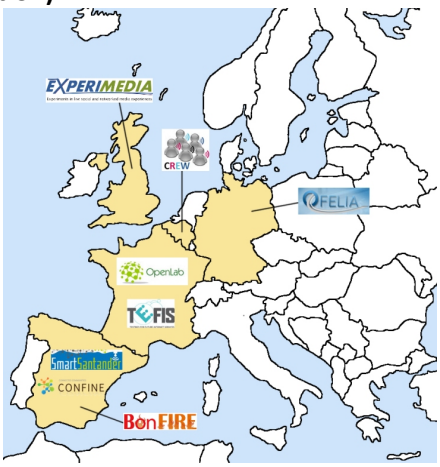


European Innovation Partnership

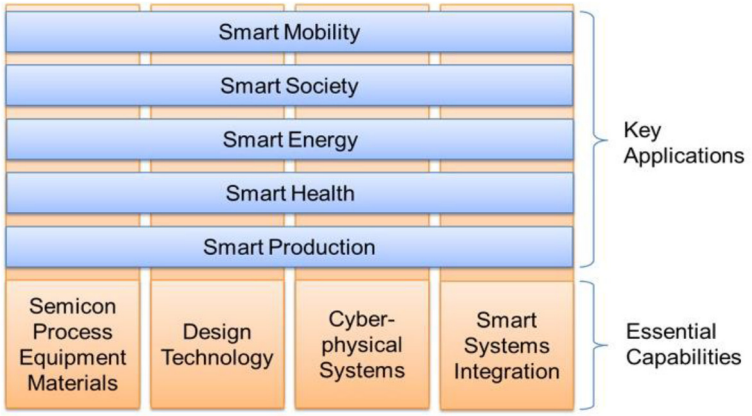


Future Internet PPP

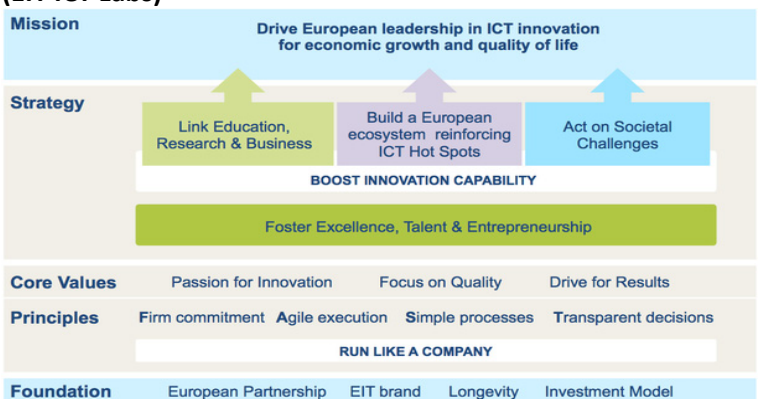
FIRE initiative (Future Internet Research and Experimentation)



'Electronic Components and Systems for European Leadership' -
ECSEL Joint Undertaking



European Institute of Innovation and Technologies ICT Labs (EIT ICT Labs)

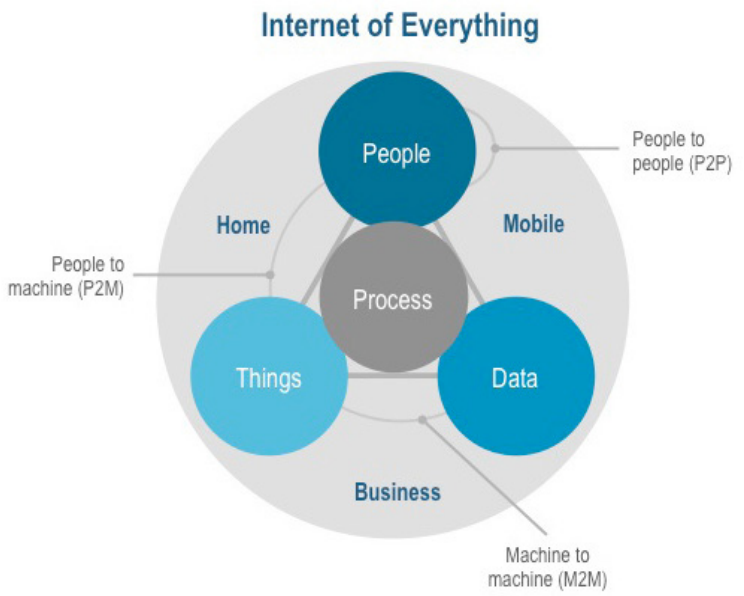


Smart Specialisation Strategy & Structural Funds

IoE IMPACT

In a recent study, Cisco calculated that the Internet of Everything, applied in 21 core *use cases* in five areas of business (asset utilization, employee productivity, supply chain and logistics, customer experience, and innovation), has the potential to deliver $14.4 trillion of value (net profits) for private-sector companies globally between now and 2022. …..The use cases cover areas such as smart grid, smart buildings, connected healthcare and patient monitoring, smart factories, connected private education, connected (commercial) ground vehicles, connected marketing and advertising, and connected gaming and entertainment.

(http://www.cisco.com/web/about/ac79/innov/IoE.html)



IoE for Bulgaria, public sector, $2.8B

Opportunity	Estim. Value [$M]	Opportunity Area	Estim. Value [$M]
Video Surveillance	$52	Virtual Desktop	$8
Smart Parking	$46	Particulate Monitoring	$11
Smart Street Lighting	$55	Disaster Response	$6
Waste Management	$15	Smart Buildings	$146
Road Pricing	$16	Correction Visits	$2
Public Transport	$23	Bridges Maintenance	$3
Offender Transport	<$1	Fleet Management	$26
Telework	$165	Local Metro	$15
BYOD	$114	Travel avoidance	$145
Connected Museum	NA	Smart Tollbooths	<$1
Connected Learning	$169	Chronic disease	$53
Gas Monitoring	$51	Inpatient Monitor	$2
Water Management	$63	Counterfeit drugs	<$1
Smart Xmission Grid	$150	Cyber Security	$71

Mobile Collaboration	$1,332	Drug Compliance	$4

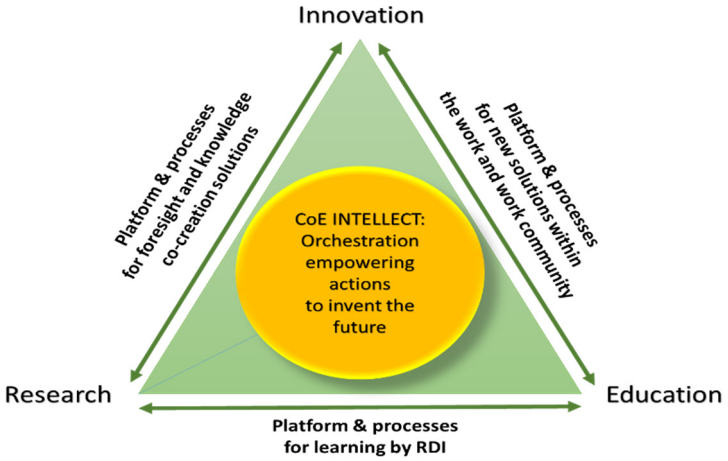
IoE for Bulgaria, Smart Cities

http://www.cisco.com/web/strategy/docs/iot-opportunities-for-bulgaria.pdf

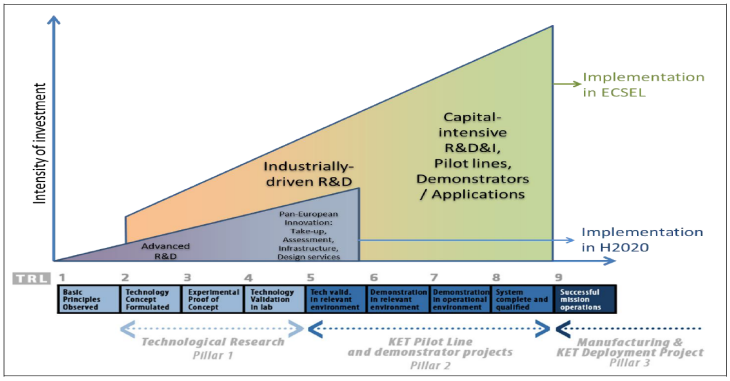
Opportunity	Estim. Value [$M]	Opportunity Area	Estim. Value [$M]
Smart Grid	$1,066	Smart Buildings	$188
Connected Commercial Vehicles	$324	Wealth Management	$245
Smart Farming	$197	Next-Gen Retail Bank Branches	$11
Physical/ Logical Security	$586	Next-Gen Vending Machines & Digital Malls	$27
Smart Factories	$907	Connected Gaming/ Entertainment	$348
Connected Private College Education	$12	Connected Marketing/ Advertisement	$1,048
Business Process Outsourcing	$399	Digital Signage	$21
Innovative Payments	$337	Virtual Attendants	$87
Future of Work	$619	Time-to-Market	$554

Travel Avoidance	$280	Supply Chain Efficiency	$325

Knowledge Triangle of the CoE INTELLECT

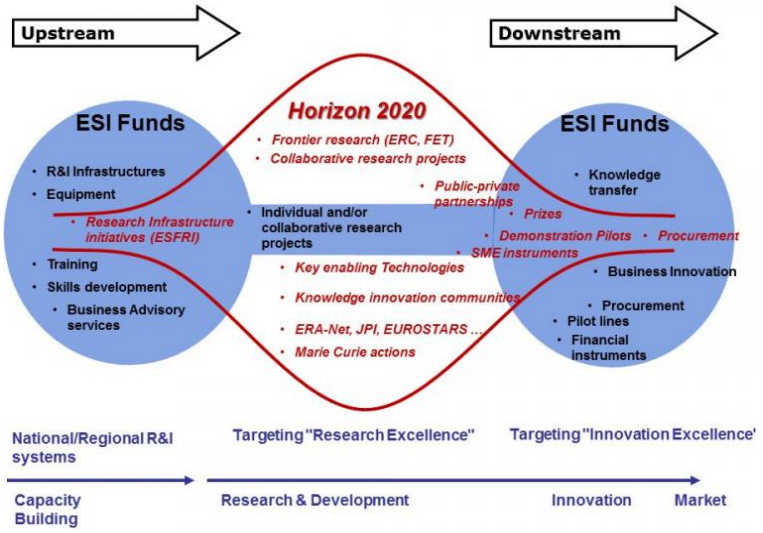


CoE INTELLECT & TRL

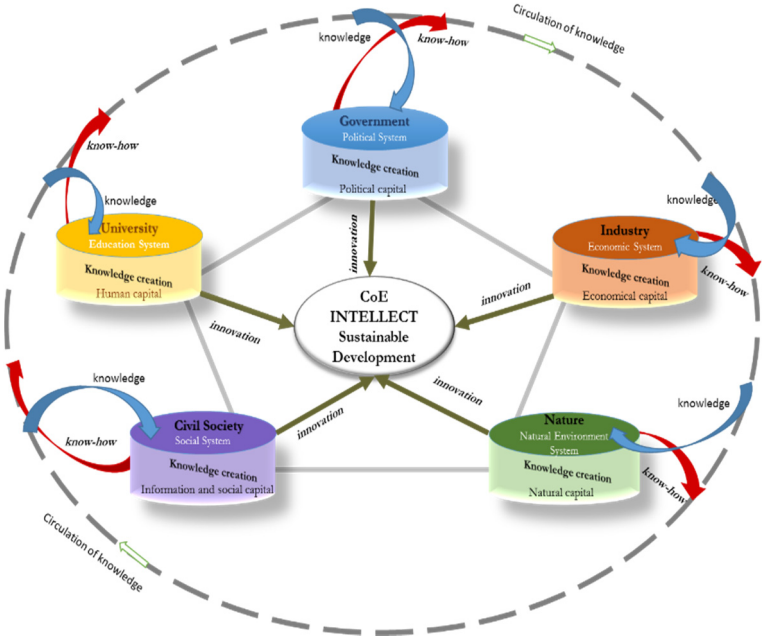


http://ecsel.eu/

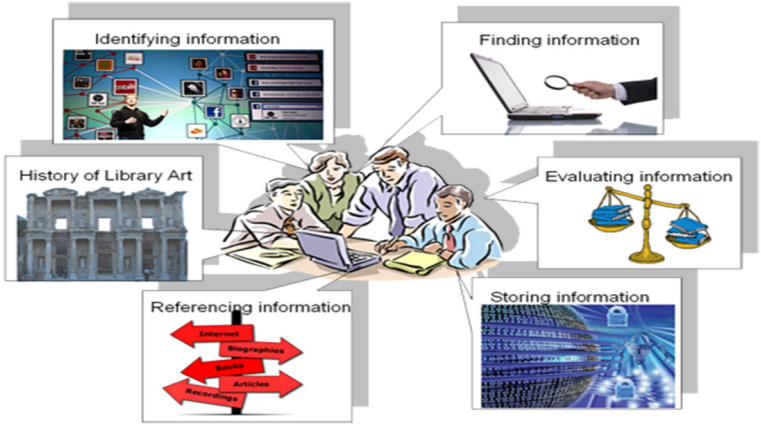
Stairway to Excellence, 2014



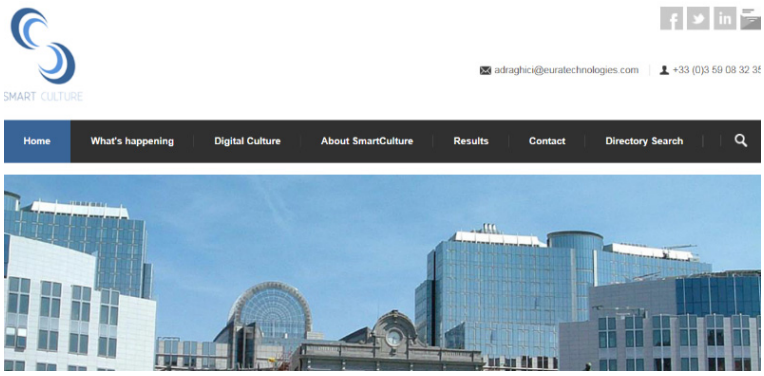
CoE INTELLECT Model



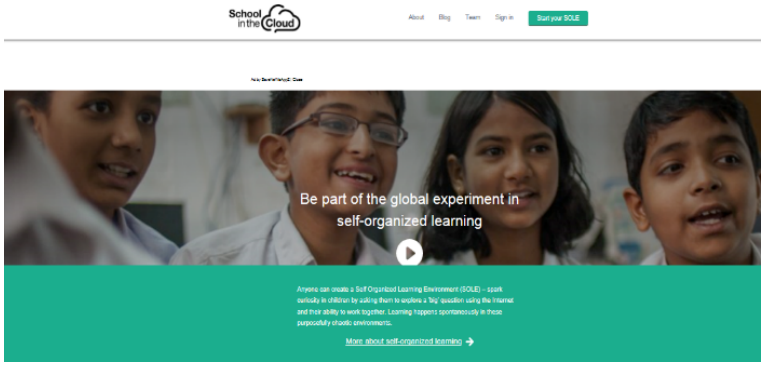
Online Master Course for Teachers History of Library Science and Information Literacy



FP7 Region of Knowledge Project SmartCulture

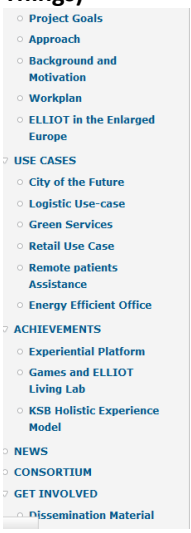


School on the Cloud



Future Education and Training in Computing: How to support learning at anytime anywhere

FP7 Project ELLIOT (Experiential Living Lab for the Internet of Things)



Activity Area: 1.3 Internet of Things and Enterprise environments

The **ELLIOT** (**Experiential Living Lab for the Internet of Things**) project aimed to develop an Internet Of Things (IOT) experiential platform where users/citizens are directly involved in co-creating, exploring and experimenting new ideas, concepts and technological artefacts related to IOT applications and services. ELLIOT allowed studying the potential impact of IOT and the Future Internet in the context of the Open User Centred Innovation paradigm and of the Living Lab approach.

The ELLIOT Experiential approach has been explored and its technology platform experimented within different use cases belonging to six different sectors, namely **Wellbeing**, **Logistics**, **Environment**, **Retail Use Case**, **Remote patients Assistance**, and **Energy Efficient Office** in order to validate the capacity for users/citizens to co-create IoT based services.
Starting from these six cases, the ELLIOT project can significantly contribute to a new,

PRESENTATIONS & PAPERS
(in English Language)

Mathematics with a computer - a contest enhancing the digital and mathematical competences of the students

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Abstract.
Two new competitions *Mathematics with Computer* and *Theme of the month* are introduced and described. Both are conducted online and enhance learning mathematics and its applications by exploring practical problems with the help of mathematical software and computer systems. *Mathematics with computer* contains 10 relatively easy problems that have to be solved for 60 minutes while *Theme of the month* consists of five problems that have to be solved for a month. The competitions are organized with the help of the portal Vivacognita, a joint project of the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences and the telecommunication company VIVACOM.

Keywords: mathematics with computer, mathematical competition, digital competence

1 Introduction

The results of Bulgarian 15-year-old students in 2012 PISA survey (47-th place among 65 participating countries), showed once again that mathematics education in the country has significant faults. The debates in the circles of educational authorities and in the professional organizations related to mathematics education have shown that there are many reasons for this poor performance. One of them is the incomplete understanding of the mere notion *Mathematical Literacy* which was actually tested by PISA survey. Today this notion also includes the ability to handle modern software systems for working with mathematical objects such as GEOGEBRA, GEONEXT, LOGO, ELICA, CABRI and the like. It includes the ability to use mathematical knowledge and modern computing systems and devices to solve specific mathematical problems arising in practice. To improve things

in this area, upon the initiative of the Union of Bulgarian Mathematicians, two new competitions were developed and tested under the provisional names *Mathematics with Computer* and *Theme of the month* [1]. *Mathematics with Computer* is for students from third to twelfth grade and is held *online* (via Internet). Each participant chooses the location and method of entry into the network. On a preliminary announced day and time each pre-registered participant in the competition gets access for 60 minutes to a *Worksheet* which contains 10 problems for the respective class. This is the time in which the participant works on the problems and submits (by Internet) the answers to the organizers of the competition. Some of the problems are equipped with several answers and the student is expected to select the correct one. The answer of a problems may also be a number which the participant has to enter (in a given format) in a specially designated field of the worksheet [2]. When solving the problems, the participant can use whatever aids and sources of information he/she likes (computer, internet, software systems, books, etc.) - as is the case with a specific problem in everyday life. Many of the problems are accompanied by a GEOGEBRA-file [3] which supports the experimental exploration of the problem and helps the solution process. A Trial Stage of the competition was held on June 6, 2014 [1]. It was attended by over 50 students from Sofia, Rousse, Razgrad, Pazardzhik and Blagoevgrad. Almost all coped very well with the challenge and this was a demonstration that the competition *is possible*. The real competition will take place in December 2015 and will be conducted with the help of the portal *Vivacognita* [4], a joint project of the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences and the telecommunication company VIVACOM which supports the initiative financially.

The *Theme of the Month* appeared initially as a tool to help students and their teachers in the preparation for the competition *Mathematics with Computer*. It gradually acquired however self-importance, even as a didactic concept. Each Theme of the Month consists of five tasks, united by a common mathematical idea and arranged in the direction of increasing difficulty. The Theme is published in the beginning of the month on the above-mentioned project portal Vivacognita and contains an invitation to students to solve the problems and send responses (online) by the end of the month. Some of the problems are accompanied by auxiliary GEOGEBRA-files which allow the students to explore the mathematical problem, to find suitable properties, to try

out different strategies and find (usually approximate but sufficiently accurate) answer. To solve more difficult problems from the Theme, the students have to adapt the auxiliary files from previous problems or to develop their own files for testing and solving the problem. The students can submit together with the answers of the problems also these modified or newly created files. Thus the participating students develop programming skills and algorithmic thinking. Their digital competence significantly exceeds that of the traditional *passive* users of information technology. The mathematical knowledge gained in the process of solving the Theme problems is deeply rooted in the mind because it is based on own research and observations of mathematical facts and phenomena. In addition, students deepen their understanding of the importance of mathematics and particularly of *Mathematics with computer*.

2. Theme of September

A windscreen wiper of a flat rectangular car window (used in older cars) [Fig. 1] should be fixed so that the wiped surface is maximal:

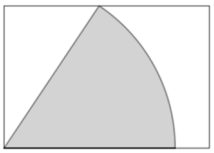


Fig.1 *A windscreen wiper of a flat rectangular car window*

Problem1.

Find the length of the arm of windscreen wiper if one of the ends of the wiper's arm is fixed at a corner of a window with sides:

a) $77\,cm$ and $57\,cm$?

b) $85\,cm$ and $57\,cm$?

Problem2.

Find the length of the arm of windscreen wiper if the window frame is with sides $50\,cm$ and $33\,cm$ and one of the ends of the wiper's arm is fixed at the middle of:

a) the shorter side

b) the longer side.

Problem3.

Suggest appropriate length of the window wiper for a frame whose corners are with coordinates $A(0;0)$, $B(45;0)$, $C(45;38)$, $D(0;38)$ and a point at which it should be fixed.

Auxiliary dynamic files are provided with information about the area of the sectors representing the area cleaned by the wiper

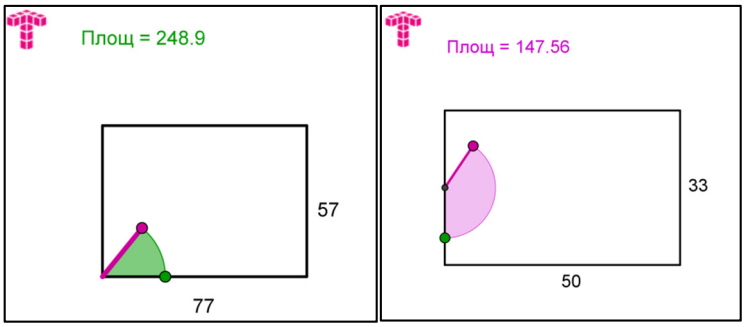


Fig.2 Auxiliary files modeling wipers with different fixing points

Analysis of the results of the participants in the Theme of September

The number of visitors of the *Theme of September* during September 2014 is 1212 from 640 accounts.

The legitimate submissions of solutions are 100. There is no significant gender difference (Fig. 3).

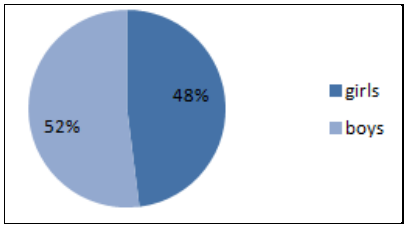


Fig. 3 Gender distribution of the participants

The distribution of the participants with regard to their grades is given in Fig. 4. The number of pupils from the primary school is relatively very small. A theme specially designed for their age is needed since the use of fractions is an obstacle for a successful performance.

Since a great part of the 7-graders are preparing for entry exams in specialized schools which are based on the classical type of assessment

(with a limited access to auxiliary tools) we expect a relatively small number participants in that group also for the upcoming themes of month.

Since a great part of the 7-graders are preparing for entry exams in specialized schools which are based on the classical type of assessment (with a limited access to auxiliary tools) we expect a relatively small number participants in that group also for the upcoming themes of month.

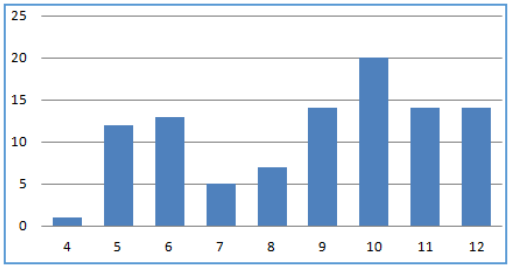


Fig. 4 Grade distribution of the participants

75% of the participants have registered and submitted their solutions in the last two days of the month (Fig. 5).

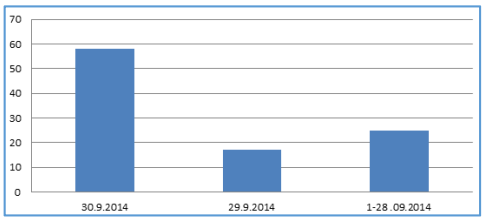


Fig. 5 Submission of the solutions

The following three histograms illustrate the results with regard to the problems. The full solution of a problem (or subproblem, if any) is evaluated with 10 points and the maximum number of points for a specific Theme of the month is 50 points. The answers are of the type *free answer*, and the evaluation is of a *target* type according to the closeness of the submitted answer to the correct one [5].

In sub-problem a) of the first problem 65% of the participants have submitted an acceptable approximation of the length of the wiper's arm and 86% of them figured out that the precise value is related with the corresponding size of the frame. We could add 6% to the percentage of those who have solved the problem, although they have

submitted the area wiped by an arm with the correct length (rather than the length itself).

It is interesting to note that between 2% and 7% of the participants have worked correctly by submitting relevant values of the objects sought still not answering the original question. They were given some points because it was surmised that they would have coped with the practical situation.

25% of the participants have submitted the length of the longer (instead of the shorter) side of the frame as their answer for the length of the wiper's arm. But in the specific ratio of the rectangle's sides their approximation of the area being wiped was acceptable. Out of these 25%, 17% have figured out that the optimal length of the wiper's arm should coincide with the length of a rectangle's side, 5% have submitted a sufficiently close approximation, and 3% have submitted the value of the sector's area. These students were also given some points (Fig. 6).

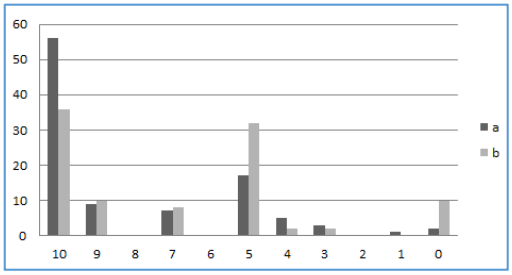


Fig. 6 *The distribution of points assigned for Problem 1, a) and b)*

46% of the participants had submitted acceptable answers for sub-problem b), thus demonstrating their understanding that there are different cases with regard to the behavior of the wiped area according to the wiper's length.

The results of Problem 2 are similar to those of Problem 1. The percentage of those who have not figured out that the length of the wiper's arm coincides with the length (or a half) of a rectangle's side is smaller (Fig. 7).

Only 9% have found an acceptable approximation of the point of fixing in Problem 3. Most participants have submitted as a solution a vertex of the rectangle or the midpoint of its side. Several students have written in the text field that any vertex (respectively a the midpoint of

a any side) is a solution. More than 30% have not submitted answers for the length of the wiper and the point of attachment (Fig. 8).

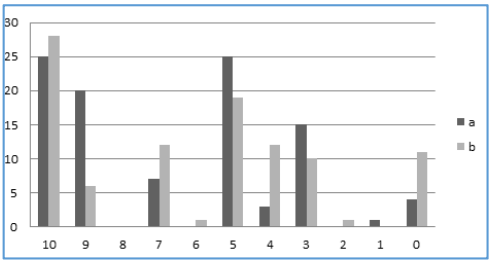


Fig. 7 *The distribution of points assigned for Problem 2, a) and b)*

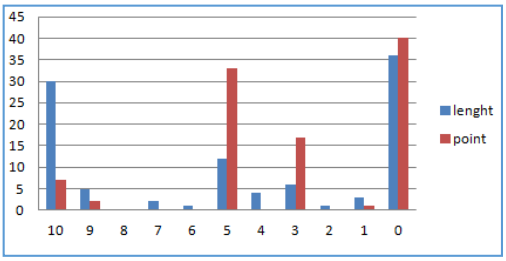


Fig. 8 *The length of the wiper and the points assigned to Problem 3*

Problem 3 is a challenge which on one hand could provide food for generalizations, and on the other – would assure a normal distribution of the ranking (Fig. 9).

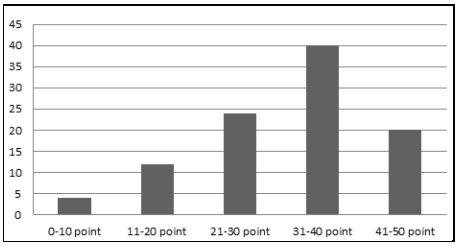


Fig. 9 *The distribution of the scores achieved for the Theme of September*

It was only Radostina Kalaydzhieva (taught by Ivaylo Kortezov from the American College in Sofia) who achieved perfect score.

One of the two participants with a zero score has not submitted any data, and the second one is a 4th grader who has written in the text field: *The problem was not that difficult but was not super easy either, so to be honest I liked it.*

The distribution is normal with a shift to the right as we expected.

82% of the submitted files are adaptation of the auxiliary files being provided with the problem's formulations.

To popularize the competitions we delivered a two-day training course for teachers in the beginning of April 2014. Also, some gatherings of teachers from all the contry in the frame of the European Projects KeyCoMath, Scientix and MASCIL (all related to Inquiry Based Learning) were used to disseminate the idea of these two competitions which actually serve the goals of these projects. In the work with teachers, we distinguish between three levels of competences for working with dynamic files:

- Direct use of ready files
- Modifying and adapting the provided auxiliary files according to a specific goal
- Development of dynamic files from scratch

Our expectations are that most of the teachers would be able to modify ready files and to encourage their students to do the same.

We are especially pleased to witness creative solutions as the one submitted by Diana Peneva, a student from the Mathematics High Scool *Nikola Obreshkov* from Razgrad, taught by Neli Stoyanova.

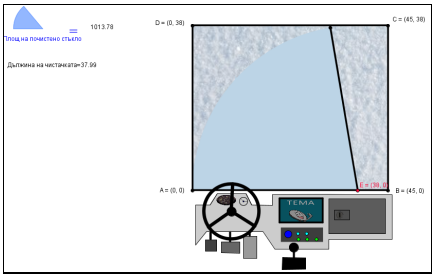


Fig. 10 *A snapshot of a file submitted by Diana Peneva to Problem 3*

Taking into account the performance of the girls participating in the Theme of September let us recall that the window wipers have been invented by a woman[2] Mary Anderson. In a visit to New York City in the winter of 1902, in a trolley car on a frosty day, she observed that the motorman drove with both panes of the double front window open because of difficulty keeping the windshield clear of falling sleet

[2] *Which goes great with another male invention, the car!* (from The Simpsons, Season 17, Episode 19: *Girls Just Want to Have Sums*)(Eds.)

[6]. When she returned to Alabama she hired a designer for a hand-operated device to keep a windshield clear and had a local company produce a working model. She applied for, and in 1903 was granted, a 17-year patent for a windshield wiper. Her device consisted of a lever inside the vehicle that controlled a rubber blade on the outside of the windshield. The lever could be operated to cause the spring-loaded arm to move back and forth across the windshield. A counterweight was used to ensure contact between the wiper and the window. Similar devices had been made earlier, but Anderson's was the first to be effective.

Another female inventor made an important mark on the early development of windshield wipers. Multiple sources, including the USPTO, report Charlotte Bridgewood received a patent in 1917 which was titled Electric Storm Windshield Cleaner. The invention is believed to be the first automatic windshield wiper which was electrically powered [7].

When working on this theme the students could reach various approximations of the correct solution, and various depths of the relevant mathematical knowledge, e.g.

- A direct verification by means of an auxiliary file and finding an acceptable approximation.
- Carrying out experiments by means of the auxiliary file, fixing the object sought, additional reasoning for augmenting the precision of the solution. In this case the student could figure out that the length of the wiper is equal to the length of a side (or its half) of the rectangle frame.
- Carrying out experiments by means of the auxiliary file and modifying it. In this case it is appropriate to make additional constructions for automatic construction of the second endmost position of the wiper, e.g. in Fig. 11

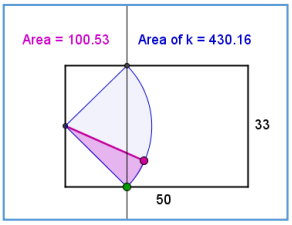


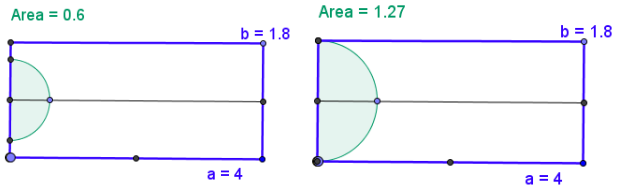
Fig. 11 *Modifying the auxiliary file with additional constructions*

- Carrying out experiments and reformulating the problem, e.g. from the original one to a *Prove that* problem. Such a method is often helpful in solving problems with more elementary means
- Computing with various mathematical tools
- Generalising and exploring the problem without limitations with regards to the set of mathematical and IT tools

Let the car window be a rectangular frame with sides *a* and *b*, $b \leq a$.

Here is a version of fixing the unmovable end of the wiper in the midpoint of the smaller side *b.* Let us consider the sector with a center - the midpoint of *b,* and a radius r .

If $r \leq \frac{b}{2}$, the sector is a semicircle and for $r = \frac{b}{2}$ the maximal area S is reached, $S = \frac{\pi b^2}{8}$ (Fig.12).



