

**8th international conference
of Czech and Slovak faculties of medicine**
*focused on e-learning and medical informatics
in the education of medical disciplines*



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2014**

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26-27 NOVEMBER 2014



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EDITORS



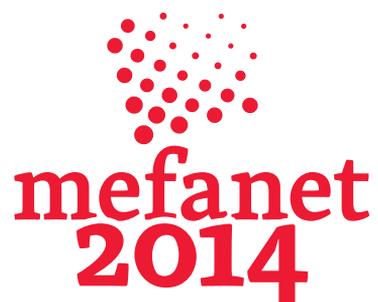
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WELCOME WORD

Dear colleagues and students,

we are pleased to welcome you to the 8th 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 learning and teaching in acute medicine”*.

Besides the standard lecture sessions, the conference programme includes several special sessions as well. One interactive session is focused on scenario-based learning and the participants will be introduced to the problems underlying humans' decision-making and its relations to clinical reasoning and virtual patients. A special symposium is devoted to the field of visual analytics and its relation to curriculum harmonization and management. The keynote lectures will certainly be attractive as well, since they will be given by lecturers from Karolinska Institutet, which consistently ranks among the top universities in the world on a number of prestigious ranking tables, and is currently the eighth best medical university in the world (topuniversities.com). An important space in the MEFANET 2014 program is provided by faculties focused on education in health care sciences and other paramedical specialities.

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, Ladislav Dušek, Stanislav Štípek

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 26 and 27 November 2014 in the hotel restaurant.

REGISTRATION OF PARTICIPANTS AT THE CONFERENCE VENUE

26 November 2014 from 7.30 to 16.00 h
27 November 2014 from 8.00 to 11.00 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 is 12 min. + 3 min. discussion.

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

WEDNESDAY — 26 NOVEMBER

REGISTRATION	7.30
MORNING COFFEE STARTER	8.30
CONFERENCE OPENING	9.30
KEYNOTE LECTURES	9.45
COFFEE BREAK	11.00
KEYNOTE LECTURES	11.30
LUNCH	12.15
SYMPOSIUM ON MEDICAL CURRICULUM HARMONIZATION (OPTIMED)	13.30
COFFEE BREAK	15.00
SBL IN MEDICINE: AUTHORIZING AND IMPLEMENTING INTERACTIVE VIRTUAL PATIENT SCENARIOS	15.30
COFFEE BREAK	17.00
E-ASSESSMENT	17.15
E-LEARNING	18.00
CONFERENCE DINNER	19.30

FOYER
POSTERS

HALL

THURSDAY — 27 NOVEMBER

8.30	MORNING COFFEE STARTER	
9.00	TECHNOLOGY-ENHANCED LEARNING AND TEACHING IN ACUTE MEDICINE	
11.00	COFFEE BREAK	
11.15	MEDICAL INFORMATICS AND INFORMATION SCIENCE	
12.30	LUNCH	
13.30	SERIOUS GAMES, SIMULATIONS AND MODELS FOR MEDICAL EDUCATION	
15.30	COFFEE BREAK	
15.45	ICT ADVANCES FOR EDUCATION IN HEALTH CARE SCIENCES	
16.45	COFFEE BREAK	
17.00		MEETING: MEFANET'S COORDINATION COMMITTEE FOR MEDICAL FACULTIES
	HALL	MEETING ROOM
	FOYER	
	POSTERS	

CONFERENCE OPENING, WELCOME SPEECH

Wednesday, 26 November, 09.30–09.45, Hall

CHAIRS: A. RYŠKA, D. SCHWARZ

CONFERENCE OPENING (15 MIN)

MASARYK UNIVERSITY

D1.1 KEYNOTE LECTURES

Wednesday, 26 November, 09.45–12.15, Hall

CHAIRS: A. RYŠKA, D. SCHWARZ

MEFANET — STATE OF THE UNION AFTER EIGHT YEARS OF NETWORKING

DANIEL SCHWARZ (30 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

TRANSFORMING HIGHER EDUCATION USING MOBILITY SOLUTIONS

SOKRATIS NIFAKOS (45 MIN)

KAROLINSKA INSTITUTET, STOCKHOLM, SWEDEN

VISUAL ANALYTICS IN MEDICAL EDUCATION

CHRISTOS VAITSIS (45 MIN)

KAROLINSKA INSTITUTET, STOCKHOLM, SWEDEN

D1.2 SYMPOSIUM ON MEDICAL CURRICULUM HARMONIZATION (OPTIMED)

Wednesday, 26 November, 13.30–15.00, Hall

CHAIRS: M. KOMENDA, S. NIFAKOS, C. VAITSIS

COMPREHENSIVE INNOVATION OF MEDICAL EDUCATION

JULIE BIENERTOVÁ VAŠKŮ (25 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

OPTIMED PORTAL PLATFORM IN PRACTICAL USE

MARTIN KOMENDA (25 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

ADVANCED DATA-ANALYTICAL REPORTS MINED FROM MEDICAL CURRICULUM MAPPING TOOLS

JAN ŠVANCARA (25 MIN)

INSTITUTE OF BIostatISTICS AND ANALYSES, MASARYK UNIVERSITY



D1.3 INTERACTIVE SESSION SBL IN MEDICINE: AUTHORIZING AND IMPLEMENTING INTERACTIVE VIRTUAL PATIENT SCENARIOS (CROESUS)



Wednesday, 26 November, 15.30–17.00, Hall

CHAIRS: D. SCHWARZ, T. POULTON, S. KAVIA

D1.4 E-ASSESSMENT

Wednesday, 26 November, 17.15–18.00, Hall

CHAIRS: V. DONIČ, L. BOLEK



FACING THE CHALLENGES OF ASSESSMENT THROUGH COOPERATION: THE UMBRELLA CONSORTIUM FOR ASSESSMENT NETWORKS (UCAN)

ACHIM HOCHLEHNERT (15 MIN)

UNIVERSITY OF HEIDELBERG, GERMANY

SELF-TESTING IN A PLAYFUL WAY

HELENA MICHÁLKOVÁ (15 MIN)

