UNIVERSITY OF ŠIAULIAI
FACULTY OF EDUCATION
NATURAL SCIENCE EDUCATION RESEARCH CENTRE

International Scientific - Practical Conference

INFORMATION & COMMUNICATION TECHNOLOGY IN NATURAL SCIENCE EDUCATION - 2013

24 - 25 October 2013

CONFERENCE PROGRAMME
&
ABSTRACTS

Faculty of Education, University of Šiauliai
P.Višinskio Street 25, Šiauliai, Lithuania

Thursday

24th October 2013

8:00 - 9:30 **REGISTRATION**

(First Floor, Hall, Library of Siauliai University, Vytauto Street 84, Šiauliai)

9:30-10:00 **OPENING CEREMONY**

(Second Floor, Room 205, Library of Siauliai University, Vytauto Street 84, Šiauliai)

Welcome – **students of Siauliai Daukantas gymnasium**
Rector of the University **prof. dr. Donatas Jurgaitis**,
Vice-Rector for Research and Art **prof. dr. Stefanija Ališauskienė**,
Dean of Faculty of Education **doc. dr. Erika Masiliauskienė**
Head of NSERC **prof. dr. Vincentas Lamanauskas**

10:00-12:00 **PLENARY MEETING (1)**

(Second Floor, Room 205, Library of Siauliai University, Vytauto Street 84, Šiauliai)

Chairmen: Vincentas Lamanauskas, Agnaldo Arroio

1. **Boris Aberšek.** *Troubles and Challenges of Today's Education* (University of Maribor, Slovenia).
2. **Celeste Ferreira*, **, Mónica Baptista**, Agnaldo Arroio*.** *Integrating Visualizations in Science Teaching: Teachers' Difficulties and Pedagogical Approaches* (*University of São Paulo, Brazil; ** University of Lisboa, Portugal).
3. **André du Plessis.** *Wikis and PowerPoint as Cognitive Development Tools in Scientific Lit* (Nelson Mandela Metropolitan University, South Africa).
4. **Uladzimir Slabin.** *Screen Handwriting and Screen Sharing in Teaching Chemistry /Video presentation/* (University of Oregon, USA).

12:00-13:00  **LUNCH**

13:00-15:00 **PLENARY MEETING (2)**

(Fourth Floor, Room 205, Library of Siauliai University, Vytauto Street 84, Šiauliai)

Chairmen: Boris Aberšek, André du Plessis

1. **Andris Broks.** *Ontodidactics of Physics – Past, Present and Future* (University of Latvia, Latvia).
2. **Sergei Teleshov, Elena Teleshova.** *Verhovskiy and His Methodical Heritage: "Chemical Alphabet"* (Saint Petersburg, Russia).
3. **Veronika Machková, Martin Bilek.** *Didactic Analysis of the Web Acid-Base Titration Simulators Applied in Pregraduate Chemistry Teachers Education* (University of Hradec Kralove, Czechia).
4. **Tatyana Mazurok.** *Intellectual Control Support for Individual Teaching* (South Ukrainian National Pedagogical University named after K.D. Ushynsky, Odessa, Ukraine).

15:15 – 16:30  **WORKSHOP**
SIAULIAI J. JANONIO GYMNASIUM

18:30-21.00  **CONFERENCE DINNER**

Friday

25th October 2013

08:30-10:00 **Workshop 1**

(Fourth Floor, Room 413, Library of Siauliai University, Vytauto Street 84, Šiauliai)

Chairman: Sergei V. Teleshov, V. Lamanauskas

1. **Valéria C. Santos, Agnaldo Arroio.** *Characterization of The Development of a Community of Practice to Support Pre-Service Chemistry Teachers* (University of São Paulo, Brazil).
2. **Anatoly V. Turlov*, Sergei V.Teleshov**.** *Natural Periodic Processes in School Science Courses The Metamethodic Aspects* (*St. Petersburg City Palace of Youth Creativity, ** State school № 635, St. Petersburg).
3. **Kosta Dolenc, Boris Aberšek, Igor Pesek**. *Architecture of Individualized Intelligent E-Learning Materials* (University of Maribor, Slovenia).
4. **Beata Jancarz-Łanczkowska, Katarzyna Potyrala, Karolina Czerwiec, Andrzej Rzepka.** *Learners as Prosumers and Their Attitudes toward Real Knowledge* (Pedagogical University of Cracow, Poland).
5. **Andris Grinfelds.** *Student Achievement in Science and Information and Communication Technology in Schools: What OECD PISA Tells Us* (University of Latvia, Latvia).

