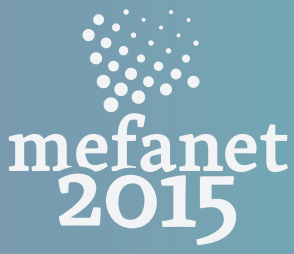
9th international conference
of Czech and Slovak faculties of medicine and health care sciences



November 25–26, 2015, Brno, Czech Republic

... TELL AND LISTEN TO THE STORIES
THAT EDUCATE, MOVE, AND INSPIRE ...

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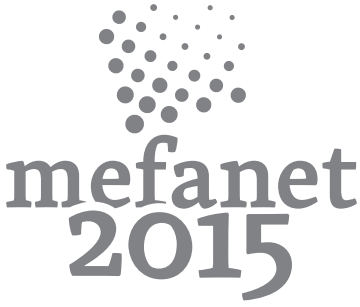

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... TELL AND LISTEN TO THE STORIES THAT EDUCATE, MOVE AND INSPIRE ...

mefanet 2015

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WELCOME WORD

Dear colleagues and students,

we are pleased to welcome you to the 9th year of the MEFANET conference, which brings together teachers and students of all medical faculties of the Czech Republic and Slovakia and experts in the field of medical informatics and electronic support of teaching. Besides the methodological and educational aspects of e-learning in the network of all Czech and Slovak medical faculties MEFANET (MEdical FAculties NETwork), this year conference will be again focused on the impact of this phenomenon on a specific field of medicine. For this year, the Programme Committee has chosen the topic: "Technology enhanced education in neuromedicine specialties".

Besides the standard lecture sessions, the conference programme includes two workshops as well. One of them (CROESUS.EU) is focused on scenario-based learning and the ICT tools for authoring virtual patients. The other one (AKUTNE.CZ®) will introduce the participants with interactive algorithms as useful tools for learning and teaching topics of acute medicine.

Two keynote lectures will certainly be attractive as well, since they will cover pedagogy (Ella Iskrenko-Poulton: "Scenario-based learning: what can it provide now for the learner, and how can we use it next ?") as well as technology and neuroscience (Fotis Liarokapis: "Examining Brain Behavior in Games and Virtual Environments").

We thank all participating speakers and authors of the conference proceedings contributions. It is our sincere hope that this conference will be a valuable resource for the MEFANET community and will inspire further research and development in the vibrant area of medical education science.

On behalf of the Programme Committee
Daniel Schwarz, Richard Barteček, Jiří Podlipný

On behalf of the Organization Committee
Daniel Schwarz, Martin Komenda, Jaroslav Majerník

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GENERAL INFORMATION

CONFERENCE VENUE

Best Western Premier Hotel International Brno
Husova 16, 659 21 Brno, Czech Republic
GPS: 49°11'41.55"N, 16°36'17.24"E

CATERING

Lunch is included in the registration fee and will be provided to all conference participants on 25 and 26 November 2015 in the foyer.

REGISTRATION OF PARTICIPANTS AT THE CONFERENCE VENUE

25 November 2015 from 12.00 to 17.00 h
26 November 2015 from 8.00 to 15.00 h

INFORMATION FOR AUTHORS

- Data projector and PC will be available to the lecturers.
- The lecturers are invited to test the technical equipment before the conference start or during coffee breaks.
- Technical assistance will be available for the whole time of the conference.
- A typical time slot for a contribution having the form of short communication is 12 min + 3 min discussion.

WE KINDLY ASK LECTURERS TO STAY WITHIN THE TIME LIMIT FOR THEIR PRESENTATIONS.

WEDNESDAY — 25 NOVEMBER

LUNCH	12.00
WORKSHOP AKUTNE.CZ®	13.00
COFFEE BREAK	14.30
WORKSHOP CROESUS.EU	15.00
COFFEE BREAK	16.30
MEFANET COORDINATION COMMITTEE OPEN MEETING	17.00
CONFERENCE OPENING & GET TOGETHER PARTY	19.00

FOYER

POSTERS

THURSDAY — 26 NOVEMBER

8.30	*MORNING COFFEE STARTER*
9.00	**E-LEARNING COURSES AND TEXTBOOKS**
11.00	*COFFEE BREAK*
11.30	**KEYNOTE LECTURES**
13.00	*LUNCH*
14.00	**TECHNOLOGY ENHANCED EDUCATION IN NEUROMEDICINE SPECIALTIES**
15.45	*COFFEE BREAK*
16.00	**TELEMEDICINE AND SIMULATIONS**
17.15	*CLOSING REMARKS, FAREWELL*
17.30	**MEDCIN PROJECT KICK-OFF MEETING**

FOYER

POSTERS

D1.1 AKUTNE.CZ®

Wednesday, 25 November, 13.00–14.30, Hall

CHAIRS: P. ŠTOURAČ

INTERACTIVE ALGORITHMS IN EMERGENCY MEDICINE TRAINING – CONCEPT, CREATION, APPLICATION

PETR ŠTOURAČ (90 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

D1.2 CROESUS.EU

Wednesday, 25 November, 15.00–16.30, Hall

CHAIRS: J. MAJERNÍK, T. POULTON, D. SCHWARZ

WORKSHOP ON TOOLS FOR VIRTUAL PATIENTS

JAROSLAV MAJERNÍK (30 MIN)

FACULTY OF MEDICINE, PAVOL JOZEF ŠAFÁRIK UNIVERSITY IN KOSICE

TERRY POULTON (30 MIN)

ST. GEORGE'S UNIVERSITY OF LONDON, INSTITUTE OF MEDICAL AND BIOMEDICAL EDUCATION, LONDON, UK

DANIEL SCHWARZ (30 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

D2.1 E-LEARNING COURSES AND TEXTBOOKS

Thursday, 26 November, 09.00–11.00, Hall

CHAIRS: O. ZAHRADNÍČEK, M. KOMENDA

A VIDEO-GUIDE TO SPECIMEN SAMPLING AND PROCESSING FOR MEDICAL MICROBIOLOGY FOR (NOT ONLY) FUTURE NURSES AND MIDWIVES

ONDŘEJ ZAHRADNÍČEK (15 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

CURRENT PROJECTS AND CHALLENGES AT MASARYK UNIVERSITY

MARTIN KOMENDA (15 MIN)

INSTITUTE OF BIOSTATISTICS AND ANALYSES, MASARYK UNIVERSITY

E-LEARNING SUPPORT FOR "HEALTHY KITCHEN" WORKSHOPS: INTRODUCTION TO SCIENCE AND CLINICAL NUTRITION

DANIEL RAJDL (15 MIN)

FACULTY OF MEDICINE IN PILSEN, CHARLES UNIVERSITY

CRYOBIOLOGY IN THE BLENDED LEARNING OF AN ELECTIVE SUBJECT FOR MEDICAL STUDENTS: THREE-YEAR EXPERIENCE

PAVEL MĚŘIČKA (15 MIN)

TISSUE BANK UNIVERSITY HOSPITAL HRADEC KRÁLOVÉ

THE FACULTY OF HEALTH STUDIES (THE UJEP) AND LMS MOODLE APPLICATION IN THE PROCESS OF EDUCATION

ZDENĚK ČEŘOVSKÝ (15 MIN)

JAN EVANGELISTA PURKYNĚ UNIVERSITY IN ÚSTÍ NAD LABEM, FACULTY OF HEALTH STUDIES

BASICS OF REFRACTIVE ERRORS CORRECTION METHODS — THE NEW INTERACTIVE LECTURE BOOK FOR EDUCATION NOT ONLY IN MEDICAL FACULTY MASARYK UNIVERSITY BRNO CZECH REPUBLIC

PETR VESELÝ (15 MIN)
FACULTY OF MEDICINE, MASARYK UNIVERSITY

UNIFICATION OF PRACTICAL TASKS ON BIOPHYSICS AND MEDICAL BIOPHYSICS AT THE THE FM CU IN BRATISLAVA

KATARÍNA KOZLÍKOVÁ (15 MIN)
INSTITUTE OF MEDICAL PHYSICS, BIOPHYSICS, INFORMATICS AND TELEMEDICINE, FACULTY OF MEDICINE, COMENIUS UNIVERSITY IN BRATISLAVA

D2.2 KEYNOTE LECTURES

Thursday, 26 November, 11.30–13.00, Hall

CHAIRS: L. LHOTSKÁ, D. RAJDL

SCENARIO-BASED LEARNING: WHAT CAN IT PROVIDE NOW FOR THE LEARNER, AND HOW CAN WE USE IT NEXT?