FACULTY OF HEALTH AND SOCIAL STUDIES, UNIVERSITY OF SOUTH BOHEMIA IN ČESKÉ BUDĚJOVICE

GAMETIX, A NEW SOFTWARE FOR MANAGEMENT OF MCQ DATABASES

DIMITROLOS KRAJČÍ

FACULTY OF MEDICINE AND DENTISTRY, PALACKÝ UNIVERSITY IN OLOMOUC

D1.5 E-LEARNING

Wednesday, 26 November, 18.00–19.15, Hall

CHAIRS: J. MAJERNÍK, J. HANUŠ

WIKILECTURES — 5 YEARS OF HISTORY IN NUMBERS

ANTONÍN ŠÍPEK (15 MIN)

FIRST FACULTY OF MEDICINE, CHARLES UNIVERSITY IN PRAGUE

E-LEARNING COURSE BASIS OF HARVEST AND PRESERVATION OF TISSUES — EXPERIENCE FROM PRE-VERIFICATION AND VERIFICATION STAGE

PAVEL MĚŘIČKA (15 MIN)

UNIVERSITY HOSPITAL HRADEC KRÁLOVÉ

SUMMARY OF ACTIVITIES REALIZED WITHIN THE PROJECT “EDUCATION OF CLINICAL DISCIPLINES IN PRE- AND POST-GRADUATE STUDY FORMS ORIENTED ON INCREASING OF NEWEST INFECTIOUS DISEASES KNOWLEDGE USING TELEMEDICINE TOOLS”

JAROSLAV MAJERNÍK (15 MIN)

FACULTY OF MEDICINE, PAVOL JOZEF ŠAFÁRIK UNIVERSITY IN KOŠICE

OVAVT AND RECAPITULATION OF E-LEARNING AT MEDICAL FACULTY IN PILSEN

LUKÁŠ BOLEK (15 MIN)

FACULTY OF MEDICINE IN PILSEN, CHARLES UNIVERSITY IN PRAGUE

3D MODELS FOR TEACHING ANATOMY

JÁN TOKARČÍK (15 MIN)

FACULTY OF MEDICINE, UNIVERSITY OF OSTRAVA

D2.1 TECHNOLOGY-ENHANCED LEARNING AND TEACHING IN ACUTE MEDICINE

Thursday, 27 November, 09.00–11.00, Hall

CHAIRS: P. ŠTOURAČ, M. STERN

SIMULATION IN ACUTE MEDICINE — IS IT AN OPTION OR A MUST?

PETR ŠTOURAČ (15 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY; UNIVERSITY HOSPITAL BRNO

VIRTUAL PATIENT IMPLEMENTATION IN CASE-ORIENTED TEACHING FOR PREGRADUATE MEDICAL EDUCATION

HANA HARAZIM (15 MIN)

INSTITUTE OF BIostatISTICS AND ANALYSES, MASARYK UNIVERSITY; UNIVERSITY HOSPITAL BRNO

SOCIAL MEDIA AND ALTERNATIVE FORMS OF EDUCATION IN EMERGENCY MEDICINE

MICHAL PISÁR (15 MIN)

TOMÁŠ BAŤA REGIONAL HOSPITAL

ADVANCED PATIENT SIMULATORS IN TEACHING ANESTHESIOLOGY AND EMERGENCY SITUATIONS

MICHAEL STERN (15 MIN)

THIRD FACULTY OF MEDICINE, CHARLES UNIVERSITY IN PRAGUE

USE OF E-LEARNING ON EMERGENCY MEDICAL SERVICE IN SOUTH MORAVIAN REGION

JANA KUBALOVÁ (15 MIN)

EMERGENCY MEDICAL SERVICE OF SOUTH MORAVIAN REGION

E-LEARNING IN ANAESTHESIOLOGY

JIRÍ MÁLEK (15 MIN)

THIRD FACULTY OF MEDICINE, CHARLES UNIVERSITY IN PRAGUE

VIRTUAL REALITY IN ADVANCED SIMULATIONS OF INTENSIVE CARE SCENARIOS

PAVOL PRIVITZER (15 MIN)

FIRST FACULTY OF MEDICINE, CHARLES UNIVERSITY IN PRAGUE

USING PROFESSIONAL ACTORS IN SIMULATION TEACHING OF COMMUNICATION SKILLS

VÁCLAV ZVONÍČEK (8 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

STRUCTURE OF SCENARIO FOR EDUCATION IN INTENSIVE CARE

LUKÁŠ DADÁK (7 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

D2.2 MEDICAL INFORMATICS AND INFORMATION SCIENCE

Thursday, 27 November, 11.15–12.30, Hall

CHAIRS: V. MIHÁL, E. LESENKOVÁ



FULLTEXT SEARCH IN MEDICAL REPORTS

VÍT VOLŠIČKA (15 MIN)

INSTITUTE OF BIostatISTICS AND ANALYSES, MASARYK UNIVERSITY

SYNTHESIS OF SCIENTIFIC EVIDENCE IN A FIELD OF DIAGNOSTIC ACCURACY AND SCREENING PRACTICES OF PRE-DIABETES TYPE 2 IN CHILDREN

DAGMAR TUČKOVÁ (15 MIN)

FACULTY OF MEDICINE AND DENTISTRY, PALACKÝ UNIVERSITY IN OLOMOUC

WEB-BASED APPLICATIONS FOR WORKING OUT STATISTICAL ANALYSES REQUIRED IN BACHELOR OR MASTER DEGREE THESIS

LUBOMÍR ŠTĚPÁNEK (15 MIN)

SECOND FACULTY OF MEDICINE, CHARLES UNIVERSITY IN PRAGUE

HOW ARE LMS SUPPORTED TEACHING STUDENTS UK OF MEDICAL DATABASES SELECTION AND INFORMATION SEARCHING SKILLS

EVA LESENKOVÁ (15 MIN)

NATIONAL MEDICAL LIBRARY

EDUCATIONAL INTERVENTIONS TO TEACH EVIDENCE-BASED PAEDIATRICS: INNOVATIONS AND SUSTAINABILITY

VLADIMÍR MIHÁL (15 MIN)