10:00-10:15  **COFFEE BREAK**

10:15 -11:30 **Workshop 2**

6. **Laima Berzina, Vitālijs Osadčuks**. *Using Open Source Software in Teaching Geographical Information Systems* (Latvia University of Agriculture, Jelgava, Latvia).
7. **Milan Kubiatko.** *The Situation of the ICT Using for Science Education in the Slovak and Czech Schools* (Masaryk University, Czechia).
8. **Renata Bilbokaitė.** Visualization Issues in Science Education (Siauliai University, Lithuania).
9. **Raffaele Pisano*, Paolo Bussotti**.** *On Popularization of Scientific Education in Italy between 12th and 16th Century* (*University of Lille1, France, **University of West Bohemia, Czech Republic).

12:15-19:00  **WORKSHOP**
(Telšiai)

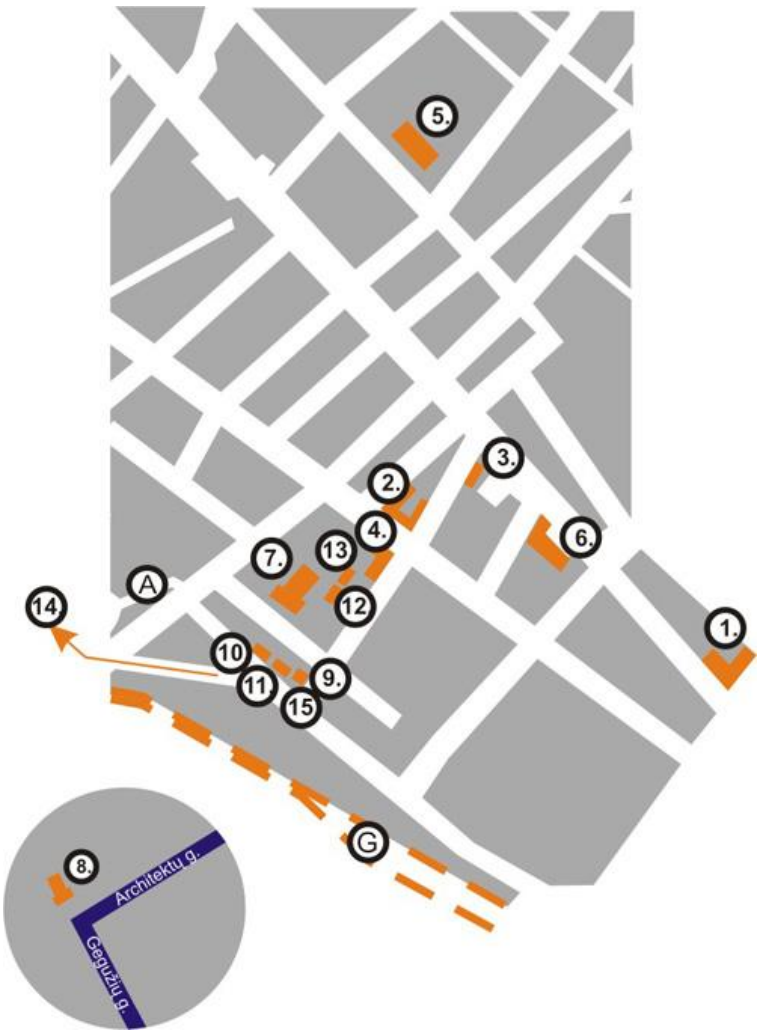
During conference
POSTER PRESENTATIONS

(Fourth Floor, Hall, Library of Siauliai University, Vytauto Street 84, Šiauliai)

1. **Violeta Šlekienė, Loreta Ragulienė.** *Inquiry-based Physics Education by Using Science Learning System Xplorer GLX* (Siauliai University, Lithuania).
2. **Mateja Ploj Virtič, Uroš Župerl, Marija Javornik Krečič.** *Pedagogy 1:1 in Higher Education: A Case Study* (University of Maribor, Slovenia).

MAIN SPONSORS
Research Council of Lithuania,
Scientific Methodical Centre "Scientia Educologica", Lithuania