`*Fig. 12* Explorations with the auxiliary file

When the radius runs in the interval $\frac{b}{2} < r < a$, the area of the sector first decreases, but then after that it increases until the sector touches the other smaller side of the rectangle (Fig. 13)

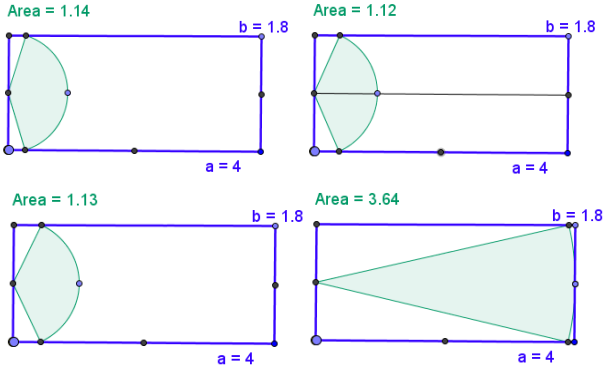


Fig. 13 *Explorations with the auxiliary file*

Denote by α the angle of the sector. We get $r = \dfrac{b}{2\sin\dfrac{\alpha}{2}}$ and $S = \dfrac{\pi b^2 \alpha}{4.\sin^2\dfrac{\alpha}{2}.360}$. The maximum $S = \dfrac{\pi a^2 \alpha}{360}$ is reached for $r = a$, i.e. for $\sin\dfrac{\alpha}{2} = \dfrac{b}{2a}$.

If $a < r < \sqrt{a^2 + \left(\dfrac{b}{2}\right)^2}$, the area of the sector is significantly less than in the previous case. This is so because the free end of the wiper never leaves the window and the sector is contained entirely into either lower or upper half of the window (Fig. 14). This is the reason for the discontinuity of the graph of the function depicted on Fig.15.

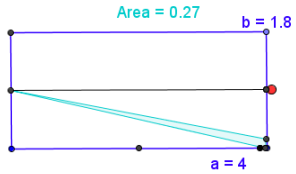


Fig.14 *Explorations with the auxiliary file*

If we use the graphs of the respective functions, reflecting the behavior of the considered areas in the three cases we get the picture in Fig. 15.

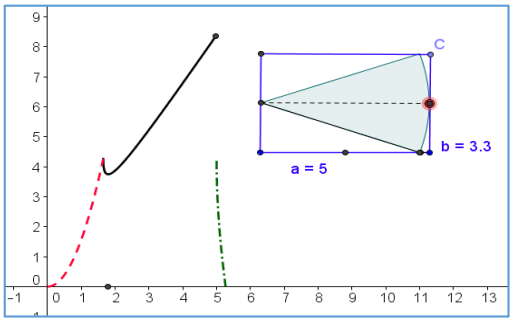


Fig.15 *Explorations with the auxiliary file*

Thus, when the attachment is in the middle oft he small side of the frame, the wiper has to be with a radius equal to the length of the bigger side of the frame so as to clean a maximal area.

3. Conclusion

The successful performance of the students at the contests *Viva Mathematics with a computer* and *Theme of the month* involved various activities and competences: registration, orientation and an adequate use of auxiliary dynamic files, installing of software, entering data, modification and adaptation of the auxiliary dynamic files being provided, search in the internet, using electronic resources, submitting solutions electronically, sharing and commenting in the forum of the site.

Thus the two contests create conditions for demonstrating and developing digital key competences [8-9], which embrace a confident and critical use of IT; formation and development of knowledge; skills and habits of mind for filtering, evaluating, saving, applying and sharing of information; communication via electronic networks, and using software for solving mathematical problems. All these are crucial components of the digital competences as determined in the Recommendation of the European Parliament and of the Council of the European Union [10] on key competences for lifelong learning necessary for the students of today to be successful in a constantly changing world of work.

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A drunk man vs a drunk bird: developing communication competences of students for presenting their research projects

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Abstract.
This paper deals with ideas related to the development of key competences as formulated in the KeyCoMath European project. The focus is on the competence behind doing science at school age and communicating the main ideas and outputs of one's own research project to peers, specialists in the field, and to a larger audience. A special kind of inquiry based learning – the open inquiry, is discussed based on the author's experience in the context of two institutions for doing scientific research at school age – the High School Institute of Mathematics and Informatics in Bulgaria and the Research Science Institute – in USA.

Keywords:
key competences, inquiry-based learning, scientific research at school age, RSI, HSSI

1. The inquiry based learning and the key competences it enhances

To keep up with the knowledge dynamics in a specific field, the citizens of the creativity&knowledge based society are expected to acquire and develop key competences such as: *inquiring and identifying relevant information; conducting one's own explorations*; *writing down thoughts and reflections, applying creatively one's findings; communicating with others orally or in written form, discussing ideas, and presenting results.*

Below we consider various projects and initiatives, in which the Institute of Mathematics and Informatics (IMI-BAS) has been involved,

aiming at the development of key competences via inquiry based math education.

Current European projects dealing with such ideas include *KeyCoMath*, *Mascil, Scientix* [1-3]. The key competences as formulated by *KeyCoMath* [4, 5] in fact overlap and below we shall focus on the competence *behind doing science and communicating the main ideas and outputs of one's own research project to peers, specialists in the field, and to a larger audience*. As seen from Fig. 1, components of this competence are mainly included in *Communication in the mother tongue* [6], but are also present in *Sense of initiative, Social competences,* and if the project deals with research in mathematics and/or informatics – they would overlap with the rest key competences as identified by the project.

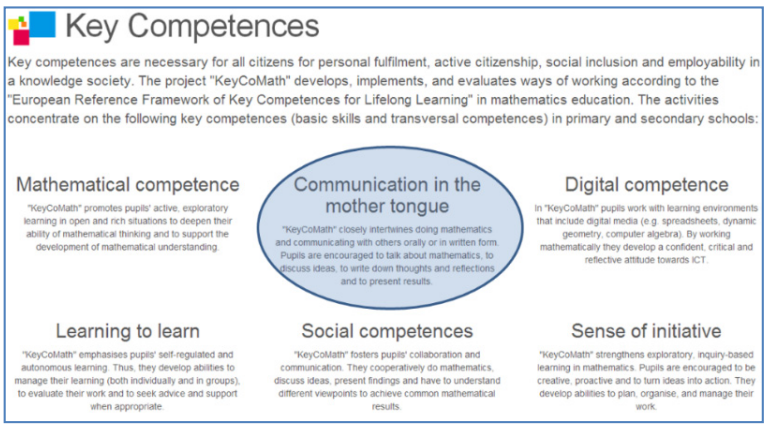

Fig. 1. The main key competences KeyCoMath concentrates on

Another important point we make is that when talking about the inquiry-based education we should take into account that it occurs at four main levels viz. *confirmation inquiry*, *structured inquiry*, *guided inquiry* and *open inquiry* [7]. The endeavors of researchers at IMI-BAS, involved with the above projects, are to prepare teachers to work at all these levels, providing them with environments stimulating not just a novel way of teaching but a novel way of *learning*. Such environments include the development of virtual labs for explorations, observations and generation of hypotheses in mathematics and science [8] but are not reduced to them. A special emphasis is put on educational forms fostering situations, in which students work on their own research projects *doing science***,** i.e. experiencing the process of

research *through the eyes of a professional mathematicians or scientists* and the teachers act as members of a research team, as authentic co-learners and explorers. This is in fact the fourth level of IBL – the open inquiry, where students derive questions, design and carry out investigations as well as communicate their results [9]. Creating conditions for high school students to work at this highest level of IBL reflects the constructionist's belief that *being a mathematician/scientists (like being a poet, or a composer or an engineer) means doing, rather than knowing or understanding* [10].

To put the Bulgarian students with special interests in math and science in a more realistic research situation, the *High School Institute in Mathematics and Informatics* (HSSI) was founded 15 years ago [11]. This institute inherited the good traditions of an earlier movement of the technically creative youth in Bulgaria and an international research program held in the USA – the Research Science Institute (RSI) sponsored jointly by the Center for Excellence in Education (CEE), and the Massachusetts Institute of Technology (MIT) [12].

2. The *Research Science Institute* international program

If I have to describe this program with one sentence it would be: *the place where to be extraordinary is the most ordinary thing*… This applies to the students, to the mentors, to the morning and evening lecturers and to all the rest officially and unofficially involved. The Research Science Institute (RSI) was developed by the Center for Excellence in Education (CEE) [13], a non-profit educational foundation in McLean, Virginia. Central to CEE is the principle that talent in science and math fulfills its promise when it is nurtured from an early age. The RSI is attended by approximately 80 high-school students from the US and other nations. Once selected, the students come to MIT and work on a research project under the guidance of faculty, post-docs, and graduate students at MIT, Harvard, Boston University, and other research and industry institutions from the Boston-area. All the students chosen for the Institute have already acquired a deep interest in a scientific field of inquiry. They work on their research projects for five weeks. At the conclusion of this internship, they write a paper summarizing their results and give an oral presentation of their work in front of a large audience at the RSI Symposium.

How to present their research projects in math and science to specialists in the corresponding field as well as to peers who are working on a large spectrum of science topics, is part of my duties as a

tutor (already for 17 consecutive summers) in RSI. We, the tutors, direct our students to the general goal via a path traced by *milestones* (intermediate objectives). At each milestone, students are expected to have finished a concrete stage of the final product development and mastered specific skills and competences [14, 15].

Traditional milestones for the written and oral presentation include:

- Presenting a mini-project using the same sample as the one for the final paper
- Gradual filling the sample starting with the background of the project, the methods used, considering partial cases and possible generalizations; classifying the cases of failure, etc.
- presenting the introductory part of their project for 3 min at a *posterless* session (with no props)(Fig. 2)
- presenting their project for 5 min with any visual support they think appropriate

All the milestones are accompanied by a feedback from us, the tutors, who work closely with the students - we read and critique the draft papers, provide editorial remarks, suggest avenues of research and areas of additional background reading, give ideas for tuning the oral presentations to a specific audience, etc. One of the most difficult things concerning the oral presentation of the projects is how to convey deep mathematical ideas for 10 minutes to a larger audience of young scientists not necessarily mathematicians but eager to understand.

Fig. 2. Talking to peers and to a Nobelist in Physics

3 The strength of a metaphor in front of a larger audience

Let us note that to communicate verbally the meaning and the relevance of scientific research to an audience larger than a few colleagues working in the same field is a competence difficult to acquire. Finding an appropriate metaphor could save a ton of rigorous explanations.

3.1 A classic example – A drunk man vs a drunk bird

Let us start with a metaphor famous among the mathematics community: *A drunk man will find his way home, but a drunk bird may get lost forever.* It is a joke by Shizuo Kakutani [16] at a UCLA colloquium talk as attributed in Rick Durrett's book *Probability:Theory and Examples.* Kakutani is known for his influential work in the fields of ergodic theory, functional analysis, and Brownian motion, as it relates to probability theory. The phrase encodes the fact that a two dimensional random walk is recurrent (i.e. the probability of returning to the origin is 1) whereas in higher dimensions random walks are not (in other words the probability of returning to the origin decreases as the number of dimensions increases)...

Fig. 3. Math breakfasts (at a table and on the grass)

3.2 *Ant geometries* as an introduction to Hyperbolic geometry

One of the most memorable metaphor from my tutor years in RSI dates from 1997 presented by Bryant Mathews in his oral presentation on Hyperbolic geometry project [17]. The idea came from a conversation he had with his mentor, Ioanid Rosu.

> *When we say "geometry", we could mean almost anything. In order to specify exactly what we mean, we must define certain objects and how these objects are related. In geometry, the two basic objects are the point and the line. Two axioms which we want these to satisfy are as follows: 1) Two points lie on a unique line; 2) Between any two points on a line, there is another point which lies on the same line. We usually think of points as dots on a chalkboard, and lines as curves connecting these points. But what if we define these objects differently? Suppose we define a point to be an ant, and a line to be a colony of ants. A point "lies on" a certain line iff an ant is a member of a certain colony. Does this geometry satisfy the first axiom above? No, because two points need not lie on a line, i.e. two ants need not be in the same colony. Let us try again. Suppose a point is an ant, and a line is a pair of ants. Now the first axiom is satisfied, because any two ants form a pair of ants. However, there is never a third ant on the same line, so the second axiom is not satisfied. Thus, our two axioms rule out each of the ant geometries; however, many geometries remain. As we add more axioms, we rule out more and more geometries until we are left with only one. If we choose the axioms of Euclidean geometry, we are left with our common notions of point and line. If we choose a different set of axioms, we may be left for example, with the mysterious hyperbolic geometry, where rectangles do not exist.*

Twelve years later I read the evaluations of Bryant's students in which they expressed their admiration for the clarity with which he presents very abstract mathematical ideas.

3.3 A sock over a shoe demonstrating *non-commutativity*

It was in this spirit that the Bulgarian participant in RSI 2013 Rumen Dangovski demonstrated the notion of *non-commutativity*, central to his project *on the lower central series of PI-Algebras* in an attractive and approachable way: he put a sock over his shoe thus showing that

the operations *putting a shoe* and *putting a sock* are non-commutative since the result depends on the order in which they are performed.

Fig. 2. Demonstrating non-commutativity to a not-only-mathematical audience by putting his sock over the shoe

3.4 A *simplified Einstein* under angle-preserving transformations

Bartosz Tarnawaski (RSI 2012) worked on an extension of Logo language towards constructionist education in mathematics. Here is a fragment of the abstract of his paper [9]:

> *The paper deals with the design of an extension of the Logo programming language. The extension consists of two environments, each of which is specific to one mathematical domain transformation of the plane- and differential geometry. In the first environment, called "Transformland" there are two viewports, one of them displaying the original objects and the other showing the same objects under angle-preserving transformations.*

To make the effect of working in his Transformland more clear instead of transforming standard geometric construction he chose a simplified image of Einstein (Fig. 3):

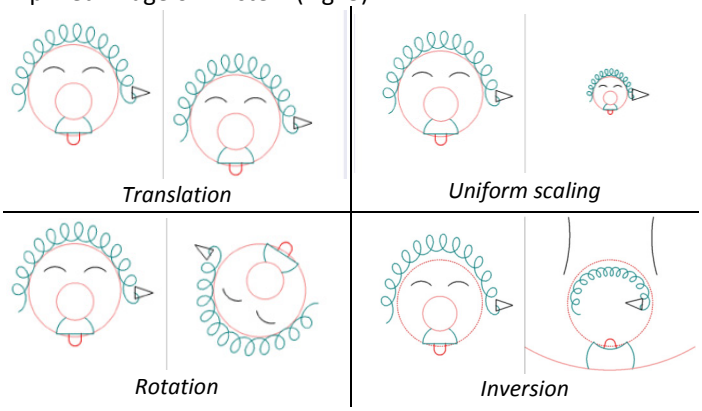

Fig. 3. Simplified Einstein under angle-preserving transformations.

3.5 *Mondrian vs Pollock* – the motivation behind Boruvka's algorithm

The project of Christopher Wang (RSI 2014) deals with improving the performance of computer programs run in parallel on multi-core processor computer. He considers relaxed data structures (beyond stacks, arrays and queues) which are *accurate enough, often enough*. The data structures (*union-find* and *disjoined-set* in his case) are *relaxed* by removing some safety conditions while improving the runtime at a relatively small cost of accuracy. A specific procedure, the so called *Boruvka's algorithm,* is used as a benchmark to compare differences in performance and accuracy between the relaxed and synchronized implementations of a concurrent disjoint-set.

Christopher illustrated such abstract notions as *relaxation of a Concurrent Disjoint set, accurate enough, often enough* and his motivation for implementing Boruvka's Algorithm in an extremely elegant and witty way – in the context of fine arts (Fig. 4)

For the recent 15 years the projects of 9 Bulgarian students participating in RSI have been recognized as "top 5" for written presentations in all fields (meaning the best in their respective fields – mathematics or informatics) and 3 – in the "top 10 oral presentations". But what is even more rewarding as a post effect is that these students are involved in many ways (including as mentors and advisors) in the activities of the Bulgarian *High School Institute in Mathematics and*

Informatics [18, 19]. By mentoring and guiding the next generations of young minds they also pass the awareness that approaching the work with genuine interest in research and discovery is what matters in the long run.

One of the main ideas behind establishing the High School Students Institute (HSSI) in Bulgaria was to implement RSI-like activities in mathematics and informatics context, taking into account the local conditions and traditions.

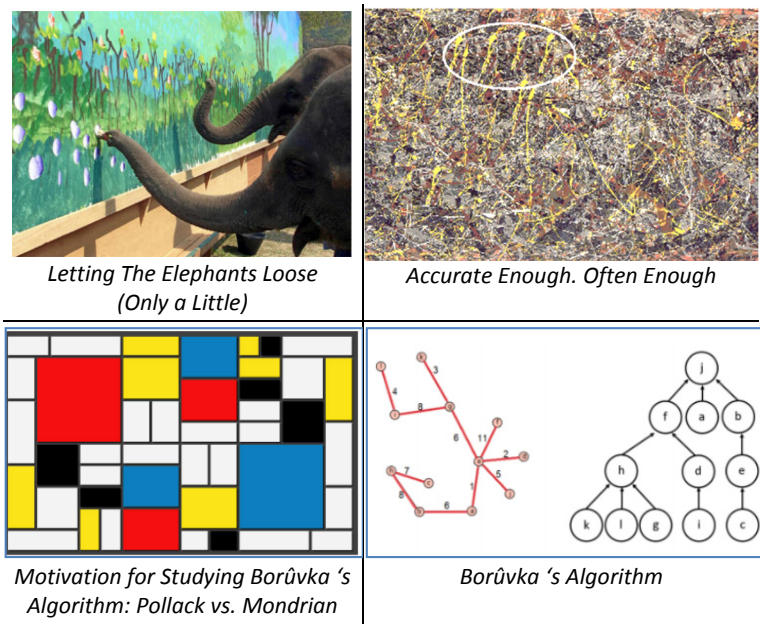

Fig.4. *Using fine art metaphors for illustrating computer science notions*

4 The Bulgarian High School Students Institute in Mathematics and Informatics

As one of the founders of the Bulgarian school for identifying and developing mathematically gifted students, Petar Kenderov, says [14]: *Talent is a resource which, unlike the ores, could vanish if not discovered early enough*… With this idea in mind and following the inspiring example of RSI, in the year 2000 the *High School Institute in Mathematics and Informatics* (HSSI) was founded by the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences,

the Union of Bulgarian Mathematicians, St. Cyril and St. Methodius International Foundation, and Evrika Foundation in response to the decision of UNESCO to declare that year as "World Year of Mathematics".

The activities of HSSI are focused on projects in mathematics, informatics and information technologies. The participants in HSSI are high school students between 8th and 12th grade, mainly from specialized Science and Mathematics Secondary Schools in the country. Every participant in HSSI works individually (or in a team) on a freely chosen topic in mathematics, informatics and/or IT under the guidance of a teacher or another specialist. A written presentation of the project is sent to HSSI. All papers are reviewed by specialists. Papers involving creativity elements are given special credit. The best projects are accepted for a presentation in the conference sessions of HSSI.

The High School Students' Conference is usually attended by more than 200 students, teachers, researchers, journalists. Based on the merits of the paper and presentation, the Jury judges the works and selects the best ones. Their authors are invited to take part in an interview for selecting two Bulgarian participants in RSI and to participate in the School Section of the Annual Conference of the Union of the Bulgarian Mathematicians.

The selection of two Bulgarian representatives for RSI is held by a Jury of specialists at the Institute of mathematics and Informatics in which the students are expected to demonstrate scientific knowledge related to their projects, commandment of of English and general culture together with other talents and hobbies (dance, arts, juggling, painting, poetry, etc.). The participation in RSI in the recent years is fully supported financially by the *America for Bulgaria Foundation* [20]. The authors of the best projects from the School Section are invited to participate in a three-week Research Summer School. During the first two weeks, lectures and practical courses in mathematics and informatics are delivered by specialists from universities, academic institutions and software companies. The main goal of the training is to extend the students' knowledge in topics related to their interests and to offer new problems, potentially the core of short-term projects. During the third week the participants present their results of their short-term projects and exchange ideas for further studies.

To help teachers improve their mentoring skills, a High School Teachers Workshop is organized during the third week of the Research Summer School. Participants are the research advisors of the students' projects, presented at the events of HSSI during the school year. In 2014 an Institute for high school students showing research potential in various sciences (an extended version of HSSI) was established at the Bulgarian Academy of Sciences and had already two sessions of students' project presentations.

Fig. 5. Moments from HSSI session – Plovdiv, 2014

The overall experience of work within these educational settings shows that the students build up a set of competences interwoven with predetermined objectives of preparing them for a dynamic society in which the *future is not what it used to be*…

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Viva Cognita: Virtual Community Software and E-Learning Software as a Framework for Building Knowledge Sharing Platform

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Abstract.
The paper presents our approach to the design and creation of Internet based knowledge sharing and knowledge creation platform for broad audience of people interested in mathematics, informatics and IT. We describe our platform as a hybrid of virtual learning community, virtual community of practice, virtual knowledge building community and e-learning platform. We present a short implementation case study and system architecture model. The paper ends with some plans for future development and research.

Keywords:
Computer Software, System Architecture, Virtual Communities, Knowledge Transfer, E-learning

1. Introduction

One of the most promising services for self-directed learning that appeared after 2008 is the massive open online course (MOOC). Some of the leading universities in the world have partnered in projects such as EdX and Coursera. As of October 2014, Coursera claimed for 10 million users in 839 courses from 114 institutions.[1].

All these services are globally accessible in the Internet. However, we have identified three possible obstacles for Bulgarian students and self-directed learners – the topics are mostly intended for college and university students (EdX, Coursera), very little or none of the content is translated in Bulgarian, the blended learning opportunity is restrained by differences in curricula and structure of courses.

With Viva Cognita project we intend to address these issues and to develop an Internet based knowledge sharing platform intended for Bulgarian audience interested in mathematics, computer science and IT.

The strategic goals for Viva Cognita project are:

- Providing better learning environment for every Bulgarian interested in mathematics, computer science or IT;
- Using the environment as a test ground for other educational projects;
- Actively involving industry partners in the project;
- Providing our diaspora with means for socializing with Bulgarian professional community.

Since we have a mature and very well organized professional community of mathematicians and computer scientists in Bulgaria, we took development strategy centered on actively involving its members in the process of development of a hybrid between E-learning platform and a virtual community.

To do this we chose to take off-the-shelf software intended for building web-based virtual communities and to use it in conjunction with off-the-shelf e-learning software for providing all of the features and services that we have intended to provide to our audience.

2. Theoretical Background

The term *Virtual community* appeared in 1993 in a book by Howard Rheingold [2] in which he describes his experiences in The WELL – an early dial-up bulletin board system (BBS) which lately evolved in Usenet group and forum.

There are numerous attempts to present a definition [3, 4]. Most of them include two key points: geographically dispersed group of people discussing and organizing shared activities (1) using information and communication technologies (2). There is always a level of abstraction of virtual representation of the real person in virtual community – it varies from a user profile with just user name in some chat room to sophisticated 3D avatar used in a virtual reality world.

Technological advancements that were used in creation of virtual communities are software solutions such as BBS, Usenet, IRC channels (those three are almost obsolete in 2014), e-mail, Internet forums, instant messaging software, social networking services, web conferencing tools, virtual reality worlds.

Contemporary virtual communities are using at least a minimal set of software solutions that offer both synchronous and asynchronous communication and file sharing to their users.

Several papers had discussed the role of member participation in virtual community building and the benefits that member inclusion can give to the entire community. Recent research papers showed evidences that psychological identity of users as members of the community is very important factor for vitalization of virtual communities [5].

Computer-based learning, education and training system or e-learning systems are part of the educational process for the last 20 years. The research on the topic is in a mature phase and very well established and financed. Collection of standards such as SCORM [6] and its recent development Tin Can API [7] are intended to standardize the way that the educational content is produced and provided to learners.

Numerous software products intended for creation of e-learning systems emerged, with some of them (Moodle and Blackboard) claiming usage by hundreds of millions users, all over the world.

3. Our approach – a case study

The Viva Cognita (www.vivacognita.org) is a joint project of several academic and business organizations. The result of this project is going to be a Web based knowledge sharing and knowledge building platform with a free and open access for anyone interested in mathematics, computer science or IT. Any organization with clear plans how to add value to the project can also be included as a partner. Due to the fast dynamics of emerging e-learning solutions the main priority of the development team was to quickly achieve a minimum value product (MVP) – a version of the product that has enough functionality to be used by all interested parties. The functionalities of MVP were meant to be expanded using a project approach.

Under these circumstances we considered that our development activities have to evolve around the following three main principles:

- Building on small iterations, constantly increasing the value of the system;
- Reusing ready or modified components wherever we can;
- Actively involving the community;

The project partners agreed upon a road map for 2014 which included organization of two online competitions, several contests and community games.

At this point there was enough data to build functional and performance requirements for MVP. Functional requirements were provided in the form of high level user stories (Table 1).

We assumed that all functionalities can be found in existing virtual community building frameworks or e-learning frameworks so we made a market research and identified 37 products that claimed they have at least one of the features that we needed. This list was revised over 6 criteria for stability and maturity – *post sales support, active community, presales support, number of implementations, number of users, available documentation* and as a result of expert judgment 14 products were shortlisted and received numerical assessment on each functional requirement.

Table 1. Functional requirements and their priorities as given in the user stories

Feature	Priority (0-100, 100 is max.)
Web portal with articles system	100
Advanced Programming Interface (API)	100
Course management system	80
Online competitions management system	80
Single Sign On (SSO)	80
Scalability	80
Forum	50
Web Calendar	50
Blogging functionalities	50
Web Gallery	20
Personal messaging system	20

We considered three possible approaches– to extend an existing e-learning platform software with some virtual community features and competitions module; to extend existing virtual community platform software with some e-learning features and competitions module; to build entirely from scratch a system with unique set of features based on evolving requirements specification.

The third option would provide us with the maximum level of control over the quality of functionalities, but it would require considerably more time to build the common features (forum, calendar, etc.) with comparable quality to existing off-the-shelves products. This time would be beyond acceptable for producing MVP.

The first and second options meant that we have to choose a software product or framework to build our platform over it, but there was no clear winner in our shortlist – virtual community software was performing better than expected with regard to social features against e-learning software, and the latter was performing even better with regard to the course management and online competitions management against virtual community software.

We took the following approach:

- We split our shortlist in two according to types of software – (1) virtual communities software and (2) e-learning systems software
- We shortened each list and took first three products in every category
- We made tuples of products in each list and implemented additional criteria – *Compatibility and Integration* with priority 200 to each tuple. The assessment mark in this criterium was intended to show the possibility and complicity to integrate both products in one.
- We put a minimum threshold passing mark of 100 for *Compatibility and Integration* criteria.

The wining tuple of products was chosen as a framework for building our Viva Cognita platform. Further, the virtual community software was chosen as a provider of authentication service, since it received a higher score in the SSO category and also according to the expert judgement.

4. Our approach – system architecture, development view

The system architecture in a development point of view [8] comprises the layered concept in which the first layer is the authentication service (SSO), the second layer represents the core functionalities provided both by the virtual community software and the e-learning system software, and on third layer is the implementation of the modular design concept in both systems providing some specific functionalities of an online competition system. (Fig.1)

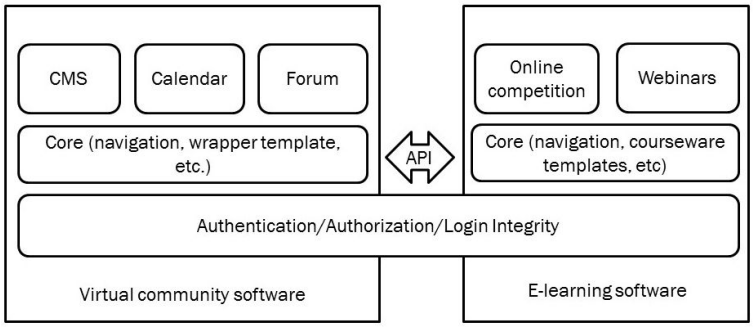

Fig. 2. On the scheme is shown the authentication and authorization layer that implements single sign on (SSO) service, available to each user, no matter of system entry point. Also on second layer API's are shown as core functionality that are used for integration.

Both, the virtual community software and the e-learning system, are implementing their own means for transferring data between layers above the second.

If there is a need to expand the integrated system in the future it can be done by adding new modules on layer three or even by integrating a discrete software package which has to use the SSO on the first layer, and to share data using API on the second one.

5. Conclusion

We have built a software solution accessible by everyone havng a computer device and Internet connection, and providing a set of functionalities needed for socialization, sharing and acquiring knowledge in the fields of mathematics [9]. It was built with the active participation of the community of its main potential users.

To create our system we have integrated two ready software products – virtual community software and e-learning software. The system is offering single sign on service and is open for extension and adding of new functionalities through well documented API.

The initial set of functionalities included in the minimum value product were built for three months and the system went public on 15 October 2014.

The statistics for November 2014 showed that 9679 individuals visited our system, 124 003 pages were visited (of which 34766 were unique visits) with mean time of visit of 9 minutes and 11 seconds.

6. Future plans for research and development

Our future plans include extension of the functionality of the platform and implementation of web-conferencing solution that will allow real-time online lecturing in interactive environment. We are also planning to extend the educational domains (in 2014 we were focused only in mathematics) towards Computer Science and IT.

The inclusion of the community is done through a continuously developed and documented project approach based on PMI PMBOK [10] showing some capacity to be a good practice.

The platform is continuously used by our colleagues at IMI-BAS for development and experiments with new approaches and models in the school education in mathematics [11].

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Bring Your Own (Disruptive) Device Supporting learning providers to improve and enhance the learner experience through use of disruptive technologies owned by learners

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1. Background

The work was commissioned as part of a larger project funded by the Department for Business Innovation and Skills called 'BYOD: Benefits, opportunities and challenges'. BYOD stands for Bring Your Own Device and refers to use by students of their personally owned devices in education settings.

The 'BYOD: Benefits, opportunities and challenges' project has two aims:

- To support providers through research evidence, models of practice and resources to make more effective use of disruptive (including learner owned) technologies to improve and enhance the learner experience, including assistive technologies that improve access for learners with learning difficulties and/or disabilities.
- To equip those working in formal, non formal and informal learning settings to effectively facilitate learners using their own devices in their learning.
- The term disruptive technology was first used by Clayton Christiensen[3] to describe technolgies which disrupt market places, and in Education the term refers to technology which interrupts our usual policies, practices, and assumptions. Truly disruptive tools will force new thinking and new approaches to learning[4].

The project aims to equip those working in formal, non-formal and informal learning.

[3] http://www.claytonchristensen.com/key-concepts/
[4] http://www.educause.edu/ero/article/role-disruptive-technology-future-higher-education

The OECD has offered definitions of these terms[5] which are summarised below.

Formal learning
This is always organised and structured, and has learning objectives. From the learner's standpoint, it is always intentional: i.e. the learner's explicit objective is to gain knowledge, skills and/or competences.

Non-formal learning
The concept on which there is the least consensus, Nevertheless, for the majority of authors, it seems clear that non-formal learning is rather organised and can have learning objectives.

Informal learning
This is never organised, has no set objective in terms of learning outcomes and is never intentional from the learner's standpoint. Often it is referred to as learning by experience or just as experience.

McGivney is quoted in Wikipedia as stating that *It is difficult to make a clear distinction between formal and informal learning as there is often a crossover between the two*. (McGivney, 1999, p1)[6].

This is increasingly so in the world of technology-based learning where learning on formal courses can include a lot of incidental learning and indeed encouragement of independent learning and networking – see below.

The objectives of the overall project are:

- To trial different approaches to BYOD (Bring Your Own Device) in differing learning contexts e.g. :
  - In a remote, rural location (in partnership with Landex).
  - In local authority provision.
  - In a community building.
  - For apprenticeship and/ or traineeship provision.
  - With learners with learning difficulties and/or disabilities
  - Off campus, outside the classroom, online, peer supported, 24/7 and blended provision.

[5] http://www.oecd.org/edu/skills-beyond-school/recognitionofnon-formalandinformallearning-home.htm
[6] http://en.wikipedia.org/wiki/Nonformal_learning

- To produce guidance for providers delivering learning outside the classroom
- To share and promote best practice in the use of BYOD with the learning community.
- To identify suitable learning resources for BYOD use.
- To produce guidance and exemplars of effective BYOD use.
- To publish and disseminate guidance through networks and web publication.

Three Generations of Distance Learning Pedagogies [6]

	Cognitive - behaviourism	Constructivism	Connectivism
Technology	Mass media; print; TV; one-to-one communication	Conferencing (audio, video and web), many-to-many communication	Web 2.0: social networks, aggregation and recommender systems
Learning activities	Read and watch	Discuss, create, construct	Explore, connect, create and evaluate
Learner granularity	Individual	Group	Network
Content granularity	Fine: scripted and designed from the ground up	Medium: scaffolded and arranged, teacher guided	Coarse: mainly at object and person level, self-created
Evaluation	Recall	Synthesise essays	Artefact creation
Teacher role	Content creator, sage on the stage	Discussion leader, guide on the side	Critical friend, co-traveller
Scalability	High	Low	Medium

[6] Anderson, T., & Dron, J. (2011). Three Generations of Distance Education Pedagogy. International Review of Research in Open and Distance Learning

2. The BYOD Landscape

The brief period of desk research for this project revealed a range of research and policy work in the area of BYOD from around the world. This also partly overlaps with wider work on Mobile Learning.

BYOD itself has origins in the world or work as the policy of permitting employees to bring personally owned mobile devices (laptops, tablets, and smart phones) to their workplace[7]. The name and the concept

[7] http://en.wikipedia.org/wiki/Bring_your_own_device

have been adopted widely in Education and have given rise to both practice advice and research into the implications for teaching and learning.