FACULTY OF MEDICINE AND DENTISTRY, PALACKÝ UNIVERSITY IN OLOMOUC

D2.3 SERIOUS GAMES, SIMULATIONS AND MODELS FOR MEDICAL EDUCATION

Thursday, 27 November, 13.30–15.30, Hall

CHAIRS: D. SCHWARZ, A. POKORNÁ

COMPUTERIZED VISUALIZATION OF BRAINSTEM RESPIRATORY AREAS INVOLVED IN GENERATION OF TIDAL BREATHING, COUGH, ASPIRATION AND EXPIRATION REFLEX

SILVIA GAVLIAKOVÁ (15 MIN)

JESSENIUS FACULTY OF MEDICINE IN MARTIN, COMENIUS UNIVERSITY IN BRATISLAVA

VIRTUAL CASES IN INTERNAL MEDICINE EDUCATION

ILJA TACHECÍ (15 MIN)

UNIVERSITY HOSPITAL HRADEC KRÁLOVÉ

LABYRINTHS TO SUPPORT CLINICAL DECISION MAKING IN PSYCHIATRY

TOMÁŠ KAŠPÁREK (15 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

VIRTUAL PATIENT IN MIDWIFERY

EVA URBANOVÁ (15 MIN)

JESSENIUS FACULTY OF MEDICINE IN MARTIN, COMENIUS UNIVERSITY IN BRATISLAVA

DEVELOPMENT OPPORTUNITIES OF EMOTIONAL INTELLIGENCE WITH REFLECTIVE STRATEGIES USING VIDEO-BASED TRAINING

ANDREA POKORNÁ (15 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

USAGE OF SIMULATORS IN OPHTHALMOLOGY, ORTHOPTICS AND OPTOMETRY LECTURES

PETR VESELÝ (15 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

UTILIZATION OF SIMULATING APPARATUR EYESIDIRECT IN CLINICAL PRACTICE

SVATOPLUK SYNEK (15 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY

SIMULATION EDUCATION AT JESSENIUS FACULTY OF MEDICINE, COMENIUS UNIVERSITY, IN WIDER CONTEXT

FERDINAND VARGA (15 MIN)

JESSENIUS FACULTY OF MEDICINE IN MARTIN, COMENIUS UNIVERSITY IN BRATISLAVA

D2.4 ICT ADVANCES FOR EDUCATION IN HEALTH CARE SCIENCES

Thursday, 27 November, 15.45–16.45, Hall

CHAIRS: S. ANDRAŠČÍKOVÁ, O. ZAHRADNÍČEK

POSSIBILITIES OF UTILIZING BLENDED-LEARNING IN THE AREA OF LANGUAGE EDUCATION OF MEDICAL PERSONNEL

RADKA ŠULISTOVÁ (15 MIN)

FACULTY OF HEALTH AND SOCIAL STUDIES, UNIVERSITY OF SOUTH BOHEMIA IN ČESKÉ BUDĚJOVICE

ONLINE TECHNOLOGY IN POST-GRADUATE TRAINING OF NURSES

HELENA MICHÁLKOVÁ (15 MIN)

NGO SEPPIA PRAGUE

E-LEARNING IN MIDWIFERY TECHNIQUES

LUCIA MAZÚCHOVÁ (15 MIN)

JESSENIUS FACULTY OF MEDICINE IN MARTIN, COMENIUS UNIVERSITY IN BRATISLAVA

INTERACTIVE ELEMENTS IN BLENDED-LEARNING EDUCATION OF MICROBIOLOGY AND IMMUNOLOGY FOR NURSES, MIDWIVES AND PARAMEDICS

ONDŘEJ ZAHRADNÍČEK (15 MIN)

FACULTY OF MEDICINE, MASARYK UNIVERSITY; ST ANNE'S UNIVERSITY HOSPITAL

MEFANET'S COORDINATION COMMITTEE FOR MEDICAL FACULTIES

Thursday, 27 November, 17.00-18.30, Meeting room

POSTER SESSION

26-27 November, Foyer

EVALUATION OF STUDENTS IN MEDICAL AND HEALTH CARE EDUCATION

MARTIN KOMENDA

FACULTY OF MEDICINE, MASARYK UNIVERSITY

EVALUATION OF RESULTS OF MCQ TESTS APPLIED IN ELECTRONIC FORMAT

DRAHOMÍRA KRAJČÍ

FACULTY OF MEDICINE AND DENTISTRY, PALACKÝ UNIVERSITY IN OLOMOUC

OUR EXPERIENCES WITH E-LEARNING METHOD OF TEACHING PRACTICAL HISTOLOGY

RADKA LICHNOVSKÁ

FACULTY OF MEDICINE AND DENTISTRY, PALACKÝ UNIVERSITY IN OLOMOUC

CLINICAL CASE STUDIES IN TEACHING OF PHARMACOLOGY AND CLINICAL PHARMACOLOGY

JURAJ MOKRÝ

JESSENIUS FACULTY OF MEDICINE, COMENIUS UNIVERSITY IN MARTIN

ABSTRACTS

TRANSFORMING HIGHER EDUCATION USING MOBILITY SOLUTIONS

Sokratis Nifakos

Karolinska Institutet, Stockholm, Sweden

D1.1 KEYNOTE LECTURES

Mobile technology allows the development of new practical tools for transforming the traditional academic settings to mobile learning (m-learning) ones. Different sides have been affected in the University organization: The University Campus environment has been adjusted to modern mobile tools and by that it can cover various needs of the staff and the students. Personalized information is now available everywhere allowing the interaction between students' and teachers' in real time without the need to be physically present in a class. The students' study environment is facilitated since there is a wide access in different tools.

Moreover, new ways of teaching methods arise with mobile tools. For instance, augmented reality is a promising technology for enhancing medical education since it may provide practical skills training. It would be also used as a tool for presenting more understandable content, such 3D images, videos and audio besides the classical book text.

VISUAL ANALYTICS IN MEDICAL EDUCATION

Christos Vaitzis, Gunnar Nilsson, Nabil Zary

Karolinska Institutet, Stockholm, Sweden

D1.1 KEYNOTE LECTURES

Keywords: *Visual Analytics, Big Data, Medical education, Data Analysis, Curriculum Mapping, Information Visualization, Medical Informatics*

The big data present in the medical curriculum that informs undergraduate medical education is beyond human abilities to perceive and analyze. The medical curriculum is the main tool used by teachers and directors to plan, design, and deliver teaching and assessment activities and student evaluations in medical education in a continuous effort to improve it. Big data remains largely unexploited for medical education improvement purposes. The emerging research field of visual analytics has the advantage of combining data analysis and manipulation techniques, information and knowledge representation, and human cognitive strength to perceive and recognize visual patterns. Nevertheless, there is a lack of research on the use and benefits of visual analytics in medical education.