University Map



1. Central building: the Rector's office, the Senate, Departments, the Publishing Office (Vilniaus st. 88)
2. I Building - Faculty of Education, Faculty of Social Welfare and Disability Studies, the Library, the Canteen (P. Višinskio st. 25, Vytauto st. 84);
3. III Building - Faculty of Humanities (P. Višinskio st. 38);
4.VII Building - Faculty of Natural Sciences, Faculty of Mathematics and Informatics (P. Višinskio st. 19);
5. II Building - Faculty of Arts (Aušros al. 50);
6. IV Building - Faculty of Technology, the Art Gallery of Šiauliai University (Vilniaus st. 141);
7. V Building - Continuous Studies' Institute (Stoties st. 11);
8. VI Building - Faculty of Social Sciences, Park of Science and Technologies (Architektų st. 1);
9. Student Representation, Student Affairs Office (P.Višinskio st. 11, P.Višinskio st. 15);
10 - 13. Dormitories (I Dormitory (P. Višinskio st. 15), II Dormitory (P. Višinskio st. 15 A),
III Dormitory (Dubijos st. 1 A), IV Dormitory (Dubijos st. 1 B)), the Career Centre (P. Višinskio st. 15A));
14. The Botanical Garden (Paitaičių st. 4);
15. Students' Leisure Centre (P.Višinskio st. 15);

A - Bus station;
G - Railway station.

INTEGRATING VISUALIZATIONS IN SCIENCE TEACHING: TEACHERS' DIFICULTIES AND PEDAGOGICAL APPROACHES

Celeste Ferreira
Faculty of Education – University of São Paulo, São Paulo, Brazil
Institute of Education – University of Lisboa, Lisboa, Portugal
celeste.ferreira53@usp.br

Mónica Baptista
Institute of Education – University of Lisboa, Lisboa, Portugal
mbaptista@ie.ul.pt

Agnaldo Arroio
Faculty of Education – University of São Paulo, São Paulo, Brazil
agnaldoarroio@yahoo.com

Abstract

This study is a qualitative research where it tries to finding out and analyze the teacher's pedagogical approaches and difficulties to introduce visualizations in science classroom. The use of visualizations in classroom has increased substantially, especially since the development of Information and Communication Technology (ICT). Fourteen in-service teachers were investigated across a teachers' training course to seek their difficulties and pedagogical approaches for integrating these tools in teaching and learning sequences (TLS). During the training teachers were invited to build in group (five groups) teaching learning sequences about some science content using visualizations. The methodology is qualitative and a study case design was adopted. It was analyzed the TLS made by them and the audiovisual record of their oral communications to the class. It was also analyzed the final semi-structured interview with these teachers' groups and a final report about the TLS application in classroom. These teachers present mainly pedagogical difficulties in order to select the suitable resource and to realize the full potentialities of these resources and sometimes the role of the teacher towards students and resources in the classroom. The technical barriers were the lack of school computers and appropriated software. The results suggest that these teachers are using mostly constructivist approaches to incorporate the visualizations in classroom trying to take advantage of the interactivity that some of these tools allow. Two groups fall more in transmission view, using this resources mostly to present information and the rest tried to use this resources to build inquiry tasks. They chose above of all multimedia tools to enhance particular concepts and skills and sometimes to innovate presentations. Some difficulties related to pedagogical approaches and technical barriers to use these resources are discussed.

CHARACTERIZATION OF THE DEVELOPMENT OF A COMMUNITY OF PRACTICE TO SUPPORT PRE-SERVICE CHEMISTRY TEACHERS

Valéria C. Santos, Agnaldo Arroio
Faculty of Education, University of São Paulo, São Paulo, Brazil
E-mail: valcampos07@hotmail.com, agnaldoarroio@yahoo.com

Abstract

The concept of communities of practice can be used in different contexts, included the educational context. The development of communities of practice where pre-service teachers work together, refine their practices and learn is a good training for these future teachers. Since communities of practice help teachers learn about teaching and improve their practices, this study aim to characterize the project PIBID of chemistry carried out at the University of São Paulo as a community of practice. On the first half of 2013 the PIBID project included 12 pre-service teachers who attended weekly meetings. These meetings consisted of theoretical training about the use of visual tools at teaching and other concepts about education and meetings to plan activities and classes about topics of chemistry to be applied in a public school at the city of São Paulo, Brazil. During these meetings was possible to notice that the pre-service teachers were engaged in a community of practice, demonstrating the three characteristics emphasized by Wenger (2008): mutual engagement, joint enterprise, and a shared repertoire. Thus the project PIBID of chemistry could be characterized as a community of practice. Furthermore, it was noticed that the community helps at the training of pre-service teachers, since it is providing support to them learn about teaching in practice and implement their knowledge.