ELLA ISKRENKO-POULTON (45 MIN)
FACULTY OF INFORMATICS, MASARYK UNIVERSITY, HCI LAB

EXAMINING BRAIN BEHAVIOR IN GAMES AND VIRTUAL ENVIRONMENTS

FOTIOS LIAROKAPIS (45 MIN)
SCHOOL OF SCIENCE AND TECHNOLOGY, DEPARTMENT OF INFORMATICS & MASARYK UNIVERSITY, FACULTY OF INFORMATICS, CZECH REPUBLIC

D2.3 TECHNOLOGY ENHANCED EDUCATION IN NEUROMEDICINE SPECIALTIES

Thursday, 26 November, 14.00–15.45, Hall

CHAIRS: R. BARTEČEK, D. SCHWARZ

VIRTUAL REALITY ADDICTION TREATMENT

SVĚTLANA LEVOROVÁ (30 MIN)
FACULTY OF MEDICINE IN PILSEN, CHARLES UNIVERSITY, DEPARTMENT OF PSYCHIATRY, UNIVERSITY OF WEST BOHEMIA, FACULTY OF MECHANICAL ENGINEERING, DEPARTMENT OF INDUSTRIAL ENGINEERING AND MANAGEMENT

PARADIGM SHIFT IN TEACHING OF PSYCHIATRY AT MASARYK UNIVERSITY AFTER INTRODUCTION OF OPTIMED

RICHARD BARTEČEK (15 MIN)
FACULTY OF MEDICINE, MASARYK UNIVERSITY

MONITORING OF RISK FACTORS OF METABOLIC SYNDROME INCLUDING NEUROSONOLOGICAL EXAMINATION IN PATIENTS WITH SEVERE MENTAL ILLNESS

MARTIN HÝŽA (15 MIN)
FACULTY OF MEDICINE, UNIVERSITY OF OSTRAVA

MRI-BASED AUTOMATED MORPHOMETRY OF BRAIN FOR RECOGNITION OF SCHIZOPHRENIA

DANIEL SCHWARZ (30 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

APPLICATION OF TELEMEDICINE AND IMAGING SYSTEMS IN EDUCATION AT THE DEPARTMENT OF NEUROURGERY AND THE FUTURE OF EDUCATION AT FACULTY HOSPITAL ST. ANNE'S

IVO ŘÍHA (15 MIN)

DEPARTMENT OF NEUROSURGERY MFMU, FACULTY HOSPITAL ST. ANNE'S

D2.4 TELEMEDICINE AND SIMULATIONS

Thursday, 26 November, 16.00–17.15, Hall

CAIRS: J. HANUŠ

PERSONAL PORTABLE DEVICES AS ENABLERS OF DECISION SUPPORT

LENKA LHOTSKÁ (15 MIN)

CZECH TECHNICAL UNIVERSITY IN PRAGUE; CZECH INSTITUTE OF INFORMATICS, ROBOTICS AND CYBERNETICS

MODEL BASED VIRTUAL SIMULATOR WITH SCENARIO OF SURVIVING SEPSIS AS 3D GAME APPLICATION

JIŘÍ KOFRÁNEK (15 MIN)

FIRST FACULTY OF MEDICINE, CHARLES UNIVERSITY IN PRAGUE

LIGHTBOARD

FRANTIŠEK VANĚK (15 MIN)

FIRST FACULTY OF MEDICINE, CHARLES UNIVERSITY IN PRAGUE

WEB-BASED APPLICATION FOR AUTOMATED AND SOPHISTICATED GENERATION OF NATURAL LANGUAGE-WRITTEN PIECES OF MEDICAL DOCUMENTATION IN ONCOLOGY PATIENTS

LUBOMÍR ŠTĚPÁNEK (15 MIN)

DEPARTMENT FOR SCIENTIFIC INFORMATION, SECOND FACULTY OF MEDICINE, CHARLES UNIVERSITY IN PRAGUE

E-HEALTH, TELEMEDICINE AND ASSISTIVE TECHNOLOGIES IN BIOMEDICAL ENGINEERING EDUCATION

LENKA LHOTSKÁ (15 MIN)

CZECH TECHNICAL UNIVERSITY IN PRAGUE; CZECH INSTITUTE OF INFORMATICS, ROBOTICS AND CYBERNETICS

POSTER SESSION

25–26 November, Foyer

PRACTICEANATOMY.COM: ADAPTIVE PRACTICE OF ANATOMICAL STRUCTURES

JAN PAPOUŠEK
FACULTY OF INFORMATICS, MASARYK UNIVERSITY

EFFICIENT SOLUTION FOR WEB TECHNOLOGIES EDUCATION

MIROSLAV BURŠA
CZECH TECHNICAL UNIVERSITY IN PRAGUE, CZECH INSTITUTE OF INFORMATICS, ROBOTICS AND CYBERNETICS, PRAGUE

CTG TRAINER

VÁCLAV CHUDÁČEK
CZECH INSTITUTE OF INFORMATICS AND CYBERNETICS, CTU IN PRAGUE, OBSTETRICS AND GYNECOLOGY CLINIC, UNIVERSITY HOSPITAL, BRNO

PRETERM LABOUR — VIRTUAL PATIENT IN MIDWIFERY

EVA URBANOVÁ
JESSENIUS FACULTY OF MEDICINE, COMENIUS UNIVERSITY IN MARTIN

APPLICATION OF SIMULATION METHODS IN SENIOR EDUCATION

MÁRIA ZANOVITOVÁ
JESSENIUS FACULTY OF MEDICINE, COMENIUS UNIVERSITY IN MARTIN, DEPARTMENT OF NURSING

INNOVATIVE EDUCATION OF MIDWIVES VIA E-TEXTBOOK

SIMONA KELČÍKOVÁ
JESSENIUS FACULTY OF MEDICINE, COMENIUS UNIVERSITY IN MARTIN, DEPARTMENT OF MIDWIFERY

INTERACTIVE ALGORITHMS IN EMERGENCY MEDICINE TRAINING – CONCEPT, CREATION, APPLICATION

Guarantee: Petr Štourač, Hana Harazim, Martina Kosinová, Olga Smékalová, Roman Štoudek, Jozef Klučka
Faculty of Medicine, Masaryk University

D1.1 AKUTNE.CZ®

Anotation: Workshop participants will get acquainted with AKUTNE.CZ interactive algorithms as teaching tools for problem-based learning. They will get to know the basic principles of their development, and learn about useful tips and tricks to design such algorithms, including the application of multimedia. Participants will work in small groups to develop the basic framework of an interactive algorithm dealing with an emergency medicine issue. Each participant will have the opportunity to finish his/her topic during a subsequent cooperation, thus developing a complete interactive algorithm as a reviewed teaching tool.

Participant profile: fourth-year (or more advanced) medical student, doctor at the Faculty of Medicine teaching courses that involve emergency medicine issues.

Outcome: Workshop participants will understand principles of education based on AKUTNE.CZ interactive algorithms, get acquainted with basic rules of algorithm development and suitable topics, develop a basic framework of an interactive algorithm, be asked to develop an AKUTNE.CZ interactive algorithm based on his/her basic framework.

WORKSHOP ON TOOLS FOR VIRTUAL PATIENTS

Guarantee: Daniel Schwarz[1], Terry Poulton[2], Ella Iskrenko-Poulton[2]
1 Faculty of Medicine, Masaryk University
2 St. George's University of London, Institute of Medical and Biomedical Education

D1.2 CROESUS.EU

Annotation: This workshop aimed at tools for virtual patients will take place as parallel activity to the MEFANET 2015 conference. Although the event will be primarily intended for MU and UPJS participants, it will also be open for other MEFANET members. Workshop participants will be informed about tools used to create virtual patients. Furthermore, they will learn about CROESUS preferred VP implementation and its use across MU and UPJS, and subsequently all institutions participating in the MEFANET project. Relevant interactive activities and questions will be included in this workshop as well.

ABSTRACTS

A VIDEO-GUIDE TO SPECIMEN SAMPLING AND PROCESSING FOR MEDICAL MICROBIOLOGY FOR (NOT ONLY) FUTURE NURSES AND MIDWIVES

Ondřej Zahradníček, Filip Daněk, Iveta Michlíčková
Faculty of Medicine, Masaryk University

D2-1: E-LEARNING COURSES AND TEXTBOOKS

Keywords: *medical microbiology, specimen sampling, specimen processing, nurses, midwives*

The education of medical microbiology for nurses and midwives is one-semester block that consists of 15 hours of lectures and 15 hours of "practical sessions" that take form of a seminary and takes place in a lecture hall. For many technical reasons it is not possible to enable the students to participate on real practical material sampling, not speaking about laboratory work. The idea was to prepare a video-guide for them, leading them through not only sampling, but also material processing in the laboratory.

The original idea was mostly to make videos showing specimen sampling for microbiology, including filling-in the request form, that means techniques, needed data and all that is necessary to know for future nurses and midwives, that would in future participate on these processes. Later we decided to go further and to show not only specimen taking, but also the complete processing of the material in the laboratory. The reason for such decision was that we think that it is better if the students are not only trained "how to do it", but they are also enabled to understand "why we do it like this" and what follows. We are convinced that such approach may enhance the motivation to work with responsibility and to cooperate better with other professionals involved in the process, namely microbiologists and laboratory assistants. All work on the material was done in cooperation between Institute of Medical Microbiology, Faculty of Medicine, Masaryk University in Brno, and Service Center for E-learning on Masaryk University.