The present study is based on analyzing the data in the medical curriculum of an undergraduate medical program as it concerns teaching activities, assessment methods, and learning outcomes in order to explore visual analytics as a tool for finding ways of representing big data from undergraduate medical education for improvement purposes. Cytoscape software was employed to build networks of the identified aspects and visualize them.

After the analysis of the curriculum data, eleven aspects were identified. Further analysis and visualization of the identified aspects with Cytoscape resulted in building an abstract model of the examined data that presented three different approaches; (i) learning outcomes and teaching methods, (ii) examination and learning outcomes, and (iii) teaching methods, learning outcomes, examination results, and gap analysis.

This study identified aspects of medical curriculum that play an important role in how medical education is conducted. The implementation of visual analytics revealed three novel ways of representing big data in the undergraduate medical education context. It appears to be a useful tool to explore such data with possible future implications on healthcare education. It also opens a new direction in medical education informatics research.

COMPREHENSIVE INNOVATION OF MEDICAL EDUCATION

Julie Bienertová Vašků, Martin Komenda, Jaroslav Štěrba, Jiří Mayer, Ladislav Dušek

Faculty of Medicine, Masaryk University

DI.2 SYMPOSIUM ON CURRICULUM HARMONIZATION AT HIGHER EDUCATION INSTITUTIONS

Keywords: *medical education, outcome-based curriculum, auditing methodology,*

Medical education is currently trending towards an outcome-based curriculum which strives to prepare medical graduates for work in a rapidly evolving and quickly changing healthcare delivery system. In this respect, competence-based frameworks previously implemented into the medical curricula of western countries seem to be extremely useful. However, competence-based descriptions of learning objectives have thus far been missing from undergraduate medical education in the Czech Republic. The proposed project therefore aims to provide an outcome-based description of the medical curriculum at the Masaryk University, Brno, including all relevant evaluation methods.

As a necessary first step, the existing medical curriculum at the Faculty of Medicine, Masaryk University, Brno, Czech Republic, was organized using the outcome-based approach and harmonized across various fields of study using a novel methodology.

Auditing methodologies were employed in order to determine how predefined key terms map onto an undergraduate medical curriculum. Standardized audit forms including a list of required terms were provided to course directors and supervisors who were asked to indicate how individual terms in fact map onto given fields of curriculum.

The above mentioned approach resulted in the development of an advanced medical curriculum description methodology which in turn provides room for subsequent innovation. The used methods provide also a meta-data description of the General Medicine field of study. Additionally developed methodologies include a multi-dimensional quality evaluation approach which integrates the opinions of curriculum designers, guarantors, students and methodological specialists.

The description of curriculum domains provides a useful framework for organizing didactic components and for the further development of medical teaching methodologies. Moreover, the resulting description and organization of the curriculum also provides a vocabulary for instituting curricular change and innovation.

Acknowledgement: Project OPTIMED — OPTimized MEDical education: horizontal and vertical connections, innovations and efficiency in practice reg. no: CZ.1.07/2.2.00/28.0042, which is funded by the European Social Fund and the state budget of the Czech Republic.

OPTIMED PORTAL PLATFORM IN PRACTICAL USE

Martin Komenda, Daniel Schwarz, Julie Bienertová Vašků, Jaroslav Štěrba, Jiří Mayer, Ladislav Dušek

Faculty of Medicine, Masaryk University

D1.2 SYMPOSIUM ON CURRICULUM HARMONIZATION AT HIGHER EDUCATION INSTITUTIONS

Keywords: *medical curriculum innovation, outcome-based approach, web-oriented platform, higher educational institution*

In this contribution a design, development and important features of an original web-based system for managing, innovating and harmonizing medical curriculum at higher education institutions will be introduced. During the oral presentation the real use cases in practice will be described.

We come up with solution, which allows to formally describe and effectively optimize a medical curriculum structure by appropriate course attribute metadata, such as learning units and outcomes, links to standardized MeSH vocabulary and essential terms.

Presented platform consists of three fundamental modules (Learning outcome register, Learning unit register, Browser), which provide easy management as well as fast and transparent browsing through large domain of medical curriculum metadata. The organization of the metadata and its linking is provided in the general curriculum model, which can be implemented without any restrictions within any relational database technology.

We introduce an original web-based system for management of medical curriculum innovations and harmonization, which fully supports the outcome-based paradigm. This solution can be used for the potentially perpetual process of specification and subsequent upgrades in a medical curriculum at a higher educational institution — providing tools to describe the educational process as effectively and easily as possible.

Acknowledgement: Project OPTIMED — OPTimized MEDical education: horizontal and vertical connections, innovations and efficiency in practice reg. no.: CZ.1.07/2.2.00/28.0042, which is funded by the European Social Fund and the state budget of the Czech Republic.

ADVANCED DATA-ANALYTICAL REPORTS MINED FROM MEDICAL CURRICULUM MAPPING TOOLS

Jan Švancara, Martin Komenda, Jiří Jarkovský, Ladislav Dušek

Faculty of Medicine, Masaryk University

D1.2 SYMPOSIUM ON CURRICULUM HARMONIZATION AT HIGHER EDUCATION INSTITUTIONS

Keywords: *medical curriculum metadata, data mining, MeSH vocabulary, data analysis*

We introduce a data analytical reporting, which assist to find the potentially problematic areas in curriculum and provide comprehensive overview for the subsequent global in-depth medical curriculum inspection. Various techniques such as word list extraction or vocabulary mapping help to construct transparent reports over huge medical curriculum data.

We have already designed and implemented formal description of a medical curriculum, which covers all elements pertaining to global curriculum harmonization including detailed metadata specification down to the level of learning units, interconnections to the learning outcomes and direct links to the specialized Medical Subject Headings (MeSH) nomenclature. We proposed special script for transformation the MeSH tree structure to linear representation of individual terms. The main reason was to simplify the links between key words

and particular learning units. Selected key words were evaluated by panel of experts. Two dimensional typology of these terms was based on average evaluation of term and variability of evaluation. Associations among MeSH key words were computed using Jaccard coefficient. All data manipulation and computations were conducted by IBM SPSS Statistics version 22.0.0. For visualization of association matrix was used yEd version 3.10.2.