WIKIS AND POWERPOINT AS COGNITIVE DEVELOPMENT TOOLS IN SCIENTIFIC LITERACY

André du Plessis
Nelson Mandela Metropolitan University, South Africa
andre.duplessis@nmmu.ac.za

Abstract

The overall performances in the Trends in International Mathematics and Science Study (TIMMS) and Progress in International Reading Literacy Study (PIRLS) of South African learners have been dismal to say the least and the Annual National Assessment test results of grade 3, 6 and 9 learners related to general literacy and mathematics have left a lot to be desired. Clearly this suggests that something has to be done to address the situation. At the same time, South African education is still suffering as a result of the legacy of apartheid and the great majority of schools lack basic resources such as libraries, infra-structure and Information and Communication Technology (ICT) resources, including internet connectivity. General learner literacy and ICT literacy development and usage for learning are high on the government's agenda, as is scientific literacy. However, there seems to be a dearth of 'how to' implement ICT related activities to develop reading, talking, listening and writing within a science classroom learning context with special reference to promoting scientific literacy in its fundamental sense. This paper attempts to assist filling the void related to the above by introducing an ICT based scientific literacy heuristic that is infused by the ICT based 'Extended Cyberhunt Approach' of Du Plessis (2010) and Du Plessis and Webb (2011, 2012a, 201b) and the off-line Scientific Literacy model of Webb and Villanueva (2008); Webb and Mayaba (2010) and Webb (2010). The focus of the heuristic is to develop scientific reading, talking, listening and writing, as well as to establish a different classroom learning space and experience. In addition, it adds emphasis on on-going feedback from the teacher to the learners as well as focusing on reflection and journal writing to inform teacher planning and subsequent interactions in the science classroom. The additional potential of the heuristic is not only that it offers ICT literacy skills development and the development of skills within a curriculum related science context, but also that ICT skills can be developed even without internet connectivity through using Microsoft Word and/or PowerPoint for writing development and presentation or adding Web 2.0 tools such as a Wiki to complement Microsoft Word and/or PowerPoint if connectivity is available. Research suggest that various skills such as planning, searching and researching, presentation, assessment as well as various cognitive skills can be developed when ICT is used as a cognitive tool in a 'Learning-as-Design' context, i.e. when learners (students) become the designers or composers of artefacts related to topics that are curriculum based. This paper also provides the framework for an intervention in two primary schools in the Eastern Cape Province in South Africa that received ICT resources for the first time ever, including internet connectivity, in September 2013. Hence, the anticipated research within these two schools will explore whether this heuristic has the potential to assist with and improve scientific reading, talking, listening and writing, as well as whether this approach improves motivation and interest related to science learning and ICT literacy development, including the potential to develop planning, searching and researching, presentation, assessment as well as various associated cognitive skills.

VERHOVSKIY AND HIS METHODICAL HERITAGE: «CHEMICAL ALPHABET»

Sergei Teleshov, Elena Teleshova
Saint Petersburg, Russia

Abstract

This article plunges us into the history of chemistry teaching methods - one of the most interesting methodological sciences. This paper focuses on a methodical review of the most, perhaps, the famous Russian and productive practitioner. Vadim Verhovskiy known for his books and instruments created by him, and his famous «Techniques and methods of chemical experiment». This article briefly describes the didactic activity of the largest Russian practitioner of the first half of twentieth century. He was a leading expert in the theory and methodology of school chemical experiment. He also was the author of a workbook, school textbooks, books to read, various means of visibility: models and instruments. «Chemical alphabet», which he created in 1927 y., allows students in visual form design formula of various classes of substances. This «Alphabet» and guidelines for it, made specifically for students can promptly be consciously formulas of substances and write the equations of chemical reactions. His advice and experience, we can actively and usefully applied in working with contemporary students. The unique experience should not be lost. It was to be hoped that the methodical heritage of V.Verhovskiy will be in demand also in the 21st century too.

ARHITECTURE OF INDIVIDUALIZED INTELLIGENT E-LEARNING MATERIALS

Kosta Dolenc, Boris Aberšek, Igor Pesek
University of Maribor, Slovenia
kosta.dolenc@uni-mb.si, boris.abersek@uni-mb.si, igor.pesek@uni-mb.si

Abstract

E-learning and online education offers important opportunities for educators as well as students. Traditional e-materials, as they are known today, do not allow the recognition of different parameters, such as: learning differences, prior knowledge, learning capabilities, learning environment, styles of learning, etc. Because e-materials are structured in such a way they cannot be successfully adapted for learners who consequently cannot control their own learning (Berge, 2002; Picciano, 2000; Saba, 2001). Such a result offers, among others, a highly anti-motivational effect. The preparation of modern e-materials therefore requires a thorough preparation in terms of content and design, which has to be (mostly) based on pedagogical and didactic theories (Bregar, Zagmajster, & Radovan, 2010). Modern e-materials, which can also be named educational e-materials, are usually accessible online (internet-based training (IBT), web-based training (WBT), online education, etc.), they enable and encourage self-learning, they are flexible, dynamic, interactive, use different types of media, individualized and adapted to the user's needs. Mostly the latter characteristic will receive special attention in the following research.