The national support organisation, JISC Legal[8], has published advice which effectively covers legal and safeguarding aspects of a BYOD policy and includes a policy template document which addresses this.[9] This work is focussed on compliance and data security. It also focuses primarily on use of different devices (users own devices) to access the same resources and data that learners already use and, as such, does not address the aspiration of this project to deploy technologies 'disruptively'.

There is now a growing body of research which does explore the disruptive potential of M Learning[10] and more recently as learning in a specific BYOD context.

Cochrane et al have suggested a mapping of pedagogies to technological changes over the last ten years and propose the model shown below as a Post Web 2.0 continuum.

Table 1 *The Post Web 2.0 Continuum*[11]

1995	2005	2013
Web 1.0	Web 2.0	Mobile
Teacher	Student	Collaboration
LMS	eportfolio	Connectivism
Content delivery	Student generated	Student generated
PowerPoint	Content	Contexts
Pedagogy	Slideshare	Mobile social media
	Andragogy	Heutagogy
	Social learning	Creativity
	Building learning communities	Active participation in professional communities

Whilst this model was developed in Higher Education there is a clear resonance in some of the survey responses (below). Some respondents offering answers in line with the vision of mobile devices enabling and encouraging networked and connectivist learning,

[8] http://www.claytonchristensen.com/key-concepts/

[9] http://www.jisclegal.ac.uk/ManageContent/ViewDetail/ID/3070/BYOD-Legal-Toolkit-1-May-2013.aspx

[10] Cochrane T (2009), Mobilising learning: intentional disruption – harnessing the potential of social software tools in higher education using wireless mobile devices.

[11] Thomas Cochranea*, Laurent Antonczakb, Helen Keeganc and Vickel Narayana (2014): Riding the wave of BYOD: developing a framework for creative pedagogies. Research in Learning Technology 2014, 22: 24637 – http://dx.doi.org/10.3402/rlt.v22.24637.

greater student generated content and active participation in professional communities.

In addition to the advice and guidance available on ensuring safety and compliance there are also training materials and courses emerging on how best to address BYOD including some interactive open peer to peer courses[12].

In summary it can be said that BYOD has generated considerable discussion and has resulted in guidance literature which falls into one of two distinct categories:

- Technical and compliance issues.
- Pedagogical opportunities.

Provider policy statements that we reviewed were morelikeley to reflect the first of the above but we did find some which also managed to articulate a vision for the pedagogical opportunities as well.

3. Findings

- Many practitioners do share a vision that BYOD will lead to changed pedagogies and greater independent learning (disruptive effect).
- The majority of practical advice documents for practitioners focus on technical and legal aspects of BYOD and on use of own devices to access identical resource and data which would otherwise be accessed through institutional systems (sustaining and not disruptive use of technology).
- Network connections are required for many but not all BYOD functions.
- Network solutions vary greatly between providers and in some cases connectivity is confined to learners' own cell phone contracts.
- Training in classroom management, effective pedagogy and safeguarding were considered highest CPD priorities.
- Many (but not all) BYOD policies appear to focus wholly on practical matters of network access, data and personal security and do not address pedagogical application.
- Respondents considered that it is important to address equality of opportunity to ensure that everyone can have access to learning. They gave many examples of addressing inequqlity of device access but were less aware of software accessibility.

[12] For example: http://byod4learning.wordpress.com/.

- About a third of the providers had BYOD policies in place and several more had plans to be preparing one soon.
- Those who did not have specific BYOD policies often felt that the necessary matters were covered by their existing IT policies.
- Patterns of difference in approach were identified which clearly mapped to the institution type and age of learners and types of courses, so typically responses from FE colleges differed from those from Adult Community learning. However, in this sample it was not possible to identify specific generic models across different types of provider.
- Although discrete models have not been identified the study did identify that providers can be located on a continuum of expectation and intervention. At the *laissez-faire* end of the continuum use of own devices is permitted with little support and little expectation of change in learning practices; at the other end of the continuum providers anticipate good technical and pedagogical support because they see significant 'disruptive' benefits to learners.

4. Recommendations

- Encourage providers to be as bold in their articulation of the vision for the changes that BYOD will bring to learning as they are in disseminating details of legal and technical access.
- NIACE should curate links to existing training resources which address the priorities indicated in the survey: Safety, classroom management, pedagogical application.
- NIACE should provide a resource to help providers think through how they will maintain their commitment to equality of access to learning.
- 'Pilot' projects should include providers with existing proactive BYOD practices in order to learn from their experiences.
- NIACE should champion the cause of the positive disruptive effect that BYOD can have on teaching and learning and learner autonomy.
- Pilot projects should include a briefing session for all participants where the results of this desk resreach and surevy are used to help participants focus on the value of BYOD as a force for positive 'disruptive' change.

5. The Survey Results

Preparation for the survey included a short period of desk research followed by 4 semi-structured telephone interviews with providers already proactive in the area of 'Bring Your Own Devices'. These interviews revealed an enthusiasm amongst managers to implement BYOD but recognition of the real challenges that this presents. From the interviews, the survey questions were drafted and then reviewed by NIACE staff.

The survey was available online between the 17th September and 10th October 2014.

A total of 39 responses were received and the spread of institutional types is shown below (Question 18).

Table 2 *Organisations represented in the survey*

General FE College	14
Adult Community Learning provider	12
Other, please specify:	3
Land-based College	3
Independent Training Provider	2
Third Sector	2
Specialist College	1
Sixth Form College	1
Specialist Designated Institution	1
Youth Community Learning provider	1
Social Housing Provider	1
University	1

Of these respondents, 19 were offering apprenticeships, 24 were delivering learning funded by the SFA Adult Skills budget and 19 offering Community Learning. Other funding included the European Social Fund, HEFCE, NLDC and full cost recovery.

There were no responses from Offender Learning Providers (OLASS) or Careers Service /IAG services.

The majority were providing formal and nonformal learning but we can anticipate that there is potential for that informal **learning by experience (see above).**

5.1. BYOD Policies

Over a third of respondents said that they had BYOD policies for staff and a similar proportion for learners. In most cases where there was a

learner policy there was also a staff policy although we did identify one institution with only a staff policy.

Table 3 *BYOD Policies in Place Do you have a BYOD policy in relation to learners? (Q8) Do you have a BYOD policy in relation to staff? (Q7)*

	BYOD policy for staff	**BYOD policy for learners**
Yes	15	14
No	19	18
Don't Know	5	7

Respondents were also asked for the advice that they would offer to others establishing a BYOD policy. A summary of the responses is shown in table 3 and a summary of their advice on establishing a BYOD policy is shown in Table 4.

Table 4 *Establishing a BYOD Policy What advice would you offer to a learning provider considering establishing a BYOD policy for learners? (Q8.2)*

Summary of free text answers
• Make it brief, simple and flexible. • Undertake a survey the devices that learners have. • Keep the BYOD policy simple but clear. • Only allow access to what is needed. • Be clear about your support capacity; exactly how much support you can reasonably supply to users and how much you expect them to be self-reliant.

Table 5 *Support for Use Outside of the Classroom Do you have a policy to support learners in using their own devices to learn outside of the classroom? (Q6)*

	Totals
Yes	4
No	28
Don't know	7
	39

Whilst the research literature points to significant disruptive benefits of learners' own devices coming through independent learning outside of the classroom this result suggests that providers are not yet fully recognising this as their responsibility.

5.2. Current Use of Own Devices

The survey also collected data on current use by students of their own devices and these reuslts are shown in Chart 2 below.

Respondents also added these uses:

- Shopping, email to friends, Skype.
- Making class notes.
- Learning how to use their devices.
- Translation Apps – English/Welsh and Welsh/English.
- Using Accessibility Apps and features.

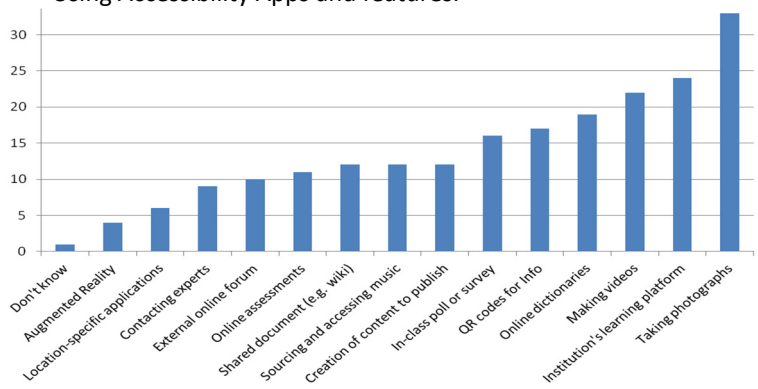

Chart 2 *Current Use of Devices In which of the following ways, if any, do your learners use their own mobile devices? (Q1)*

This suggests that many of the activities associated with connectivist learning (e.g. contacting experts and use of external forums) are relatively under developed and that in user-created content development video making is the most popular.

5.3. Support and Services

We asked providers about the services and support that they offer for BYOD.

Table 6 *Supporting BYOD In which of the following ways, if any, does your organisation support the use of BYOD? (Q2)*

	Totals
Offers secure and separate Wi-Fi networks	27
Requires users to adhere to an Acceptable Use Policy	22
Communicates a clear statement of how your organisation supports BYOD	14
Other	3
My organisation doesn't specifically support BYOD - it just allows it to happen	7

This table shows that providers are much more likely to offer wifi access than to offer a clear statement of how BYOD is supported. A significant number (7 out of 39) take a totally laissez-faire approach

allowing learners to use their own devices with no technological or pedagogical support.

Table 7 *Services for BYOD*
Which of these services, if any, do you offer to your learners? (Q 3)

	Totals
Wi-Fi Internet access	35
Institutional email	23
Mobile access to a learning platform	26
Access to working desktop with applications (e.g. Microsoft Office)	20
Allow learners to make use of their own connectivity (e.g. phone 3G /4G)	26
None of the above	1

Of the two largest groups of providers represented, nearly all General FE colleges offered wifi internet access but only two thirds of Adult Learning providers made this available.

5.4. Training

All respondents identified some forms of training as important or very important for staff.

The statistical results, along with the free text answers, reveal that safeguarding, classroom management and pedagogical application of BYOD are of higher priority to respondents than technical training for staff.

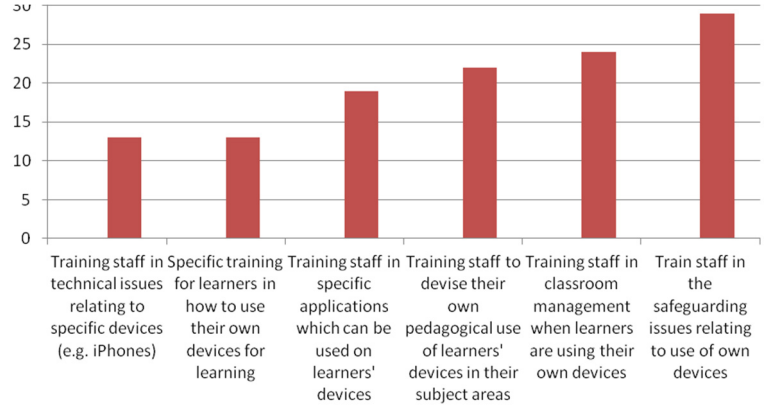

Chart 3 *Training priorities*
How important do you consider each of these types of training in supporting the use of BYOD? (Q4) Graphs shows responses for 'very important'

5.5. Equality of Access

The free text answers to the question about ensuring equality of opportunity[13] were quite extensive and indicated that, there is a 'mixed economy' in many college classes with some learners using their own devices and others using a tablet loaned by the institution. Some cases were cited where a handheld device was a course requirement.

The answers to this question centred largely on equality of access to a physical device and respondents described use of strategies such as pair work and group work as ways of managing situations where not all students had their own device.

Broader issues of equality of access through accessible content and ability to take learning seamlessly in and out of the classroom were not much addressed.

5.5. Implementing BYOD

Respondents were asked a number of questions realting to reasons for establishing a BYOD policy and the drivers and barriers for effective implementation.

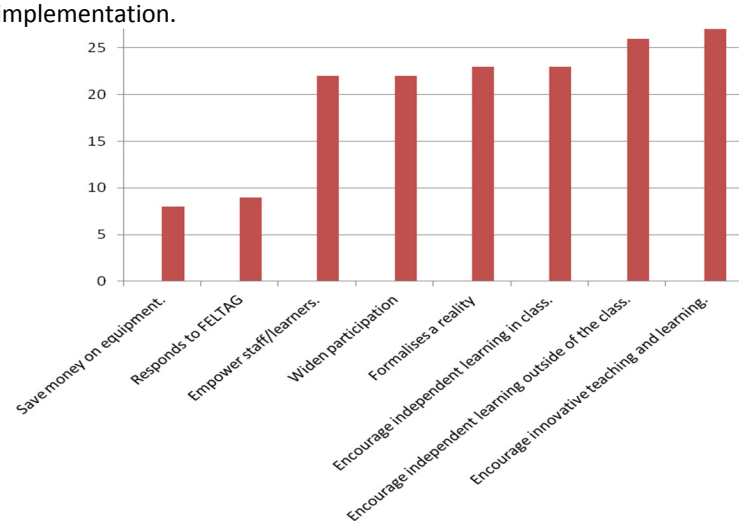

Chart 3 *Reasons for Having a BYOD Policy In your opinion, how important are each of these reasons for providers to have a BYOD policy? Chart shows those who responded 'very important'*

[13]In what ways have you ensured equality of access to learning in a BYOD environment?

When asked the most important reasons for implementing BYOD policy the largest number of responses suggested that it will encourage innovative teaching and independent learning in and out of the classroom. A saving on organisational IT costs was only considered very important by 8 of the 39 participants. This suggests that the vision of many practitioners at least is that BYOD can have a positively disruptive effect on learning and they anticipate change.

Table 8 *Advice in Establishing a BYOD Policy [1] Q 7.2 What advice would you offer to a learning provider considering establishing a BYOD policy?*

Summary of responses
Make it brief, simple and flexible and don't expect it to be understood or read in full.
Ensure you know what has access to what.
Flexible approach that matches learner needs.
Be clear about your support capacity; exactly how much support you can reasonably supply to users and how much you expect them to be self-reliant.
Same policy for everyone – staff and learners. Ensure everyone knows about it. Offer staff training. Ask JISC legal to check it before implemented.
Explain carefully to staff what it means.
Our BYOD policy forms part of the staff handbook and relates to all use of IT such as social media use, remote access etc. This way staff have one simple document to understand policy that covers all use of IT.
That the tutor is fully aware of safeguarding and H&S requirements. Enable tech support for initial sessions as some learners have irregular Internet providers.

Table 9 *BYOD and Organisational Effectiveness Do you think a BYOD policy has or would improve the effectiveness of your organisation? (Q)*

	Totals
Yes	23
No	6
Don't know	10

The benefits as well as the dilemas were illustrated in this free text answer:

> *...it would bring IT in as there is just no money to invest in modern equipment when there isn't enough money for staff and paper usually! It provides a solution to the problem of keeping as up to date as possible in an IT world that is constantly changing – 5 years ago there wouldn't even have been tablets and now a majority of learners have either a smartphone or tablet and traditional skills... BOYD is really the only way forward,*

but my concern is that it leaves a bigger gap still for those who can't afford technology and puts them even further behind other learners so they need to be supported too instead of excluded.

Table 10 *Barriers to Internal Use What is the greatest barrier to learners using their own devices in class? (Q13)*

	Totals
Learning content which cannot be accessed by multiple devices	3
Unresolved security issues	5
Learners' unwillingness	3
Staff reluctance	15
Other, please specify:	13

Table 11 *Barriers to External Use of Own Devices What is the greatest barrier to learners using their own devices outside of the classroom? (Q14)*

	Totals
Learning content which cannot be accessed by multiple devices	6
Unresolved security issues	3
Learners' unwillingness	8
Staff reluctance	8
Other, please specify:	14

Table 12 *Barriers to Implementation What have been/could be the barriers to the effective implementation of BYOD in your organisation? (Q 15)*

	Totals
Data security	11
Learner safeguarding	11
Cost of maintaining networks	15
Perceived removal of 'expert role' from staff	9
Learner exclusion if not implemented inclusively	15
Other, please specify:	8

5.6. Participation in Forthcoming Trial

Table 13 *Interest in taking part in NIACE's forthcoming trial of approaches to BYOD in different learning contexts. Of the 39 respondents 26 indicated a willingness to participate in the trial; the number of offers in each category of provider are shown below:*

General FE College	ACL provider	VI Form College	Land-based College	Independent Training Provider	Third Sector	Specialist College	Other	Specialist Designated Institution
10	6	1	3	1	2	0	2	1

NIACE wishes to identify 5 providers to participate in the trial. The following are possible routes for identification of trial participants:

In a remote, rural location (in partnership with Landex).	Myerscough College and Moulton College are very active but recommend consultation with Landex
In a community building.	Suggest WEA
In local authority provision.	
For apprenticeship and/ or traineeship provision.	19 respondents are offering this
Off campus	Covered by Community Building above
Outside the classroom	Covered by Land Based Colleges above
Online	
Blended provision	Will apply to most providers
Learners with learning difficulties	This was not explored in survey but most providers do work with learners with learning difficulties.

6. Conclusion

This study was carried out in a short period in Autumn 2014. The ownership and deployment of mobile electronic devices can be expected to continue to grow and to change rapidly. It is likely that learners will continue to arrive at learning in larger numbers with their own devices – exactlty what those devices will be and what they can do for learing may change, but this study shows that, in seeking solutions, learning providers are developing piecemeal solutions and that there is a role for a role for some national leadership to help to articulate the vision for BYOD as well as pointing towards necessary practical steps which need to be taken.

Organizational values: intercultural study in universities

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Abstract:
The types of organizational culture, conflicts and strategies of handling conflicts in a university in Sofia and in Manchester have been analyzed. A comparative analysis of the dominating organizational values in the choice of strategies of handling conflicts has been made as well as their interrelations with the types of conflicts in the academic environment. The constructs allow to be adequately measured and instruments, psychometrically and quantitatively consistent to be used. The survey results display trends for the existing differences in the types of organizational culture, in the choice of a strategy of handling conflicts in the specific university circles. Correlation analysis and analysis of variance have been used in order to confirm or reject the hypotheses. Data have been processed by means of the software SPSS-19.

Keywords:
Organizational culture organizational conflicts·strategies of handling conflicts · universities

Introduction

The organizational culture has been studied because it has strong impact on the entire organizational life – on the attitudes, values, wishes and goals of employees. The organizational culture comprises assessments, norms, feelings, aspirations and hopes of the individual in the organization. It keeps its relative stability and internal integration to the whole combination of various external factors and conditions that affect the organization's activity, emphasizes the organization's uniqueness – its quantitative particularities that give it a distinctive aspect independent of the other organizations in the same or in another area of action, explains the specifics of the processes [1]. The culture in the organization could be considered as a micro culture that interacts directly with the culture of the

environment. Such influence is an analogue of the relationships between culture and individual. Macro culture is made up of national and international cultures. The micro culture is expressed through views, management style, values, norms, etc.

On their part, the organizational conflicts and the strategies to handle them are a clear sign, an indicator for the dominating values in the organization. The culture could be examined as a global code of the subjective side of the organizational life [2, 3] – it could have a significant impact on the human behavior. Ones of the indicators for the state of the organizational culture are the types of conflicts and the strategies to handle them. This gives the reason they to be studied and the influence they have on the organizational culture to be sought. In this sense, the conflicts in the core of which there are various dominating value orientations would be referred to a different type of organizational culture and they would be handled by a different type of strategies of handling conflicts. The reasons for the rise of conflicts are explained by the existence of various interests and values [4]. But also it is considered that the conflict is a normal manifestation of the social connections and relationships among people, a way of relationship in the case of norms of behavior, incompatible with each other, a clash of different points of view, a confrontation of parties having different goals.

The organizational strategies of handling conflicts are a part of the development of the conflict actions. Typically, whether a given strategy would be successful or not, depends on the complexity of the problem, the participants as well as the specific situation.

It is assumed that the organizational culture, conflicts and strategies of handling them outline different preferences in the separate universities, and the significant correlations have their specifics dictated also by the place of the study. In order to confirm or reject the deduced hypotheses the following tasks have been set: to determine the dominating types of organizational culture, the differences in conflicts and the strategies of handling them; to establish the interdependence between the different types of culture, conflicts and strategies of handling them; to make comparative analysis of the differences in the surveyed universities. The object of the study is universities in two EU countries and its subject is the organizational culture, conflicts and strategies of handling them. The set research tasks have been solved by the direct use of a number of statistical methods: have been studied the average arithmetic and

standard deviations for the types of organizational culture, conflicts and strategies by the studied places, as the expectations from the indicated statistics are related to the outline of the specifics of the studied constructs. The purpose was to identify the significant factors that influence the formation and the functioning of the organizational culture as well as the rise and the handling of conflicts. The analysis of variance ANOVA is used where the F-ratio is significant, *sig* is the level of significance larger than 0.05. As it is assumed that these differences are more pronounced among some of the groups having more than two variables, is used also Post hoc Test for multiple comparisons made after the method of Tukey that has been selected because of the availability of a misbalance in the number of measurements in the various groups. Data have been processed with the standard package of statistical programs SPSS-19.

Methods

Three types of questionnaires have been enclosed.

The instruments FOCUS [14] have been used for the study of the organizational culture. These instruments outline four basic value orientations to: the goals, the support, the innovations and the rules and comprise 35 statements. The six-point scale of Likert has been used that ranges between *never* and *always*. The reliability of the questionnaire is very high ($\alpha = 0.88$) as the individual sub-scales indicate good reliability according to the coefficient α of Cronbach. Other researchers used the questionnaire, obtained similar results in their analyses [1, 4]. Individually, each of the cultures is distinguished by characteristic features: the culture of the goals is found out in the pursuit of organizational goals, tasks and values, embodied in their strict accomplishment, the bearing of the specific responsibility and accurate assessment of the implementation and the results; the culture of support in the organization is shown in the mutual trust in the workplace, understanding and supportive behavior; the innovative type of culture is manifested by finding new ways of working, flexibility and adaptability; the culture of rules is oriented to the standards in the performance of tasks, the compliance with orders and instructions and caution in taking risks.

For the study of the types of organizational conflicts are used the instruments developed under the leadership of Afzal Rahim [5, 6, 7], where the types of conflicts are divided into three dimensions: inter-group, intragroup and role in 21 statements that reveal the occurrence or absence of conflicts. The high level of agreement shows the lack of

conflicts, group cohesion and cooperation between groups. The low scores reveal the presence of conflicts in a given dimension. For each type of conflict are set by 7 statements as some of them are reversible. Estimates are given on the 5-point Likert scale, starting from 1 - strongly disagree to 5 - strongly agree. The reliability of the questionnaire is very high ($\alpha = 0.89$). Individual subscales show good reliability according to the coefficient α of Cronbach.

The method, which shows the choice of strategies of handling conflicts is developed under the leadership of Afzal Rahim [8, 9, 10] and comprises 35 items divided into five scales that describe the integrating, avoiding, dominating, obliging and compromising strategies. The five strategies are considered in relation to the orientation to themselves or to others, excluding the possibility of a best strategy, but the choice depends on who within the organization is the conflict with - the management, the colleagues, the subordinates . Scores are given on the 5-point Likert scale starting from 1 - strongly disagree to 5 - strongly agree.

Sampling

A comparative analysis is presented of two groups of respondents in the same field of activity, respectively for the University in Sofia – 37, for the Business school at the University of Manchester - 36, in total 73 persons. Questionnaires were collected personally from September - November 2013. Respondents were divided into groups depending on the studied demographics: by gender: men - 43.8%; women - 56.2%; by age: up to 45 years - 56.2%; over 45 - 43.8%; non habilitated individuals are 54.8% and with habilitation qualifications - 45, 2; by the length of service at the specific workplace they are divided as follows: up to 5 years - 38.4%; up to 10 years - 34.2%; 15 and over 15 years - 27.4%. The number of people in the work teams is distributed as follows: up to 10 people - 49, 3% and more than 10 people - 50, 7%.

The verification of the hypotheses is done through the following methods: by frequency distribution are tracked the average and standard deviations for the types of conflicts and the strategies of handling them; the purpose is to reveal their specifics; with the analysis of variance is assessed the degree of influence of the studied constructs and are identified the factors that are essential; the correlation analysis shows the degree of interdependence between random variables. The data are processed with the standard statistical package SPSS-19.

In order to examine in depth the manifestations of the organizational culture is made a multifactor analysis of variance for the individual universities. The results of the analysis of variance indicate that the place leads to statistically significant differences in the value preferences to each of the types of organizational culture (See Table 1). In the search of the factors that make up the specifics of the organizational culture in both universities the study shows that in Sofia the preferences are for the culture of goals as opposed to the preferences for the culture of rules in Manchester. For the individuals studied in Manchester is characteristic the aspiration to rules, the routine performance of the work and the various ways to perform the activity. The focus is on the competence, the high level of expert power in greater force than on the individual. In both places there is a relatively high degree of readiness to adopt the new. The culture in the organization is perceived as a dynamic and flexible, which, however, is directed more to the correct execution of the tasks that is considered to be the goal of the team work.

Table 1. *Differences in displays of types of organizational culture according to the place.*

Types of Cultures	Group	x	SD	F	Sig.
Innovation	Manchester	3,64	0,66	7,41	0,001
	Sofia	4,29	0,80		
Support	Manchester	3,77	0,73	8,15	0,001
	Sofia	4,41	0,69		
Rules	Manchester	3,84	0,65	7,34	0,001
	Sofia	4,41	0,77		
Goals	Manchester	3,78	0,82	6,51	0,003
	Sofia	4,45	0,82		

So the launched hypothesis for the influence of the place on the choice of dominating organizational values is partially confirmed. Results obtained could probably be attributed to national and economic characteristics, which affect the value orientation in the workplace and define a significant part of its image. In this sense the organizational culture corresponds to the factors of external and internal environment and are subject to a change.

The trend is one-way - in Sofia all values are higher. The dispersions are almost equal, which means the deviation is systematic and is not due to individual respondents. Interesting is the fact that the respondents from both universities show high levels of commitment to each of the types of organizational culture.

It is assumed that the effect of the different types of organizational culture, conflict and strategies are caused by different dominating factors in both universities. The hypothesis was confirmed partially because significant differences in both places were observed only for the role conflict (See Table 2).

The contradictions arisen between the various role positions of the individual, the uncertainty and the excess tension in the course of the activity, the expectation gap to the individual compared to the others entail role conflicts. But the positive side of such conflicts can be seen in the maintenance of intragroup relations, thus forming an interdependent balance between the parties. Also, as an end result could be made clear the positions and the interests of the participants and to be measured the power potential of competing viewpoints. If these expectations are correct it is assumed that the styles of conflict handling will be bound by compromises and concessions. Indeed, significant differences are observed namely in the Avoiding, Obligating, Compromising styles (See Table 3).

Table 2. *Differences in displays of types of organizational conflicts according to the place*

Conflicts	Group	x	SD	F	Sig.
Intergroup	Manchester	3,30	0,49	0,59	0,558
	Sofia	3,44	0,61		
Intragroup	Manchester	3,44	0,55	0,45	0,637
	Sofia	3,55	0,50		
Role	Manchester	4,03	0,50	3,12	0,050
	Sofia	4,36	0,63		

Table 3. *Differences in displays of styles of handling conflicts according to the place*

Styles	Group	x	SD	F	Sig.
Integrating	Manchester	27,23	3,40	2,20	0,118
	Sofia	28,76	3,07		
Avoiding	Manchester	24,37	4,64	3,63	0,052
	Sofia	26,84	3,11		
Dominating	Manchester	21,71	5,23	0,24	0,785
	Sofia	22,27	5,66		
Obligating	Manchester	23,91	3,40	3,58	0,053
	Sofia	26,16	3,72		
Compromise	Manchester	25,31	3,31	4,58	0,051
	Sofia	27,49	3,19		

Preferred style of handling conflicts in both places is the integrating one because of the specific of the activity, which is the same in both structures. The respondents from Sofia, in the evaluation of all styles,

showed higher values, which is probably due to cultural differences. According to ANOVA analysis statistically significant differences are observed in Avoiding, Obligating, Compromising styles. The compromising style, with the highest values, is a desired style of handling conflicts. It is applicable if both sides have the same power or resources, or have conflicting goals. Compromise, however, is only a temporary solution and is completely ruled out, if it comes to the effectiveness of the organization. The easygoing style is expressed in the neglect of their personal interests for the interests of others and is perfectly suited for complicated and profound problems or relationships. An important advantage is the encouragement of the cooperation, but because of its relative resistance in practice the problem is not solved. The avoiding style is characterized by passive withdrawal from the situation. This is a type of personal strategy, which key factors are passive withdrawal or active suppression of the problem. It is effective when damages from a possible confrontation would outweigh the benefit of conflict handling. This style is a natural reaction in difficult situations, but it is a temporary solution and is not suitable for important issues which delay would further deteriorate the conflict.

Through a correlation analysis are deduced the significant relationships and those variables that have the strongest deterministic role in the individual universities. It is assumed that certain types of organizational culture produce certain types of conflicts. This is demonstrated by the correlation coefficients, which confirms the hypothesis (See Table 4).

Table 4. *Correlations among the types of organizational culture and the types of conflicts in Sofia and in Manchester.*

Group	Conflicts	Culture			
		Innovation	Support	Rules	Goals
Manchester	Intergroup	0,05	0,13	0,18	0,11
	Intragroup	0,15	0,19	0,31	0,17
	Role	-0,01	0,32	0,22	0,13
Sofia	Intergroup	0,38*	0,35*	0,31	0,27
	Intragroup	0,47**	0,38*	0,33*	0,37
	Role	0,52**	0,50**	0,55**	0,63**

Most likely, such data can be explained by the low level of connectivity and influence between the variables. Similar is the situation with the correlations between the types of organizational culture and the strategies of handling conflicts (See Table 5). However is confirmed the idea that the support-oriented organizational culture may influence

positively such aspects of conflict handling, which are related to team effectiveness, processes of decision making, communicative competence. The goal-oriented organizational culture supports the task performance and the competitiveness.

The innovation culture can stimulate the initiative, but also to increase the level of conflicts within the group and to worsen the interpersonal communication. Assumptions are confirmed partially by reason of the low values of the correlations from Manchester. These data probably could be explained by the differences in the means of communication in both places, provoked by the national psychology.

Table 5. *Correlations among the types of organizational culture and the strategies of handling conflicts in Sofia and in Manchester.*

Group	Styles	Culture			
		Innovation	Support	Rules	Goals
Manchester	Integrating	0,10	0,13	0,16	0,21
	Avoiding	-0,10	-0,02	-0,14	-0,22
	Dominating	0,10	-0,16	-0,10	-0,27
	Obligating	0,14	0,20	0,11	-0,04
	Compromise	0,20	0,33	0,29	0,15
Sofia	Integrating	0,37*	0,18	0,36*	0,24
	Avoiding	0,67**	0,61**	0,68**	0,53**
	Dominating	0,46**	0,50**	0,35*	0,43**
	Obligating	0,38*	0,33*	0,32	0,32
	Compromise	0,50**	0,53**	0,51**	0,58**

Conclusions.

Based on the results obtained the following conclusions could be drawn. For the surveyed universities are revealed the dominating value preferences to the

culture of the goals in Sofia and the rules in Manchester. The innovation culture is preferred by both universities. It is suitable for the type of work, which encourages initiative and personal responsibility. Most of the respondents are developing precisely in such a environment. The innovative kind of culture is characterized also by overt focus on new methods of management and production and at the same time it involves flexibility and adaptation to the requirements of the situation. Values in both places according to the respondents are in favor of the precise definition of the organizational goals with clear criteria for performance and implementation of new ways of working, seeking new market niches, creativity and adaptation to the rapid changes in the external environment. The focus is on core values such as competitiveness and productivity. Situations of

unresolvable conflicts in the collectives are rare and most commonly used strategies of handling conflics are based on compromise and weighted concession. The aim is not to deepen the differences. These are the perceptions in the teams of both universities. The emphasize is on the desire for integration and tolerance.

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Science Fair Evaluation Framework: The importance of high school science initiatives

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Abstract
We report and analyse the results of an international study on the attitudes of science fair participants and their teachers towards this kind of events, as well as the major actors who facilitate these students' participation in the fairs. The reported results are promising and allow us to plan on a future strategy for improvement of the research events for high school students, interested in the STEM field.

Keywords: science fair, evaluation, STEM, career

Introduction

The current brief article aims to inform the educators about the basic features of science fairs, as a type of high school competition and the extracurricular activities they promote, as well as to introduce few key findings of the *Science Fair Evaluation Framework*, a project, whose aim is to maintain a long lasting observation of the impact that science fairs have in Europe.

Science Fairs

Science fairs have been a factor in high school education for at least sixty years, and if we assume broader definitions - more than a century. If we divide, purely theoretically, the extracurricular work in the STEM field into ”problem solving” and ”research activities”, then the science fairs will have the same role for the latter group, as the science olympiads - for the former. They are not only measure of success for the individual student, but also an important event for students to meet with like-minded teenagers and organisations, which support youth science activities - to showcase their initiatives.

Structure

Science fairs are usually open to middle and high students, with some allowing the whole k12 range to join and some - permitting college

freshmen. The choice of topic comes either from scientific field they have found interesting or investigations connected with the field of expertise of their mentors. They are usually STEM field professionals, with diverse background raging from teachers to young researchers willing to work with high school students.