In cooperation tens of videos were taken at the Institute of Microbiology, and screen shots of laboratory information system were added to that to show the process in its complexity. After completing this, the individual parts were taken together and connected by texts. The work on the project is still in progress, but complete set of videos already exists to topics "nasal swab", "throat swab", "sputum", and nearly complete set also "skin swab/imprint" and "wound swab/imprint". The first of them is already prepared in the form of a guide made of text comments and videos. All the results will be prepared for study materials of corresponding subjects for spring 2016. After having first feedback and necessary corrections, we plan to transfer the materials to a separate platform as an e-learning material available also for other students and other subjects, maybe also as a part of Mefanet network.

We conclude, that a video-guide may act as a good tool to show and explain the topics that cannot be (for time or any other reasons) shown and trained practically. It may lead to better image of how the microbiology examination of clinical specimens is organized.

Acknowledgement: Service center work was supported by project CZ.1.07/2.2.00/28.0041.

CURRENT PROJECTS AND CHALLENGES AT MASARYK UNIVERSITY

Martin Komenda, Andrea Pokorná, Hana Kubešová
Institute of Biostatistics and Analyses, Masaryk University

D2-1: E-LEARNING COURSES AND TEXTBOOKS

Keywords: *elearning, medical education, technology ehnanced learning*

Modern information and communication technologies have been improving a quality of education. Innovations and developments in e-learning agenda have been undoubtedly changing a domain of higher education institutions. This contribution brings an overview of new projects and activities under the coordination of Masaryk University, which are focused on support of medical education.

We aim to present current projects at Faculty of Medicine, which are primarily oriented to enhance particular medical disciplines and fields of study. These projects were successfully accepted and founded on local as well as international level.

We introduce the following research activities and projects, which are solved in cooperation with teachers, senior experts and guarantors of medical education: (i) starneme-uspesne.cz, (ii) testovani.mefanet.cz, (iii) EVAMED, (iv) MEDCIN.

Thanks to the grant projects, we are able to face interesting challenges and integrate new features in medical education domain. We want to consolidate experiences from presented projects for future usage in the medical faculties network.

E-LEARNING SUPPORT FOR "HEALTHY KITCHEN" WORKSHOPS: INTRODUCTION TO SCIENCE AND CLINICAL NUTRITION

Daniel Rajdl, Dana Müllerová, Jana Langmajerová, Jana Dvořáková, Miroslava Čedíková, Petr Hošek
Faculty of Medicine in Pilsen, Charles University

D2-1: E-LEARNING COURSES AND TEXTBOOKS

Keywords: *healthy kitchen, nutrition, science, e-book, MOODLE, CEVA*

Nutrition and healthy lifestyle are systematically integrated into curricula at minority of medical faculties worldwide. On the other side, it is quite obvious that majority of "diseases of affluence" (obesity, metabolic syndrome, diabetes mellitus, atherosclerosis, tumours ...) are (at least partially) caused by unhealthy lifestyle. Healthy or teaching kitchen can be an effective environment for "hands on" teaching of different topics related to nutrition and cooking. With an e-learning

support practical teaching can be even more intensive and a wide range of other topics (e.g. critical thinking of "How to teach") can be attractively incorporated into this concept.

Our newly arranged teaching kitchen at Medical Faculty in Pilsen served as a teaching framework for practical workshops. For e-learning support e-books, presentations with voice-over comments and interactive quizzes incorporated into MOODLE courses were used.

We arranged 10 e-learning courses in 2 domains – Introduction to science and teaching (How to give a lecture, Basics of webinars, How to make a poster, How to write a scientific publication, Introduction to statistics in biological sciences, Medial techniques, Critical thinking); Healthy nutrition and lifestyle changes (Composition of food, Assessment of nutrition status and physical activity optimisation, Dietary intervention). Courses are freely available (in Czech language) at http://www.ceva-edu.cz (e-learning portal CEVA is dedicated to life-long education of nurses, medical doctors and other medical stuff). These courses were successfully integrated into practical workshops in teaching kitchen.

E-learning support can intensify educational process focused on gaining practical skills in healthy kitchen and successfully introduce a wide range of topics not directly associated with cooking and nutrition.

Acknowledgement: The project Popularizace UK II, reg. č. CZ.1.07/2.3.00/45.0028 is operated under OPVK programme and is co-financed by the European Social Fund and the state budget of the Czech Republic.

CRYOBIOLOGY IN THE BLENDED LEARNING OF AN ELECTIVE SUBJECT FOR MEDICAL STUDENTS: THREE-YEAR EXPERIENCE

Pavel Měřička[1], Lubomír Štěrba[1], Hana Straková[1], Pavel Navrátil[2], Barbora Honegrová[1]
1 Tissue Bank University Hospital Hradec Králové
2 Regional Transplantation Centre, Dept. of Urology Charles University in Prague, Medical Faculty Hradec Králové

Keywords: *Cryobiology, E-learning, Blended learning, Medical students*

The aim of this study is to evaluate experience with the cryobiology part of the e-learning course used in blended learning of the elective subject: Basis of Harvest and Preservation of Tissues. The Czech version of the course has been used since academic year 2013/2014, the English one since the academic year 2014/2015. The courses are used by students simultaneously with the classic face to face teaching/learning of an elective subject (6 hours of lectures, 6 hours of practicals, 3 hours of the final seminar).

The cryobiology part of the course consists of presentation and/or texts dealing with mechanisms of freezing damage and cryoprotection, cryopreservation of cell suspension, low temperature

preservation of tissues and organs including the quality and safety aspects of processing of cells and tissues. The part is followed with the short test containing 5 questions selected randomly from the bank of questions. The same bank generates also 5 questions included in the final testconsisting of 15 questions, but least 10 correct answers are required to obtain the credit. Each test can be repeated maximally twice. In the verification stage the following parameterswere evaluated: 1. The percentage of students who completed the course, 2. The percentage of students, who repeated the tests.

The course was verified in the group of 32 Czech speaking and 14 English speaking students from different countries (Greece 1, FRG 3, Ireland 1, Malaysia 1, Norway 2, UK 3). There was no difference i nthe percentage of students who completed the blended learning course (100% in both groups). The percentage of students, who repeated the test was however higher in the English speaking group (28.6%) than in the Czech speaking group (12.5%). No negative feedback from students was obtained.

The demonstrated combination of e-learning with the classic face to face teaching/learning proved to be a useful tool to teaching cryobiology. The results showed that the Czech version of the course does not need substantial changes, the English one needs, however some refining.

Acknowledgement: CZ.1.07/2.200/15.0164

THE FACULTY OF HEALTH STUDIES (THE UJEP) AND LMS MOODLE APPLICATION IN THE PROCESS OF EDUCATION

Zdeněk Čeřovský
Jan Evangelista Purkyně University in Ústí Nad Labem, Faculty of Health Studies

D2-1: E-LEARNING COURSES AND TEXTBOOKS

Keywords: *education, skills, moodle, information technology, e-course, e-learning*

The Faculty of Health Studies, the University of J.E. Purkyně in Ústí nad Labem offers the following bachelor's programs: health care and nursing, midwifery, physiotherapy and occupational therapy. The programs are available both in full-time and part-time systems. In addition to theoretical knowledge and practical skills covering their specialization field the students also gain useful knowledge in the field of information technology.

The faculty has been using Moodle as the e-learning system since 2011. Currently this educational portal (http://vyuka.fzs.ujep.cz/) uses Moodle 2.6.4+, but in the beginning it used Moodle 1.6.x.

E-learning course which is available for our students is divided into 12 topics. The topics contains: IT basics, hardware & software, basic principles of computer networks, Information resources and research databases, data archiving and the backups, presentations, MS Word text

editor, MS Excel spreadsheet. The danger of viruses, system recovery and other tools are included. It is also an introduction to the policy of licensing.

All the assignments and tests are performed in LMS Moodle. The students upload the task in the system, which is then evaluated by the teacher and the students are given the feedback including the comments. Some progress tests can be performed from home. There are 3 attempts with the requirement of at least 75% passing level. The course is set up with a sequential performance which opens other topics after study material skimming and test completing. The final test is taken in the computer lab at the faculty. It is in the form of twenty questions randomly generated for each student. The test includes various task types: filling, answer choosing, matching. The test is protected against any unwanted access by IP addresses (a computer lab) filtering, but also using a password. Immediately after sending the test each student is informed about the procedure outcome. The test is stored for the time limit of 30 minutes monitored by LMS Moodle.

The requirement for the test is at least 75% amount of correct answers.

During the summer semester of the academic year 2014/2015 when the course was last taught (our faculty offers IT courses mainly in summer semester), the students of three of the four study programs (midwifery program offers IT classes over two semesters, therefore in this course the participation of these students is not taken into account), 88 full-time students attended this e-learning course.