INTELLECTUAL CONTROL SUPPORT FOR INDIVIDUAL TEACHING

Tatyana Mazurok
South Ukrainian National Pedagogical University named after K.D. Ushynsky, (SNPU, Odessa), Ukraine
mazurok62@mail.ru

Abstract

One means of improving the efficiency of education is to improve the means of control the teaching process. The development of different forms of e-learning, mobility of students, increase the volume of educational information determine the importance of the developing of tools to automatization the individual teaching.

Features of the learning process are the need to take into account when controlling their own development of intellectual abilities of the student. Therefore synergetic model of learning management is developing. To implement it developed further charts: learning control teaching by learning elements, learning discipline, and the formation of competence, system of the competences. Decomposition of these schemes and analysis of necessary information transforms identified means to implement them. Usage of artificial intellectual systems to solved main tasks of control is proposing.

Hybrid model for intellectual support by the implementation of individual teaching control are synthesized. The hybrid model consist are: training a neural network for the synergetic model of teaching; neuro-fuzzy model for determining the type of didactic system, neural model of interdisciplinary connections; fuzzy clustering relationships between the interdisciplinary connections and system competences, the clustering of homogeneous groups of learners; hierarchical system of fuzzy inference to determine the degree formation system of competencies.

The features of the information, software management system are described. The results of the implementation in the different forms of learning are shown.

PEDAGOGY 1:1 IN HIGHER EDUCATION: A CASE STUDY

Mateja Ploj Virtič, Uroš Župerl, Marija Javornik Krečič
University of Maribor, Slovenia
mateja.ploj-virtic@uni-mb.si, uros.zuperl@um.si, marija.javornik@um.si

Abstract

The use of ICT in education has changed substantially over the last two decades. The development of new technologies has enabled us, the users, to mature and gain experience. The first part of the article deals with the use of ICT in teaching and the change in the teachers' role. The concept of pedagogy 1 to 1 is presented; this places the student at the centre of the activity and is based on the development of a suitable learning environment. The second part of the article describes case study as the development of a remote lab for conducting remote experiments at the University of Maribor, Faculty of Mechanical Engineering. Development of the remote lab was carried out as a successful student project and its utility is a reflection of the remarkable work done. In the coming academic year, we're planning to evaluate which skills and competencies of the 21st century the students develop conducting the experiment.

DIDACTIC ANALYSIS OF THE WEB ACID-BASE TITRATION SIMULATORS APPLIED IN PREGRADUATE CHEMISTRY TEACHERS EDUCATION

Veronika Machková, Martin Bilek
University of Hradec Kralove, Czechia
veronika.machkova@uhk.cz

Abstract

The wide development of the information and communication technologies provides conditions to use different digital learning object in education. In Chemistry learning and teaching computer simulations are used for increasing clearness in Chemistry lessons and for supporting experimental activities during laboratory work. We deal with questions: which roles could play educational simulation as an innovative didactic tool in Chemistry lesson; how can they be use for supporting Chemistry learning; and what are the gains and risks when using educational simulations in Chemistry lessons. In the paper, there are presented results of didactic analysis of 35 examples of acid-base titration simulators which are available on the web. Resulting from the didactic analysis we find three different types of educational simulations with specific use in Chemistry lessons. Overview of all analyzed simulators and proposals of their educational applications is available from the web site http://titrace.wz.cz.

LEARNERS AS PROSUMERS AND THEIR ATTITUDES TOWARD REAL KNOWLEDGE

Beata Jancarz-Łanczkowska, Katarzyna Potyrala, Karolina Czerwiec, Andrzej Rzepka
Pedagogical University of Cracow, Poland
bjancarz@wp.pl, potyrala2@wp.pl, karolinaczerwiec@gmail.com

Abstract

The research design was created on the theoretical backround connected with the media, social change and prosumerism.Mass media combined with other transmitters, creating infrastructure metaphorically defined as 'information highway' or 'information superhighway' (Green, 1999). Development of new media and social media and the educational needs of C generation (Tapscott & Williams, 2007) open quite new research perspective in the field of teaching and learning. Learners are knowledge prosumers (Levinson, 2010), their attitudes toward knowledge must be taken into account (Kozinets, 2012).

It was assumed that students, the members of C generation perceive the Internet and Web Social Network as a natural environment for teaching and learning. It is was also assumed that there are the differences in their attitudes towards real knowledge.

The study of different attitudes and behaviour during learning and problem-solving in Web Social Network was conducted on a group of young people aged 13-19 years (high junior school and high school). The diagnostic survey questionnaire containing six questions was used. 173 respondents participated in the research.