1346 learning units were described by 3224 MeSH terms (1 to 5 terms per learning unit). We identified that majority of these terms is on 3rd or 4th level of MeSH tree structure. Expert evaluation of selected key words was done in 13 separated areas. Average evaluation was used as final measure because evaluation of all 13 areas is highly correlated. Typology of key words based on expert evaluation shows that almost one half of key words is appropriately incorporated into medical curriculum. Association matrices of Jaccard similarity coefficient were visualized in interactive form. This visualization shows that vast majority of key words is connected with one or more other MeSH terms. Terms with poor expert evaluation have weaker association with other MeSH key words.

We have developed a comprehensive set of sequential procedures, which are able to mine novel and potentially useful patterns from well-structured medical curriculum metadata and biomedical MeSH vocabulary. The final data analytical report significantly helps curriculum designer during the building of well-balanced curriculum. We also aim to reduce the time spent on global curriculum overview and systematic evaluation, which represents an important role for the continuous curriculum innovation process.

Acknowledgement: Project OPTIMED — OPTImized MEDical education: horizontal and vertical connections, innovations and efficiency in practice reg. no.: CZ.1.07/2.2.00/28.0042, which is funded by the European Social Fund and the state budget of the Czech Republic.

SBL IN MEDICINE: AUTHORIZING AND IMPLEMENTING INTERACTIVE VIRTUAL PATIENT SCENARIOS (CROESUS)

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D1.3 INTERACTIVE SESSION

The interactive session on competency-driven education in medicine will allow participants to acquire knowledge about how educational activities and resources can be better designed to target clinical competencies, improving the preparedness of learners for clinical practice. The session will cover available technologies, the use of scenarios, and how to address the challenge of curriculum transformation based upon the experiences of the contributing organizations: E-learning Unit at St George's University in London and Institute of Biostatistics and Analyses at Masaryk University.

FACING THE CHALLENGES OF ASSESSMENT THROUGH COOPERATION: THE UMBRELLA CONSORTIUM FOR ASSESSMENT NETWORKS (UCAN)

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D1.4 E-ASSESSMENT

Keywords: *assessment*

Good exams are an essential part of the learning process. Top-quality items, state-of-the-art quality management and judicial security are therefore pivotal for modern assessment. At the same time, most educational institutions have to cope with scarce resources for exams.

Instead of facing these challenges alone, UCAN empowers actors in the field of educational assessment to cooperate in networks, complement their resources, share the knowledge and to develop new methods and standards to establish excellent exams.

UCAN serves as a non-profit umbrella organization for different assessment networks. 60 schools, boards and councils from eight countries use a common platform for the exam preparation, exchange, delivery and evaluation. Today this platform contains 194,000 items, 5140 users cooperate in 1530 working groups e.g. by using the integrated review system for quality assurance (Pre- and Post-Review). 10,400 examinations have been conducted successfully. In close cooperation with all partners, UCAN develops formats, content, procedures and tools to support the workflow in medical assessment.

In the last two years, UCAN integrated new formats such as OSCEs and Structured Oral Examinations. Several apps for tablet-based exams were developed and established in several partner faculties. The first competency-based ProgressTest with 600 participants was conducted in eight schools. Currently a feedback system is in development, giving students a longitudinal feedback on strengths and weaknesses in different competencies, examiners information about the exam-quality and faculties important insights on the effects of curricula changes.

To address current challenges and requirements in assessment, a cooperative approach is essential. UCAN offers a comprehensive platform for such cooperation. Partners can use the new tools and innovations in the field of competency-based assessments.

SELF-TESTING IN A PLAYFUL WAY

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D1.4 E-ASSESSMENT

Keywords: *e-learning, self-testing, evaluation, feedback*

Testing students' knowledge is a part of e-learning course and it is valuable feedback for the students. The e-learning course instructs the students and also tests the acquired knowledge. The test is not only about answering questions, it is also entertaining. Animations or graphics will increase students' interest in self-testing.

The aim of the project has been to design e-learning for the subject Methods of Nursing. Every topic contains a multimedia tool consisting of an animation of a nursing treatment, a video, photograph, presentation, text and a test for the final self-evaluation of the student.

E-learning contains:

1. Videos of nursing methods
2. Photographs of nursing instruments, equipment, materials and tools
3. Animation of nursing treatment
4. Presentation
5. Theoretical materials related to the nursing methods
6. Evaluation system in e-learning

The result of the project is the multimedia support of teaching the Methods of Nursing. Multimedia tools are a component of e-learning for the students of Faculty of health and social studies University of South Bohemia.

Acknowledgement: FRVŠ 201/2013

GAMETIX, A NEW SOFTWARE FOR MANAGEMENT OF MCQ DATABASES

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DI.4 E-ASSESSMENT

Keywords: *database, questions, MCQ, electronic, testing*

Background: Examination of student's knowledge by application of written or electronic tests is widely used in modern pedagogy. Large collections of examination questions must be managed systematically and securely using dedicated software that allows user to add new questions progressively and to edit these questions written in various MCQ formats. Consecutive creation of question sheets and their publication for printed or electronic delivery is another required feature of such a software. We have coded and practically tested a stand-alone portable application called GaMeTix. In this report we analyze specific features of this application and demonstrate its functionality in practical testing in Histology for medical students.

Methods: The program is created under the .NET framework in the C# language. Database of the test questions is stored in a file encrypted using the symmetric cryptography. Questions and generated tests are stored in UTF-8 format and can be imported or exported from/into various formats. In order to generate tests, one or more databases simultaneously can be used. Access to the program is protected by a username and password. Several user accounts can be created.