The author of this e-course has it also available in English, which is primarily designed for ERASMUS+ students visiting the faculty. This course offered in English is also available on the educational portal MEFANET.

BASICS OF REFRACTIVE ERRORS CORRECTION METHODS — THE NEW INTERACTIVE LECTURE BOOK FOR EDUCATION NOT ONLY IN MEDICAL FACULTY MASARYK UNIVERSITY BRNO CZECH REPUBLIC

Petr Veselý, Svatopluk Synek
Faculty of Medicine, Masaryk University

D2-1: E-LEARNING COURSES AND TEXTBOOKS

Keywords: *interactive electronic publication refractive error correction spectacles*

The refractive error correction is one of the main procedures in optometry and ophthalmology. So during the faculty lectures we give special importance to this topic. Our aim was to create interactive electronic publication and place it on web interface, which will be easily approachable for students, e.g. from mobile devices.

Thanks to cooperation with colleagues from MEFANET portal and s-techniques form Masaryk University we created interactive electronic publication, which contains except of traditional structuring into chapters also many schematic pictures and animations.

Students can use this publication for not only reading and learning, but they can also study schematic pictures and animations .

We hope that this interactive electronic publication will help to students to interconnect theory with practical exercises. In our conference presentation we are going to mention refractive error correction methods and possibilities of usage of the new interactive electronic publication including practical demonstrations.

UNIFICATION OF PRACTICAL TASKS ON BIOPHYSICS AND MEDICAL BIOPHYSICS AT THE THE FM CU IN BRATISLAVA

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D2-1: E-LEARNING COURSES AND TEXTBOOKS

Keywords: *university education, biophysics, practical training*

The pedagogical project "Innovation in the content, forms and methods of practical exercises of Biophysics and Medical Biophysics to the study of Medicine and Biomedical Physics" is aimed at improving the quality of teaching these and related subjects (courses) in the 1st, 2nd and 3rd degree of university education. The outputs of the project are intended to upgrade and modernise the practical exercises of Biophysics and Medical Biophysics for medic and paramedic students and practical exercises for students of Biomedical Physics studying in Slovak and English language.

The practical training in the mentioned courses is given during 12 weeks in the first winter term, 3 and 2 hours per week for General Medicine (GM) and Dentistry (D), respectively. In average, the courses are attended by 350 GM students and 40 D students studying in Slovak, 250 GM and 40 D students studying in English. The assessment of practical training – the accepted protocols – form 10 % of the grade in the final exam. Therefore, to achieve some objective evaluation we unified the practical training teaching as twelve lecturers are needed to be involved in.

Twenty-two tasks are divided into two areas, each involving eleven tasks; one of them is oriented more physically, the second more physiologically. The tasks concern measurement and evaluation of physical factors of working place, physical properties of liquids, optical methods of concentration determination, physical characteristics of the human body (anthropometry, spirometry, thermometry, physical analysis of hearing, visual acuity, functional diagnostics of cardiovascular system, biosignals analysis) and principles of modelling. Task documents are prepared in form of Excel files consisting of several sheets (working procedure, measurement sheet, the protocol itself, supplementary parts) and are available for the students at the homepage of our institute.

Every protocol consists of common parts (measurement conditions, the measurement itself, numerical, graphical and statistical evaluation according to the topic, discussion, conclusions, used literature). Based on these parts, points are assigned to each protocol and students have to

gather more than 60 % of the maximal amount of points in both task areas. The theoretical background is supported by literature available either at the MEFANET Portal of the FM CU (http://portal.fmed.uniba.sk/) or in printed form in both languages. Students have to enter the literature, from which they studied the theory into the measurement sheet before coming to the practical exercises for each topic. The "raw" measurement is entered into the measurement sheet, which is approved by the teacher "on-line" and forms an obligatory appendix of the submitted protocol. The protocols can be prepared either in electronic form or partially by hand. Students obtain points according to the protocol parts that are correctly fulfilled (data tables including basic statistical calculations, graphs drawn by hand, mentioned common parts). Bonus points are given for more complicated statistical evaluations and computer processed graphs. To check whether a student understands what is she/he calculating, control calculations form an obligatory part of the protocol.

Unification of practical tasks is one of the first steps how to upgrade and modernise the practical exercises of Biophysics and Medical Biophysics. It also helps to evaluate the student's work during the term and to give the grade not only for one day examination. Besides, the fact that students can prepare their protocols in electronic form is regarded as a way of training for working with electronic documents.

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SCENARIO-BASED LEARNING: WHAT CAN IT PROVIDE NOW FOR THE LEARNER, AND HOW CAN WE USE IT NEXT?

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Keywords: *Scenario based learning, simulation, education*

Scenario based learning (SBL) in medicine is the use of interactive simulations of real-life clinical scenarios for the purpose of medical training, education and assessment. SBL immerses the learners in situational simulations or learning experiences that mimic real life, and encourages students to take an active, integrated and inquiry-based approach to learning. SBL is a rapidly growing activity that can be presented in a variety of different forms, each designed for the learning and teaching of different skills, whether in mannequin simulations, computer-based virtual patients, games or virtual worlds. It is technology that provides the essential interactivity in SBL. Originally used to support active learning strategies in self-directed learning, and then problem based learning, it is increasingly used in several new learning activities that are themselves driven by eLearning technologies.

This presentation will consider the different types of SBL, and focussing on virtual patients (VPs), describe how VPs can be used in the modern context, new blended learning activities: flipped classroom; Team-Based Learning; Massive Open Online Courses (MOOCs). Finally this presentation with consider its impact on learner accessibility and personalisation, staff resources, and the cost effectiveness of these new approaches.

Results show that a strong gaming profile not only could possibly enhance the performance in BCI training through motor-imagery but it can also increase EEG rhythm activity. For body ownership correlations were found for ownership control and beta/ gamma band frequencies as well as agency control and alpha, beta, gamma and theta band frequencies.

Two fold conclusions from the above studies. Current results for games provide a first step into user-centered neuro-game design for platforms using eletro-physiological data as an input. For body ownership the same experiment will be performed in patients with schizophrenia and will be checked for correlations with the healthy subjects.

Acknowledgement: Service center work was supported by project CZ.1.07/2.2.00/28.0041.

EXAMINING BRAIN BEHAVIOR IN GAMES AND VIRTUAL ENVIRONMENTS

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Keywords: *Brain computer interfaces, computer games, virtual environments*

Brain–Computer Interfaces (BCIs) are communication systems which translate brain activity into control commands in order to be used by computer systems. This presentation will examine (a) the effect that prior gaming experience has at the brain pattern modulation as an attempt to systematically identify the elements that contribute to high BCI control and (b) if body ownership differs in real, virtual and augmented reality environments.

The methods used for experimentation are based on the provision of visual feedback (games or virtual environments) to healthy subjects. Data collection is based on classical human computer interaction approaches such as questionnaires as well as neuroscience techniques for recordings and analysing raw brainwaves.

Results show that a strong gaming profile not only could possibly enhance the performance in BCI training through motor-imagery but it can also increase EEG rhythm activity. For body ownership correlations were found for ownership control and beta/ gamma band frequencies as well as agency control and alpha, beta, gamma and theta band frequencies.

Two fold conclusions from the above studies. Current results for games provide a first step into user-centered neuro-game design for platforms using eletro-physiological data as an input. For

body ownership the same experiment will be performed in patients with schizophrenia and will be checked for correlations with the healthy subjects.

VIRTUAL REALITY ADDICTION TREATMENT

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Keywords: *virtual reality, alcohol addiction, virtual therapy, cue exposure*

We are presenting a training program based on the principle of cue exposure therapy in virtual reality. This program is being developed from scratch by a team from the Faculty of Mechanical Engineering of the University of West Bohemia and the Department of Psychiatry of the Faculty of Medicine in Pilsen.

The virtual reality application enables the clients who are being treated with alcohol addiction syndrome to be safely, but authentically and effectively, exposed to an alcohol themed stress environment – a virtual pub with alcoholic beverage consumation. This treatment principle is called cue exposure therapy. The clients are trained to withstand the alcohol consumption stimula even through intentionally induced craving. Advanced virtual reality devices like stereoscopic projection walls or head mounted displays combined with positional tracking devices will be used.

The "virtual pub" project is nearing first validations in real conditions. We needed to develop a replicable scenario for each exposition. This scenario was then analysed and processed into an assignment documentation for software development, respecting a methodology for developing virtual reality applications. A real-life pub was modelled. A brand new state machine based engine for controlling the virtual world and its objects was developed. Virtual human models including animations based on common Czech pub regulars. In final steps, a methodology for validation of the exposure was developed. The current status of the project is debugging. Real speech has to be recorded.

Virtual reality is a strong method in means of training, treatment and other various areas. Virtual therapies are already used in treatment of various health conditions, although only a few projects in addictology are known worldwide.