The fairs usually last 1-3 days, with international events such as EUCYS (European Competition for Young Scientists) or Intel ISEF (International Science and Engineering Fair) spanning their events over a whole week. The vast majority of the official events in the fairs are non-competitive - meetings with researchers, lab visits, technological demonstrations and presentations of university programs. The competitive days are seldom more than two, where jury members interview the participants in front of their stands. Occasionally presentations are preferred in front of poster sessions, when participants are fewer and the science fair is expected to draw more public from the STEM fields, as opposed to general crowds.

Evaluation criteria vary broadly and are not always publicly available in complete detail. Usually most value is placed on the importance of results, the correctness of the methods and possible future applications, especially in ”real life”.

Science fairs in Bulgaria

The first organised scientific and engineering competitions in Bulgaria appear in 1967 with the creation of the so-called ”Technical and Scientific Work of the Youth” (TSWY - THTM), which survives until the end of the 80s. The first modern scientific competitions of this kind, however, reappear in the turn of the century, when the Bulgarian Academy of Sciences and several foundations, including the heir of TSWY - the Eureka foundation, create HSSI [1, 2]. This High School Students Institute of Mathematics and Informatics is still the backbone of the extracurricular project-based activities in the STEM field in Bulgaria, with three country-wide events per year. Alongside them, there are two other major competitions - ”Young talents”, organised by the Ministry of Education, which selects the Bulgarian participants for EUCYS and Bulgarian Science and Innovation Fair - INNOFAIR , organised by the NGO Club Young Scientists, which selects the Bulgarian participants for Intel ISEF. From 2014 a wider High School Students Institute, encompassing all sciences, natural and humanitarian is also functioning as part of BAS, aiming to implement the internationally acclaimed model of HSSI in other fields.

This creates a much more intense program for the students, involved in high school research activities, than what is present in other countries. Thus, there exists a robust, if small community of such teenagers, which receives considerable support from the academic institutions. This status quo differs to an extend from the model seen in other European countries, where there exists wider amount of high school initiatives, such as school clubs or informal learning initiatives, engaging more students, but relatively less country-wide forums and less programs for direct academic support. Nonetheless, both models have been proven successful.

Science Fair Evaluation Tool

Basic information

While there is little doubt in the scientific and education community that the science fair initiatives are effective way for introducing more people, especially teenagers to STEM, until recently, there was remarkable lack of statistic evidence in support of this claim. To rectify this was the aim of Intel, European SchoolNet and ten country-wide science fairs participate in a continuous effort to provide statistical evaluation of the benefits of science fairs.

Participants in SFET'2014			
Name of event	Location	Students	Teachers
Spring conference of HSSI	Bulgaria	55	17
Student's professional activities	Czech republic	203	62
Estonian contest for young scientists	Estonia	61	45
INESPO	Netherlands	161	23
National Scientific and Innovation Contest	Hungary	27	14
Sentinus Young Innovators	Northern Ireland	21	13
Norwegian Contest for Young Scientists	Norway	37	4
E(x)plory	Poland	30	12
Portuguese Contest for Young Scientusts	Portugal	211	36
Utst¨allningen Unga Forskare	Sweden	39	14

Both teachers and students were provided with anonymous questionnaires, consisting of 26 different questions with answers on a modified 4 step Likert scale. All respondents were science fair participants, mentors of participants or visiting teachers. Results were

collected in April to September 2014, then aggregated and analysed together. According to the agreement of the consortium, no results were given for separate countries, due to the highly uneven number of respondents in each country.

Most important findings

Full statistical data can be found in the book of the framework [3]. Here we will briefly comment on several key points.

Nearly two thirds of the participants (64%) claim that they are more likely to pursue STEM careers after participating in science fairs. This indicates that science fairs are extremely effective in promoting STEM education and professional orientation.

While there is practically no gender disparity among the students (51% female, 49% male), there exists significant difference for the teachers - 57% female, 43% male. This is a phenomenon, well-observed in the literature for the last several decades.

Of special interest is the finding that 76% of the participants are veterans, while only 4% have been to three or more science fairs. This however, is not valid for Bulgaria, due to the more intensive chain of such competitions.

This observation is more striking, when considered that 88% of the participants would repeat and 91% would recommend science fair participation to friends. However, 70% of the participants are 17 or older.

Last but not least, it should be noted that only 13% of the participants have participated in internships.

The teachers' questionnaire provides important findings on the motivation of the students, which seems to stem mainly from the opportunity to feel like researchers and receive appreciation for their own acievements. Lack of support from ministries and local authorities is frequently reported too.

Possible actions

While we are still at least two years away from important longitudinal studies, the cited findings allow us to discuss possible actions towards increasing the number of young adults, interested in STEM.

First of all, involving students in STEM fair from an early age will increase the growth of these events significantly, due to the willingness of the participants to promote this activity to their peers. The given figures represent a very favourable environment for creating

a self-sustaining and rapidly growing community, if a critical mass of participants is reached. One may argue that a short term exponential growth may be achieved for new fairs.

Second, actions for promoting science and science fairs specifically towards girls seem, according to this study, unnecessary. The participation rates are already even. Targeted projects may be better suited towards teen and preteen internet communities, or less-developed regions, where science education receives little attention from the local authorities. This will allow us to introduce students to the project-based activities at an earlier age and stimulate students from less resourceful schools to compete on even grounds with their peers.

Another field of considerable importance is communication with the media. Apart from the scientific journals, of specific importance are lifestyle and popular science journals, which can provide targeted information to the demographic groups which are of most importance for the fairs.

Lastly, the business is traditionally one of the strongest supporters of science fairs, which makes possible the arrangement of more prizes in the form of internships and visits, rather than monetary awards. Better initiatives for communication between School and Industry may need to be developed, as the current, such as the inGenious code [4] are much more concerned with legal technicalities, rather than general principles

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Continuing education of *chitalishte*[14] librarians - a factor in overcoming the digital divide

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Abstract.
This article discusses the potential of Bulgarian educational and cultural institution *chitalishte* to help overcome the digital divide by providing infrastructure and trained professionals capable of minimizing some of the observed national digital barriers. The article is organized in three sections as follows: The first section discusses the problem of digital divide, as well as the barriers causing this form of social inequality in Bulgaria. Section two outlines available resources to overcome digital divide through Bulgarian chitalishte infrastructure. The third section analyzes the need to conduct continuous training for librarians in present-day environment.

Keywords:
digital divide, Bulgarian chitalishte, continuing education

1. Introduction

In modern society a globally important problem proves specifically linked to the expansive distribution of Information and Communication Technologies (ICT) in social and public life. Despite numerous advantages offered by the existing technological infrastructure today, (network for Internet access, hardware and software at affordable prices) part of society still manifest little interest to use it. This in turn is a factor for persons falling within this group to remain digitally illiterate and, as a result, digitally separated. Broadly speaking, those who for one reason or another do not perform effective use of ICT fail to utilize the opportunity to become part of the modern information society. Identification of principal barriers behind it is an essential prerequisite to addressing this problem and a basis to generate appropriate measures to tackle it.

[14]A chitalishte is a typical Bulgarian public institution such as a community center (Eds.)

The current article highlights the need to conduct continuous training of librarians in one of the most widespread cultural and educational organizations in Bulgaria, aiming at overcoming the digital divide on national level.

The article is organised in three sections as follows:

The first section discusses the problem of digital divide, as well as the barriers causing this form of social inequality in Bulgaria. Section two outlines available resources to overcome digital divide through Bulgarian chitalishte infrastructure. The third section analyzes the need to conduct continuous training for librarians in present-day environment.

2. Digital divide in Bulgaria

Existence of present-day digital divide in society is based on the different capacity to use Information and Communication Technologies (ICT). Despite the general availability of online resources and the opportunities offered, some part of the world's population remain insufficiently skilled and with limited access to modern ICT infrastructure. This gives grounds to introduce the term *digital divide*, naming the problem at hand, and to discuss the underlying barriers and the follow-up problems due to their existence. Part of the society is still beyond the capacity offered by modern ICT. A factor for this can be seen in some existing social restrictions acting as specific barriers, resultative in about 60% [7] of global lack of Internet usage.

In Bulgaria the problem, albeit gradually subsiding in recent years, still has its objective reality. A total 40.6% [9] of people have never used the Internet. The main factors [1] affecting the population in Bulgaria in respect to ICT usage are three: poor access to technical resources and infrastructure, lack of digital skills and lack of motivation for their acquisition. Studies [4] show that absence of motivation is the most frequently observed reason for not accessing ICT. It can be assumed that this particular barrier plays an important role as critical threshold towards digital equality (Fig. 1). Building motivation for ICT usage among the population with limited interest to new technology requires formulation of tasks to be undertaken.

Building motivation in turn is associated with increasing public awareness of the benefits the public network provides and advantages offered through its e-services. This is often associated with the provision of information that a traditionally manifested need (to communicate, to deliver information, to execute payments, place

inquiries and exchange commerce) may eventually be met online in the presence of a number of facilities and privileges. After establishing the existence of such needs, a natural further step is for the consumers to seek access to the technical means for their realization. To meet these needs, however, users need to possess a set of digital skills. The abovementioned requires the implementation of two tasks:

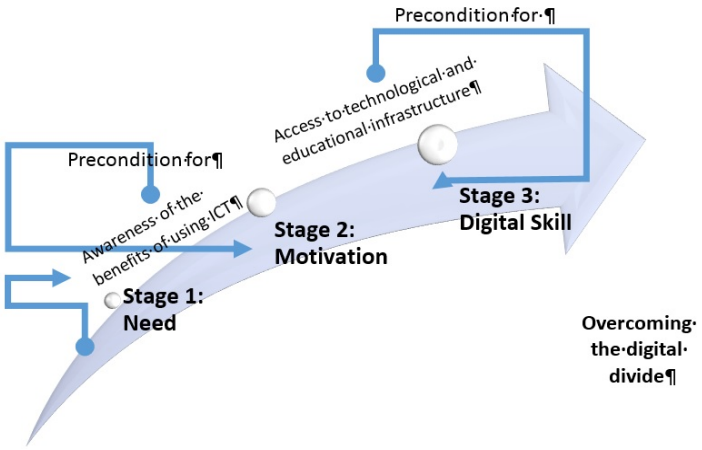

Fig. 1. Stages in overcoming the digital divide

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- Establishment of public points for free-of-charge access to computers and the Internet.
- Creating conditions to further develop and improve the digital skills of society.

The next section will set out some requirements for the implementation of these tasks.

3. Ability of chitalishte centers to help overcome the digital divide

The tasks set above, raise questions related to the level of preparedness for their accomplishment. The debate is about the existence of infrastructure capable to facilitate and carry out the assignment. Analysis [2] addressing the issue shows that the infrastructure provided by the Bulgarian cultural institution chitalishte can offer an adequate solution [8]. There are three main factors which identify chitalishte as infrastructure competent to patronize the idea of digital divide control in the country [2]:

- Territorial distribution - chitalishte centers are unevenly distributed throughout the country and operate in both large and small settlements.
- Available facilities and equipment - chitalishte centers possess facilities and equipment which, although outdated, has the potential to be upgraded to respond to both the set of required measures and the needs of the modern consumer.
- Availability of human resources - chitalishte centers employ personnel capable of supporting initiatives to develop the digital skills and competences of visitors.

Conventional means by which chitalishte can assist the implementation of each of the tasks leading to minimizing digital divide are related to:

- Stimulation of public interest to ICT - The institution is characterized by its general availability and is widely accepted by population. Each new form of service in this institution will create interest in the community, and if these services are designed for public use and do not require payment, their appreciation would be tangible. In this regard it is important to point out that chitalishte library has extensive experience in competence-related incentives and contributes greatly to issues concerning self-improvement and self-education of the community members.
- Provision of technical equipment to access the Internet – it includes the potential to allocate a specially designated area within the premises and equip it with computers and software applications, as well as to provide access to the most frequently used Internet services (online communication, access to information, e-commerce and services, e-records and e-payments). Such public service would prove favourable for the majority of non-ICT users, and stimulate their interest in technologies currently unfamiliar to them and the opportunities

they provide. In this regard it is important to outline the fact that chitalishte libraries hold the potential to facilitate technically the establishment of such centers and on this basis, to participate in EU projects and programs, as well as to benefit from donations.

- Provision of circumstances for digital skills training and acquisition: From practical point of view provision of premises and equipment for Internet access is just the first step towards implementation of measures to tackle digital divide.
- To be used in an efficient way these technologies require a further training and self-training to practise the necessary skills and abilities for each service accessed online. This requires provision of staff to assist the process of learning. Within chitalishte institution that employee would naturally be the Librarian, who in this new situation must balance tasks related to information brokerage and advisory activities [5].

4. Analysis of the need to conduct ongoing training of chitalishte librarians

Introduction of new services in chitalishte library incorporates changes in existing traditional operations, performed by library specialists. The new role of the modern librarian is expressed in the parallel implementation of library and advisory services, as well as giving consultation in matters concerning the use of ICT. Being part of an Internet providing institution, the library professional is required to assume consultation functions and mediate between abundancy of Internet information and the user's specific need. However, in order to be successful information brokers, librarians need to demonstrate certain abilities related to the specifics of information mediation, such as [3],[5]:

- Search and provision of information;
- Effective use of information technology;
- Analysis and structuring of information and development of secondary data;
- Consulting.

Each of these activities require modern library specialist to display respective skills as part of a spectrum of competencies. This new scope, however, demands to further examine the realities which chitalishte personnel is currently facing and assess its resources and potential. Chitalishte centers with one person holding both positions: Librarian and Secretary, and performing both activities - administrative

and library (a situation observed most often in small settlements), could be considered problematic. Due to differences in function and responsibility for each of the two positions, such centers create obstacles for the proper implementation of measures to deal with digital divide.

A comparison of the two chitalishte positions (Secretary and Librarian) shows differences in the required level of education for the respective employees: the person holding the position of librarian must have at least *bachelor* in the corresponding area, and for the person holding the position of Secretary requested level of education is secondary. Considerable differencies can be found in job responsibilities for each position - in general, the Secretary takes care of documentation and administrative activities of the library and the Librarian ensures the successful operation of the library. The existence of differences between the two positions raise questions about the effectiveness of the implemented measures to address digital divide through library infrastructure. Insufficient range of skills and competencies of the library specialist might generate unfavourable conditions for the implementation of the measures. This requires defining a basic set of competencies which the modern specialist serving chitalishte library must possess. The package will include:

- Higher education in the field of librarian science - this requirement is laid down in LPB (Law on Public Libraries) and is essential for providing quality library service.
- Digital Literacy - a requirement imposed by the changing environment, the social significance of the library and by consumer needs.
- Consultation Skills - a requirement called forth by the measures to overcome digital divide in Bulgaria, outlined above.

Each of these requirements will have an effect on the quality of library services, and in turn help to increase the motivation for acquiring digital skills in the population. In conclusion, it can be assumed that the ongoing training of librarians, aimed at developing their digital competency, their consultation and training skills, is not only a desirable, but an indispensable step to overcoming the gap of digital divide in Bulgaria.

5. Conclusion

Digital divide is a global problem which, broadly speaking, divides the world population into two parts – one part, having access and skills to

use ICT and another, with no motivation, skills or opportunities to use this technology. The capacity to overcome the problem in Bulgaria is at hand. Bulgarian chitalishte institution has the available resourses and can offer material and technical base, providing access to computers, software applications and the Internet. However, this measure to tackle digital divide, might not prove sufficient.

It is also necessary to make sure that consumers using the new services in chitalishte, will be consulted on issues connected to technology and its operation. This will in turn guarrantee that creating an interest to ICT in people who approach chitalishte for self-education purposes, accompanied by the provision of technical resources and consultation by library professionals, will lead to overcoming the digital divide in society. Whether these measures would prove sufficient to establish digital equality in Bulgaria, or would new barriers become apparent in the future, only time could tell.

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A system for online assessement of mathematical knowledge

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Abstract
The paper presents a brief review of a system for online testing of mathematical competences and skills. The system has enhanced testing abilities. It allows the teacher to define a problem by using dynamic mathematical models. Also the system automatically evaluates five different types of answers which make the evaluation process faster and more precise.

Keywords: dynamic model, automatic evaluation, mathematic, knowledge

1 Introduction

Online automated assessment of mathematical knowledge poses two main problems: (i) an adequate content representation of questions and tasks, and (ii) an automated evaluation of the answers. The assessment system to be discussed here below was designed and developed in accordance with the requirements defined by a team of researchers from the Institute of Mathematics and Informatics of Bulgarian Academy of Science involved in the implementation of the Inquiry based mathematics education [1, 2]. The most essential user requirements have been determined as follows:

- Enhanced content representation with dynamic interactive models by means of Geogebra [3]
- Starting tests by time scheduler
- Real time recording of the answers
- Separate storage of conditions and answers
- Encrypting the correct answers
- Automated evaluation of the results
- Integration within the CMS Invision Power Board

Although most of these functionalities are quite common for such type of testing systems there are some new extensions such as including of dynamic models and automation of the evaluation process.

When working on mathematical problems the students experience variety of difficulties such as inability to easily connect abstract or conceptual aspects of math with reality or inability to effectively visualize math concept [4]:

An attempt to ease the transition between real world perception and its mind replication is to enhance formal and verbal representation of mathematical tasks with dynamic and interactive models [1]. A dynamic and interactive model is a visual illustration of a mathematical object which updates its expression values upon modification.

When numerous users pass online tests the only feasible solution to check the results and grade them is the automated evaluation. The evaluation system should recognize not only everyday used answers such as *a single choice – a single answer* but also answers which are more specific to mathematic free numerical answers mapped by some valuation function.

2 Implementation

The assessment system consists of four main parts:

- Representative
- Communicative
- Data warehouse
- Scheduler
- Analytic

The representative part is responsible for interpretation of the questionnaires. Formally all questions and their valuations are described by using XML schema. The correct answers are encrypted and stored in separate data warehouse. This is done for security reasons to protect simultaneous access to questions and answers. The communication module carries synchronous duplex data exchange between user agent and the server. The data flow relies on AJAX technology. The user is acknowledged if its answers are not accepted by the system for any reason. Analytical part evaluates an individual test in real time or by the administrator demand. The overall results are reported for all users, tests and individual questions. The scheduler allows tests to be started in arbitrary time window for any group of users.

The system architecture building blocks are shown in Fig. 1.

3 Automatic evaluation of the answers

The system interpreter currently is able to recognize five types of questions and their answers:

- Single choice – single answer
- Single choice – multiple answers
- Multiple choice – multiple answers

Fig. 3. *The scheme depicts flowchart of data circulating among the system components. The questions and valuation of the answers in XML format are stored in file system FS. Correct answers and scheduling information are stored in MySQL database. User information is retrieved from CMS Invision Power Board [5]. The two decision blocks which drive whole application are* ***Representation*** *and* ***Results****.*

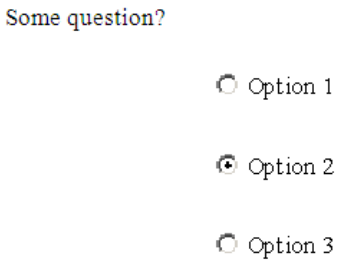
- Exact number
- A number in discrete intervals

The evaluation function f in a *single choice – single answer* question type is defined as:

$$f: A \to \{0, n\}$$
$$where\ A = \{\, x \in \mathbb{N} \mid x \leq 9\} \ and\ n \in \mathbb{R}$$

This function is total surjective such that for each chosen answer the result is 0 or some real number. The amount of choices is restricted to nine by the current development state of the parser. In further

releases of the software this number could be changed. The single choice quiestion looks pritty *classical*:



The evaluation function for a *single choice – multiple answer* question type is defined as:

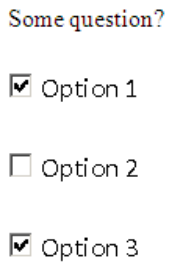
$$f: A \to B$$
$$where\ A = \{\, x \in \mathbb{N} \mid x \leq 9\}\ and\ B \in \mathbb{R}$$

Obviously the argument and the function could be related in different ways. Here each choice is correct. Also it is possible to valuate each answer by any real number.

Multiple choice – multiple answers is the sum *S* of the values of each choice:

$$S = \sum_{i=1}^{9} b_i a_i$$
$$where\ a \in \mathbb{R} \text{ and } b = \{0,1\}$$

The Boolean variable *b* represents a test whether a given choice is checked or not thus offering 2^i discrete real values for evaluation of a question. A typical multiple choice quiestion looks as follows:



The valuation of an exact number is defined as:

$$f: \mathbb{R} \to \{0, r\}$$
$$where\ r \in \mathbb{R}$$

Thus the answer is 0 or some real number. This is apropriate for evaluation of free numerical answers of quantitative problems. The answer options are represented by single field where the number is typed.

The last evaluation option is trivially named a *target*. It resembles a discrete function with symmetric intervals around a central point. The answer is a single real number which is passed as an argument of the function:

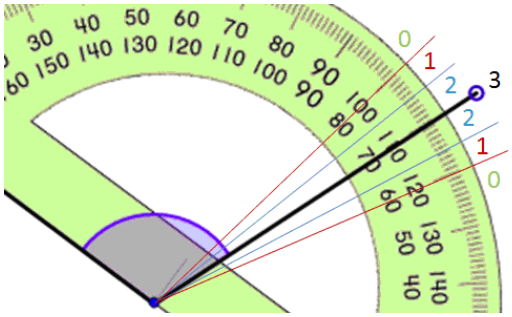
$$f: \mathbb{R} \to \mathbb{R}$$

A = $\{a_0, \dots, a_k\}$, $a \in \mathbb{R}$ is a finite set of valuations,

M = $\{m_{-k}, \dots, m_0, \dots, m_k\}$, $m \in \mathbb{R}$ – set of interval boundaries

$$f(x) = \begin{cases} a_0, & x = m_0 \\ a_k, & x < m_{-k+1} \wedge x \geq m_{-k} \vee x > m_{k-1} \wedge x \leq m_k \end{cases}$$

Each interval is defined as a predicate of its boundary values. No limitation is put on the number or size of the intervas. The interval function may be depicted as follows:



4 Dynamic models

Dynamic mathematical models included as part of the problem formulations are the most important didactical novelty. They are created by means of GeoGebra. Further models are prepared for web based usage as JavaScript code. All models are collective for the entire test system and could be reused in different quiestionaries.

Preliminary qualitative survey confirms the assumption that interaction with a mathematical model will increase the comprehension of the problems thus improving the test results. Further study and analysis should be carried out to clarify qualitative aspect of integration of dynamic models in the testing process.

5 Conclusions

The system was tested in several online mathematical competitions with duration from one hour to one month. Curently the most attended contests are the issues of *Viva Mathematics with a computer* [2, 5, 6] with about of thousand participants solving up to ten problems for an hour. Bottle neck analisys reveals that the narrow segment is the database engine. The cause are numerous requests from client browsers where answers of each individual questions are recorded in real time. This requirement is mandatory since no answer should be lost if the data flow is broken on the path to the server. Therefore two options exist to increase the system productivity: optimizaion of the database behaviour and hardware enhancements.

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Open Access

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Abstract
The paper gives an introduction of the movement to open access to scientific publications and data. Organizations and countries promoting open access are listed. Some European projects in these fields are highlighted. Information about open access resources is given. Some recommendations for further open access work are given.

Keywords: Open Access, Open Science, Open Data, Responsible Research & Innovation, Access to Knowledge

Introduction

In 2001 a meeting on scientific publicizing held in Budapest adopted the phrase *Open Access*. Open Access (OA) is the provision of free access to peer-reviewed, scholarly and research information to all. It envisage that the rights holder grants worldwide irrevocable right of access to copy, use, distribute, transmit, and make derivative works in any format for any lawful activities with proper attribution to the original author [1]. The Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities is a major international statement on OA / access to knowledge. It emerged in 2003 from a conference on open access hosted in the Harnack House in Berlin by the Max Planck Society. Organizations that commit to implementing this definition of open access can sign on to the declaration. Now there are more than 495 organizations all over the world signing the declaration.

Countries have started to supports OA for the benefit of the global flow of knowledge, innovation and equitable socio-economic development. Access to scientific information is a problem even for the best endowed universities, especially due to a high and increasing cost of peer-reviewed journals and fluctuations in the exchange rates. OA has inspired a global movement that is revolutionizing the way research information is shared, disseminated and utilized. Essentially, it is about removing the financial and access barriers and use

restrictions present in traditional publishing allowing key stakeholders and the public to view and use research and documentation generated within one's own country and around the world. Requirements for such credible research and data are critical for policymakers, and those that are part of the decision-making process, to help them take informed action in seeking solutions to national issues. It has also allowed for scholarly research and information, which had mainly been the field of elite universities and wealthy countries that could afford it, freely available to the public. Further, OA is evolving the way research is reviewed, developed and measured creating new paradigms of interaction and evaluation.

A study funded by the European Commission (EC) suggests that open access is reaching the tipping point, with around 50% of scientific papers published in 2011 now available for free: *The tipping point for open access (more than 50% of the papers available for free) has been reached in several countries, including Brazil, Croatia, Estonia, Lithuania, Macedonia, Switzerland, the Netherlands, the US, as well as in biomedical research, biology, and mathematics and statistics* [2].

Organizations and countries promoting OA

The European Commission (http://ec.europa.eu/) emphasizes open access as a key tool to bring together people and ideas in a way that catalysis science and innovation. To ensure economic growth and to address the societal challenges of the 21st century, it is essential to optimize the circulation and transfer of scientific knowledge among key stakeholders in European research - universities, funding bodies, libraries, innovative enterprises, governments and policy-makers, non-governmental organizations and society at zlarge. The Commission envisions a future in which the data infrastructure becomes invisible and the information itself is an infrastructure from the user's perspective. To improve access to scientific information, Member States, research funding bodies, researchers, scientific publishers, universities and their libraries, innovative industries, and society at large need to work together [3].

The UNESCO (http://en.unesco.org/) Open Access strategy approved by the Executive Board in its 187th session and further adopted by the 36th General Conference identified up-stream policy advice to Member States in the field of Open Access as the core priority area amongst others.

SPARC: the Scholarly Publishing and Academic Resources Coalition (http://www.sparc.arl.org/) is an international alliance of academic

and research libraries working to create a more open system of scholarly communication. SPARC believes that faster and wider sharing of the outputs of the scholarly research process increases the impact of research, fuels the advancement of knowledge, and increases the return on research investments. SPARC focuses on taking action in collaboration with stakeholders – including authors, publishers, and libraries – to build on the unprecedented opportunities created by the networked digital environment to advance the conduct of scholarship.

EIFL: Electronic Information for Libraries (http://www.eifl.net) enabling access to knowledge in developing and transition countries. Working in collaboration with libraries in more than 60 countries in Africa, Asia, Europe, and Latin America, EIFL enables access to knowledge for education, learning, research and sustainable community development. EIFL advocates for the adoption of open access policies and mandates. EIFL also builds capacities to launch and sustain open access repositories.

COAR: Confederation of Open Access Repositories (https://www.coar-repositories.org/) is an international not-for-profit association that aims to promote greater visibility and application of research outputs through global networks of OA digital repositories. As organizations committed to the principle that access to information advances discovery, accelerates innovation and improves education. COAR endorse the policies and practices that enable OA – immediate, barrier free access to and reuse of scholarly articles.

RDA: The Research Data Alliance (https://rd-alliance.org/about.html) builds the social and technical bridges that enable open sharing of data. The RDA vision is researchers and innovators openly sharing data across technologies, disciplines, and countries to address the grand challenges of society. The current global research data landscape is highly fragmented, by disciplines or by domains, from oceanography, life sciences and health, to agriculture, space and climate. When it comes to cross-disciplinary activities, the notions of *building blocks* of common data infrastructures and building specific *data bridges* are becoming accepted metaphors for approaching the data complexity and enable data sharing. The Research Data Alliance enables data to be shared across barriers through focused Working Groups and Interest Groups, formed of experts from around the world – from academia, industry and government. It was started in 2013 by a core group of interested agencies – the European Commission, the US

National Science Foundation and National Institute of Standards and Technology, and the Australian Government's Department of Innovation. Other agencies, countries, companies, associations and institutes are due to join. RDA also has a broad, committed membership of individuals – now 1600 from 70+ countries.

OASPA: the Open Access Scholarly Association (http://oaspa.org/) mission is to represent the interests of OA journal and book publishers globally in all scientific, technical and scholarly disciplines. This mission is carried out through exchanging information, setting standards, advancing models, advocacy, education, and the promotion of innovation through a shared interest in developing appropriate business models, tools and standards to support OA publishing.

In July 2012 the European Commission issued COMMISSION RECOMMENDATION on access to and preservation of scientific information [4]. In 2013 after years of wrangling in America's Congress the white House stepped in to require federal agencies that spend more than $100m a year on research to publish the results where they can be read for free [5]. Spain has recently taken the legislation route to OA by enacting law on Science that includes provision for OA mandate. Similarly, Argentina has just passed a policy, which demands all big institutions to maintain Open Access Repository for the benefit of science, technology and innovation. In 2014 the Finnish Ministry of Education and Culture established Open Science and Research Initiative to incorporate open science and research to the whole research process. The Chinese Academy of Sciences and the National Natural Science Foundation of China have both issued new OA policies which will contribute to making research more available. The announcement on the Policies on OA to Research Articles from Publicly Funded Research was made on May 15, 2014 during a briefing on the Annual Meeting of the Global Research Council in Beijing, China. Governments of Argentina, Mexico and Peru have introduced national open access mandates and open access is now required by law in these countries. The Bulgarian steps in this direction are given in [6, 7].

European OA projects

OpenAIREplus (https://www.openaire.eu/) built a 2nd-Generation Open Access Infrastructure by significantly expanding in several directions the outcomes of the OpenAIRE project, which implements the EC OA pilot. Capitalizing on the OpenAIRE infrastructure, built for managing FP7 and Europa Research Council funded articles, and the associated supporting mechanism of the European Helpdesk System,

OpenAIREplus *develop an open access, participatory infrastructure for scientific information*. OpenAIREplus retain its European footprint, engaging people and scientific repositories in almost all 27 EU member states and beyond. The technical work are complemented by a suite of studies and associated research efforts that are partly proceed in collaboration with *different European initiatives* and investigate issues of *intellectual property rights, efficient financing models, and standards*. The new OpenAIRE2020 will expand and leverage its focus from: (1) the agents and resources of scholarly communication to workflows and processes, (2) from publications to data, software, and other research outputs, and the links between them, and (3) strengthen the relationship of European OA infrastructures with other regions of the world, in particular Latin America and the U.S. Through these efforts OpenAIRE2020 project will truly support and accelerate Open Science and Scholarship, of which Open Access is of fundamental importance. OpenAIRE2020 project continues and extends OpenAIRE's scholarly communication infrastructure to manage and monitor the outcomes of EC-funded research. It combines its substantial networking capacities and technical capabilities to deliver a robust infrastructure offering support for the Open Access policies in Horizon 2020, via a range of pan-European outreach activities and a suite of services for key stakeholders. It provides researcher support and services for the Open Data Pilot and investigates its legal ramifications. The project offers to national funders the ability to implement OpenAIRE services to monitor research output, whilst new impact measures for research are investigated. OpenAIRE2020 engages with innovative publishing and data initiatives via studies and pilots. By liaising with global infrastructures, it ensures international interoperability of repositories and their valuable OA contents. To ensure sustainability and long-term health for the overall OpenAIRE infrastructure, the OpenAIRE2020 project will establish itself as a legal entity, which will manage the production-level responsibilities securing 24/7 reliability and continuity to all relevant user groups, data providers and other stakeholders.

EUDAT: European data infrastructure (http://www.eudat.eu/) vision is to support a Collaborative Data Infrastructure which will allow researchers to share data within and between communities and enable them to carry out their research effectively. EUDAT aims to provide a solution that will be affordable, trustworthy, robust, persistent and easy to use.

PASTEUR4OA: Open Access Policy Alignment STrategies for European Union Research (http://www.pasteur4oa.eu/) is a project that supports the aim of encouraging the development of matching policies on open access and open data in the European Union according to the EC's Recommendation on *Access to and preservation of scientific information* and in view of maximizing alignment with the Horizon 2020 policy on access to the research funded by the EC.
FOSTER: Facilitate Open Science Training for European Research (https://www.fosteropenscience.eu/) identifies content that can be reused in the context of the training activities on open access and open data, enhances/repackages/reformats it to be used on the portal to support e-learning, blended learning and self-learning.
RECODE: The Policy RECommendations for Open Access to Research Data in Europe project (http://recodeproject.eu/) leverage existing networks, communities and projects to address challenges within the open access and data dissemination and preservation sector and produce policy recommendations for open access to research data based on existing good practice.