Results: The program is composed of five functional units. A Database Management pane provides the key function of this software to add new questions to the database and to categorize them by different criteria (ID number, topic, theme, semester, difficulty level, date of the last usage, frequency of use). A search filter available in this pane is to sort questions according to these criteria. In the Test Generator, some filters can be set to specify the range and the number of questions that should appear in the test. The generator checks whether the selected databases contain sufficient number of the questions for the specified filters and generates the tests. Tests of the same topic can be generated in several versions, each version contains different, randomly selected and differently sorted questions to prevent possible cheating. The generated tests can be exported into the text file format or directly printed. Printing of the test on the printer or into a PDF file is followed by printing of the key to the correct answers for easy evaluation of test results. The saved tests can be also exported into txt and xls files for on-paper editing or importing sets of questions into electronic test creators like Articulate Quizmaker 13.

Conclusions: The GaMeTix is a dedicated stand-alone application to manage several databases of MCQs in a secure and portable manner. It provides educators with a simple tool to create sets of examination question

sheets with random selection of questions on predefined topics in various MCQ formats. The development of this application still continues according to comments and request of academic users.

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Acknowledgement: Acknowledgements: Development of this software and application of electronic testing was supported by ESF-OPVK grant n. CZ.1.07/2.2.00/28.0089.

WIKILECTURES — 5 YEARS OF HISTORY IN NUMBERS

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D1.5 E-LEARNING

Keywords: *e-learning, educational portals, wiki*

Five years ago — in November 2009 — WikiLectures were officially introduced as a new tool of cooperation in medical e-learning. From its humble beginnings, WikiLectures have grown into the most visited portal for students of medical faculties in the Czech Republic.

Retrospective analysis of selected website traffic and usage indicators. The official data on daily visitors and page views counts were taken from Google Analytics account. Integrated statistic tools of MediaWiki system were used for analysis of history of articles and users counts

The average number of unique visitors of WikiLectures website in November 2009 were just between 200 and 800. In June 2014 (during the summer exam period) the same portal hosted about 20,000 to 40,000 daily visits. WikiLectures have reached 9,200 registered users in 9/2014. In 11/2009, WikiLectures contained only about 500 articles while in 9/2014 WikiLectures contained more than 7700 articles from different branches of medicine (not including discussion and service pages).

During 5 years, WikiLectures became the most used internet source of information for medical students in the Czech Republic. Both numbers of articles and active users have increased rapidly and nowadays they are still growing.

E-LEARNING COURSE BASIS OF HARVEST AND-PRESERVATION OF TISSUES — EXPERIENCE FROM PRE-VERIFICATION AND VERIFICATION STAGE

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D1.5 E-LEARNING

Keywords: *E.learning, tissue donation, tissue preservation, tissue banking, elective subject*

The aim of the paper is to review the authors' experience from pre-verification and verification stage of the use of the e-learning course introduced into teaching an elective subject in the academic year 2011/2012. The

pre-requisites of the course were basic knowledge of medical biology, biophysics, anatomy and physiology and study of selected chapters of the textbook: Transplantology for Medical Students.

The course was divided into 3 main topics: Donation of tissues and Organs, Low temperature preservation of tissues and organs, Safety and Quality Assurance in tissue and procurement establishments. The fourth topic: Basic procedures in the Tissue Establishments served for enlarging and repetition of knowledge. The fifth topic was represented by database for uploading the seminar theses. To complete the course the students were obliged to pass through the final knowledge test consisting of 15 questions selected randomly from the bank of questions. At least 10 correct answers were required to receive the certificate.

In the pre-verification stage (academic year 2012/2013) the total of 26 students were enrolled in the course. They used it for studying and/or downloading the study materials and preparation and archivation of seminar theses. This initial experience has already been published.

Verification of the course was made on the group of 18 undergraduate students enrolled in the academic year 2013/2014. All students were able to pass through the final knowledge test without apparent problems. Evaluation of the questionnaire filled by the participants showed that the majority of the students appreciated use of the course as a useful support of standard face-to face learning. Only exceptionally (in two cases) the students were convinced that the course could replace the standard teaching/learning process.

The presented course has already become the standard part of teaching an elective subject Basis of Harvest and Preservation of Tissues at the Medical School in Hradec Králové. Its verification will be however continued in the next academic years.

Acknowledgement: CZ.1.07/2.200/15.0164

SUMMARY OF ACTIVITIES REALIZED WITHIN THE-PROJECT “EDUCATION OF CLINICAL DISCIPLINES IN PRE- AND POST-GRADUATE STUDY FORMS ORIENTED ON INCREASING OF NEWEST INFECTIOUS DISEASES KNOWLEDGE USING TELEMEDICINE TOOLS”

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D1.5 E-LEARNING

Keywords: *education, infectology, video streaming, video gallery*

We applied telemedicine techniques to offer our students but also to all interested persons the latest knowledge from the area of infectious diseases, their prevention and treatment. This presentation summarizes main activities we realized during three years period of the project where specialized and scientific sessions were live streamed, archived and shared through video gallery on our faculty portal.

Sharing of medical knowledge over a long distance has relatively long history and is usually referred to telemedicine applications. Because of changes in curriculums and related transferring processes based on more effective utilization of modern e-learning tools in education at our faculty, we decided to create a methodology that combines advantages of face-to-face and distance education into the teaching approach useful for our students, but also for other persons interested in infectology topics. From technological and historical point of view, there were various methods used to distribute educational content to remote students all around the world. Therefore, live broadcasts of scientific and educational sessions were captured and then processed,

archived and shared as on-line video-clips to be accessible anytime and anywhere. The structure of our methodology respects two main requirements. The first, is the ability to distribute live education events to the almost unlimited number of users and the second one represents accessibility for the users having no special technological equipment.

Most of the infectology related lectures were broadcasted using video streaming technologies. Here, the students were able to view the streams on their own computers wherever it suits them rather than having to take part in a face-to-face lecture. Considering our previous experiences and our technical equipment we decided to use RealNetworks Helix technology to stream live education events. Individual live video streams were broadcasted as free to join events, so everybody interested in particular topics was able to watch them. However, there are often various objective reasons why some of the sessions cannot be viewed when broadcasted. Therefore, the raw video records were used to prepare archive of audiovisual lectures including DVD movies, compressed video formats for web as well as interactive presentations. Educational outputs were processed to be available for students in both on-line and off-line forms. The faculty's web portal of multimedia support in the education of clinical and health care disciplines (portal.lf.upjs.sk) was selected as the most suitable platform to share already prepared multimedia outputs and as the best way to offer them to the students and public. Also the links to the Moodle e-learning courses are integrated in this portal because of existing interconnection between MEFANET activities.