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PARADIGM SHIFT IN TEACHING OF PSYCHIATRY AT MASARYK UNIVERSITY AFTER INTRODUCTION OF OPTIMED

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D2-3: TECHNOLOGY ENHANCED EDUCATION IN NEUROMEDICINE SPECIALTIES

Keywords: *OPTIMED, psychiatry, pregradual teaching, virtual patients*

Introduction of OPTIMED – a dynamic platform developed at Masaryk University, aimed at enhancing orientation of students and teachers in the lessons - showed among others the importance of lesson content harmonisation across both theoretical and practical subjects in pre-gradual teaching of general medicine. This fact lead to a paradigm shift and major reorganisation of psychiatry teaching at Department of Psychiatry. The aim of this work is to describe differences between former and current methods of psychiatry teaching at Masaryk University, rationale behind the change, framework used in reorganisation, structure of lessons and current teaching methods.

Reorganisation was meant to impact whole psychiatry teaching from its theoretical roots, through methods of teaching, structure of lessons, to student assessment. Behind this change stood a major paradigm shift in considered purpose of psychiatry for pre-gradual general medicine students. Formerly students were required to mainly get specified amount of information about field of psychiatry, some of it being without direct practical use. Simplified curriculum for post-gradual education of future psychiatry specialists was used. Such approach was hardly useful for pre-gradual students. On the other side, new system is meant to teach students information and skills they will need as general practitioners meeting a psychiatric patient. Important focus is on acquiring information and learning to use them in management of psychiatric cases. In this effort OPTIMED platform was significant in defining specific learning outcomes and to demarcate learning units.

Psychiatric lessons are currently divided into three main types of lessons: theoretical seminars, case seminars and practical lessons. Each typical day student spend at Department of Psychiatry consists of all three types of lessons. Each day is focused on one group of diagnoses – one learning unit. The only difference are first two days which should give student basic information about general psychiatry, treatment and law in psychiatry. Theoretical lessons in general psychiatry are reduced. Practical lessons are meant to offer students contact with normal work-flow at psychiatric wards and to have experience with patients. During these lessons students are not meant to perform complex mental status examination, rather they should make brief patient assessment and observe changes in patient state. The main focus of case seminars is to connect theoretical knowledge with practical life and to teach students to solve different psychiatric cases. Different teaching methods can be applied: patient presentation with a discussion, virtual patients or both. Besides the OPTIMED platform, current teaching of psychiatry at Masaryk University utilises various parts of e-learning infrastructure.

Psychiatry teaching of pre-gradual students at Masaryk University recently underwent major change. Whole new system was designed and implemented. Important factor in its creation was OPTIMED platform. The whole system of psychiatric lessons is subject of periodical assessments with half-year and one-year frequency. Further refinement is driven by these internal assessments as well as possible student satisfaction surveys.

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MONITORING OF RISK FACTORS OF METABOLIC SYNDROME INCLUDING NEUROSONOLOGICAL EXAMINATION IN PATIENTS WITH SEVERE MENTAL ILLNESS

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D2-3: TECHNOLOGY ENHANCED EDUCATION IN NEUROMEDICINE SPECIALTIES

Keywords: *metabolic syndrome, risk factors, neurosonology, psychiatry*

In psychiatric patients, the increased incidence of cardiovascular diseases was observed compared to healthy population. Considering the severity of them and their significant impact on mortality level, the proper and regular monitoring is required.

Therefore, we prepare a program of such monitoring that will be provided in new day care center. All the patients entering the center will be included, primarily those with severe mental illnesses (schizophrenia, major depressive disorder, bipolar disorder) after inpatient care.

Our project is based on programs that are already used – S.O.M.A. project and a web site www.apsafety.eu. The S.O.M.A. project was developed in Psychiatric hospital in Praha Bohnice and it is a screening of cardiovascular and metabolic risk factors, that automatically counts the real risk in a Hippo computer program.

A web site Apsafety is an internet modul developed for monitoring safety in long-term treatment with antipsychotics. According to these guidelines we will monitor blood pressure, abdominal obesity (BMI, WHR), fasting blood glucose and lipid levels, smoking, age and physical activity. A program for automatic evaluation is under development. Special recommendations for individual risk quantifications are discussed.

The Itareps program is also briefly mentioned as an important part of outpatient keeping. It is unique program (Information Technology Aided Relapse Prevention in Schizophrenia) developed in Prague Psychiatric Centre that automatically watches over patient's warning signs of relaps, sending regularly questions on their cellular phones.

The uniqueness of our project is in joining the two methods for monitoring the cardiovascular state of a patient in general high risk. The above mentioned automatic screening will be supplemented by neurosonological examination, both intracranial and extracranial. The method is under development in our department and the usage in psychiatry is completely novel and very perspective. We are able to evaluate directly patient's cardiovascular system and influence in preventing further severe somatic comorbidity.

Patients with severe psychiatric disorders are in high risk to die prematurally for a number of reasons. Our project of a new day care center aims to prevent relapse and improve a quality of life. We will also monitor the cardiovascular and metabolic risk to minimize such adverse effect in a moment they are quite easily resolvable. Information technologies are part of a process of evaluation the risk.

Acknowledgement: Supported by grant from Norway

MRI-BASED AUTOMATED MORPHOMETRY OF BRAIN FOR RECOGNITION OF SCHIZOPHRENIA

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D2-3: TECHNOLOGY ENHANCED EDUCATION IN NEUROMEDICINE SPECIALTIES

Keywords: *biomedical engineering, magnetic resonance imaging, neuroimaging, computational neuroanatomy, machine learning, brain morphometry, schizophrenia*

Psychiatry, biomedical engineering, neuroimaging and biostatistics are some of the many sciences active in brain research.

The contribution will firstly render a summary on the current state of the art of image registration and pattern recognition techniques applied in neuropsychiatric research. The second part will describe the original algorithms for recognising first-episode schizophrenia patients from healthy controls. The various approaches to classification or prediction tasks include automated whole-brain morphometry of magnetic resonance images and the methods of supervised learning with ensemble strategies.

The presented results, obtained from a dataset, collected during a prospective observational study of first-episode schizophrenia patients, will be discussed in the light of the findings published in recent literature.

In the specific area of mental disorders, the move from biomedical engineering research towards clinical practice will have to be supported with other interdisciplinary collaborations, in order to obtain the pathophysiology of the disorders at multiple levels from cell, brain, to behaviour.

Acknowledgement: This research is supported by the AZV MZ CR project No. 15-25710A "Individual dynamics of glycaemia excursions identification in diabetic patients to improve self managing procedures influencing insulin dosage".

APPLICATION OF TELEMEDICINE AND IMAGING SYSTEMS IN EDUCATION AT THE DEPARTMENT OF NEUROURGERY AND THE FUTURE OF EDUCATION AT FACULTY HOSPITAL ST. ANNE'S

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D2-3: TECHNOLOGY ENHANCED EDUCATION IN NEUROMEDICINE SPECIALTIES

Keywords: *telemedicine, videoconferencing system, neurosurgery*

The idea of using videoconferencing systems and multimedial elements for teaching students at the Masaryk University, Faculty of Medicine and BUT as well as in postgraduate education of MDs and doctoral training arose as early as in 2004, in conjunction with the newly established workplace of the Department of Neurosurgery, Faculty of Medicine MU and Faculty Hospital St. Anne's in Brno. The concept of theORs and the surgical wing was influenced by direct mutual communication between students and teachers. This kind of knowledge coming out of the education of students at the Department of Neurosurgery was applied during the process of planning the systems in the surgical wing of the newly opened Pavilion of Intensive Care Medicine, which was inaugurated as a part of Faculty Hospital St. Anne's in October this year. Students will have the oportunity to watch surgeons and to communicate with them, whichever of the 12 ORs the surgeon will be, in FULL HD quality.

In 2004, two Polycom SD videoconferencing devices were purchased for educational purposes, which provide two-way visual and verbal communication between the OR and the teaching room. Neurosurgeons got used to the new techniques of education step-by-step. Transmissions of surgeries to farther places, in terms of congresses and workshops, followed. In 2009, two Polycom HDX 8006 systems and a 58" Full HD Panasonic plasma display was purchased from the resources of Faculty of Medicine, MU. The Polycom HDX8006 device replaced the original videoconferencing equipment and upgraded the picture quality to FULL HD. At the same time, the original SD endoscopic system in the OR was replaced by the FULL HD Aesculap. Later on, the upgrade of the operating microscope to Zeiss Pentero 900. In the newly established premises of the Pavilion of Intensive Care Medicine, all the video management items are already fully integrated. In each OR, there is an a EIZO 47" preview display embedded in the wall, next to which is a touch-screen controlled Smart surgery video-management & routing system with an integrated controlled video-switch of any video input to any video output and a control unit for setting up the connected peripheral devices, including connection points for a videoconferencing system. The accessory arms of the surgical lights are equipped with a FULL HD Simeon camera to observe the operating field. Accessory SD and HD video inputs are placed on the walls as well as on the surgical and endoscopic ceiling mount stands in the ORs.