STUDENT ACHIEVEMENT IN SCIENCE AND INFORMATION AND COMMUNICATION TECHNOLOGY IN SCHOOLS: WHAT OECD PISA TELLS US

Andris Grinfelds
University of Latvia, Latvia
andris.grinfelds@lu.lv

Abstract

Information and communication technology (ICT) is important part of education system. The research question of the proposed presentation is: Does and how the achievement of 15 year old students is influenced by ICT resources in schools and intensity of ICT use at school and at home? The results obtained within four cycles of OECD PISA research program since 2000 have been discussed.

Expected outcomes are the following:

1. Overview of the results and main trends of implementation and use of ICT in instruction and comparative analysis of possible influence of ICT use on student achievement in OECD PISA cognitive domain of science.
2. Analysis of OECD PISA ICT indices and their relation with students' performance in PISA test science įtems.
3. Impact of frequent use of computers at school on students' achievement in OECD PISA tests.
4. Relation of computer use at home and students' achievement in OECD PISA tests.

All data is obtained within the OECD PISA 2000, 2003, 2006, and 2009. Standard set of instruments (school questionnaire, student questionnaire and test booklets) has been used to obtain data from the representative sample of schools.

Data stored in international OECD PISA database have been used for comparative analysis. Data processing is performed by SPSS software. Regression analysis of data is the main method of data processing.

USING OPEN SOURCE SOFTWARE IN TEACHING GEOGRAPHICAL INFORMATION SYSTEMS

Laima Berzina, Vitālijs Osadčuks
Latvia University of Agriculture, Jelgava, Latvia
laima.berzina@llu.lv, vtl@tvnet.lv

Abstract

Many Geographical Information Systems (GIS) software companies such as ESRI, Intergraph and others play an important role for GIS development. Also ArcGIS and Geomedia are mainly used in teaching of GIS in Latvia University of Agriculture (LUA). Both mentioned software are commercial and commonly used in industry. Recently a number of alternative free and opens source GIS software are becoming available. The functionality of freeware software (e.g. Grass, gvSIG, QuantumGIS, etc.) allows to use them in projects of moderate and high complexity where only commercial software was used. This makes necessary to consider the inclusion of open source tools to GIS teaching programs and evaluate benefits of replacing the expensive commercial products with free software.

The aim of the study is to evaluate the ways of teaching GIS in LUA and possibilities to use free and open source GIS software in the study process. Case study and survey of students' and teachers' point of view was performed during the analysis of problems via to adopting and integration of open source and free GIS software in the GIS studies.

ON POPULARIZATION OF SCIENTIFIC EDUCATION IN ITALY BETWEEN 12TH AND 16TH CENTURY

Raffaele Pisano
University of Lille1, France
pisanoraffaele@iol.it

Paolo Bussotti
University of West Bohemia, Czech Republic
paolobussotti66@gmail.com

Abstract

In this paper the relations between mathematics education and civilization in Italy between the 12th and the 16th century is proposed: the Abacus schools and Niccolò Tartaglia. These cases studies are significant because the events connected to them are strictly interrelated. We aim to describe the ways through which mathematical knowledge was spread in Italy between late middle ages and early modern age. We are convinced that the knowledge of such significant relations between society, mathematics education, advanced mathematics and science can be useful for the scholars.

NATURAL PERIODIC PROCESSES IN SCHOOL SCIENCE COURSES THE METAMETHODIC ASPECTS

Anatoly V.Turlov
St. Petersburg City Palace of Youth Creativity
tavsui@mail.ru

Sergei V.Teleshov
State school № 635, S.-Petersbrg
histmetodik@mail.ru

Abstract

This article presents the history of the study of various periodic processes, related to physics and chemistry. A significant contribution to the study of oscillatory processes have made by German scientists from the 19th century. Then, the initiative passed to the scientists of other countries. For a long time it was thought that the vibrational response - it's just only a figment of the imagination. The greatest scientists have denied the possibility of their existence. Unfortunately, this was due to an incorrect interpretation of the second law of thermodynamics. The situation changed dramatically after the work of A.Zhabotinsky and his colleagues. Now, the reaction of this type are called «BG-reaction». Oscillatory movements even as physics course is replaced by natural sciences, are there proper place. This article deals with the review of different types of oscillating processes on metamethodic level. Modern computer technologies allows graphic images of oscillatory processes. However, students need to make sense of the image according to mathematical calculations and try to make the right conclusions. Use the metamethodic approach is the way to success. We are of the view that the task of the school is not to teach one or the other branch of knowledge, but to teach the scientific method.