OA resources

Directory of Open Access Journals (DOAJ) (http://doaj.org/) is a service that indexes and provides access to quality, peer reviewed Open Access research journals, periodicals and their articles' metadata. The Directory aims to be comprehensive and cover all open access scientific and scholarly journals that use an appropriate *quality control* system and is not limited to particular languages or subject areas. The Directory aims to increase the visibility and ease of use of open access scientific and scholarly journals regardless of size and country of origin thereby promoting their visibility, usage and impact. Now it includes 10,067 journals, 5,940 searchable at article level, 136 countries and 1,777,441 articles.
ROAD the Directory of Open Access scholarly Resources (http://road.issn.org/) is a service offered by the ISSN International Centre with the support of the Communication and Information Sector of UNESCO. ROAD provides a free access to a subset of the ISSN Register (1.7 millions of bibliographic records, available on subscription, http://www.issn.org/en/understanding-the-issn/the-issn-international-register/). This subset comprises bibliographic records which describe scholarly resources in OA which have been assigned an ISSN by the ISSN Network: journals, conference

proceedings and academic repositories. ROAD records are also downloadable as a MARC XML dump and are available as RDF triples.
DOAB: Directory of Open Access Books (http://www.doabooks.org) providing open access to scholarly monographs is a growing movement and lists now - 2396 academic peer-reviewed books from 79 publishers.
RoMEO (http://www.sherpa.ac.uk/romeo/) is a searchable database of publisher's policies regarding the self- archiving of journal articles on the web and in OA repositories. It contains publishers' general policies on self-archiving of journal articles and certain conference series. Each entry provides a summary of the publisher's policy, including what version of an article can be deposited, where it can be deposited, and any conditions that are attached to that deposit.
ROARMAP: Registry of Open Access Repositories Mandatory Archiving Policies (http://roarmap.eprints.org/) lists now institutional mandates - 238, funder mandates - 90, thesis mandates -121.
OpenDOAR: The Directory of Open Access Repositories (http://www.opendoar.org/) is an authoritative directory of academic open access repositories. Each OpenDOAR repository has been visited by project staff to check the information that is recorded. This in-depth approach does not rely on automated analysis and gives a quality-controlled list of repositories. OpenDOAR lets you search for repositories or search repository contents. Additionally, it provides tools and support to both repository administrators and service providers in sharing best practice and improving the quality of the repository infrastructure.
There are over 9700 OA journals and over 2500 institutional OA repositories. The major institutional repository software, DSpace, has reached over 1300 installations recently. However, only 20% of scientific journal articles are available via Open Access. Although many have started to argue that a tipping point has been reached. Since 2000, the average annual growth rate has been 18% for the number of OA journals and 30% for the number of articles [8].

Conclusions

Based on the analysis of current state of OA we suggest some recommendation for further OA work:

- To define clear policies for the dissemination of and open access to scientific publications resulting from publicly funded research. It should be on the basis of the green model, within which quality is ensured by scientific publications. This should embrace all

research institutions which perform and/or disseminate fully or partially state-funded research. Access to the results of state-funded research should be provided to the greatest possible extent.

- To ensure that research funding institutions are responsible for managing public research funding and that academic institutions receiving public funding implement the OA policies.
- To define clear OA policies for the dissemination and OA to research data resulting from publicly funded research.
- To reinforce the preservation of scientific information.
- To explore the opportunities for coordination between the bibliometric indicator and the OA policies. An investigation should be carried out to find out if it is possible to achieve coordination between the bibliometric indicator and OA.
- To create a service for a long-term storage of scientific publications. A service for long-term storage should be created, which will ensure that the digital publications can be read and used for a long time.

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Cultural heritage: multimedia lectures and learning materials

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Abstract.
This article presents four multimedia lectures and learning materials as part of the scientific-research project named A Model for Creating Information Environment for Stimulating Scientific Research in the Sphere of Cultural and Historical Heritage. The project was implemented by a research team at the State University of Library Studies and Information Technologies (SULSIT) and it was supported by the National Science Fund at the Bulgarian Ministry of Education and Science (MES). The presented multimedia educational products are related to various topics of cultural heritage - the state policy on cultural heritage, the Thracian heritage, libraries and literary heritage, urban spaces and ensembles. Other important objectives of the report are to highlight the advantages of the virtual learning environment and the need to introduce a innovative methods of teaching and learning within the university education in the field of cultural heritage.

Keywords:
Cultural Heritage, University education, Project activities, Multimedia lectures and learning materials.

1 Introduction

The leading role in developing the methodology and application of innovative approaches in teaching cultural heritage belongs to UNESCO globally and the Council of Europe in the European context. The application of these approaches corresponds with the modern requirements for quality education and training and to adapt them to the real and the information environment and the application of information and communication technologies[15]. Referring to that, we

[15] Implementation of Standarts and Guidelines for Quality Assurance in Higer Education of Central and East-European Countries. UNESCO-CEPES, Bucharest 2009. - 320 p.; Topical Contributions and Outcomes. UNESCO Forum on Higer Education in the Europe Region: Access, Values, Quality and Competitiveness. UNESCO-CEPES,

would like to point out several reasons that motivated us to work on this project. The first one is that our country Bulgaria is one of the transition countries, and recently (in 2007) became an EU member. Cultural and educational sectors have undergone a lot of reforms and are currently in a process of dynamic development. The second reason relates to the fact that after the launch of EU enlargement in 2004, cultural heritage has been highlighted as priority in European policies for preservation of European cultural diversity[16]. The third reason relates to the access to updated scientific information in electronic format, which is extremely important for contemporary development of research in international scientific exchange and communication as well as for the purposes of university education in the field of cultural heritage. Statistical data and conclusions based on their analyses reveal a lag behind in the scientific and research sector in Bulgaria as compared to European countries as well as the insufficient application of ICT potential in education[17]. So far and for the purposes of university education in Bulgaria, an integrated digital and virtual information research and educational resource in the field of cultural and historical heritage has not been created.

2. Good practices of the SULSIT in the teaching of cultural heritage

In this regard, the paper tries to present in detail innovative approaches of the modern educational policy of the State University of Library Studies and Information Technologies (SULSIT), which is a unique (in Bulgarian context) research and educational interdisciplinary center integrating studies in the library science, digital technologies, cultural and historical heritage. SULSIT is a leading university in Bulgaria for training specialists in the field of cultural and historical heritage. SULSIT conducts training in undergraduate programs in the specialty of Information on Collections of Cultural and Historical Heritage and a Master degree in Cultural and Historical

Bucharest 2009. -242 p.; Eugenia Apicella. 2008. Presentation of twenty years of experience at the European University Centre for the Cultural Heritage (CUEBC), Ravello, Italy. In: Cultural Heritage and Risk : Some Europeans experiences. Consul Of Europe, Strasburg, 2008, pp. 9-11.

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[17] *Operational Programme for Human Resources Development for the period 2007-2013*. Ministry of Labour and Social Policy, 2007, p. 96-116.

Heritage in Contemporary Information Environment and Protection of Cultural and Historical Heritage in Bulgaria. In 2011 the Institute for Research on Cultural and Historical Heritage – (IRCHH) was created in the structure of the University.

An important part of the modern educational policy of SULSIT is the research activity on different projects in the field of cultural heritage. One of the university projects which we realized is on: *A Model for Creating Information Environment for Stimulating Scientific Research in the Sphere of Cultural and Historical Heritage*. This project is supported through the National Science Fund of Ministry of Education and Science (MES) of Republic of Bulgaria and was selected in a competitive process within the program *Promoting Scientific Research in Priority Areas* in the period between 2010 - 2013. One of the main objectives of the project is to enhance the links between scientific researches and the teaching and learning**.** Working on this project had been useful to support the learning process with visual materials and multimedia products that not only enriched theoretical knowledge but also developed appropriate practical skills in the students.

3. Multimedia learning products

One of the main activities of the project is to prepare learning materials in the type of multimedia educational products. The project is implemented research, preparation and issuance of four multimedia research products that are made in versions of Bulgarian and English languages and are structured in thematic modules and lectures:

3.1. *Stoyan Denchev, Sofia Vasileva.* (2013) State Policy on the Cultural Heritage of Bulgaria 1990 – 2012. *Multimedia Lecture Course.* Publisher: Za bukvite – O' pismeneh.

The main aims of this course is to highlighting the Cultural Heritage as an important area of the Bulgarian state policy. The course includes the following topics: Interactions between policy, legislative authorities, institutions and culture; Priorities of state cultural policy; Current practices and legislative initiatives in the field of culture; Integration of the Bulgarian cultural heritage in the global and European structures; The debate on Cultural Heritage. Strategies for cultural policy in the modern and contemporary era. The preliminary stage on collection and systematization of materials lectures *State policy on cultural heritage on Bulgaria 1878-2009* published in 2010

were used as the basis[18]. **Structure.** The course consists of 150 slides, divided into the following thematic structure: Annotation, Three thematic Modules, Bibliography. The Content of this course includes: Module I. Cultural Policy and Cultural Heritage (Lecture. *Changes in State cultural policy.* Influence of Policies of the Council of Europe and the European Union); Module II. Cultural Heritage Management (*Lecture. Legal and Regulatory System.* International Regulations. *Lecture.* National Legislative Regulations. *Lecture. Institutions dealing with the cultural and historical heritage*. Lecture. The Ministry of Culture. Policy in the Field of Cultural Heritage; Module III. Priorities of Modern State Policy for Cultural Heritage in Conditions of European Integration (Lecture. Cultural Heritage in the policies of Sustained Regional Development. European Programs. EU Structural Funds.Operational programs, national development strategies).

3.2. *Valeria Fol.* (2013) Thracian Cultural and Historical Heritage. *Learning Materials.* Publisher: Za bukvite – O' pismeneh.
Structure. The Learning Materials consists of 234 slides, divided into the following thematic structure: Annotation, Five thematic Modules (Thrace before the Thracians; Forming the Thracian Ethnos; Thracian Tribes – VI – IV C. BC; The King's Power; Thracian Orphism; The Concept of Space and the Thracian Belief in Immortality. References. Bibliography.

3.3. *Ivanka Yankova .* (2013) Libraries and Book Heritage. *Learning materials.* Publisher: Za bukvite – O' pismeneh
Structure. The Learning Materials consists of 110 slides, divided into the following thematic structure: Annotation, History of Libraries **(**The Libraries in Egypt and Mesopotamia; The Libraries of Babylon; The Libraries in Ancient Greece; The Libraries in Ancient Rome; The Libraries in the Middle Ages; The Libraries in the Renaissance).

3.4. *Svobodna Vrancheva, Diana Stoyanova.* (2013) Urban Spaces and Ensembles. *Multimedia Lecture Course.* Publisher: Za bukvite – O' pismeneh.
Structure. The course consists of 92 slides, divided into the following thematic structure: Annotation, Two thematic Modules: Module 1. The city as a phenomenon of civilization. (Material and spiritual

[18] Denchev, Stoyan, Sofia Vasileva. (2010) State Policy On Cultural And Historical Heritage Of Bulgaria, 1878-2009. Sofia:Za Bykvite. -432 p. (Language BG, Abstract, Contents, Introduction – EN, Russian)

characteristics. Creation and destruction in urban development. The city as a literary, pictorial and film storyline. Module 2. Geography wrote the story. (Urban forms of Mesopotamia and Egypt. The architecture and power. Atina and Athenian Acropolis - the ancient worldview and culture. Buildings and areas of public life).

Fig. 1. *Multimedia learning products*

The project team which realized this research products consists of 5 habilitated tutors, 4 professors and 1 associated professor. There are 4 PhD students under the age of 35 and one student. The work on this project create a favourable environment for their professional development. Team work, as well as the activities create opportunities for systemized huge massif of various scientific material, increase their publication activity and generate new ideas. Young scientists gain experience that will be helpful when working on other projects.

4. Conclusion

The multimedia lectures and learning materials presented here are prepared in versions on English and Bulgarian language. This research

products have been integrated into the educational content and in the teaching methods in SULSIT courses in BA and MA programs. Academic growth has been achieved as well as a marked increase in the professional qualification of young scholars members of the scientific staff. These multimedia products are used in teaching the subjects taught in the educational and qualification degree Bachelor in Information Collections of Cultural and Historical Heritage at SULSIT - 'State Policy of the Cultural and Historical Heritage of Bulgaria', 'History of Bulgarian Cultural Institutions', 'Architecture of Bulgarian cities', 'Urban Spaces and Ensembles and in the Master degree in *Cultural heritage in modern information environment - Cultural Policy and Cultural Heritage*. This multimedia learning products are related to various topics of cultural heritage - the state policy on cultural heritage, the Thracian heritage, libraries and literary heritage, urban spaces and ensembles. Although they are different as topics, the presented scientific products are united around a common vision and goal to highlight the benefits of Information and virtual learning environment and the need to introduce innovative methods on teaching and learning in the system of university education in the field of cultural heritage

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Erasmus Intensive Programmes effective tool for educational and scientific communities

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Abstract
The report presents the project concept and achievements of Erasmus Intensive Programme 'Library, Information and Cultural Management – Academic Summer School' (IP LibCMASS), held in the period 2011-2013, as an effective tool for educational and scientific communities collaboration in the field of Library and Information sciences and Cultural Heritage Science. The international network consists of: State University of Library Studies and Information Technologies (SULSIT, Sofia) – coordinator, and partners - Hacettepe University in Ankara (Turkey), University of Zagreb (Croatia), IUT University Paris Descartes (France) and University of Szeget (Hungary).

Keywords:
Erasmus Intensive Programme, Library, Information and Cultural Management, State University of Library Studies and Information Technologies, Library and Information Science

Project Description of Erasmus Intensive Programme 'Library, Information and Cultural Management – Academic Summer School' (IP LibCMASS)

Intensive Programme '**Lib**rary, Information and **C**ultural **M**anagement – **A**cademic **S**ummer **S**chool' (**IP LibCMASS)** aims to create interdisciplinary educational programme and learning environment in which to acquire the knowledge and skills relating to the contemporary challenges of the management of libraries, museums, archives and information technology centers. The target group are students (Bachelor, Master, PhD students) in library and computer science, information technology and cultural and historical heritage specialties of State University of Library Studies and Information Technologies (SULSIT, Sofia), Hacettepe University in Ankara (Turkey), University of Zagreb (Croatia), IUT University Paris Descartes (France)

and University of Szeget (Hungary). Every year the total number of participating students vary from 23 to 25, teachers – from 16 to19.

Mission

The mission of the project is through using a rich methodological toolkit to realize a modern educational process aimed at the implementation of interdisciplinary knowledge and skills relevant to the new requirements in the career development of students in library and information and cultural sector and the policy response to higher education and the European Union initiative on *New skills for new jobs*.

The main topics in IP LibCMASS are:

- Library, Information and Cultural Management;
- Preservation and access to cultural heritage. Digital libraries;
- Intellectual Property. Information brokerage;
- Information technologies in libraries, archives, museums and other cultural institutions. Information literacy.

In 2011 IP LibCMASS was held in SULSIT, Sofia (4-17 September 2011); 2012 in University of Zagreb (2-15 September 2012) and in 2013 was organized in Hacettepe University, Ankara (8-21 September 2013). This sustainability of the project concept ensures a stable international and interdisciplinary network in higher education in library and information sciences, computer sciences and cultural heritage sciences and promotes cooperation between academic education and practice – library, information and cultural sector.

For each topic students have theoretical lectures by a multinational team of lecturers, focusing on presenting different theories and approaches according to the specialization of an expert. The theoretical material were assimilated through a variety of teaching methods (workshops on national and international teams, seminars, individual assignments and Case Study in cultural institutions).

In IP LIbCMASS we have outdoor learning days, exploring cultural and historical heritage sites in the host countries. In 2011 we visited the Rila Monastery, Boyana Church, National Historical Museum, National Library *St. St. Ciryl and Methodius* and City Library at Sofia, Bulgaria. In 2012, the connection theory-practice was realized by working visits in National and University Library in Zagreb, Croatian State Archives and Zagreb City Library. Students also have had outdoor learning day exploring cultural, natural and architectural routes in the coast city Zadar and National Park Plitvicka jezera (UNESCO Natural Site). In 2013 we spent two learning days, visiting cultural and historical heritage

sites in Cappadokia, and others working trips to library and cultural institutions in Ankara, Turkey.

We shared national experiences and best practices, we interacted in national and international teams, we stimulated the intercultural dialogue and foreign language communication in English. ICT technologies and interactive applications were widely used in the learning process. Graduates acquired 4 ECTS. IP LibCMASS accumulated theoretical and practical basis on which universities made updates to existing curricula and textbooks.

Textbook *Library, Information and Cultural Heritage Management* and CD with selected educational materials were published. [2, 3] Students and lecturers collaborate actively in research projects and participated with joint papers in international conferences and forums such as BOBCATSSS international students symposium, International Conference Qualitative and Quantitative Methods in Libraries, European Conferences on Information Literacy etc. [5-8]

Project management and communication

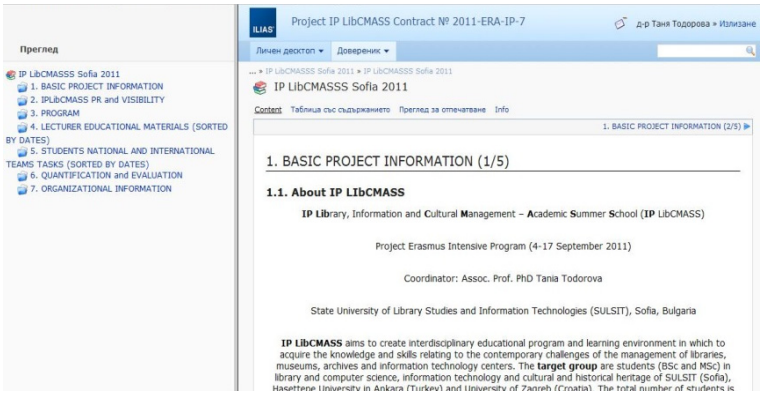
Project management and communication teacher-student were based on own website: http://libcmass.unibit.bg/, which was created and used for the project preparation and implementation work. All related material and information for lecturers and students as itinerary, tasks, bibliography, organizational information, useful links, news and PR activities and etc. could be found there on time. This central place for project material and communication was also used for post-processing work of evaluation material and photo gallery collections for every day of the IP programme. [1]

> *Thank you very much for these useful information and links in the project website. I am very excited to meeting with you and other colleagues from different countries in Sofia. I am following these links everyday…*
> Tolga Çakmak, IP LibCMASS student 2011, Ankara
>
> *The webpage is very useful to Zagreb students' team, we are checking it every day and so far we have found many useful links and information.*
> Petra Miocic, IP LibCMASS student 2012, Zagreb

For IP LibCMASS project was created new course in the e-learning platform ILIAS (open source learning management system), which

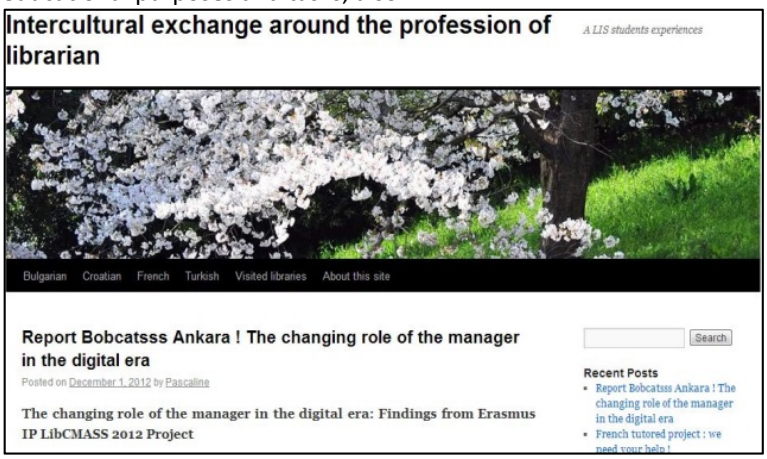
guaranteed the long-term sustainability of the IP LIbCMASS Intensive Programme. All lecturers' materials (lectures, instructions, recommended literature, presentations) and students' presentations and contribution materials on the different topics are accessible freely on the IPLIbCMASS website (rubric Education) and on the e-learning platform ILIAS (with a key login).

IP LibCMASS website http://libcmass.unibit.bg/



Project e-learning platform ILIAS: http://libcmass.unibit.bg/iplibcmass/

In 2012 and 2013 we used e-platform *'Intercultural exchange around the profession of librarian' http://www.docinfos.fr/culturex/* for educational purposes and tasks, also.



e-platform 'Intercultural exchange around the profession of librarian' http://www.docinfos.fr/culturex/

To stay in permanent contact with all responsible persons of the partner institutions during the whole project year, a mailing list was established to send all information concerning IP LibCMASS organization directly to the institutional coordinators, lecturers and students.

Evaluation Process

The IP LIbCMASS has several level and methods of project evaluation. Every year, during the preparation process from June to September, active e-mail communication was used for all management and organizational tasks. In the project website the participants could find the Selected Project Correspondence – feedback, shared remarks and new ideas.

In the frame of the implementation of Intensive Programme regular evaluation discussions were held at the end of each week with lecturers and students contribution. The main points of the evaluation aspects were:

- Information/organization/communication;
- Academic/learning outcomes;
- Recommended literature and educational materials;
- Student tasks and collaboration in national and international teams;

- Collaboration between bachelor and master students;
- Quality of education;
- Library and cultural institution visits;
- Quality of cultural activities and outdoor learning hours;
- Foreign language communication in English;
- Accommodation; per diem for students;
- etc.

Due to the requested problems and suggestions, the coordinator and the SULSIT organization team tried to react immediately. Otherwise those evaluation rounds were a perfect possibility to receive also positive feedback from all participants combined with individual opinions.

At the end of the Intensive Programme each national student team had to prepare an evaluation publication and other tasks. On the last IP day they participated on the Round table *IP LibCMASS – new competences for future success. Re-thinking the Profile of the Modern Manager of Memory Institutions*, opened for wide audience and for whole academic community of the host university. Also was organized programme exam. On these events students presented their essays and presentations and these materials were discussed with the exam jury and other participating lecturers and guests. It was an important element of the project review.

For further detailed analyses of all project related aspects by the European Union, the students had to fill *Final Report Form for students*, questionnaire by Bulgarian Human Resource Development Center. All participating lecturers were also invited to fill in anonymously *Evaluation Questionnaire for participating lecturers*.

Partner universities sent to the project coordinator Official Letters with short internal evaluation of project participation of students and lecturers and Official Letters of recognition of 4 ECTS of students.

Important point on our discussions was the involvement of possible new partners in our intensive programme and collaboration with other IP and international projects such as:

- EU-ERASMUS Intensive Programme (IP) IPBib: Das Grimm-Zentrum – (k)ein Bibliotheksmärchen: http://www.ibi.hu-berlin.de/ipbib (4-17 September 2011, Vilnius) [4];
- EU-ERASMUS Intensive Programme (IP) Information and communication technology in supporting the educational process:

(10-23 Sept 2011, Zagreb) http://infoz.ffzg.hr/erasmusip/programme.html

After analyzing all forms of evaluation process it was concluded that **IP Lib**rary, Information and **C**ultural **M**anagement – **A**cademic **S**ummer **S**chool (IP LibCMASS) was very successful Intensive Programme, which satisfied all participants.

> *Thank you for your effort in creating this program for us students, we all had wonderfull time, we learned much about our future profession and make friendships that we are all so glad about. You inspired me to go in that direction and I want to thank you for that.*
> Manuela Babić, IP LibCMASS student 2012

Conclusions

The Erasmus Intensive Programme '**Lib**rary, Information and **C**ultural **M**anagement – **A**cademic **S**ummer **S**chool' (**IP LibCMASS)** gave the Library, Information and Cultural Heritage Science students the opportunity to work together in innovative educational environment with interdisciplinary content.

The multiple methodological character of the whole program improved the communication and presentation skills of all participants. They collected and shared interesting experiences and valuable knowledge within a framework of lectures, seminars, workshops and discussions which were complemented with study trips to libraries and other cultural institutions. In this context the students prepared presentations and discussed topics in national and international teams from the first day on. The international mixture and teamwork of lecturers and students made it possible to compare different national concepts and experiences like the national study Programs and projects. Also the students discussed new ideas on professional topics such as digitization and cultural heritage, intellectual property, public relations, information literacy etc.

Working in international teams of students gave teachers and students the opportunity to use and prove interactive learning methods. Besides, it also enhanced the development of language and social networking skills. An important benefit of the Program is to give the students the experience of living abroad, to get international contacts and to enhance their professional orientation and competence.

Collaboration between students with different cultural and educational backgrounds (Bachelor, Master, PhD) was a tremendous enrichment for the future and resulted in stimulating professional and personal partnerships. We could conclude that Erasmus Intensive Programmes are an effective tool for educational and scientific collaboration in the European education area.

Achievements

The project ERASMUS Intensive Programme 'Library, Information and Cultural Heritage Management – Academic Summer School' was awarded with the first place and received Certificate for overall quality performance between all projects, realized in Bulgaria in 2012, as part of the European Program for education and training *Lifelong Learning*, from Bulgarian Ministry of Education and Human Resources Development Center.

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Education Enhanced by Cloud Computing

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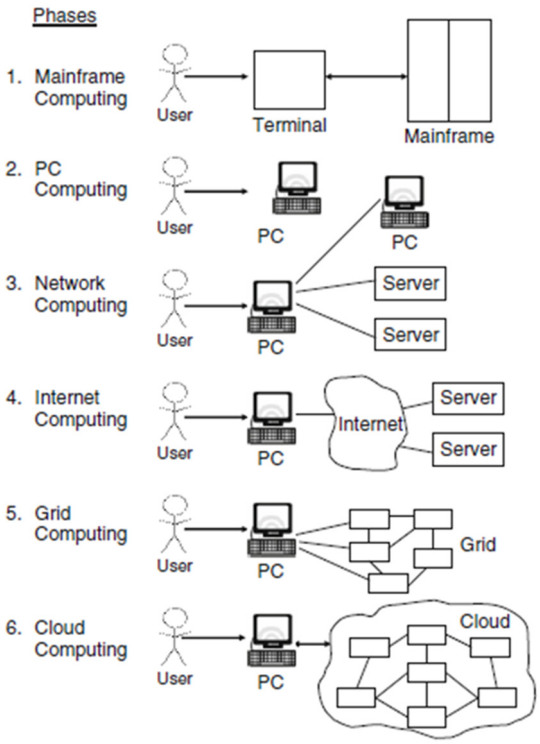
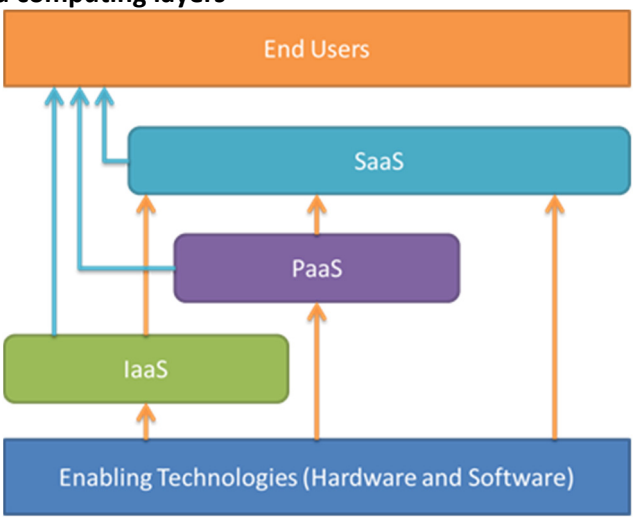
By researching concepts for managing cloud infrastructure to design model and implement solution for improving the learning process within university. *Main tasks*: Research on the concept and best practices in cloud computing; Requirements analysis of efficient environment for research and studying; Design and implementation of dynamic datacenter infrastructure; Design, implementation and evaluation of integrated systems and platforms for eLearning, collaboration and authoring

Definition of *Cloud*

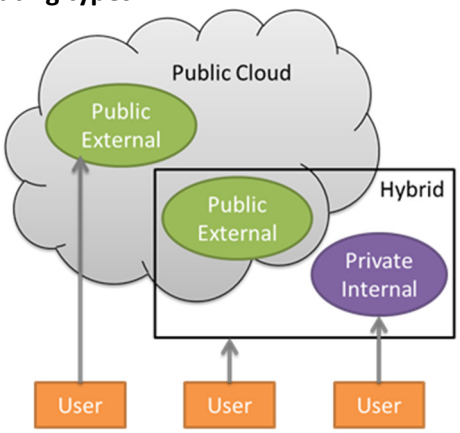
Combination of the remote access to both software and hardware of datacenter



Cloud computing layers



Cloud computing types



Features

- **Scalability and on-demand services** Cloud computing provides resources and services for users on demand. The resources are scalable over several data centers.
- **User-centric interface** Cloud interfaces are location independent and can be accesses by well established interfaces such as Web services and Internet browsers.

- **Guaranteed Quality of Service (QoS)** Cloud computed can guarantee QoS for users in terms of hardware/CPU performance, bandwidth, and memory capacity.
- **Autonomous system** The cloud computing systems are autonomous systems managed transparently to users. However, software and data inside clouds can be automatically reconfigured and consolidated to a simple platform depending on user's needs.
- **Pricing** Cloud computing does not require up-from investment. No capital expenditure is required. Users pay for services and capacity as they need them.

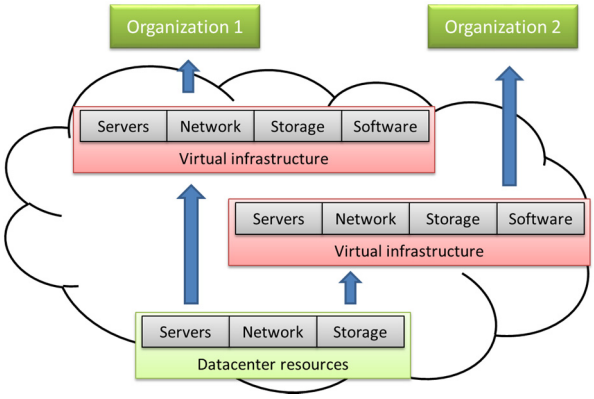
Challenges

- **Performance** The major issue in performance can be for some intensive transaction-oriented and other data-intensive applications, in which cloud computing may lack adequate performance. Also, users who are at a long distance from cloud providers may experience high latency and delays.
- **Security and Privacy** Companies are still concerned about security when using cloud computing. Customers are worried about the vulnerability to attacks, when information and critical IT resources are outside the firewall. The solution for security assumes that cloud computing providers follow standard security practices.
- **Control** Some IT departments are concerned because cloud computing providers have a full control of the platforms. Cloud computing providers typically do not design platforms for specific companies and their business practices.
- **Bandwidth Costs** With cloud computing, companies can save money on hardware and software; however they could incur higher network bandwidth charges. Bandwidth cost may be low for smaller Internet-based applications, which are not data intensive, but could significantly grow for data-intensive applications.
- **Reliability** Cloud computing still does not always offer round-the-clock reliability. There were cases where cloud computing services suffered a few-hours outages.