The teleconferencing techniques were repeatedly used for example for undergraduate education of students of the 5th year of the Faculty of Medicine, MU, within the surgery course. It is possible to watch the image from a surgical microscope, an endoscope, a navigation planning station and a C-arm modality. The direct communication with students enables to carry out neuroscience

courses in a direct connection with the OR possibilities. Another teacher is present in the teleconference room to present the theoretical details of the surgery to the students. The questions asked by the students can be asked both by the surgeon and by the teacher. In the terms of postgraduate training, teleconferencing is used for teaching doctoral students and young MDs prior to an actual surgery in the OR.

The spatial capacity of the operating room is still limited and the economical aspect and safety measures when even small groups of students are present in the operating room cannot be neglected. Moreover the amount of information in neurosciences, including neurosurgery is continuosly growing. Therefore this concept of multimodality education further augments the effectivity of the educational process. Our Department of Neurosurgery has been concerned with the development of an educational system for 11 years. The educational process and the use of telemedicine were refered to at national conferences and they also became a topic of a poster presented for example at the 20th International Computer Assisted Radiology and Surgery Congress and Exhibition in Osaka, Japan, 2006.

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PERSONAL PORTABLE DEVICES AS ENABLERS OF DECISION SUPPORT

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D2-4: TELEMEDICINE AND SIMULATIONS

Keywords: *decision support, mobile technologies, telemedicine*

Currently, mobile technologies in general as well as particular pieces of technology like sensors, sensor networks, and other micro and nano technology based devices already enable the collection, pre-processing, and communication of a vast amount of data about individuals. This multi-parametric data can include physiological measurements, genetic data, medical images, and laboratory examinations. The information spans data and sensor fusion through to the concept of the Virtual Physiological Human (VPH) as an overarching model used to correlate this diversity of information.

Mobile devices and applications are now ubiquitously available. They form the technological basis for creating intelligent devices, and service provision wherever and whenever can combine to offer permanent and reliable availability. We can distinguish at least three large groups of applications and respective levels of systems.

1. systems and devices that can be summarized as recommendation and suggestion systems, which are systems and devices we can find, for example, in the area of well-being and fitness, and which serve mainly for informing the users / clients about their health status;

2. decision support systems – which serve as guidance for professionals and experienced users, like chronic patients on the one hand and active athletes on the other;
3. decision making systems – which contains systems and devices that are directly linked with actuator part influencing patient health by that way making decisions automatically or at least semi-automatically depending on, e.g., the severity of recorded and analyzed vital signs.

Additionally it is the human factor that is most significant, as the first two groups of applications require, and rely on, the interaction of a human being with a system, a machine, a device or an application.

The main topics that decision support and decision making algorithms and related applications are faced with today and tomorrow are focused on the above mentioned three levels of systems containing personal portable devices, MDD-compliant devices, and other applied device types. Once again, it is the group of recommendation and suggestion systems as the basic level mainly helping the user to make a decision; it is the group of decision support systems providing the professional user with a conclusion derived from recorded and analyzed data but leaving the decision to the user; it is eventually the group of decision making systems, like robotic system as well as semi-automatic or even fully automatic control systems that do not only derive conclusions but which actively influence care processes.

In designing devices it is vital to consider compliance with standards in general, and with the European Medical Device Directive (MDD) in particular. The devices in second (decision support) and third category (decision making) are mostly required to fulfil the MDD requirements whereas most of the category 1 devices are not. Being MDD-compliant is essential for a device if it forms a major part of the basis for making decisions about someone's health.

Decision support and decision making based on applying advanced ICT in terms of micro and nano technology devices like sensors, actuators, and respective (wireless) body area networks (WBAN) will advance in the future. This paper aimed at giving a brief introduction into some of the most important technical challenges that may occur when introducing such devices in the form of Personal Portable Devices (PPD) and their capability to collect and record personal health data into processes of recommendations, decision support, and decision making in health care and welfare. It tackled aspects like the Medical Device Directive (MDD) as well as devices that are compliant with MDD and those that are not.

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MODEL BASED VIRTUAL SIMULATOR WITH SCENARIO OF SURVIVING SEPSIS AS 3D GAME APPLICATION

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D2-4: TELEMEDICINE AND SIMULATIONS

Keywords: *scenario based simulator, model based simulator, gamification*

Applying virtual reality to medical education was showed to be effective as with learning with a patient. Virtual patient are used as physical simulators – figurines which are driven e.g. by scenario or by model, or combination of both. Another type of virtual patients can be delivered as software simulators – figurines are presented only as visualization and driven again by scenario, or model or by both.

Our team developed recently set of tools, frameworks to integrate complex model of human physiology and selected scenario into a 3D visualization and interactive game engine. A scenario of surviving sepsis was implemented as a first application able to be executed on Windows 8 platform.

Modelica is equation based and acausal modeling language maintained by open Modelica association and it was shown that simple as well as complex models are maintainable and understandable for different domain experts. Physiomodel represents the latest version of the complex model of human physiology based on the original work of HumMod implemented in Modelica language and library for modeling physiology Physiolibrary.

Unity 3D is a multiplatform game engine which can be controlled e.g. from .NET programming platform. In recent years we have developed a Bodylight platform to integrate the Modelica models into simulators controllable in .NET programming platform. The virtual patient instances can be executed separately, or can be controlled via a teacher's module which consist of .NET web services allowing to communicate and control virtual patient instances and a HTML and Javascript application as a frontend for teacher in class.

Surviving sepsis scenario was adapted from recent node-based games from Akutne.cz with enhanced of other modalities, like 3D virtual space, monitor, explanatory part. A student is guided through complicated case. In each step a decision is visualised in 3D scene with possibility to switch to complex model browser to see the state variables and dynamics of Modelica model simulation. Teachers module visualizes instances of virtual patient and shows nodes which were selected by students and gives opportunity to individually consult the steps or not correct selection.

This contribution presents a combination of scenario based and model based simulators with 2D and 3D graphics visualization which makes such concept attractive for learning on virtual patients.

The advantage is also that the models and scenarios are open, thus can be critically reviewed by current knowledge about simulated scenario, which is not true for majority of current hardware virtual patients, where the model implementation are generally protected know-how.

The software simulators of virtual patient can be used as cost-effective preparation of students for real hardware virtual patient training and for clinical praxis.

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LIGHTBOARD

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Keywords: *lightboard, LED, chalkboard glass*

Lightboard is a transparent glass chalkboard. It allows you to create tutorials and presentations clips. It combines natural front view of the speaker/lecturer with his commentary and additional graphic elements. Presentations are created simply, there is no need post-production.

Lightboard author is prof. Peshkin from Northwestern University. Lightboard principle was published in 2013 and its construction released for public use (open source hardware). Lightboard

Lightbordu principle is based on the fundamental physical properties of glass – reflection and refraction of light.If light strikes the interface of glass and air at a smaller angle than the critical angle, total reflection occurs inside the glass.Lightboard is charged with light. When the beam encounters the glass wall at the place where it is on the outer side material with a different refractive index (e.g. trace of the liquid chalk pen), the beam of light reflected from this point and leave the glass plate. This position from the outside appears as "luminous".

At this moment, we have built a test version of lightboard. We chose a design with a steel frame (price, solidity), lighting is by LED strips. The connection of the camera image and the graphic presentation is done by a software mixer. During the construction and basic testing, we found many small structural and operational deficiencies that may affect the final quality of the clip. Currently we optimize the type and direction of lighting the presenter. We are looking for the perfect pen (type, thickness of the tip, suitable colors). We would like to test the possibilities of online keying of lecturer background.

We verified that described the principle of "light-charged glass plates" is useful for creating AV clips. It opens us to the huge variety of applications: creation of short educational videos (e.g. A description of pathological parts RTG/CTG records, explanation and derivation of chemical equations etc.), creating eye-catching PR-clips, graphically interesting summary of projects and research studies.

Acknowledgement: Supported by grant from Norway

WEB-BASED APPLICATION FOR AUTOMATED AND SOPHISTICATED GENERATION OF NATURAL LANGUAGE-WRITTEN PIECES OF MEDICAL DOCUMENTATION IN ONCOLOGY PATIENTS

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D2-4: TELEMEDICINE AND SIMULATIONS

Keywords: *computer-assisted medical documentation reporting, medical decisions-making systems, R, ShinyApps, computer-suggested guidelines and protocols, natural language processing*

Managing and administration of all medical documentation arising from a hospitalisation of a patient is indisputably time-consuming and exacting everyday activity of all medical professionals involved in routine medical practise, not only in oncology. We tried to face the complaints of growing amount of medical documentation needed to be administered per patient and per day of her/his hospital stay in terms of working out an online application that enable oncologists to input basic pieces of information about the patient, i.e. gender, age, oncology diagnosis etc. and then to automatically get elemental pieces of medical documentation written in formal Czech medical language and corresponding to the outlined oncology treatment plan, based on appropriate guidelines.