ONTODIDACTICS OF PHYSICS – PAST, PRESENT AND FUTURE

Andris Broks
University of Latvia

andris.broks@lu.lv http://blogi.lu.lv/broks/

Abstract

Along with very popular and progressive use of computer technologies in Education today we need also serious systemic changes within the content of secondary school physics as well as other Natural Science and Technology Education (NSTE) subjects.

Ontodidactics as general theory of principal innovative approach in education means development on new content and methodology corresponding to remarkable changes in our modern life.

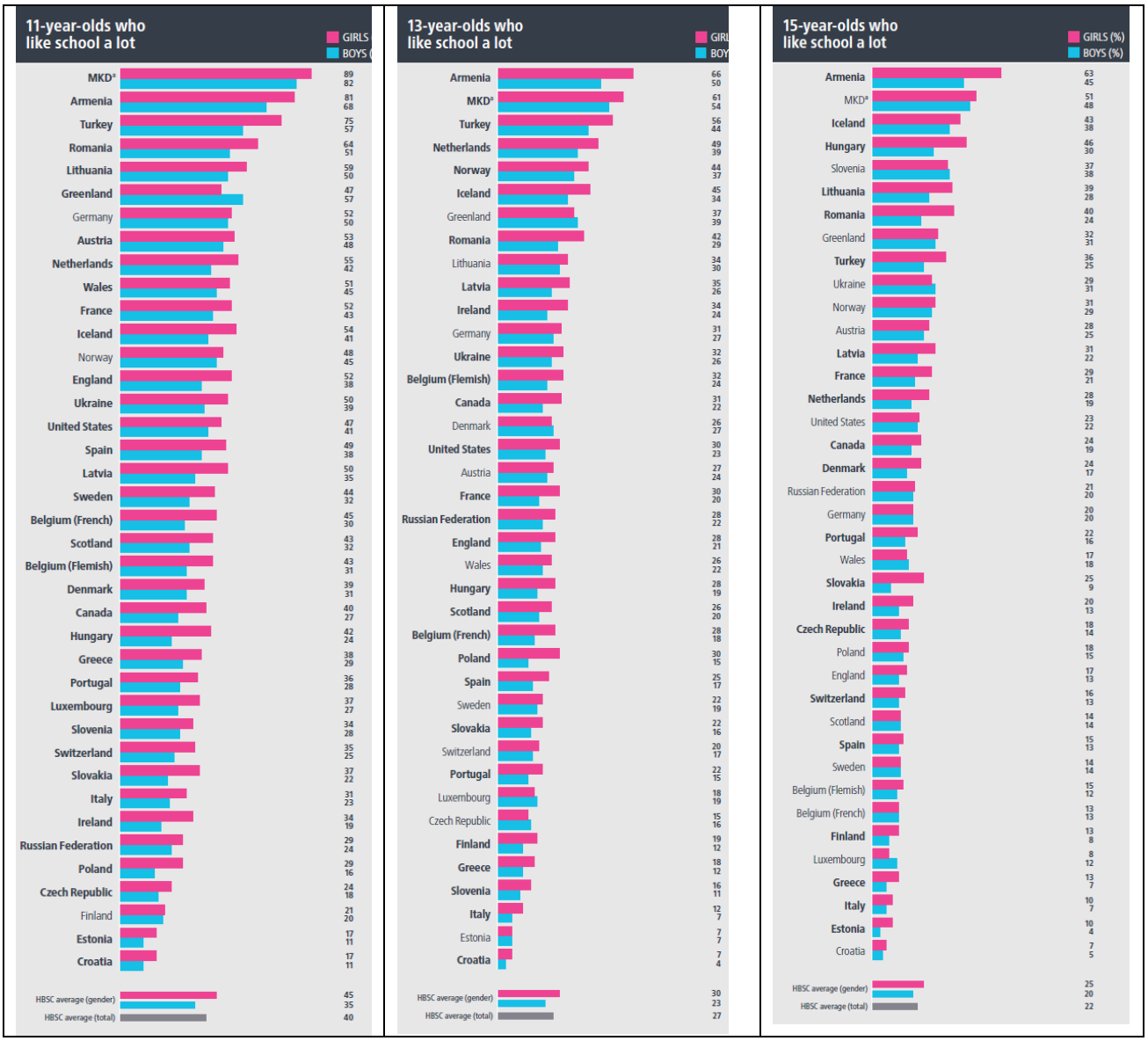
Philosophical and Psychological background of fundamental and applied scientific research must considerably innovate modern NSTE. General principles and main guidelines for Physics subject content reconstruction are reported and discussed.

TROUBLES AND CHALLENGES OF TODAY'S EDUCATION

Aberšek Boris
University of Maribor, Faculty of Natural Science and Mathematics, Slovenia

Abstract

More and more countries are on the school field focuses on the measurement and monitoring of the quality of education (OECD, 2010). The need for a change in the paradigm of school and not just minor adjustments becomes conscious of the fact that it is not, however, easy and a great step, but time consuming process. Below is some data of student's opinion about school.