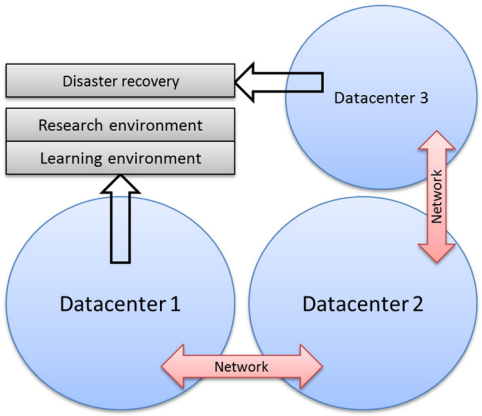
Requirements analysis

Based on the cloud computing concept, centrally managed dynamic infrastructure is required to be implemented within university for delivering end-to-end services for supporting research and learning processes

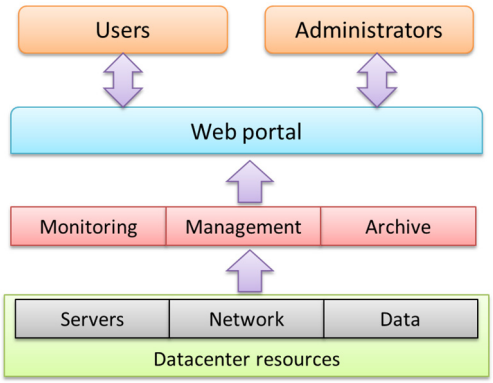
Public datacenter for IaaS



Private datacentre



SaaS platform



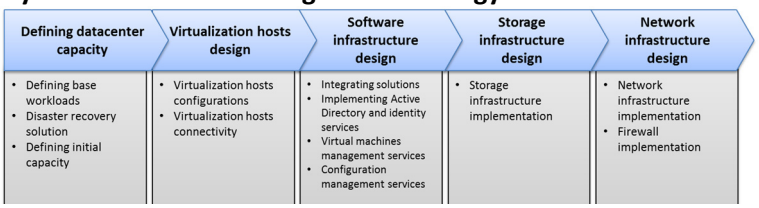
Microsoft Cloud Solutions

- **Microsoft System Center** provides management of both public and private clouds
- **System Center** tools allow monitoring of the complete infrastructure of servers and services
- **Dynamic Infrastructure Toolkit for System Center** automates creation and installation of virtual machines
- Dynamic Data Center Toolkit for Hosters simplifies the creation of datacenters

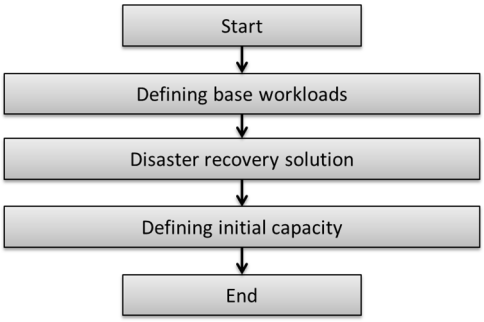
VMWare Virtualization Solutions

- **VMWare vCompute** is used for creation of virtual servers and their logical clustering
- **VMWare vStorage** is used for logical management of the storage
- **VMWare vNetwork** provides network services for the virtual machines
- **VMWare vMotion** is used for migration of the virtual machines form one datacenter to another
- **VMWare High Availability** is used for disaster recovery

Dynamic datacenter design methodology



Defining datacenter capacity

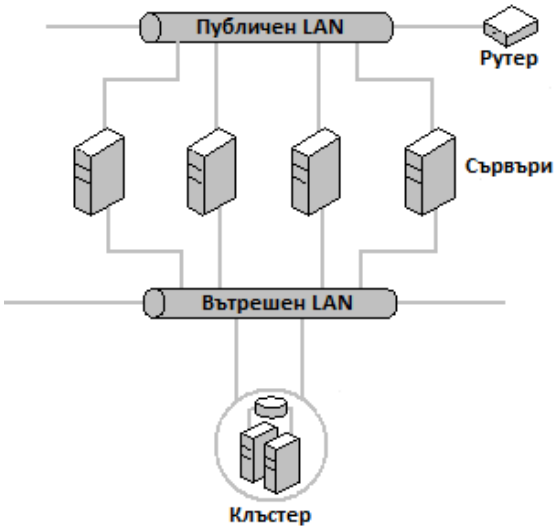


Defining base workloads

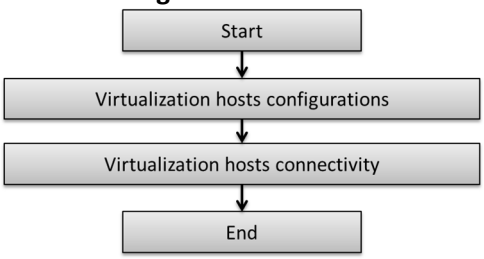
- Providing services for research and learning activities

- eLearning system with high workload
- Collaboration platform with high workload
- Authoring tool
- Digital repository

Disaster recovery solution



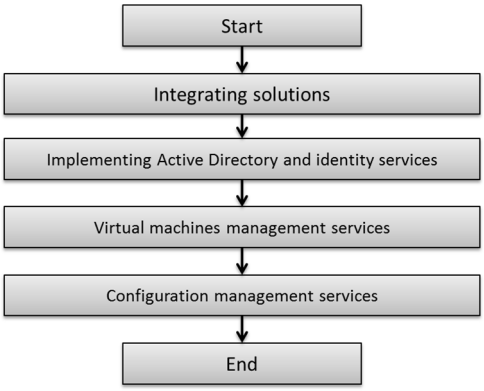
Virtualization hosts design



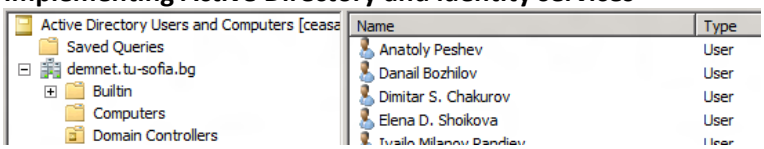
Virtualization host configuration

OS Name	Microsoft Windows Server 2008 R2 Enterprise	
Version	6.1.7601 Service Pack 1 Build 7601	
Other OS Description	Not Available	
OS Manufacturer	Microsoft Corporation	
System Name	LANCELOT	
System Manufacturer	Dell Inc.	
System Model	PowerEdge 2950	
System Type	x64-based PC	
Processor	Intel(R) Xeon(R) CPU	E5420 @ 2.50GHz, 2500 Mhz, 4 Core(s), 4 Logical...
Processor	Intel(R) Xeon(R) CPU	E5420 @ 2.50GHz, 2500 Mhz, 4 Core(s), 4 Logical...

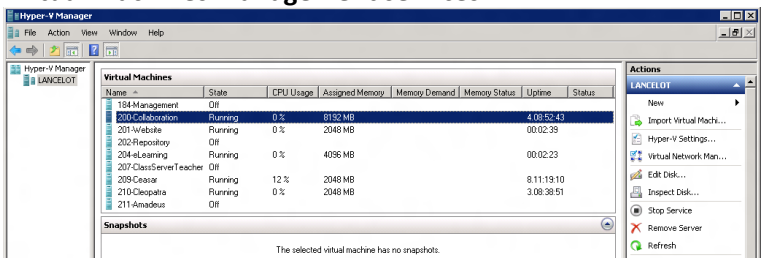
Software infrastructure design



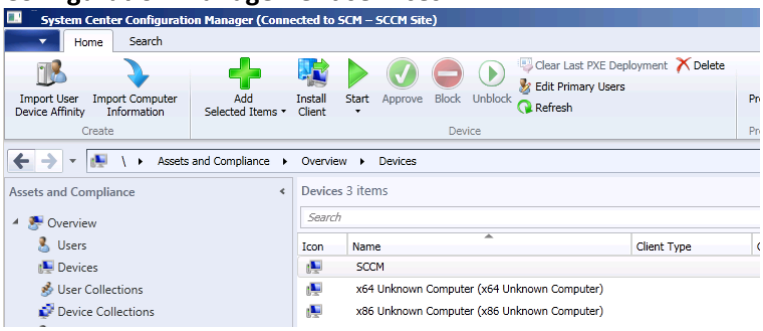
Implementing Active Directory and identity services



Virtual machines management services



Configuration management services

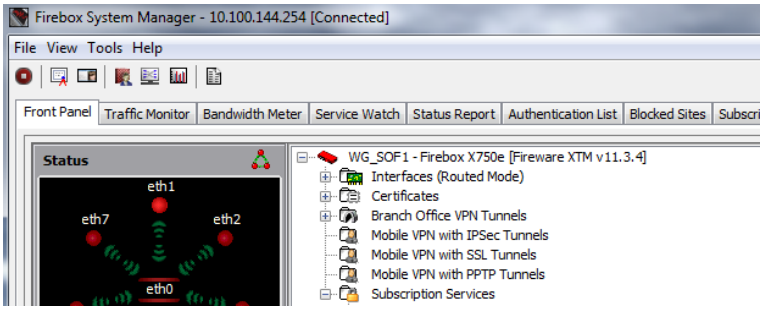


Storage infrastructure design

The following requirements for the dynamic datacenter should be meet:

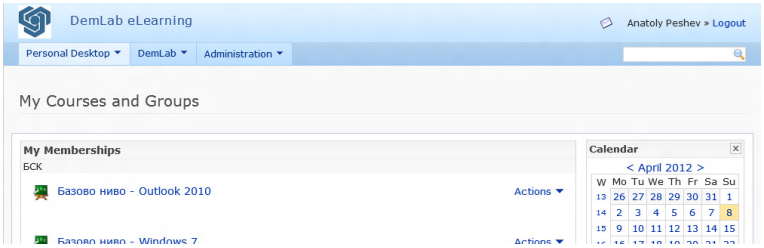
- The capacity of the stored data
- The performance of the data access
- Data loss prevention
- Control

Network infrastructure design

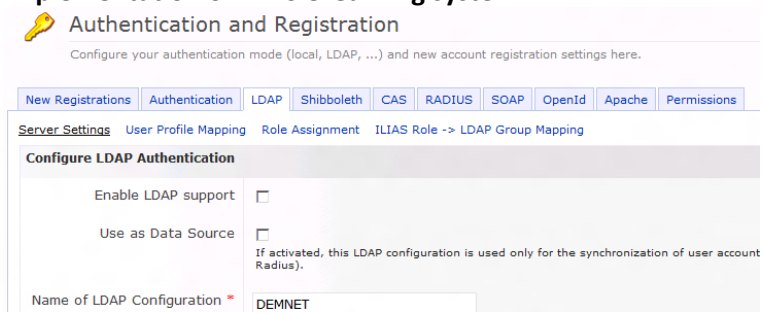


Watchguard firewall

ILIAS eLearning system

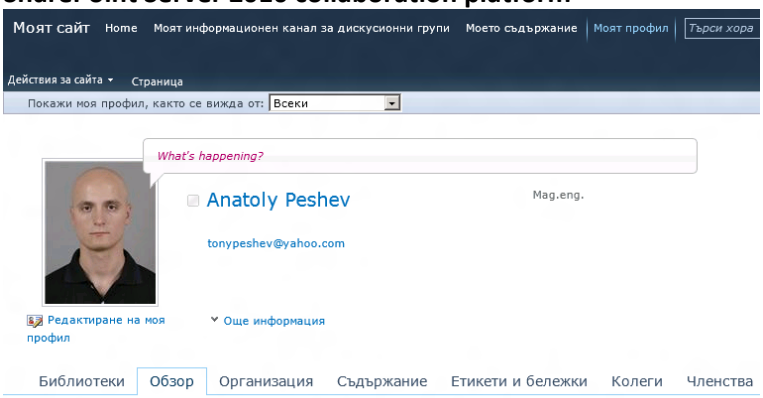


Implementation of ILIAS eLearning system



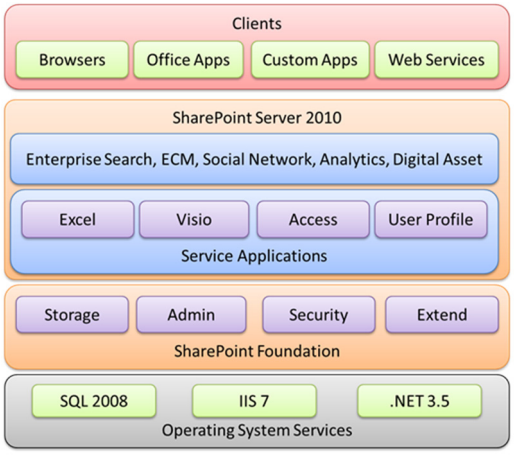
LDAP services for identity management

SharePoint Server 2010 collaboration platform



User profile in SharePoint Server 2010

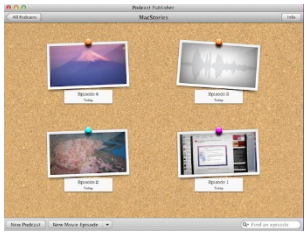
SharePoint Server 2010 architecture



SharePoint 2010 collaboration tools

- Document collaboration
- Wiki & blogs
- RSS support
- Forums
- Project management
- Contacts, calendar and tasks
- Email integration

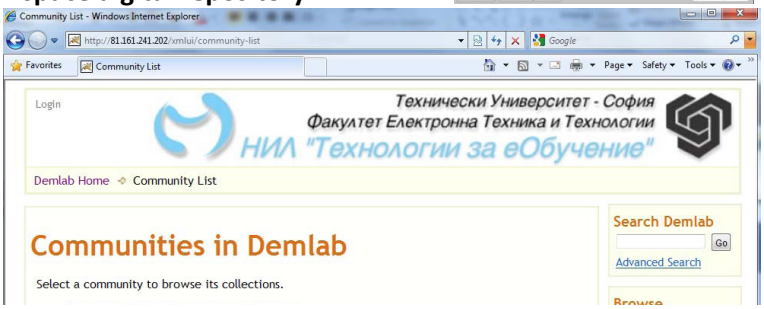
- MS Office integration
- Web 2.0 versions of the office applications



Podcast Publisher home screen

Authoring tools

Dspace digital repository



Evaluation

- The pilot experiment for ILIAS with more than 200 students from TUS and UNIBIT was conducted in 2011-2014
- The pilot experiment for SharePoint Server 2010 platform was conducted with 25 students in TUS in 2011
- The eLearning system, collaboration platform, authoring tool and digital repository are the source for successful completion of the following research projects:
  - *Автоматизирано генериране на метаданни за спецификации и стандарти на Е-документи*, Договор № Д002-308/2008, Насърчаване на научните изследвания в приоритетни области (*тематичен конкурс*) – 2008/2012, Фонд Научни изследвания, МОНМ.
  - *Повишаване квалификацията на преподавателите във висшите училища*, проект по схема BG051PO001/3.1-02; м. ноември-декември 2010, ТУ-София.
  - Научно-изследователски проект, в помощ на докторанти *Обучение и управление на знания в системата ILIAS*, финансиран от НИС при ТУ-София, Договор № 112пд039-3, 2011.

The Odrysian Kingdom - an Interactive Multimedia Application for Educational Purposes

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Abstract. The presentation of cultural heritage is difficult comprehensive and constantly updated topic. Researchers often focus more on the different techniques to digitize artifacts of cultural heritage. This work focuses on the overall shape and structure of future multimedia application whose specificity is determined by the topic - Odrysian kingdom. Below is presented a concept for structure and content-based information available for individual kings from Odryssae dynasty. Special attention is paid to the presentation of preserved artifacts associated with the reign of specific rulers. The multimedia application dedicated to the Odrysian kingdom is already in use in several teaching programs related to cultural heritage and history of antiquity in University of Library Studies and Information Technologies (Sofia, Bulgaria) and University of Montreal (Canada). The aim of designers is that it can be modified easy for use in museums also.

Keywords: multimedia content, multimedia application, interactive presentation, e-learning, cultural heritage, Thracians, Odrysae, Odrysian kingdom

1. Cultural heritage education - the role of ICT

Cultural heritage education in most European countries was based for a long time on traditional teaching methods such as face-to-face classroom lessons using mainly printed materials (texts and images), and very seldom watching videos [1]. Strangely enough, such innovativeness has not yet reflected openness to the introduction of ICT (Information and Communication Technology) in teaching and learning methods, which has, on the contrary, characterized other disciplines in the last few years [2]. As a matter of fact, no specific reference was directly made in the recommendation, as far as the use of ICT to support and enhance Cultural Heritage Education [3]. As a consequence, nowadays ICT, while being increasingly employed in the

field of Cultural Heritage [4] to produce large archives of materials [5], to support scientific research and to foster the maintenance/preservation of Cultural Heritage artifacts [6], has not yet affected the approaches to teaching and learning in Cultural Heritage Education enough.

2. Presentation of cultural heritage artifacts

The graphic information handled by people working in the cultural heritage sector usually is presented using several different approaches – bidimensional images (scanned documents or photographs), video (e.g. documentaries) and 3D virtual models. Cultural heritage sites and artifacts get a significant added value from high-resolution 3D models. These models are increasingly available due to improvements in technology and to higher integration of survey techniques such as laser scanning and photogrammetry [7]. Photogrammetry has been extensively used for obtaining

three-dimensional digital models from valuable sites from a set of photographs [8]. However, in general terms, it is worth pointing out that this technique is primarily oriented to solving well-defined shapes (such as cones, cylinders or plane polygons).

Complex shapes are preferably acquired using modern laser scanners.

3. The Odrysian kingdom - characteristics of the subject [9]

The name 'Odrisos', 'Odrysos', 'Odreios'and 'Odryios' occurred already as a topographic and ethnic designation in Linear B inscriptions from Knossos on the Island of Crete and from Thebes in mainland Greece, but its meaning has not been clarified. The kingdom of the Odrysae emerged on the political scene of ancient Europe at the end of the 6th or the beginning of the 5th century BC. From Herodotus onwards, their name was used to denote the Thracians inhabiting the territory along the Tonzos (present-day Tundzha) and Hebros (present-day Maritsa) rivers to the Aegean Sea. Athenian historian Thucydides reports that their kingdom was the biggest and the most powerful one in Europe between the Adriatic and the Black Seas.

Herodotus writes about the Thracians that they would have been unbeatable if they had been united. That observation of his was valid of the entire history of the local state organisations. According to the oral Orphic faith, their ruler was the son of the Great Mother-Goddess and of her son-Sun. Power in the dynastic families was conferred

according to the ancient rule of the best among equals reaching the top.

The legendary tradition required a value trial through which the worthiest was to prove his qualities over the rest. Royal power was not passed from father to son. Although that occurred upon ascension to the throne, replacing the practice of electing rulers. The dynastic insignia were given to the person recognised by the others as being the worthiest to wear them. During the age of written history, primacy was often usurped by plotting with allies and aliens, by banishing the incumbent ruler and even by murdering him.

The hierarchy in the political and administrative system of the Odrysian state was not complicated: the king was at the head, followed by his council, which initially consisted of the members of the dynasty. The paradynasts – parallel dynasts, corulers

– appeared already in the 5th – 4th century BC. They, too, usually came from his family, ruling over vast territories on behalf of the dynast and not infrequently trying to become independent or to usurp the throne. In later times, representatives of other aristocratic families or of the administrative elite responsible for the labour and military conscription also became paradynasts, albeit not so frequently. As Alexander Fol wrote 35 years ago, it is necessary to bear in mind always that the 'terms used reflect the Greek views on the situation to the north of them during the different historical periods. And the titles used by the Greeks for the rulers in the Balkans were extremely confused and inconsistent.'

The state of the Odrysae was first described by Greek authors on account of the actions of Teres I (± 540 – 448 BC). He was not the first dynast, but he was the most powerful and he succeeded in building a large kingdom over most of the lands to the south of the Istros (present-day Danube) River. Teres I had sons, two of whom ruled after him: Sparadokos and Sitalkes. There is indirect evidence that Sparadokos reigned after the death of Teres I and before Sitalkes. The silver coins of that ruler that have survived to this day also support the hypothesis that he was at the head of the state organisation (Fig. 1).

Fig. 1. *Coin of Sparadokos. On the obverse: a horse depicted in slow motion to the right, with right foreleg raised high and inscription SPA/RA/DOKO. On the reverse: an eagle with spread wings and holding a snake in its beak in a rectangular frame. Photo: Nikolai Genov*

After about 60 years, and a change of a few rulers Kotys I (383–359 BC) came to the throne at a time when the Greek world was torn by controversies and wars. Kotys I ruled for 24 years. He entered history as a friend of the Athenians, later turning into their most dangerous enemy. By killing Kotys I, the Athenians unwittingly opened even wider the door to Philip II, and he benefited fully. Odrysian Thrace was divided into three parts between Kersebleptes (359-341 BC) – reliably attested as son of Kotys I, Berisades and Amadokos. Kersebleptes sought alliance with and help from the Triballoi, which is evidenced by a gift with his inscription found in the Rogozen silver treasure (Fig. 2).

Berisades (359-356 BC) reigned to the west of Maroneia. He died in 356 BC and he was succeeded by his son Ketriporis (356–352/351). Amadokos II (359–? BC) established his kingdom in the lands between the lower courses of the Nestos (present-day Mesta) with the Bistonian Lake and the Hebros (present-day Maritsa). After 351 BC, Teres II (second half of the 4th century BC) appeared in the place of Amadokos II, being probably his son. Seuthes III (± 330–302/301 or 297 BC) emerged on the political scene. Seuthes III felt sufficiently secure and enjoying military and political autonomy and he built his capital Seuthopolis in the present-day Kazanlak Plain, at the meander of the Tonzos River (nowadays submerged under the waters of the Koprinka Dam). The region was recently given the name Valley of Thracian Kings on account of the numerous sacral constructions: subtumular tombs, herons and halls for mysterial initiation.

Fig. 2. *Part of the Rogozen silver treasure that belonged to the dynastic clan of the Triballoi. There are vessels bearing inscriptions in the treasure: to Kotys I, Kersebleptes and Satokos. Photo: Nikolai Genov*

4. Structure of the multimedia application

We chose the following structure of the multimedia application "The Odrysian kingdom" – main menu is a detailed list of all known kings of Odryssae dynasty. Each name is a link leading to an internal page dedicated to the respective king (fig. 3).

There is detailed information for the specific ruler - text, combined with the available visual material associated with him and the period of his reign, for example preserved coins, treasures, armor etc.

Multimedia application was created using Action Script and Lua programming languages and produced and disseminated as single executable file (at the moment application is only available for PC users).

Fig. 3. *The main menu of presented application*

5. Conclusions

The work describes the concept and content of the multimedia application dedicated to the Odrysian kingdom in which are presented all known rulers of the dynasty Odryssae with brief information about each of them and corresponding visual materials. The study of historical facts is the result of many years of work of a number of authors and their works.

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Challenges to Future Training with Interactive Intelligent Avatars

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Abstract.
Today, the new digital world is opening a number of possibilities for training, providing at the same time both – effectiveness and flexibility. An innovative accent to note in this context is the implementation of avatars in the process of human – machine training interaction. This new approach could significantly increase the trainees' feelings of comfort and positive predisposition, providing good perspectives for achieving better learning results. The paper is describing an experimental prototype of an Intelligent Teaching Avatar (ITA) system. ITA is a voice controlled, animated female virtual agent, encompassing multimedia knowledge response to discrete collection of questions. Aspects, concerning system decision logic engineering, multimedia resources usage and avatar appearance live development are studied and discussed in the paper.

Keywords:
interactive training, avatar design, human-machine interface, voice control, decision logic engineering, multimedia knowledge representation

1 Introduction

Modern digital world is constantly progressing with a number of different technological solutions and services, related to education and training [1]. A key challenge in this process is the achievement of a more successful and well prepared new generation of people in the new digital era.

Training models, like *active learning*, have significantly proved their effectiveness in comparison to the passive ones and are progressively implemented in todays' education process [2].

What however is important to note are the trainees' necessity of: personalization, knowledge specifics, real involvement in the process and cost effectiveness.

Today and in the near future, the way of everyday living is implementing network technologies as the backbone of modern digital environment, encompassing social networks, smart devices, homes and even cities [3].

These open a number of human-machine interaction modalities: vocal, visual, tactile, odour, etc. An important role in the context is given to *avatars* that in practice present an embodiment of an intelligent software agent [4].

Initially this idea became popular from the movie industry and entertainment (to mention James Cameron's science fiction *Avata*, Andrew Niccol's *S1m0ne* and Linden Lab's on-line virtual world *Second Life*) but today there are also solutions, concerning teaching (e.g. Voki multiplatform avatars, Virtual Eve, developed in Massey University, New Zealand or the new military training environment VBS3).

Further on, an experimental approach for Intelligent Teaching Avatar – ITA system prototype design with users' appearance specifics assessment will be given.

2. Intelligent Teaching Avatar System Design

The concept for Intelligent Teaching Avatar - ITA system design is based on the implementation of a decision support system concept [4], advanced with: human avatar multiplatform interface for the users, multimedia web data and problem oriented knowledge models.

ITA system, presented on Fig. 1, is using the ideas from ALEX [5], encompassing six basic modules: (i) Interactive Avatar-based Interface (a synthetic combination of voice, portrait and character collections), (ii) Middleware (interaction with Knowledge & Data Management Systems – KBMS, DBMS); (iii) Multimedia Data Base (image, sounds and video collections from WWW), connected with (iv) Knowledge Base (KB) Models used for interpreting system decision logic – AI; (v) input-output Trainees' connectivity interface channels (input: voice, gestures, face emotions or even biometric body signals [6]; output: Wi-Di, Wi-Fi, Bluetooth, IR, etc., for connecting with different multimedia platforms, like: smart screens, projectors, tablets, smartphones, multimedia googles). Additional content control is also organized with (vi) human-in-the-loop Knowledge & Data Supervisor.

3 Experimental Prototyping

The real prototyping of ITA concept from Fig. 1 was experimentally implemented by using a combination of commercial-off-the-shelf

solutions, together with own created software developments. The working environment was MS Visual Studio 2010 Express©. As input modalities we have used voice control, provided from a Plantronix© ML18 handsfree system and Bluetooth communication. The avatars interface was produced by combining four DAZ Studio© models (blond, red, brown and black) with four IVONA© artificial voices (Salli, Emma, Amy, Kimberly). The working environment for avatars experimental prototyping was CrazyTalk© Pro v 7.11 and two of the standard build-it characters.

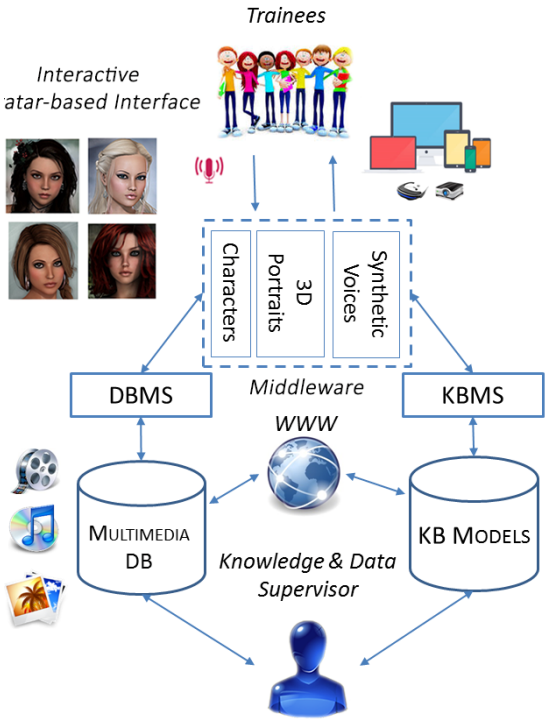

Fig. 4. *Intelligent Teaching Avatar – ITA system design concept.*

As output multimedia devices were tested: SONY© Vaio Pro 13 ultrabook, SONY© Xperia Z SGPT15 tablet, Samsung Galaxy S4 smartphone and IVS 72" multimedia googles with AV input and AV Wireless Transmitter/Receiver PAT-630. The working environment was MS Windows© 7. As voice recognition and synthesizer of user

input commands and avatars' speech was used MS SAPI 5.3, defining own grammar rules set. The decision logic implements own KB rule-based system with fuzzy sets implementation [7]. Multimedia data were gathered from WWW – YouTube website, encompassing videos about space. The connectivity amongst KB and DB were organized via data tagging and twenty models key words, implemented in the models and ITA grammar commands. Other similar solutions for multimedia data management could also be used [8], depending on the size.

A key problem in creating ITA system was related to Interactive Avatar-based Interface.

Generally, creating of realistic artificial interface avatars is quite a comprehensive programming and design task. So, for the present system, a user based appearance evaluation was accomplished, following [5], but with two different 3D models.

The process organization covered two basic stages: (i) initial participants' emotional state evaluation, (ii) rating via questionnaires selected input 3D models, synthetic voices collections and character.

A focus group of 35 people (17 male, 18 female; average. age = 21.6 years, VAR = 0.45) were studied via questionnaire method.

The initial emotional state was evaluated, using the methodology from [] and IAPS/IADS databases [9].

Fig. 5. *Implemented avatars DAZ Studio© 3D face models.*

The studied subjects produce the overall positive emotional state to both image and sounds stimuli, (≈ 97 %, VAR = 0,33).

The second task of the group was to put together four DAZ Studio© models' faces (Object1, Object 2, Object 3 and Object 4, see Fig. 3) and IVONA© voices (Voice 1 – Amy, Voice 2 – Emma, Voice 3 – Kimberly, Voice 4 – Salli), pronouncing one and the same words sequence with normal speech speed, volume level and two different CrazyTalk© Pro v 7.11 characters: Character 1 – *flirting* and Character 2 – *telling a secret* [10].

Similar studies of the problem, referring users' predisposition towards: trustworthiness, competence, dominance, extroversion, regarding human face and voting [11], are also addressing the avatar design problem, but do not consider dynamically the character.

The evaluation results for the four 3D faces models/voices and both characters are generalized on Fig. 3.

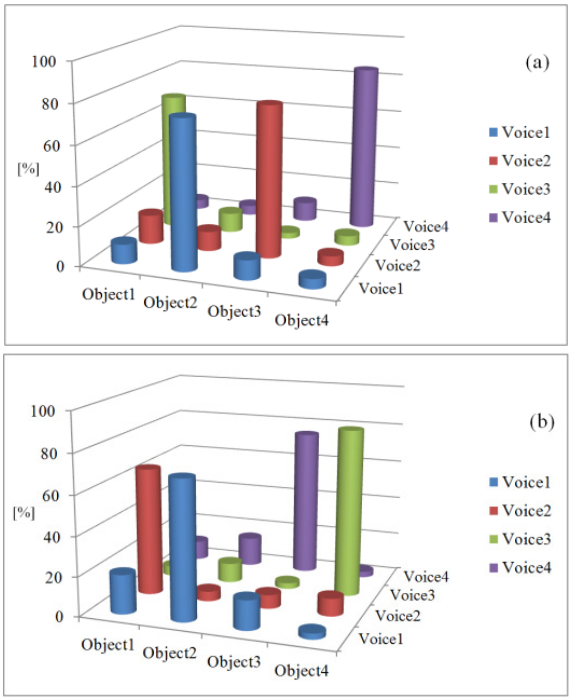

Fig. 6. *Averaged results differences from 35 people (VAR = 0.45) for avatars: face, voice and characters combinations (Character 1 (a) and Character 2 (b).*

Two most common avatar combinations selection from this survey were produced for Object 4. The combination including, Voice 4 and Character 1 was named – Intelligent Teaching Avatar. A live video demo of ITA virtual teaching avatar is available on-line from [12].

4 Discussion

Today the technologies are advancing and enriching the training process. At the same time, the big unknown is the educational success assessment. As a qualitative variable, success is difficult to be measured at all, requiring context specific and a long period of time observation.

The main idea of the presented Intelligent Teaching Avatar system is to outline the problems, related to design, prototyping and decision logic engineering in the context of future education development challenges.

The improved human-machine interface, machine replicating in avatars of behaviour and emotions character features are some of the key points, supporting a better realism in communication and trust, regarding this context.

What however stays to be explored for the future is the application effectiveness of such training system that requires both platform and user's multicriteria evaluation, concerning the training process.

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PRESENTATIONS & PAPERS
(in Bulgarian Language)

Обучение, базирано на компетенции

Милена Крумова & Елена Шойкова

Цел на доклада е да представи актуалността на Обучението, Базирано на Компетенции подкрепено от синергията между технологичните образователни иновации в процеса на създаване и споделяне на знание в учебния процес в контекст на стратегията на Европа 2020

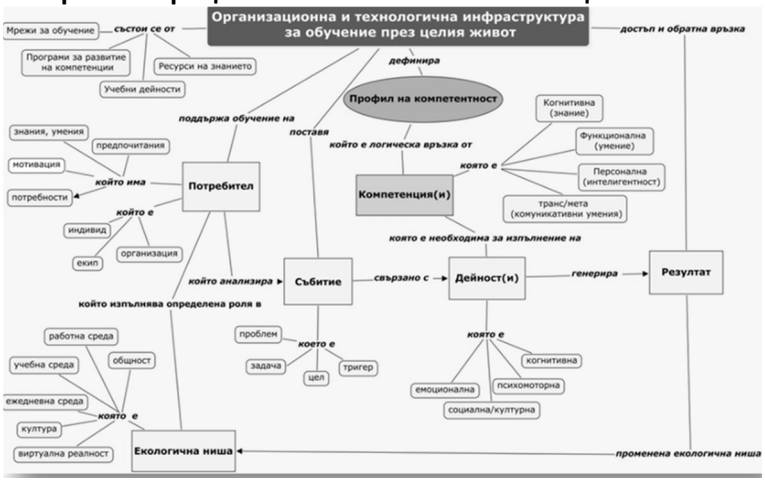
- Компетенция и добри практики за ОБК
- Концептуални модели за ОБК
- Иновативен сценарии 2.0 за ОБК
- ОБК и сценарии 2.0 в реална учебна среда
- Feedback анализ
- Изследователски резултати

Дефиниция: Компетенция

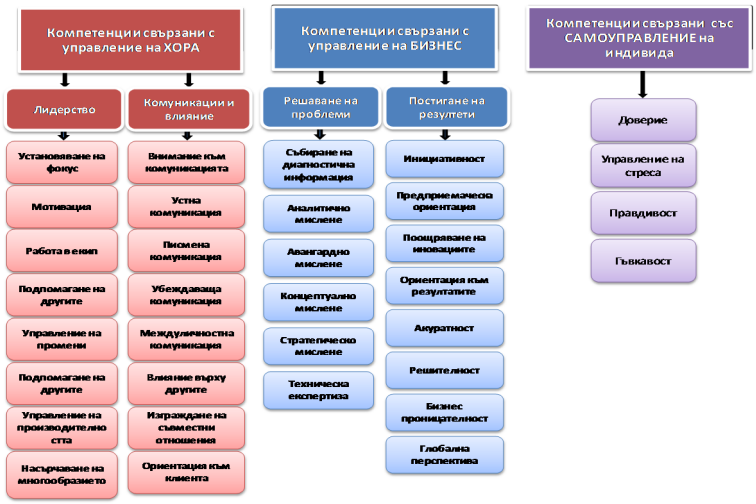
Компетенцията се разглежда като измерима способност на даден човек да действа качествено и резултатно за справяне с конкретни проблеми, събития или задачи, които възникват в конкретна ситуация и екологична ниша (учене, работа, спорт и т.н.)[1].