Medical documentation is usually written in natural language. However, most kinds of medical documentation in the course of time have got their expected structure how it should be formulated and phrased. These key properties on the one hand enable to mechanically "read" some pieces of medical documentation in order to process them, and on the other hand they enable to automatically generate some other pieces of documentation, both with the aid of a computer. Our application contains several online free-available modules so that each of them deals with a specific kind of input or output pieces of medical documentation. The core of the application is based on programming code written in language R. The R is a free software language and environment for (not only) statistical computing and graphics. Code snippets of the application were written offline in R environment and then uploaded online using ShinyApps open-source package, also written in R. The application interface is written in Czech because the decision models and guidelines applied in the application are designated for Czech oncologists. The ways how the application deals with its input written in natural language are based on common approaches such as statistically frequently occurring n-grams of specific terms etc. Every word with typo in input piece of documentation is replaced by a matching vocabulary term which shares the least approximate string distance with the word.

The project is still in progress and could be improved or updated anytime. So far we have got to work a version of the application dealing particularly with oncology patients suffering from head and neck cancer. Current version of the application is available on www.shinyapps.io server; interface is user-friendly and follows common features of contemporary computer architecture. We expect the way of usage of the application as follows – at the input there should be patient's basic data such as a gender, age, oncology diagnosis, "one-sentence" history of present illness, for instance: "A 69-year-old patient suffering from hypopharyngeal cancer, indicated for radio-chemo-therapy, undergoing the PEG placement tomorrow." and chief complaint worded for example the following way: "throat pain for last two months, weight loss.". A natural language at the input is inevitable and therefore expected. An optional, but suggested part of input is a case history of the patient and extended history of present illness describing staging results, imaging reports etc. At the output, there are suggested hospital-course records, treatment plans and reports, medical request forms and discharge summaries, all formulated in natural medical language. All these pieces of medical documentation are ready to be manually checked by a physician and can be cut and pasted into appropriate medical record-platforms of commonly used hospital information systems.

It is evident that medical doctors, not only oncologists are coming under increasing pressure requesting perfect administration of any kind of their medical reports. A utilization of an open-source programming language R in order to develop web-based application automatically outputting well-formulated natural language-written pieces of medical documentation could not only improve effectiveness of daily practise of clinical oncologists and save up their time avoiding them writing the documentation all over again and again, but also could educate medical students or graduates in the sense of how to write their medical reports as nifty and correctly as possible.

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EHEALTH, TELEMEDICINE AND ASSISTIVE TECHNOLOGIES IN BIOMEDICAL ENGINEERING EDUCATION

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D2-4: TELEMEDICINE AND SIMULATIONS

Keywords: *ehealth, telemedicine, assistive technology, education*

Recent years have brought very fast technological development, in particular in mobile technologies, smart systems, telemedicine, information and communication technologies. Health care information systems at all different levels are in routine use. However, there are still application

areas, which need more attention, in particular because of different types of end users. Many developed applications in the areas of mobile technologies, smart systems and telemedicine can be successfully used as support for elderly and disabled persons. However, sometimes the control of the systems is too complicated and thus they are not so well accepted by potential users. Currently there is a lack of graduates having interdisciplinary education in the fields of electronics and information and communication technologies and simultaneously focusing on the whole complex of practical needs of applications related to the above mentioned areas.

Many solutions using mobile technologies and applied to medical and care tasks are based on the same technological principles and requirements. From this point of view we can consider eHealth, telemedicine and assistive technologies (eHTAT) similar. Thus the education content has common fundamentals. However, there are much higher requirements on interdisciplinary character of education that should focus on eHTAT principles and development and practical application of these technologies. Although there are already graduates in informatics that are able to develop implementations in eHealth and telemedicine, situation in the area of assistive technologies (AT) is completely different. It may be characterized in following way: there are no graduates specialized in AT; there is no complex educational program in AT; there exist a number of information barriers between disciplines that may be solved exclusively by consistent interdisciplinary integration; there exists social and objective demand for employees in AT; in the Czech Republic there are relatively numerous SMEs and institutions focused on AT that need graduates and support for life-long learning of current employees.

The main aim is increase of competence and qualification for the interdisciplinary area of AT. An important feature is consistent interdisciplinary orientation with the aim of optimum balance between theoretical and application content. Very significant element is focus on system integration which is not contained in current educational programs though being very important.

Currently the curricula in biomedical engineering are well defined. We have included eHTAT topics in several courses that are interconnected. One course is focused primarily on assistive technologies; mobile technologies and telemedicine topics are covered both in medical informatics and medical technology courses. We have to stress that one of the aims of biomedical engineering education is that the students understand that they develop new tools and systems for users who in general do not have engineering education. We want that the students really understand the practical problem and are able to see it from the user's perspective. Thus we have to bring them into contact with potential users. Or at least they should get the feedback how the users perceive the developed system or application. Transition to project-based education is the best way how to bring students and users together. The ideal situation would be to bring together students of different study programmes, in particular engineering and informatics on one side and health and social care on the other side. Namely, students of engineering and informatics will be the future designers, developers and producers of new technologies, and students of health and social care represent one group of future users who should be aware of the technological possibilities and the best ways how to introduce these products to their clients. Without understanding and acceptance of the technology on the side of care givers there will be lower acceptance at clients.

When focusing on engineering education, it may seem that all technologies described above are somehow covered by existing courses in electronics, informatics, telecommunications, etc. However, many students are lacking the system view on an interdisciplinary problem. In addition to purely technical courses there must be introduced courses that cover, for example, problems of handicapped people in case of assistive technologies. We strictly follow the idea of real-life

problems. The students have to use knowledge acquired in several courses and synthesize it in order to be able to solve the problem. If we can integrate them into interdisciplinary teams and let them work together with medical doctors and other professionals in hospitals, they acquire not only the necessary knowledge, but also practical experience how to work in such an interdisciplinary team.

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PRACTICEANATOMY.COM: ADAPTIVE PRACTICE OF ANATOMICAL STRUCTURES

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POSTERS

Keywords: *anatomy, adaptive practice, intelligent tutoring system*

Learning of anatomy includes memorizing of many anatomical structures, names, and their relations. Repetition is a common method of study to acquire this kind of knowledge. Online applications represent an interactive way of providing a student with educational textual and visual materials. Based on an analysis of users' data we can estimate difficulty of individual items and automatically provide their practice according to needs of a particular student, especially by the choice of proper difficulty. We present an application http://practiceanatomy.com (Czech version http://anatom.cz) using the method of adaptive construction of questions based on collected data.

The presented application provides users with anatomical diagrams coming from Memorix Anatomy and asks naming and recognition of anatomical structures (by Nomenclature Terminologia Anatomica). Using machine learning methods and collected data we estimate difficulties for practiced items and skills for learners. The estimate gives us probability the given learner knows the given item. Based on this probability and other available information, the system constructs suitable questions for practice, neither too difficult, nor too easy. This approach should lead to efficient learning. Finally, we can easily compare difficulty estimated by an expert (anatomist) and a model based on machine learning techniques using users' interactions and provide new insights into the subject matter.

We have successfully processed diagrams from Memorix Anatomy which allows the presented system to construct quite large number of varied multiple-choice and open questions and visualize learners' knowledge in an easily understandable way. Although the system is operating only for a short time period, its development is based on an existing application providing practice of geography (http://slepemapy.cz) which is quite often used during lessons at schools. Since this application has high and stable traffic, we were able to prove that the deployed methods positively influence users' learning and their motivation to stay within the system and keep practicing.

Machine learning methods incorporated into the online application PracticeAnatomy.com (Anatom,cz) helps the application to continuously adjust the difficulty of the questions practiced by learners. They have potential to enhance the user experience and shorten the time needed to learn the given topic.

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EFFICIENT SOLUTION FOR WEB TECHNOLOGIES EDUCATION

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POSTERS

Keywords: *it education, virtualization, web technologies*

Education of web and computer skills to (bio)medical students is often a problematic task. The students rarely have any basic skills in development. Therefore, to get them introducet to the area, we have to create a playground to make them safely play and learn with the modren technologies. We have therefore designed and developed a virtualization-based solution where each student is an owner and maintainer of a web server. This allows him to feel the responsibility for his server, understand the permises under which it works and actively explore the system. Moreover, the system is designed so that it is easily recoverable, accessible and error-safe.

Using current open-source and free technologies we have created a (KVM) virtualized system with about 30+ fully featured web servers running on a standard PC. Each of them acts as a single machine and can be initialized from scratch. Therefore the students can follow the administration work from the beginning – installation of the system. Further, they can (under supervision) install and configure various needed technologies (web server, database server, scripting processor, etc.).

The access to the servers can be made by many protocols, such as FTP, SSH, VNC, etc. Understanding (using) these protocols gives the students brief introduction in the IT world. During the course, various background tasks of the system administration are communicated, such as backup, monitoring, firewalling, etc.