SCREEN HANDWRITING AND SCREEN SHARING IN TEACHING CHEMISTRY

Uladzimir Slabin

University of Oregon, USA

Abstract

Nowadays, distance education increasingly includes science and, in particular, chemistry. To effectively teach the subject and to minimize teacher-student alienation that arises from computer mediation, screen handwriting and screen sharing are the key moments of science education. The presentation features them on example of some chemistry topics using websites, AppleShare, Skype, and Second Life.

THE SITUATION OF THE ICT USING IN THE SLOVAK AND CZECH SCHOOLS

Milan Kubiatko

Masaryk University, Faculty of Education, Brno, Czech Republic
mail: mkubiatko@gmail.com

Abstract

Information and communication technologies (ICT) are nowadays inseparable part of education process. Teachers use them for the preparation of learning materials and students use them for the gathering information about different topics and also other activities regarding to educational process. The different sources like articles in scientific journals, reports from the government and also reports from the nonprofit organizations show, the school are equipped by ICT. Teachers and students used ICT for the learning purposes; also the using of mobile phones for learning purposes is becoming common activity, more on the students' side in comparison with teachers. Teachers have got opportunities for next education in the using of ICT. There are more schools in Czech Republic, whose have got highly digitally equipped schools, which are characterized with fast broadband and high connectedness. Probably it caused by different political situation in both countries. It could be one of the factor, which influence the relatively difference in using of ICT at school in these two countries.

MODEL OF VISUALIZATION USAGE IN SCIENCE EDUCATION

Renata Bilbokaitė
Šlaiuliai University, Lithuania

Abstract

Objectivised phenomenon in science education and their elements, revealed for students in the homogenised visual form, stimulate development of the Subject consciousness within the context of learning. By stressing this, the use of visualisation during lessons of Biology, Physics, Geography and Mathematics becomes relevant not only philosophically – culturally, but psychologically as well. The perceiver is given especially simplified information of various dimensions, forms, colours, sizes and other characteristics, which activates the *perception* of learners, better and easier understanding of complex objects, *imagination*, which contributes in imagining and restoring objects and their interactions, invisible by other means, *attention,* helping to concentrate deeper to follow and to remember the information, as well as *memory,* which is obligatory for epistemic application of the gained knowledge in practice. The named psychological processes can be identified as *cognitive,* application of which affects the construction of more versatile mental models (Tasker, Dalton, 2008) in the memory, combining the verbal and visual schematic totality of codes, influencing the more effective assimilation of information of educational purpose as well as the formation of correct models in science education (Gilbert, 2008). It has been scientifically confirmed that application of visualisation during lessons of Biology, Chemistry, Physics, Geography and Mathematics leads to the higher interest of students in educational content and phenomenon of nature.

INQUIRY-BASED PHYSICS EDUCATION BY USING SCIENCE LEARNING SYSTEM *XPLORER GLX*

Violeta Šlekienė, Loreta Ragulienė
Šlaiuliai University, Lithuania
E-mail: fk@fm.su.lt

Abstract

In order to improve students' competencies of natural science must be consistent and systematic development of learning methods and strategies. Since Physics is an experimental science, the role of practical activities in physics education is very important. Experimental activities are one of the main Physics teaching/learning methods. One of these methods is inquiry-based learning, in which students answer research questions through data analysis. Computer-based data logging is a powerful strategy for the teaching and learning of physics. It helps to deliver a deep and meaningful physics education, increasing the interaction between the student and the concepts under investigation.

This article deals with Physics experimental works by using the Xplorer GLX on different levels (confirmation, structured, guided and open inquiry) of inquiry-based learning. The research methodology is based on the provisions of the constructivist education theory underlying the structured, guided and open explorations as an effective educational technology, which promotes a positive attitude towards science, helps to apply the acquired knowledge in different situations, develops higher-level thinking skills, encourages active learning processes.

Experimental activities use an inquiry-based approach, based on a small-scale research activity. through different levels of inquiry using science learning system *Xplorer GLX*. The aim of each experimental activity is to gain practical research skills, master research methods, learn how to work safely with the physical equipment, to collect, process and convey the results of experiment and link them to theoretical models, to make generalizations and conclusions. One phisics laboratory work (*Capacitor Discharge)* at the level II, as structured exploration, and level III, as guided exploration, using science learning system *Xplorer GLX* is presented. A key focus is on learning through collaborative work, supported by practical work. Students work together to collect & analyse data and present their results.