1. Европейската квалификационна рамка за учене през целия живот (ЕКР)

Абстрактен процес за описване на компетенции



Речник от компетенции WORKITECT



Компетенция - Концептуално мислене

Дефиниция на компетенция **Концептуално мислене**: *Намиране на **ефективни решения**, чрез използване на холистична, абстрактна или теоретична перспектива*

- Забелязва сходствата между различни и привидно несвързани ситуации
- Бързо установява централните или основните въпроси в една комплексна ситуация
- Изработва графична диаграма, показваща системния поглед върху ситуацията
- Прави аналогии или метафори за обясняване на ситуацията
- Поставя теоретична рамка за изясняване на ситуацията

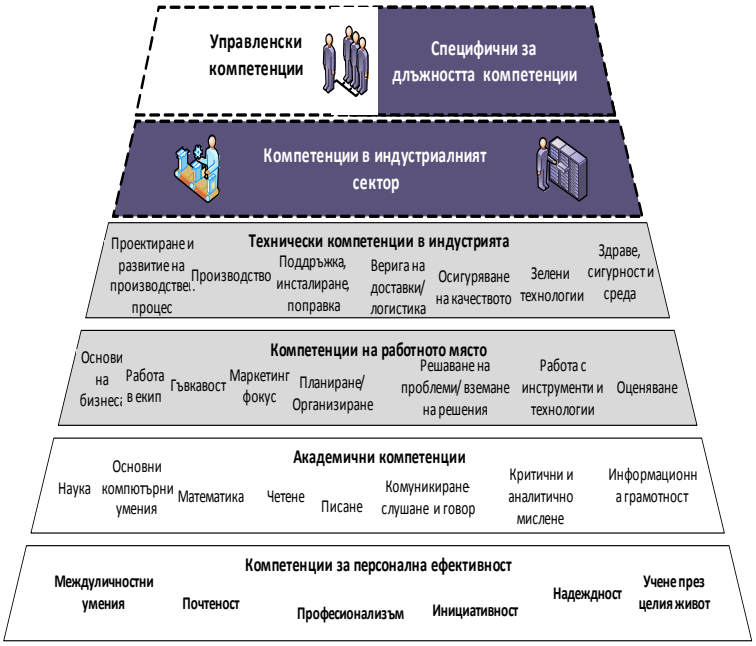
Компетенция и учебен сценарии

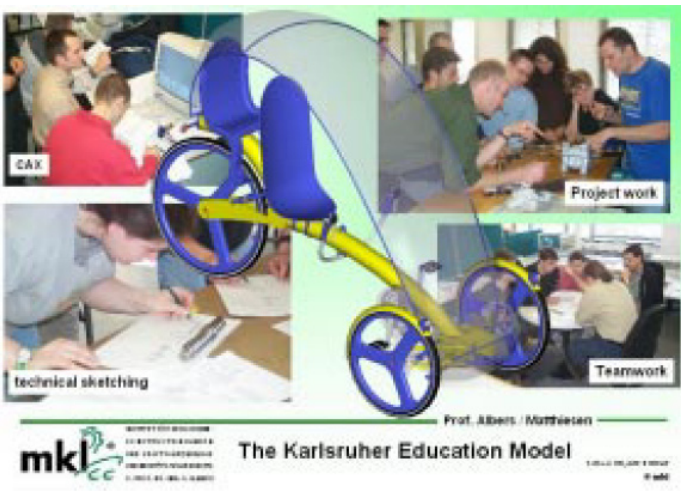
Компетенции Courses/Subjects	Компетенция 1	Компетенция 2	Компетенция 3	...	Компетенция n
Курс на обучение/ **Предмет 1**					

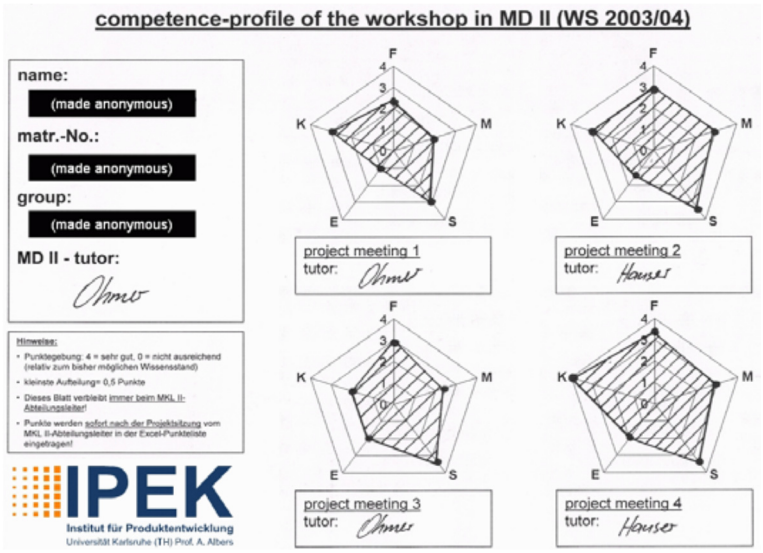
Курс на обучение/ **Предмет 2**					
Курс на обучение/ Предмет m					
Компетенции отнасящи се до учебната програма Курс /Предмет	Компетенция 1	Компетенция 2	Компетенция 3	… ….	Компетенция n
Курс 1	x		x		X
Курс 2		x	x		
….					
Курс m	x	x			x

Компетентностни модели

- Karlsruhe компетентностен модел
- Индустриален компетентностен модел
- Компетентностен модел в сектора телекомуникациите – *модел на дървото*
- Компетентностен Т-Модел на изследователи
- Компететностен модел на Western Governors University




CAX
Project work
technical sketching
Teamwork
Prof. Albers / Matthiesen
mkl
The Karlsruher Education Model


competence-profile of the workshop in MD II (WS 2003/04)
name:
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group:
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MD II - tutor:
Hinweise:
• Punktegebung: 4 = sehr gut, 0 = nicht ausreichend (relativ zum bisher möglichen Wissensstand)
• kleinste Aufteilung= 0,5 Punkte
• Dieses Blatt verbleibt immer beim MKL II-Abteilungsleiter!
• Punkte werden sofort nach der Projektsitzung vom MKL II-Abteilungsleiter in der Excel-Punkteliste eingetragen!
IPEK
Institut für Produktentwicklung
Universität Karlsruhe (TH) Prof. A. Albers
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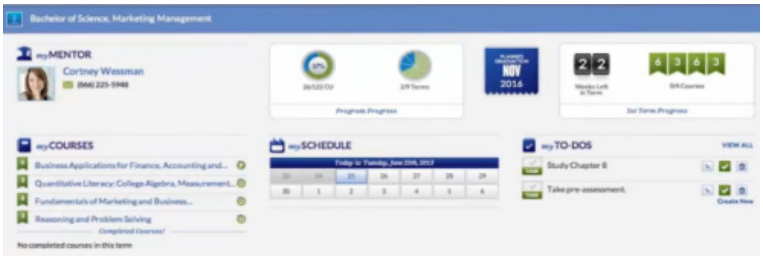
tutor: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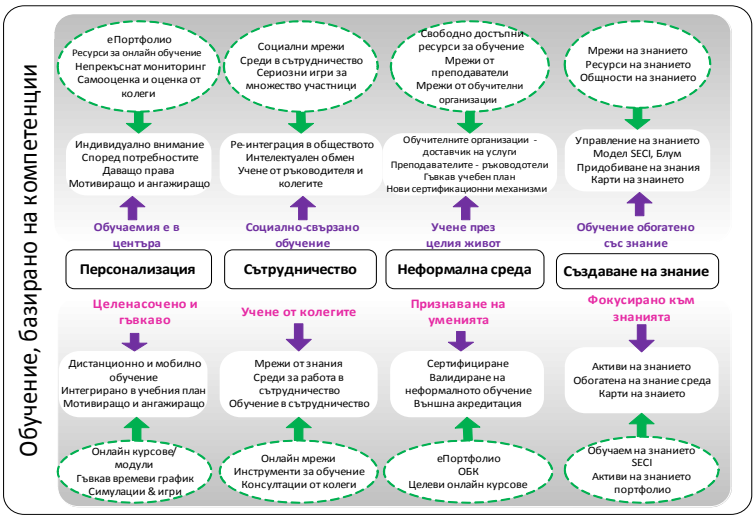
Тенденции при ОБК



Обучение 3.0

	Обучение 1.0	Обучение 2.0	Обучение 3.0
Означава ...	диктуване	социален конструктивизъм	социален конструктивизъм и контекстуално преоткриване
Технологията ...	се конфискува на входа на класната стая (digital refugees)	се използва внимателно (digital imigrants)	е навсякъде (Ambient digital universe)
Преподаването е	преподавател към студент	преподавател към студент, студент към студент	преподавател към студент, студент към студент, студент към преподавател, хора-технологии-хора (co-constructivism)
Образователните организации са локализирани	в сграда	в сграда и онлайн (brick and click)	навсякъде (изцяло интегрирани в обществото; кафенета; боулинг;

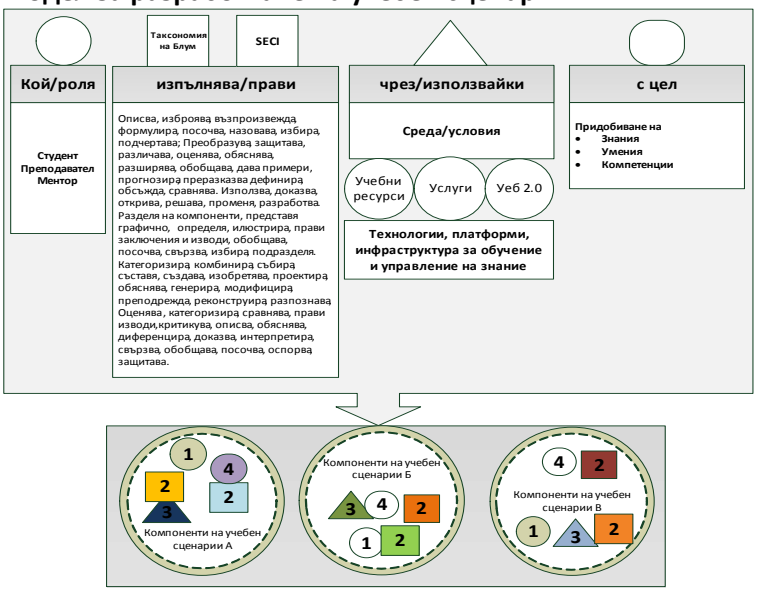
			работни пространства; др.)
Родителите виждат училищата като	ежедневна грижа	ежедневна грижа	място, където те също могат да се учат
Хардуер и софтуер в образователната организация	се закупуват на висока цена	са свободно достъпни, и на ниска цена	са достъпни на ниска цена и са използвани с цел
Индустрията приема завършващите обучението като	група линейни работници/служители	не добре подготвени работници/служители в икономика на знанието	колеги и сътрудници или предприемачи

Уеб 2.0 приложения

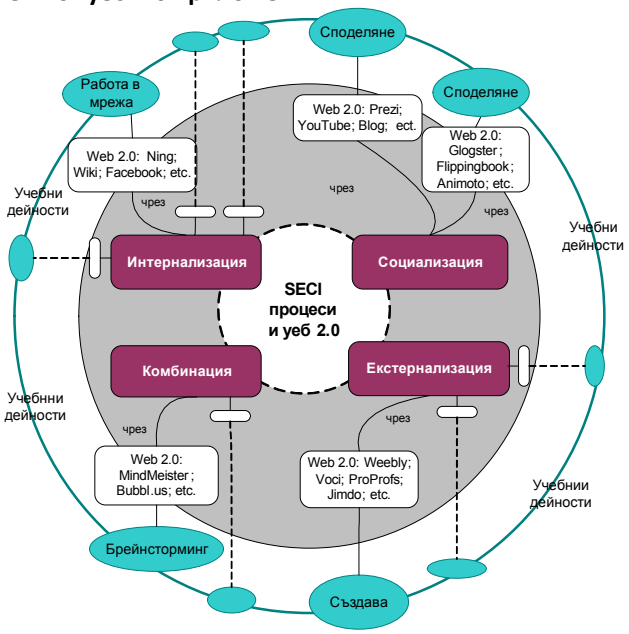
Тип	**Функция**	**Инструмент**	**Уеб приложение**
Комуникация	Споделяне на идеи, информация и творения	Social networking, Blogs, Audio blogs, Video blogs, IM tools, Podcasts and Web-conferencing	Facebook, Blogger, YouTube, MySpace, Twitter, BumpIn, Vidipedia etc.
Публикуване в сътрудничество	Работа в сътрудничество с конкретна цел и споделено пространство	Authoring, Editing tools, Virtual communities of practice (VCOPs), Wikis	Wikipedia, Vidipedia, Netcipia, Wordpress
Документиране (управление на съдържанието)	За събиране/или представяне на доказателства за опит, др.	Blogs, Videoblogs, E-portfolios, Open Journalism	SeeNReport, Calameo, Drupal, Joomla
Създаване	Създаване на нещо ново, което може да се споделя и достъпва свободно	Mashups, VCOPs, Virtual Learning Worlds (VLWs)	Amazon (customer comments), Second Life, Flickr, YouTube

Интерактивност	За обмен на информация, идеи, ресурси, материали	Social bookmarking, RSS, VCOPs, VLWs	StumbleUpon, Delicious, Facebook, MySpace

Модел за разработване на учебен сценарии

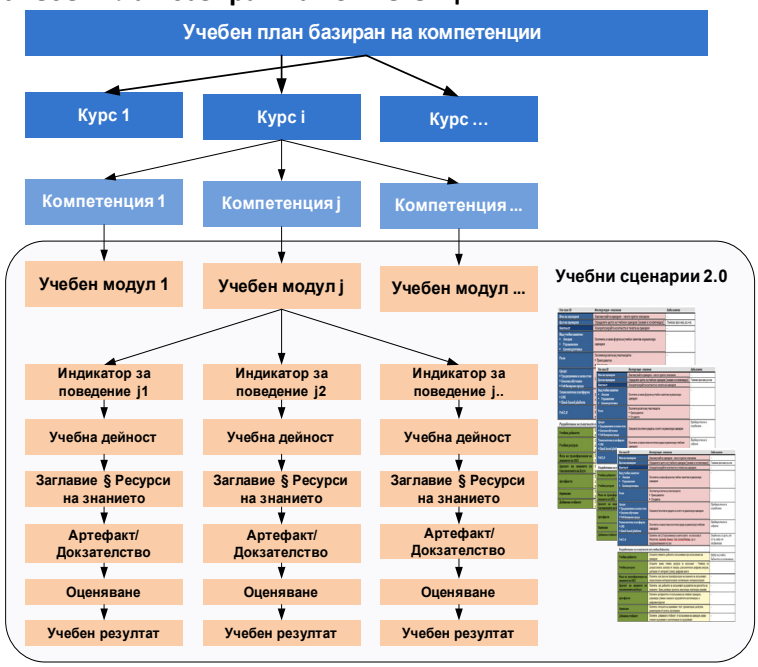


Модел за динамични итерации между явни и скрити знания обогатени от уеб 2.0 приложения



Системна методология за проектиране на учебен план базиран на компетенции

Учебен план базиран на компетенции



Иновативен модел за учебен сценарии с интегриране на уеб 2.0

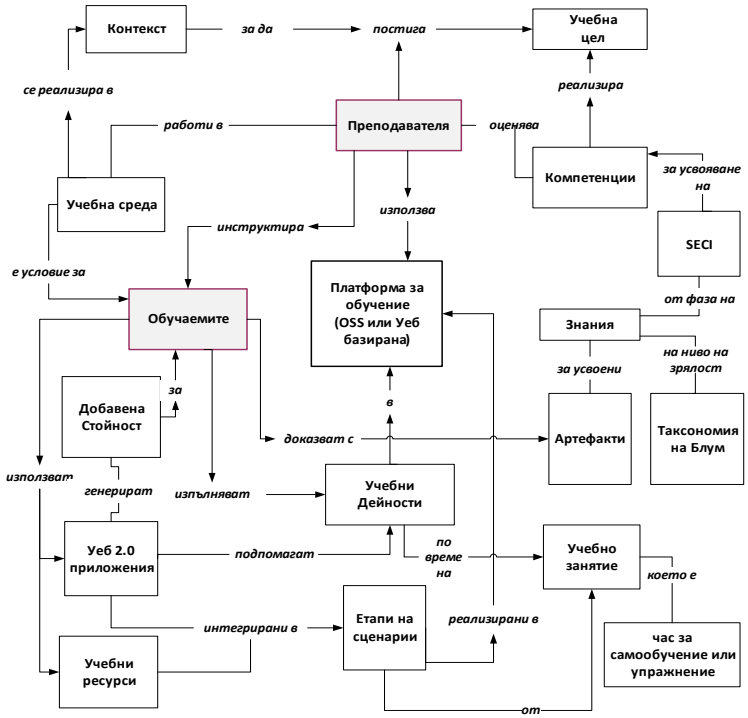
Use case ID	*Инструкция - описание*	*Забележка*
Име на сценария	Наименувайте сценария – много кратко описание	-
Цел на сценария	Определете целта на учебния сценарии (знания и компетенции)	*Гъвкава времева рамка*
Контекст	Конкретизирайте контекста и темата на сценария	-
Вид учебно занятие: • **Лекция** • **Упражнение** • **Самоподготовка**	Посочете, в каква форма на учебно занятие се реализира сценария	-
Роли	Посочете ролите на участниците: • Преподавател • Студенти	-
Среда: • **Традиционна класна стая** • **Смесено обучение** • **Уеб базирана среда**	Опишете/посочете средата, в която се реализира сценария	*Предварително е определена*
Технологична платформа • **LMS** • **Cloud-based platform**	Посочете, в каква технологична среда се реализира учебния сценарии	*Предварително е избрана*
Уеб 2.0	Посочете уеб 2.0 приложение/я, което/които се използва/т. Например: Animoto; Screenr; Voci; SurveyMonkey; др. и предназначението му/им	*Определени са групи уеб 2.0 за избор от студентите*
Разработване на съвкупност от учебни дейности		
Учебни дейности	Опишете учебните дейности изпълнявани при изпълнение на сценария	*Набор на учебни дейности за изпълнение*
Учебни ресурси	Опишете какви учебни ресурси се използват - Учебник по дисциплината; записки от лекции; допълнителни цифрови ресурси, достъпни от интернет (линк); цифрови книги	
Фаза на трансформация на знанието по SECI	Посочете, кои фази на трансформация на знанието се изпълняват: социализация; екстернализация; комбинация; интернализация.	-
Зрялост на знанието по таксономията на Блум	Посочете, кои дейности се изпълняват за развитие на зрялостта на знанието - Знае; разбира; прилага; анализира; синтезира; оценява	-
Артефакти	Посочете артефактите от изпълнение на учебния сценарии, доказващи усвоени знания и придобитите компетенции, и цифровия формат	-
Оценяване	Посочете методите за оценяване: тест; презентация; дискусия; рецензиране от колеги, самооценка	-
Добавена стойност	Посочете добавената стойност от изпълнение на сценария, какви умения се развиват и компетенции се придобиват	-

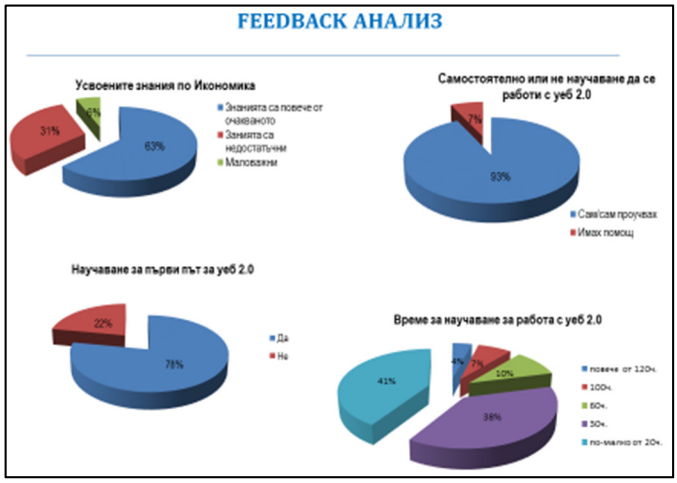
Уеб базирани приложения, подпомагащи обучение базирано на компетенции

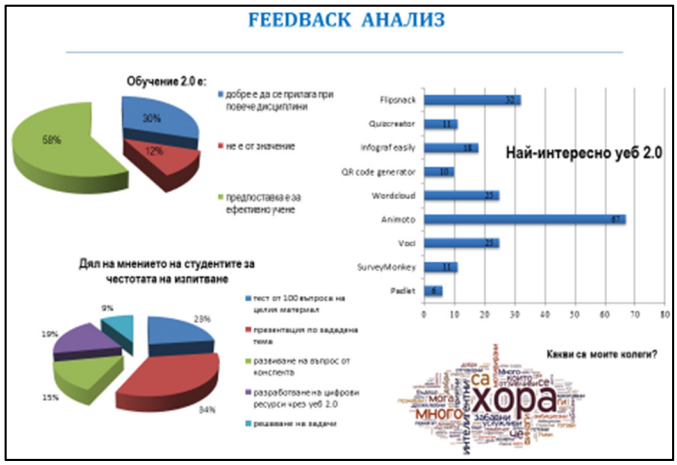
- Animoto
- Quiz-Creator
- Screenr
- Prezi
- SurveyMonkey
- MindMeister
- Voci
- ProProfs
- Flipsnack
- Bitrix24

- Vuvox, Tiki-Toki, MapBox, SurveyPlanet, WordCloud, Infogr.am, Padlet, Hackpad, Qualtrics, Tumblr, SkillPages, Easily.ly

Семантичен концептуален модел на сценарии 2.0







Резултати

- Часовете за самоподготовка имат голям принос за знанията на студентите. Те са среда, както за формално, но много повече за неформално обучение, която студентите могат да обсъждат, размишляват и дискутират поставените учебни задачи, интересът към ученето е много по-висок, когато се прилагат иновативни методи на преподаване, когато подходът на преподаване е наситен с примери от практиката и студента има право и алтернативи за избор.
- Днешните студенти имат много добри способности за работа с технологии и с минимални усилия в подходяща

технологична среда, могат да придобиват и да създават нови знания ефективно и с висока степен на удовлетвореност.

- Двигател в обучението на студентите е личната им мотивация, която може да бъде стимулирана с индивидуален подход и обогатена с многообразие от уеб 2.0 приложения.
- Иновативните сценарии за обучение с интегриране на уеб 2.0 имат синергичен ефект, както за процеса на обучение, но най-вече за резултатите от обучението.

Методи и технологии за извличане на семантична информация в системи за управление на съдържание

Диман Карагьозов

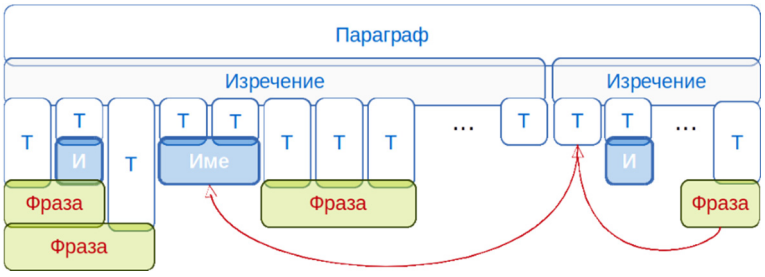
1. Актуалност на темата

- Информацията днес
  - Обем
  - Многоезичност
- Семантична информация
- Системи за Управление на Съдържание (СУМ)

2. Аналитичен обзор

- Системи за управление на съдържание
  - Жизнен цикъл на съдържанието
  - Процеси
- Пред-семантични методи за работа с цифрово съдържание
- Методи за извличане на семантична информация от текст
- Автоматично категоризиране на текст
- Клъстериране (групиране) на документи
- Резюмиране на текст
- Машинен превод
- Заключение
  - ЕТ на английски език са много по-добре развити от тези, работещи на други езици
  - Сред достъпните ЕТ преобладават моно-езичните, т.е. реализиращи функционалности за семантичен анализ на един език
  - ЕТ са слабо интегрирани в системите за управление на съдържание

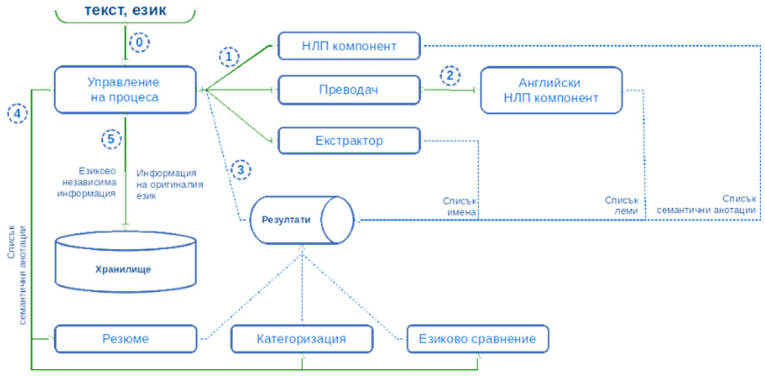
3. Концептуален модел



- Предвидено използване (use cases)
- Критерии за успешност
- Модел на данните
- Компонентна архитектура

4. Концептуален модел

Процес на обработка на текст



Предизвикателства и ограничения

- Хетерогенни NLP технологии
- Хетерогенни входно/изходни данни
- Хомогенизиране на качеството за обработваните езици
- Механизъм за откриване на идентични (многоезични) семантични елементи
- BigData съвместимост
- Добавяне на нов езиков пакет

5. Проектиране, реализация и апробация

Проектиране на прототип – функционалности

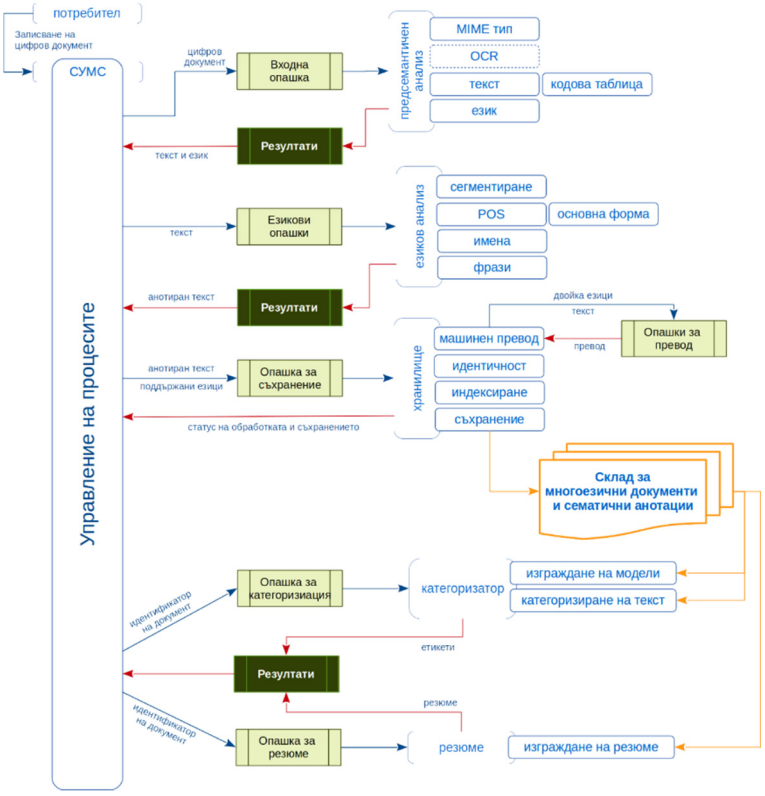
- Възможност за обработка на един или няколко документа
- Определяне на типа на един документ
- Извличане на текстовото съдържание от един документ
- Разпознаване на кодовата таблица на документа
- Преобразуване на текстовото съдържание на документа към UTF-8 кодова таблица
- Разпознаване на езика на текста на документа
- Сегментиране на текста на документа на параграфи
- Сегментиране на текста на документа на изречения
- Сегментиране на текста на документа на токени
- Определяне на частта от речта, с която дадена *дума* участва в изречение
- Определяна на основната форма на думите в едно изречение
- Определяне на именните същности в едно изречение
- Многоезиково търсене
- Определяне на фразите не съществителното в едно изречение
- Определяне на идентичност между две именни същности
- Определяне на идентичност между две фрази на съществително
- Изграждане на резюме на текста на документ
- Превод на текста на документа и неговите лингвистични анотации
- Записване на документа и неговите анотации в хранилището за документи
- Категоризиране на един или няколко документа към предварително изграден категоризационен модел.
- Клъстериране на колекция от документи
- Намиране на подобно съдържание на един документ
- Намиране на подобно съдържание на колекция от документи
- Извличане на *важни* фрази и имена от текст

Проектиране на прототип – не-функционални изисквания

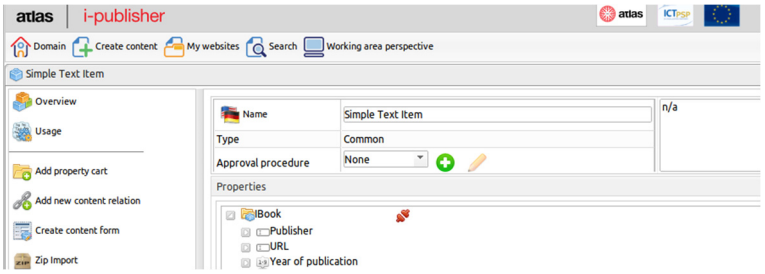
- Привеждане на хетерогенни езикови средства към една технология
- Скорост на работа
- Хоризонтално скалиране
- Взаимнозаменяеми езикови технологии

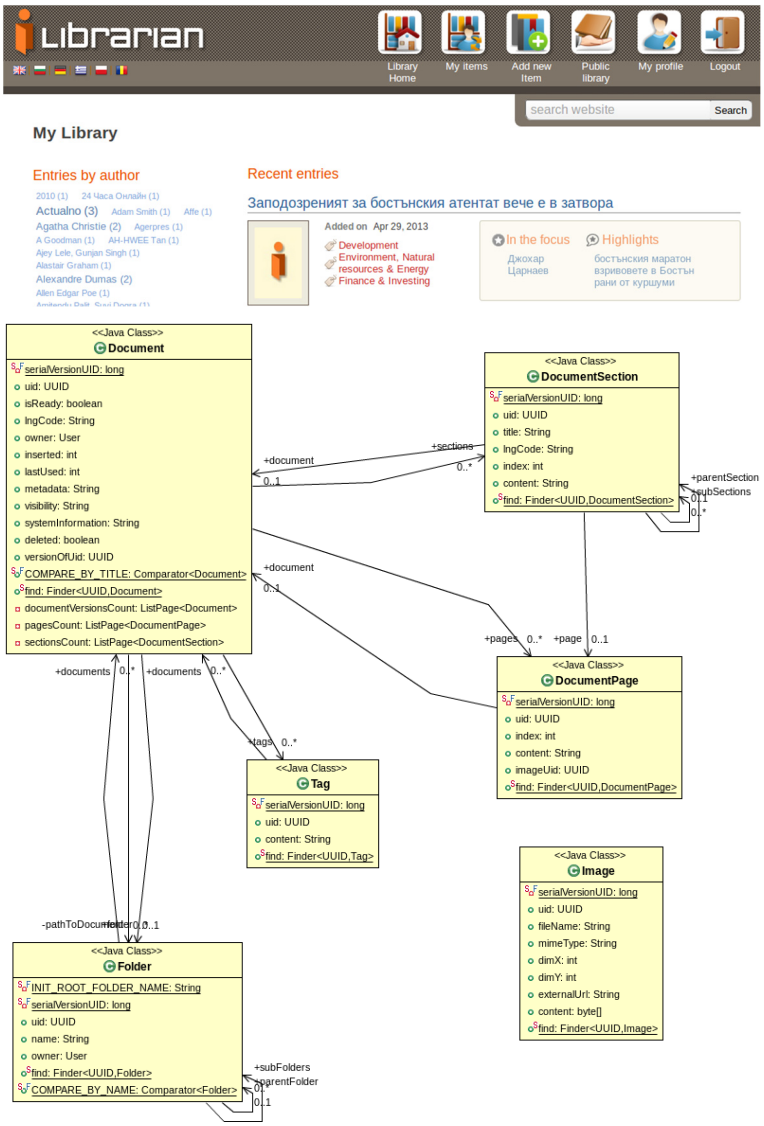
Проектиране, реализация и апробация

- Ниско ниво на свързаност (low coupling)
- Високо ниво на специфичност (high cohesion)
- Компонентна система OSGi
- Система за обработка на съобщения – AMQP



6 Прототип – интеграция в ATLAS CMS





Прототип – тестване - ATLAS - D.71User evaluation plan

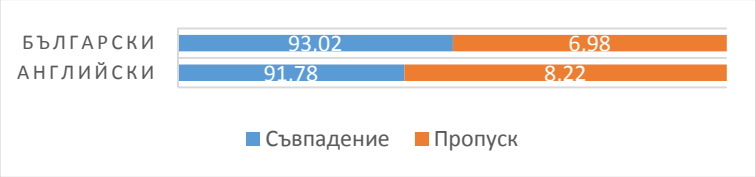
- Методология за формално оценяване
  - Техническо тестване на прототипа
    - верифицира наличието на предвидените функционалности
    - измерва се скоростта на работа на прототипа

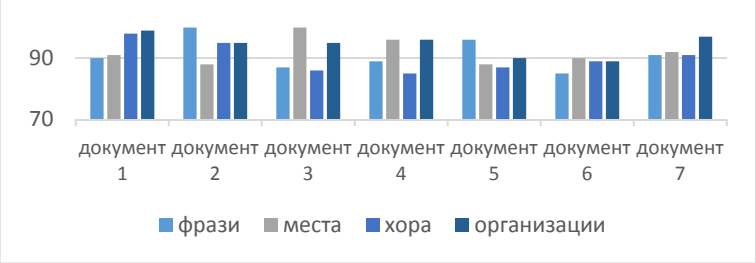
- подготвят тестови данни за формалното измерване на качеството на прототипа
- измерва се качеството
- интеграционни и регресионни тестове

○ Оценка на прототипа от потребители

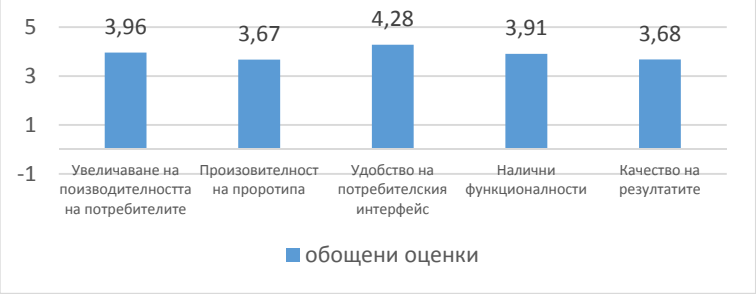
- набор от сценарии за тестване и съответните им въпросници
- три кръга на тестване с цел да се адаптира прототипа спрямо коментарите и препоръките на потребителите

Прототип – техническа оценка





Прототип – потребителска оценка



Прототип – изводи от тестването на прототипа

- Подобряване на качеството на резултатите
  - Езиковия анализ
  - Категоризацията
  - Машинния превод и CLIR
- Увеличаване на производителността

7 Внедряване

- Преодоляване на проблемите идентифицирани по време на тестването:
  - Паралелна обработка на еднотипни задачи
  - Подмяна на AMQP имплементацията
  - Интегриране на многоезични лексикони
  - Разширяване на категоризационите модели
- Услуги и продукти
  - documented.bg
  - MediaTalk (www.mtalk.eu)

8. Заключение

- Теоретични приноси
  - формализирането на процеса на интеграция на езиковите технологии в други софтуерни системи
- Приноси в приложната област
  - 3 софтуерни услуги
  - Езиково-независим алгоритъм за изграждане на резюме
- Насоки за бъдеща работа
  - методи за определяне на идентичността и подобието между две фрази, в общия случай на различни езици
  - Концептуализация на извлечените семантични елементи
  - Подобряване на качеството на резюмето

Система за управление качеството на обучението в УниБИТ

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Абстаркт:
Съвременните информационни технологии предоставят възможност за висока степен на интеграция и позволяват качествено обслужване на учебния процес и повишаване на ефективността на работата на администрацията на учебните заведения. В **УниБИТ** в периода 2013/2014г. се реализира **интегрирана информационна система *АГОРА*** за информационно осигуряване на дейностите посредством изграждане на единна съвкупност от организационни схеми, нормативна уредба, стандарти и информационни системи. В настоящия доклад са разгледани основните модули на ИИС *АГОРА* за управление на знанията в УниБИТ.