The whole systems is designed for educational purposes and is able to run on a normal PC. Of course, dedicated fully equipped server would be a better solution, however for financial reasons we had to implement the solution on a PC. Another possibility is cloud rental. However, for financial reason this solution is neither feasible.

The particular outcomes are: (1) elaborated structure of theoretical course and presentations that forerun the practical course, (2) design and creation of individual practical assignments and their validation (function, validity, demands and time requirements), (3) motivational and

semestral projects to encourage the students to actively participate, and (4) dedicated virtualizad server infrastructure for the course where each student has its own virtual machine.

We have fully-functional virtualization system with impact on easy use, safety and with high educational value that can be freely used by the students. It allows them to understand basics of web technologies problematics. Moreover, by using our solution (and not 3rd party solutions, even though free) the students get insight into the background of such services.

It also teaches them responsibility and rational design and solution approach as each student is responsible for his/her own virtual server. Also, the fact that the virtual engine can be easily re-started, recovered is a crucial in relieving the stress of unknown technologies and experimentation.

Future work. Currently, the virtualization is based on KVM, however for the future, technologies as docker might be more feasible. Also, for some tasks, LXC containers would be more light-weight, however, these would not allow the students to get the experience of system install.

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CTG TRAINER

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Keywords: *cardiotocography, fetal heart rate, e-learning*

Cardiotocography (CTG) – electronic monitoring of fetal heart rate and uterine contractions – is available for half a century. Almost every pregnancy in our part of the world is monitored by CTG at least once during its course. The recently updated FIGO guidelines on intrapartum CTG evaluation assured its usefulness, yet in the same time CTG (and its imperfect interpretation) is cited as one of the main reasons for the increase of Caesarean Sections and also as the reason for problems of many adjunct technologies to prove its usefulness in clinical trials (see FM-ALERT study, US STAN-RT, both published 2015).

Within the presented project we have developed a web-based system for learning – and subsequent training and testing – of CTG interpretation, using expert knowledge as well as automated decision support system principles.

Drupal was used as the CMS platform adapted to work as a "hospital information system" providing clinical information. The CTG trace itself – the focal point of the project – is presented using JavaScript and several open-source plotting libraries used in order to make the user interface as user-friendly and as capable as possible.

The data for the project are based on the open-access CTG database published by the authors

previous year, and uses, anonymized, with the traces linked clinical information from the University hospital in Brno.

Finally the part of the application dedicated to the training/testing procedures is envisioned as a test-bed with the goal to homogenize evaluation of CTG traces within obstetrics department. It was developed in close cooperation with the clinicians of the University hospital in Brno. First the trainee should get an idea about the trace itself followed by understanding of its clinical consequences with the reasoned decision making process towards the next clinical steps.

We use web-based user interface to mimic displays of CTG monitors used at the delivery ward, with the possibility to measure, track and display various variables related to the CTG trace such as baseline, shape of decelerations or stress ratio in a dedicated window.

Additionally links to important documents useful for analysis – FIGO or STAN guidelines – are available to the user as well as access to other relevant on-line sources.

The goal is to reinforce understanding of the CTG traces by explaining and graphically highlighting reasons for possible alarms or alerts in the system.

Additionally to the visualization of the trace itself we present anonymized clinical information about the patient, the course of the delivery etc. Based on such information the testing phase of the application can simulate, to some extent, the real decision making process of the obstetrician/mid-wife present on site.

Within the testing phase the application asks questions about the CTG trace – leading to learning the terms used in the FIGO guidelines as well as about the clinical consequences of the trace and gives an opportunity to the trainee to select clinical decisions based on the additional data provided

Initial version of the web-application for the CTG training was presented and the main features have been described. The ultimate goal of the application is to create meeting point between the clinical experts and decision system algorithm developers in order to incorporate useful techniques of computerized medicine to the field of the CTG evaluation.

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PRETERM LABOUR — VIRTUAL PATIENT IN MIDWIFERY

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POSTERS

Keywords: *preterm labour, virtual patient, midwifery, education*

Preterm labour is defined as cervical changes and uterine contractions occurring between 37 and 24 (in American and French literature 20) weeks of pregnancy. The onset of preterm labour is often insidious and can be easily mistaken for normal discomforts of pregnancy. It is essential that midwives or nurses know how to detect early symptoms of preterm labour. Early recognition of preterm labour is important for midwives to implement interventions successfully.

The aim of this paper is presentation of project to create scenario of Preterm Labour as virtual patient in midwifery.

The basis of our work is a virtual patient available on the platform Open Labyrinth, which is primarily intended for medical students. This virtual patient is adapted to needs of midwifery. Virtual patient will be used for training only simple procedures in midwifery and therefore in the design we uses a simple linear structure of virtual patient.

The content is aimed on nursing assessment especially on risk factors for premature labour. Next, the nursing assessment is focused on the symptoms of premature labour e.g. gestational age, uterine activity, progressive cervical change etc. and managing of basic techniques in midwifery as fetal monitoring and monitoring of uterine contractions, application of peripheral intravenous catheter etc. The algorithm is logically processed step by step, including the rationale for correct and incorrect answers.

Virtual patient as well as this case of premature labour helps students to solve the case in laboratory conditions without stress. It complements practical training and helps to solve problematic situations in clinical practice.

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APPLICATION OF SIMULATION METHODS IN SENIOR EDUCATION

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POSTERS

Keywords: *university of the third age, simulation methods, seniors*

The current demographic trend points to the numerous representations of seniors in the population (16.2%) and according to that they become the specific target group with special educational needs. Active ageing is a vital strategy for the protection of the physical and mental health depending on the individual's ageing. University of the Third Age (UTA) is one of the possibilities with which modern society is trying to address the issue of free time activities of seniors and the range of their leisure activities. At the same time it contributes to compensation of deficits in their education, which is achieved by increasing their social importance and prestige in society. While educating the elders it is necessary to choose the right teaching methods with regard to developmental changes which bring physiological aging. Global trend of recent years in medical education is the use of simulation technology.

JMF CU, since September 2013, carried out studies for students with support of the UTA project "University of the Third Age – Active Ageing and information from the fields of medicine and medical study programs" ITMS project code: 26120130056.

One of the outcomes of the project is the implementation of innovative teaching methods and creation of special interactive UTA classrooms. Study within study programs "General Medicine" and "Elderly Care" allows students to better and more deeply know themselves in terms of health. Understand their health problems and actively apply appropriate procedures for the layman solutions. Simulation methods are used to bridge the theoretical preparation and clinical practice which bring into teaching elements of clarity and attractiveness. UTA is available for students at JMF CU in Martin in the simulation training center, which is equipped with models, trainers and simulators.

The aims of education of the elderly are prolonged working activity, a combination of elements of productive aging with a strong focus on quality of life, mental and physical fitness. Passing the UTA education program contributes to the formation of proper attitude to their health and healthy aging. To make learning in UTA more attractive and efficient it is recommended to use innovative teaching methods, especially practical learning and simulation.

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INNOVATIVE EDUCATION OF MIDWIVES VIA E TEXTBOOK

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Keywords: *E-textbook, midwifery, multimedia*

The goal of authors is to introduce a multimedia E-textbook that focuses on the area of methods used in the work of midwives that are composed of the newest trends from the perspective of nurse-midwifery. Multimedia textbook is a teaching aid of modern alternative teaching that complements traditional form of education. Our aim by way of E-textbook is to motivate students of nurse-midwifery to their study and subsequent acquiring of skills as well as to lead them to independency, creativity and responsibility.

For the preparation of E-textbook, we have used the software package "Flip Viewer Creator". Multimedia textbook will be published on the portal of MEFANET JLF UK in Martin and accessible to users of medical schools in Slovakia and Czech republic.

The content of the textbook is divided into 5 chapters that are focused on the following areas: antenatal care for pregnant woman, physiological birth, puerperium, care for newborn, examination methods in gynaecology and midwifery. Each chapter defines its goals at the beginning and it is divided into subheads that contains text section, graphical section (schemes, charts, graphs) as well as animation section that enables the user to illustratively understand the subject with the possibility to review pictures, photographs and videos. At the end of each chapter and within the feedback between student and subject of study, there are available tasks and autotest that enable students to test themselves in their awareness of respective issue. Each chapter is supplemented by listed literature. It is possible to go over the chapters and subheads by means of textbook pagination and structured menu. Didactic texts are previewed.

Composing of chosen topics of E-textbook could provide complex viewpoint on given issue, more illustratively understand the chosen topics, secure dynamic connection of theory and practice, create assumptions for obtaining necessary practical skills, contribute to innovation of educational methods, develep crtitical thinking in order to reach the desired knowledge level and make self-study more effective. Multimedia E-textbook decreases the dependency on the direct teaching and helps to solve insufficient personell and spatial capacities and so increases the efficiency of practical teaching.

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