We realized web based approach to disseminate medical educational content including latest information about infectious diseases, their treatment and prevention to the undergraduate and postgraduate students at medical faculties, as well as to the clinical professionals and specialists and to the wide range of interested population. The combination of traditional teaching methods and new technological innovations brought advanced teaching and learning tools for our teachers and students.

Acknowledgement: Results presented in this work were obtained with the support of the national grant KEGA 005UPJS-4/2012.

OVAVT AND RECAPITULATION OF E-LEARNING AT MEDICAL FACULTY IN PILSEN

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D1.5 E-LEARNING

Keywords: *OVAVT, e-learning, electronic education, MOODLE, MEFANET, MODIM, popularization, Pilsen*

In the following article is a recap of activities of the OVAVT (Department of Education and Computer Applications), for the whole period of its existence. Represents the history of the origin and development of the department. Presents "The system of the progressive development of electronic education at Medical Faculty in Pilsen", which OVAVT put into practice successfully. It summarizes results obtained in teaching, promotion of education, industrial development, testing, classrooms administration and commercial activity. The conclusion describes surprising end of OVAVT.

The teaching of computer technology at the Faculty of Medicine in Pilsen was launched in 1992 as part of the biophysics. In 1998 the Department of Education and Computer Applications (OVAVT) was founded as a part of the Biophysics department. The team of OVAVT was stabilized in a short time at five individuals who are suitably complemented with their education. The team consist of leader which was a doctor with a good knowledge of IT, then the IT engineer and teachers with IT specialization. The main activity of OVAVT was a development of e-learning at Medical faculty in Pilsen. OVAVT created a long-term plan called "The gradual development of e-learning in the Faculty of Medicine in Pilsen". The idea was to develop synergy in the field

of IT education for students and their teachers. The purpose of the whole thing was to prevent dams in the use of modern technology in the classroom. Since 2004 the main e-learning platform was the Moodle LMS. Since 2009 as the perfect complement to MOODLE we began to use the portal MEFANET, which was created under the project “Standardization and sharing educational platform among medical schools in the project MEFANET”.

The main result of the OVAVT activities is reaching a state where e-learning is used as a standard support of education at the Faculty of Medicine in Pilsen, not only students but also teachers and other employees of Medical faculty. In Moodle is now 101 electronic courses commonly used in students’ teaching and staff training. Department provides student testing completely during all year. This testing activity uses 15 clinics and institutes. It represents the most branches throughout medical school. The MEFANET website currently contain 403 mostly high-quality educational works. At the faculty were deployed 9 educational kiosks, which proved very useful. OVAVT gained during its existence itself or support their activities many projects that have brought the development of e-learning at least 60 million czk. OVAVT popularized e-learning among teachers so that dedicated themselves to the creation of e-learning works. Last OVAVT project “Modernization of didactic methods through the e-learning support” received a grant of 36 mil. CZK and helped to involve at least 150 teachers to creation of e-learning materials.

The 1st July 2014 the OVAVT was canceled as department, team members were included in the Technical department and team leader was removed from his post and dismissed from the team.

At the Faculty of Medicine in Pilsen thanks to intensive and long-term activities of the Department of education and computer applications (OVAVT) managed include e-learning as an integral part of the learning process. We also succeeded in e-learning popularization among teachers so that they become its creators. OVAVT with their activity also brought considerable resources to support e-learning at faculty. Activities of OVAVT largely supported the implementation of modern, user-friendly way of students’ teaching so participated in the improving the overall quality education at the Faculty of Medicine in Pilsen.

Acknowledgement: Standardizace a sdílení vzdělávací platformy mezi lékařskými fakultami v rámci projektu MEFANET (cz.1.07/2.4.00/12.0050), Modernizace didaktických metod cestou podpory systému elektronického vzdělávání — MODIM (cz.1.07/2.2.00/28.0198)

3D MODELS FOR TEACHING ANATOMY

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DI.5 E-LEARNING

Keywords: 3D anatomy, human body, teaching

Anatomy is one of the most important and crucial courses at the Faculty of Medicine. Recently, we had the opportunity to implement new procedures into the education of medical students, and in this way contribute to the improvement of teaching at the Faculty of Medicine. The Department of Anatomy of the Faculty of Medicine focuses on 3D modeling and visualization techniques production. Students have the opportunity to understand the topographical relationships of the anatomical structures of the individual parts of the human body, with the help of selected interactive and animated anatomical models.

During the work, the programme EON Experience Player was used. For the construction of the various parts of the human body, the resources of the Institute of Anatomy, Medical Faculty were used. Subsequently, the sections were converted from 2D video sources into 3D object structures. The resulting objects were subsequently modified in Maya and EON Studio, resp. EON Creator. The output images were supported by the software solution EON Experience Player, which performs highly interactive visualization. Animations are presented with the aid of a projector, controlled by a computer.

During the studies, the student has the opportunity to gain knowledge of anatomy from lectures and practical exercises in the autopsy room. The acquired knowledge can be improved and then checked in the “Quiz”. The test consists of open and closed questions. For open questions, the correct answer must be entered for closed questions, the system offers four options, from which the student may choose one correct answer. The system automatically evaluates the accuracy of the answers after each question. In the case of incorrect answers, the student continues the test. In conclusion, the system evaluates the overall test, including the number of correct and incorrect responses, and the overall evaluation of the test.

The future of teaching anatomy can be seen in conjunction with conventional methods of interconnection of imaging in clinical practice. Our goal was that the students had the opportunity of using fixing 3D topographical anatomy to better understand the relationships of anatomical structures of the individual parts of the human body. Interest in creating 3D models was expressed mainly by students of medicine and bachelor's candidates for the continuing validation of knowledge in the study, and in the repetition of the test anatomy.

SIMULATION IN ACUTE MEDICINE — AN OPTION OR A MUST?