Ключови думи:
Информационна система, УниБИТ, Европейски проекти, Университетска информационна система, Оперативна програма *Развитие на човешките ресурси*

Въведение:

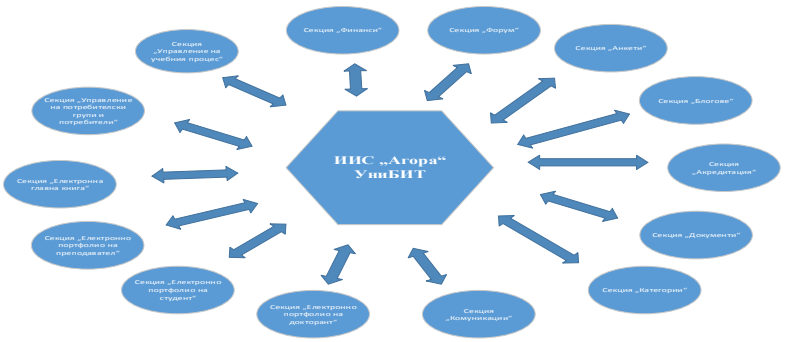
ИИС *Агора* е проектирана от екипа на катедра *Информационни системи и технологии*, като в нея влизат както наличните ресурси, така и новите проекти, включващи система за управление на знанията (СУЗ), изграждана в рамките на проекта *Разработване на система за управление на знанията във Факултета по информационни науки на УниБИТ* по Договор: BG051PO001-4.3.04-0066; Схема BG051PO001-4.3.04 *Развитие на електронни форми на дистанционно обучение в системата на висшето образование*. Другата система , влизаща в състава на ИИС *АГОРА: е Системата за управление качеството на обучение (СУКО), създадена в рамките на проект Развитие на системата за управление на качеството, свързано с измерване и оценяване дейността на академичния състав и определяне себестойността на дейностите, извършвани в УниБИТ*,

финансирана от Оперативна програма *Развитие на човешките ресурси*, съфинансирана от Европейския съюз чрез Европейския социален фонд" по договор BG051PO001-3.1.08-0029

Предназначението на ИИС *АГОРА* е за качествено подобряване на учебния процес и административното обслужване на нарастващия брой потребители, посредством интегрирана обработка на цялостната информация в УниБИТ. Системата обхваща областите, засягащи единната система за обработка на данните, информационната сигурност, защита на интелектуалните и авторските права на потребителите, защита на личната информация и др.

Основна част:

Чрез внедряването на ИИС „Агора“ в УниБИТ се очаква да се повиши качеството и ефективността на обучението в съответствия с изискванията на пазара на труда. ИИС ще доведе до унифициране на учебния процес в рамките на системата за управление на знанието и ще създаде възможност за проследимост на движението на студентите, като същевременно ще улесни прехвърляне на студенти от една форма на обучение към друга, което ще опрости административната процедура.



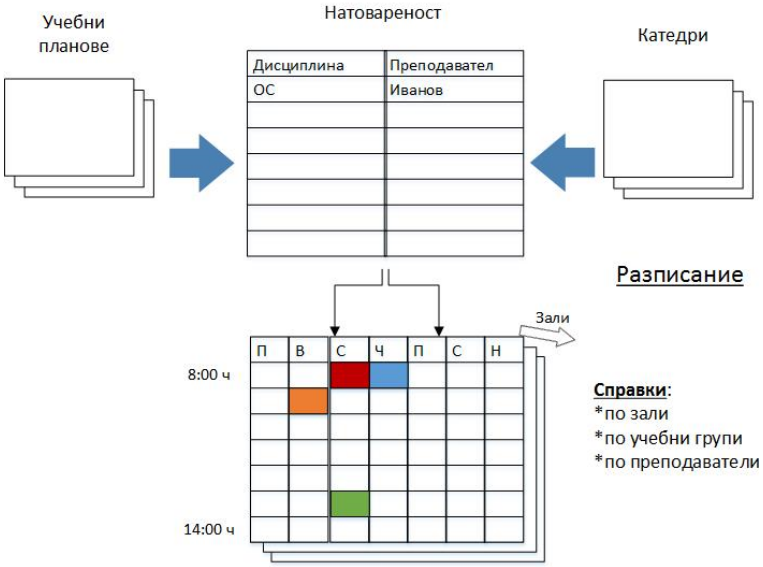
Фиг. 1 Обща схема на интегрираната информационна система АГОРА

В архитектурата на ИИС се съдържат като следните интегрирани секции, формиращи модулите, които осигуряват необходимите функционалности.

Секция *Управление на потребителски групи и потребители*: Секцията обслужва създаването на групи, потребителите в които имат еднакви права за достъп до системата, дефинирани на ниво група.

Секция *Управление на учебния процес*: В тази секция са инструментите за управление на основният документ за управление на учебния процес, а именно учебният план на специалността. Учебните планове могат да бъдат променяни всяка година в рамките на определен процент.

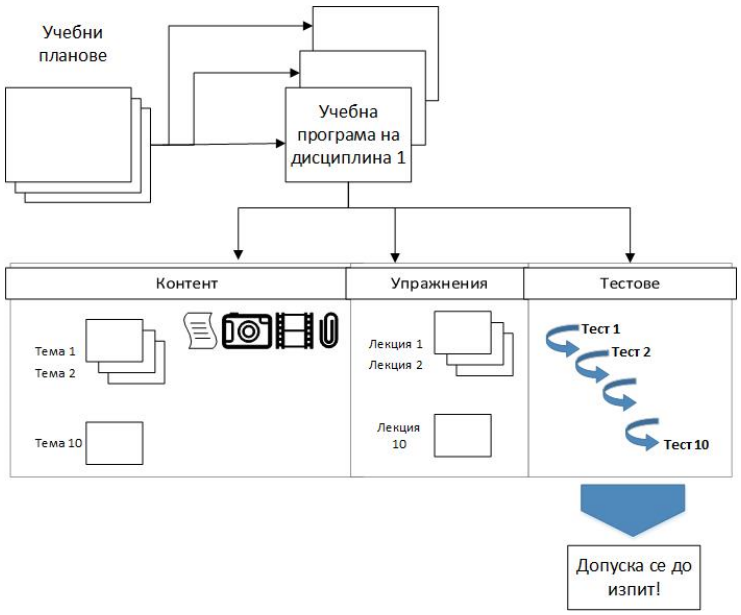
Освен това тук е осигурена възможност за планиране на учебния процес като създаване на графици и разписания за провеждане на учебни занятия и изпити за редовната, задочната и дистанционната форма на обучение.



Фиг. 2

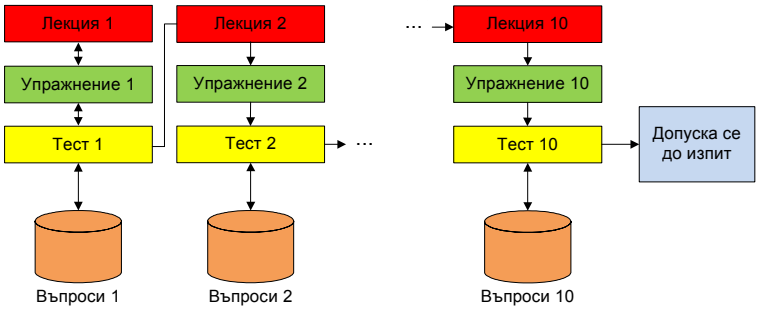
Секция *Виртуална библиотека* В тази секция се въвежда учебното съдържание за всяка дисциплина, описана в учебния план. Създава се и се редактира съдържанието на учебните дисциплини, както и се формират учебни програми с помощта на предварително зададени шаблони. Към всяка дисциплина могат да се прикачат учебни материали.

Секция *Тестова система* Дава възможност да се създават базови тестове за дисциплина или тема от дисциплина, съдържащи набори от въпроси, на базата на които автоматично да се генерират тестове.



Фиг. 3

Секция *Контрол на знанията* През семестъра се провежда текущ контрол по всички теми от учебните дисциплини. Студентите трябва да получат заверка за всеки текущ контрол за да получат семестриална заверка. За всяка отделна дисциплина водещият преподавател формира модел за текущия контрол на знанията.



Фиг. 4

Секция *Електронна главна книга* Предоставя възможност за поддържане на персонална и обобщена електронна главна книга, която съхранява обобщена детайлна информация за обучението на студент; семестриални заверки с анализиране на състоянието

на студента; статистики на състоянието при приключване на семестър и учебна година; автоматизиране на прехвърлянето в по-горен курс на успешно приключилите учебната година и заплатили семестриална такса за поредната учебна година студенти; мониторинг на ниво администрация, факултет, катедра на състоянието на студент в процеса на обучението – записани семестри, преход в по-горен курс, условно записване на семестър и причини за незаверен семестър.

Секция *Електронно портфолио на преподавател* Осигурява необходимата информация за преподавателите – информация за идентификация и контакт, преподавани дисциплини с хорариум, както и информация за заетостта на преподавателите, която се получава от модула за администрация на графици за обучение и изпити.

Секция *Електронно портфолио на студент* Предоставя възможност за проследяване на кариерното израстване на студента и осигуряване на неговата ежедневна дейност. В ИИС са налични всички инструменти за управление на студентско състояние, като част от информацията в студентското досие идва от други системи, използвани в ИИС „АГОРА“, използвана в УниБИТ.

Секция *Комуникации* ИИС поддържа средства за комуникация между всички участници и ползватели на системата, посредством изпращане на имейл.

Секция *Категории* За удобство при управлението на документите те са обособени в различни категории. По този начин по-лесно се организира и ограничаването на достъпа до определени категории документи (например само членовете на определена катедра да имат достъп до документи за катедрен съвет).

Секция *Документи* Тази секция дава възможност за създаване на многообразни документи, спомагащи управлението на административните процеси в университета. Документите могат да се организират в различни директории в йерархична структура.

Секция *Акредитация* Тази секция служи за отчитане и следене на текущото състояние на измеримите резултати на УниБИТ според текущата критериална система на НАОА за институционална акредитация на Висшите училища, за откриване на професионално направление и специалност от регулирана професия, за програмна акредитация на професионални

направления и специалности от регулираните професии, за програмна акредитация на докторска програма и за дистанционна форма на обучение в професионално направление.

Секция *Блогове* Секцията предоставя лично пространство на всеки служител в университета за публикуване на различни документи. Преподавателите могат да използват личните си блогове и за споделяне на информация със студентите.

Секция *Анкети* Дава възможност за провеждане на проучвания сред служители и сред студентите. Освен това се предвиждат функционалности за автоматизирано обработване на резултатите.

Секция *Финанси* Секция „Финанси“ ще се използва за моделиране и прогнозиране на икономическата ефективност на дейностите, извършвани за изпълнение на различни специфични дейности, свързани с провеждането на учебния процес в УниБИТ.

Заключение:

Чрез изграждането на единна съвкупност от организационни схеми, нормативна уредба, стандарти и информационни системи се реализира интегрирано информационно осигуряване на дейността на УниБИТ. Влизащите в състава на ИИС „Агора“ Система за управление на знанията (СУЗ) и Система за управление качеството на обучение (СУКО) успешно са интегрирани е цялостната система на ИИС на УНиБИТ.

Литература

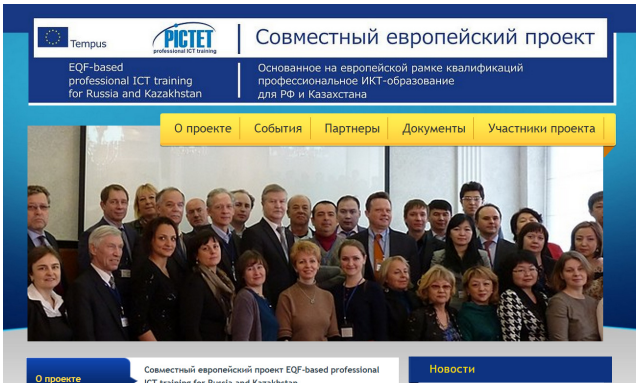
1. Техническа документация - Проект „Разработване на система за управление на знанията във Факултета по информационни науки на УниБИТ„ по Договор: BG051PO001-4.3.04-0066; Схема BG051PO001-4.3.04 „Развитие на електронни форми на дистанционно обучение в системата на висшето образование”.
2. Техническа документация – Проект „Развитие на системата за управление на качеството, свързано с измерване и оценяване дейността на академичния състав и определяне себестойността на дейностите, извършвани в УниБИТ“, по договор BG051PO001-3.1.08-0029
3. Интегрирана информационна система – АГОРА, http://agora2.unibit.bg

The PICTET, SoC and FETCH European Projects

Евгения Ковачева и Елена Шойкова
УниБИТ
e.kovatcheva@unibit.bg, e.d.shoikova@gmail.com

Абстракт:
В настоящото представяне се разглеждат три текущи Европейски проекта, в които УниБИТ е партньор

TEMPUS - PICTET 2014-2017EQF-based professional ICT training for Russia and Kazakhstan 2013-2016



http://www.pictet-tempus.sstu.ru/

Целта на проект PICTET е предназначен за засилване на връзките между образованието и ИКТ бизнеса чрез подобряване на системата за професионално обучение по ИКТ в Русия и Казахстан - обучение чрез използване на Европейската квалификационна рамка.

Специфичните цели на проекта :

- Създаване на
  - електронни квалификационна рамка за Русия и Казахстан
  - мрежа от ICT- центрове за обучение в университетите
  - нова методология на професионално обучение по ИКТ - обучение
- Разработване на нови учебни програми за ИКТ квалификации
- Развитие на механизми за осигуряване на качество
- Разпространение на системата на професионално обучение по ИКТ

Координатор на проекта е University College Ghent – Hogeschool Gent, Ghent, Belgium. Общият брой партньори са 22 – университети и представители на бизнеса от Русия, Казахстан, България, Италия, Румъния, Гърция и Испания.

SoC: School on the Cloud connecting education to the Cloud for digital citizenship

Тригодишен Европейски проект по програма Lifelong Learning, Action Erasmus Networks.

Координатор на проекта: Doukas School, Атина, Гърция.

Консолидиран бюджет на проекта: 600 000 евро

http://schoolonthecloud.eu/

Мрежата се състои от 57 партньори, повечето от които са лидери в техните образователни сектори. Те представляват 18 европейски страни и включват:

- 10 училища,
- 21 университети фирми,
- неправителствени организациинационалните власти,
- изследователски центрове,
- асоциации и
- доставчици на обучение на възрастни.

Управляващият комитет на "School on the Cloud" включва:

Doukas School (Greece)

Innovative Learning Network Ltd. (UK)

EUROGEO European Association of Geographers (Belgium)

GO! Education of the Flemish Community (Belgium)

Ghent University (Belgium)

SoC е ИКТ мрежа, която има за цел да изследва нови динамични начини за обучение, което е в хармония с начина, по който съвременните хора мислят, споделят, учат и си сътрудничат, в рамките на различни сектори на образованието, чрез използване на възможностите на средите базирани на облачни изчисления.

SoC се основава на работата на четири тематични работни групи:
Група 1: Преход от „земята към облака"
Група 2: Иновативен учител
Група 3: Интегриране на облачните изчисления и персонализацията във формалното и неформалното образование
Група 4: Бъдещи перспективи

УниБИТ участва в три работни пакета на SoC: Мениджмънт, Иновативен Учител и: Разпространяване.

FETCH: Future Education and Training in Computing: How to support learning at any time anywhere

Постигане на интелигентен растеж, както и изграждането на знания и иновации в обществото чрез повишаване на качеството на образование в областта на компютърните науки и технологии, въвеждане на авангардни технологии за обучение, обмен на знания, обсъждане на методологии, насърчаване на обмена на добри практики между всички страни.

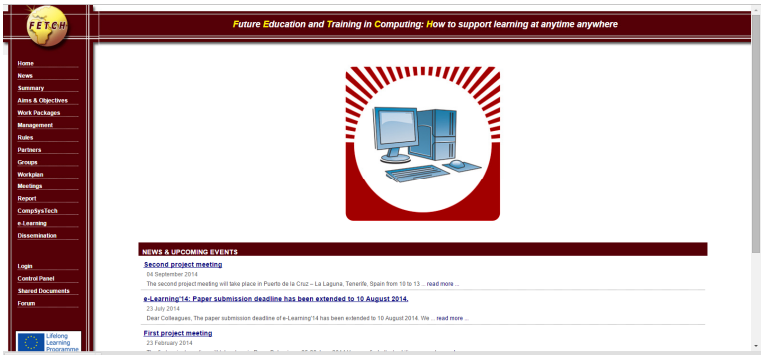
Специфичните цели на проекта

- **Разработване на Европейска стратегическа рамка** за образование и обучение по компютърни науки и технологии 2020
- **Разработване на Европейската рамка за оценка** на образованието и обучението по компютърни науки и технологии 2020

- **Изготвяне на препоръки за бъдещите цифрови програми** в образованието и обучението по компютърни науки и технологии 2020.
- Разработване на нови дидактически теории и модели за обучение за използване на социалните медии в образованието.

Партньори

- Русенски университет „Ангел Кънчев“ - Координатор на проекта:
- Консорциумът включва 67 партньори от 35 страни:
- 27 страни от ЕС, Исландия, Норвегия и Лихтенщайн, Турция, Бивша югославска република Македония, Хърватия, Сърбия и Албания.
- шест типа институции:
  - Университет или институция от висшето образование,
  - изследователска организация,
  - фирма (услуги),
  - неправителствена организация,
  - сдружение с нестопанска цел,
  - МСП.



http://fetch.ecs.uni-ruse.bg/

SATELITE SEMINARS

Two seminars related correspondingly with the EU projects: *MaSciL: Mathematics and Science for Life* (http://www.mascil-project.eu/) and *NETT: Networked Entrepreneurship Training of Teachers* (http://nett-project.eu/), were carried out in the frames of *QED'14*.

Reports by the chairs of these events (in Bulgarian Language) follow.

Семинарът по *MaSciL* и постер-сесията в рамките на QED'14 – форум на новаторски образователни идеи

фото-репортаж от Жен-И-Сен
Институт по математика и информатика, БАН

На форума, предоставен от *QED'14*, се срещнаха международни и български дейци на образованието: политици, университетски преподаватели, изследователи (*млади* по дефиниция и/или по дух) и учители от страната, доказали потенциала си да работят в изследователски стил с учениците си. Ето няколко кадъра от участието на членове на екипа на *Mascil - Математика и природни науки за цял живот* (*Mathematics and Science for Life* - http://www.mascil-project.eu/):

Особено важно бе участието на учителската компонента в *QED'14*– хора, които не са само олицетворение на реалността, в която теоретиците и политиците на образованието експериментират иновативни идеи и стратегии, а по-скоро членове на изследователски екипи и съавтори на такива идеи и стратегии.

Те бяха поканени за участие в семинар по проекта *MaSciL* на тема *Разпространяване на изследователския подход в образованието* като учители, които са *приобщители* на идеите, свързани с този подход.

Учителският семинар бе елемент от каскаден процес, при който се започва със сравнително малка група от учители и всеки от тях продължава да предава опита си на следваща група от учители. Участваха 30 учители от 10 селища (Благоевград, Варна, Добърско, Пазарджик, Пловдив, Разград, Русе, Селановци, София, Стара Загора). Семинарът бе ръководен от Евгения Сендова, която представи задачата на *MaSciL* за месец ноември *Застраховка на*

велосипед и остави учителите да влязат в ролята на ученици, разделени на малки изследователски групи (точно както се очаква от тях, когато застанат пред учениците си). След оживени разисквания за различните фактори, които са важни за определяне на размера на застраховката и на обезщетението, капитаните на групите докладваха своите аргументирани препоръки към застрахователната компания. Резултатите бяха впечатляващи от гледна точна на разнообразието в подходите, събраната информация, използваните средства, артистичност при представянето. Участниците в семинара бяха поздравени от акад. Кендеров, координатор на *MaSciL* от българска страна, и разговаряха с проф. Евгения Стоименова по въпроси, които ги вълнуваха във връзка с преподаването на елементи от статистиката и вероятностите в училище.

Ето моменти от работата по групи и представянето на резултатите:


ЗАСТРАХОВАТЕЛ
ПРЕС

На специално организираната в рамките на *QED'14* постер-сесия учителите представиха творчески разработки на своите ученици, вариращи от игрови математически сценарии за най-малките (Галя Пенчева) и софтуерни игри от по-големите за по-малките ученици (Нели Стоянова), през художествени реализации на математически идеи в часове по ИТ (Кремлина Черкезова) и по математика (Елисавета Стефанова), до експерименти със сапунени мехури и математическите идеи в този контекст (Боряна Куюмджиева). В разговори с останалите участници авторите на тези презентации споделиха колко удовлетворени и заредени с нови идеи се чувстват от ентусиазма, с който работят техните ученици – и в клас, и след училище.

Организаторите и официалните гости на *QED'14* с интерес разгледаха проектите, представени на специална постер-сесия. Нели Стоянова (ПМГ *Акад. Никола Обрешков*, Разград) представи компютърните програми, които нейните деветокласници са разработили като игри за по-малките ученици:

Боряна Куюмджиева (МГ *Баба Тонка*, Русе) обясни на проф. Joke Voogt) и на колеги разработката си, която е надстройка на сценарий от проекта *MaSciL*, а Елисавета Стефанова демонстрира развитието от триъгълника на Паскал до килимите на Серпински:

Галя Пенчева сподели как се запалват най-малките за математика, а Монка Коцева говори за предизвикателствата пред е-фасилитаторите в училище

Разработките на учениците на Кремлина Черкезова, умело съчетаващи информатични и художествени умения, бяха също посрещнати възторжено:

На церемонията по закриването Нели Стоянова, преподавател от математическата гимназия в Разград, бе удостоена с наградата за *устойчиви и иновативни ИКТ приложения в образованието,* връчена от Доц. Златогор Минчев, директор на *Съвместния център за обучение: симулации и анализ.*

На *Деня на будителите* поканените лектори на *QED'14* от Франция (ЮНЕСКО), Холандия и САЩ, съпроводени от проф. Румен Николов, доц. Евгения Ковачева и доц. Евгения Сендова, посетиха училището "Любен Каравелов"в Копривщица в отговор на любезната покана на ръководството му. Гостите бяха посрещнати от прекрасното изпълнение на духовия оркестър на училището под диригенството на Валентин Петков, от директорката Бойка Дюлгярова и учителката по физика и математика Нанка Панчева. Трите представители на учениците Ганка Радоева, Румян Аксимов и Андон Душков показаха с гордост училището си и забележителностите на града, при това - на отличен английски език.

След завръщането си гостите споделиха свои впечатления и мисли:

Mariana Patru (представител на ЮНЕСКО): *Атмосферата беше прекрасна и чувствах, че участниците с радост и гордост споделят работата си.*

Проф. Joke Voogt (Холандия): *Начините, по които учителите използват новите технологии са вдъхновяващи. Тези учители по математика са такива творци! Аз искрено им се възхищавам… А атмосферата в училището „Любен Каравелов" беше толкова топла и гостоприемна. Бих искала да посетя часове в това училище, жалко, че бе събота…*

От името на домакините в Копривщица благодарност изказа директорката **Бойка Дюлгярова**:

За мен бе чест да посрещна такива високи гости, които са посветили професионалните си дейности за издигане на образованието в международен план в хармония със стандартите на ЮНЕСКО.

Заедно с преподавателския състав ще положим всички усилия нашето училище да стане член на асоциираните към ЮНЕСКО училища в България и като първа стъпка ще се изпълним съвета на г-жа Мариана Патру да се обърнем към Националния ни координатор.

Участниците в семинара по *Mascil* също изразиха мнения препоръки, които биха могли да се обобщят по следния начин::

Най-полезното е атмосферата, в която се водят дискусиите. Всеки може да се сравни с останалите, да сподели опит, да научи нови идеи. Може би е добре в края на тези сбирки да се излиза с кратко становище до МОН; Бяха разгледани идеи за това КАК да представим даден проблем пред учениците, така че да ги мотивираме. Разясни се идеята и нуждата от подтикване на учениците да търсят експертно мнение и въобще да се УЧАТ ДА ТЪРСЯТ.

А Нели Стоянова написа:

Наградата за мен беше приятно вълнение, което започна още когато представях разработките на учениците си. Почувствах удовлетворение от факта, че материалът ми предизвиква интерес и много колеги потърсиха контакт с мен за бъдещо сътрудничество. Преди журито да обяви своята оценка аз получих наградата на колегите и гостите на семинара. За мен тя е НЕ по-малко важна от официалното класиране. Приех решението на журито като признание за цялостната си работа; като одобрение на нетрадиционните методи, които прилагам; като мотивация за бъдещата си дейност; като потвърждение, че идеите ми се приемат у нас и в чужбина; и не на последно място - като доказателство за значимостта на създадените от учениците ми материали.

Семинар за учители по предприемачество - Проект NETT: Networked Entrepreneurship Training of Teachers

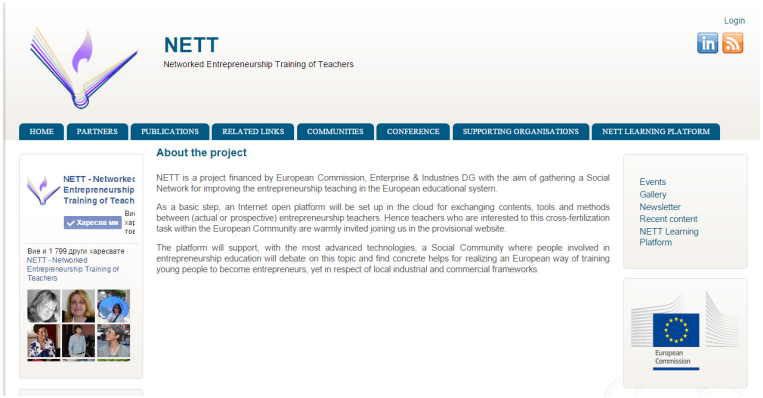
репортаж от Евгения Ковачева
УниБИТ

Какво представлява предприемачеството? *Компетентност, с която се раждаме, или която развиваме?*

Все повече се набляга на второто твърдение - че това е компетентност, която може да бъде развита. Създават се методологии и центрове за развитие на уменията и качествата, свързани с предприемачеството, например: *Steven Institute of Technology, Ice House, Junior Achievement* и т.н.

В България предприемачество влиза в учебната програма, но как учителите да се подготвят за това?

В рамките на QED'14 се проведе семинар по Европейския проект NETT: Networked Entrepreneurship Training of Teachers – *Изграждане на мрежа от учители по предприемачество* (http://nett-project.eu/). Този проект е насочен именно към учители по предприемачество и предоставя възможността те да си помагат в работата, като изградят единна европейска общност.



Партньори по NETT са:

- Университетът на Милано (Факултет по компютърни науки – координатор на проекта), Италия
- Консултантска и обучаваща фирма от Италия - Arkè

- EGECED – Институт по образование и младежка учебна асоциация, Турция
- Институт за технологии и развитие, България

Тъй като предприемачеството все повече навлиза в Европейските училища, Генералната дирекция на ЕК *Предприятия и индустрия* преди 4 години обяви конкурс за създаване на платформа в помощ на учителите по предприемачество, която да изпълнява функциите на:

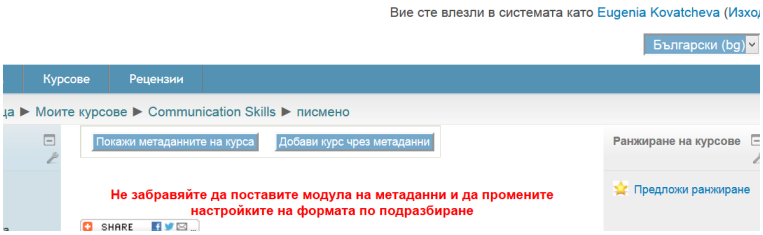
- система за електронно обучение,
- хранилище с материали по предприемачество
- социална мрежа за общуване между учителите по предприемачество.

Екипът на NETT изгради такава платформа на базата на системата за електронно обучение MOODLE, обединена с платформата за електронно портфолио MAHARA. Към MOODLE са добавени възможности за описание на всеки обект от системата, като по този начин той става основен елемент от NETT хранилището. По този начин курс може да се създаде по ключови думи (невъзможно в *оригиналния* вариант на MOODLE), т.е. да се изберат учебни материали и дейности от съществуващите в хранилището, които да станат част от новия курс или пък да бъдат използвани с модификации, като самите модификации стават част от хранилището. Всеки обект може да бъде оценен от 1 до 5 звезди от потребителите.

Платформата е многоезична (английски, български, италиански и турски) както по отношение на интерфейса, така и по отношение на разработените учебни обекти.

Първа страница на платформата NETT с основните пет категории

Участниците в семинара станаха част от общността от преподаватели по предприемачество в NETT платформата.



Платформа NETT - метаданни

Тестването на платформата бе извършено с предварително описани сценарии:

- Регистрирайте се в платформата
- Създайте курс в областта *Технически умения*
  - заглавието може да е на български
  - второто задължително поле е кратко име на курса (уникално за системата)
- След като влезете в курса, имате 2 варианта
  - от *Добави курс чрез метаданни* може да избирате от елементи, които да използвате за курса си

- филтрирате съществуващите в хранилището обекти с метаданни и получавате списък от тях
- подбирате елементите за курса

- от *Добави дейност или ресурс* добавяте директно материали

След като създадете курса, споделете:

- какво Ви допадна в платформата
- лесно ли се ориентирахте
- какво Ви затрудни
- какво не Ви допадна
- в какви други области може да я използвате

Отзиви след тестването:

1.Какво Ви допадна в платформата?

- Страхотна система за учители, които искат да преподават по различни начини, но нямат нужните ресурси за това. Удобно е както за дистанционно обучение, така и за студенти, които не харесват традиционните среди за обучение.
- Огромен набор от възможности и настройки за задания, отличаващи се със своята уникалност.

- Можеш да споделиш е-обучението с всеки по всяко време.
- Прилична интернационализация.

2.Лесно ли се ориентирахте?

- За създаване на курс със задания и т.н. е нужно всички настройки да са видими, лесно достижими и удобни за попълване, следователно има нужда от тотална реконструкция на дизайна и осигуряване на лесен достъп до нужните елементи, а не както е сега - за да знаеш какво трябва да направиш, трябва да си работил дълго време с платформата.

3. Какво Ви допадна?

- На места системата показва грешки, които не са ясни за потребителите.
- При нужда от смяна на парола, системата препраща към началната страница.
- Няма нотификация при влизане като гост.

4. В какви други области може да я използвате?

- Платформата е стриктно за е-обучение. При използване в други области или няма да се използва целият набор от настройки, или ще бъдат недостатъчни настройките и ще има нужда от програмни корекции.

Разпространението на резултатите прерасна в дискусия за предприемачеството в Българските училища и възможността за възпитание в предприемачески дух, нужен на нашето съвремие.

Gallery

Gerald Knezhek - Texas University, USA,
Roumen Nikolov – SULSIT;
Joke Voogt – University of Amsterdam, The Netherlands

Opening – students from National School of Dance trained under Veneta Tsenova and Miroslav Slavov

Welcome address from the Host Institution
Prof. Stoyan Denchev, Rector of the University

Greeting by Prof. Rumiana Kolarova, Minister of Education and Science

Keynote talk - Mariana Pătru,
UNESCO representative, sector Higher education

Gerald Knezhek, Eugenia Kovatcheva, Roumen Nikolov, Joke Voogt,
Evgenia Sendova, Konstantin Delchev, Zlatogor Minchev,
Elena Shoikova, Mariana Pătru, Tania Todorova

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