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D2.1 TECHNOLOGY-ENHANCED LEARNING AND TEACHING IN ACUTE MEDICINE

Keywords: *virtual patient, patient simulator, acute medicine*

Medical education in general is undergoing significant shift from traditional methods (textbooks, lectures, bedside teaching) to a more comprehensive approach which includes modern ICT tools (e-learning, interactive algorithms, virtual patients, standardised patient, manequines, advanced patient simulators) due to space, economic, personal and clinical limitation (lack of appropriate cases etc.) of traditionally approach. The new approach has been shown to improve the learning skills of medical students and residents over traditional methods.

Anaesthesiology, intensive care and emergency medicine is a dynamic and time-pressured environment with high demands on team communication and leadership, correct clinical reasoning and often immediate decision-making. Simulation offers a good technique for training multidisciplinary medical teams, facilitating interaction among team members and enabling the team to function in an effective and coordinated manner.

Virtual Patient

The virtual patient is a software platform for the presentation and support case-based teaching and learning. There are many platforms and implementations that oscillate between a simple presentation of the software case studies and three-dimensional display of hospitals and patients in the style of Second Life worldwide.

Basic and Advanced Patient Simulators

Mechanical simulators of basic skills (peripheral/central vein or artery cannulation, tracheal intubation, regional anaesthesia application, manequines, etc.) are used for basic propedeutic skills training. The advanced simulators can be enriched by complex physiological models and used for complex clinical scenarios of emergency or intensive care medicine in simulation based learning.

Standardised Patient

Standardised patient is for a clinical situation masked and instructed person and forms the next step to increase the fidelity of acute situations. But it is very personnel and time requirements solution and are mainly used for one-off events and exercises.

Where can you meet simulation techniques in pre- and postgraduate teaching of acute and emergency medicine will show the following block of lectures: Technology-Enhanced Learning and Teaching in Acute Medicine.

Acknowledgement: MEFANET clinical reasoning reg. n.: CZ.1.07/2.2.00/28.0038.

VIRTUAL PATIENT IMPLEMENTATION IN CASE-ORIENTED TEACHING FOR PREGRADUATE MEDICAL EDUCATION

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D2.1 TECHNOLOGY-ENHANCED LEARNING AND TEACHING IN ACUTE MEDICINE

Keywords: *virtual patient, medical education, interactive algorithms, clinical scenarios*

We aim to present interactive tools implementing virtual patients for teaching and learning master's and bachelor's medical education study programmes. The tools, which are freely available at educational web portals AKUTNE.CZ (part of MEFANET) and Sepsis-Q.cz, are in the form of interactive multimedia algorithms or clinical scenarios. They are representing an important contribution to lessons that are more oriented to problem solving (Problem Based Learning, PBL) compared to the traditional educational scenarios. Use of virtual patient is one of the main features that supports teaching and memory footprinting in management of critical case, without hurting a real patient. We want to introduce options and possibilities of our original platform for authoring and using virtual patients.

In the period of the 2007–2009 an educational portal for e-learning in acute medicine www.akutne.cz was established as a part of MEDical FACulties NETwork in the Czech and Slovak Republics. The portal contains web-based tools for authoring of virtual cases, which have a form of interactive algorithms for clinical reasoning training. Interactive algorithms are created by teams of students led by physician during one school year. The process consists of different steps: study of literature, construction of story of the case, writing the text of each node in two language versions — Czech and English, creation of multimedia materials, as well as adding supporting laboratory results and physiological parameters to every node. The algorithms are developed in a set of forms generated by a backend application (PHP/XML/MySQL) and then rendered on a frontend application (ActionScript/FLASH, nowadays HTML5). Completed algorithms undergo a three-stage review; final peer-review by special-physician is published together with algorithm in education part of the website.

Strictly anonymous basis for interactive clinical scenarios SEPSIS-Q are drawn from the register EPOSS (Data-based evaluation and prediction of outcome in severe sepsis). Cases from EPOSS research database suitable for education are subsequently upgraded to didactically appropriate level by a backoffice application (PHP/MySQL), which enables convenient and comprehensive web content management. All the finished cases are approved by a guarantee designated by the Board of the EPOSS/SEPSIS-Q project. Consequently, the clinical case becomes immediately available on-line in Adobe flash player environment (nowadays HTML5 player).

Since 2007, more than 40 interactive algorithms were created in Czech and English languages and published at AKUTNE.CZ educational web portal. Individual algorithms cover the following thematic areas: first aid, emergency medicine, intensive medicine, pain management, anesthesiology, dentistry, gynecology and obstetrics, pediatrics and surgery. Since 2012, the educational web portal Sepsis-Q published seven clinical scenarios of severe sepsis, based on real clinical cases. Lessons based on virtual patient are used with a positive feedback from students of General Medicine, Dentistry, Nursing and Midwifery in the following courses: First Aid, Anesthesiology and Pain Management, Intensive Care Medicine and Anesthesiology for Midwives.

Lessons with the use of the algorithms or virtual patients compose a very important part of undergraduate teaching of acute medicine topics. The introduced tools can be used in the classroom in the form of PBL courses of study General Medicine, Midwifery and Dentistry. These peer-reviewed educational tools can be used to guide the PBL-like conducted sessions integrated into curriculum of medical and paramedical professions. Our platform for authoring and using interactive algorithms is now available for the academic use worldwide.

Acknowledgement: Financial Support: “MEFANET clinical reasoning” reg. n.: CZ.1.07/2.2.00/28.0038

SOCIAL MEDIA AND ALTERNATIVE FORMS OF EDUCATION IN EMERGENCY MEDICINE

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D2.1 TECHNOLOGY-ENHANCED LEARNING AND TEACHING IN ACUTE MEDICINE

Keywords: #FOAMed, emergency medicine, social media, open-access, medical education

The term Free Open Access Medical Education or #FOAMed, coined in 2012, describes the vast amount of medical information that has been available for many years in various forms of multimedia on the internet. #FOAMed has been created primarily by emergency physicians, intensivists, anesthesiologists and retrieval specialists but participation of other specialties, including nurses is increasing. It is an ever-expanding database on various topics of acute care medicine and is now fully searchable. The two major genres are blogs and podcasts of variable focus and extent. They comprise formal lectures, expert interviews, group discussions, recordings from conferences, commentaries, case studies, or just rants and snippets of wisdom and many others. Their informal tone allows the spread of tips and tricks and bedside experience. Blogs and podcasts are often interlinked and use numerous other multimedia: photos, videos, live streams, hangouts etc.

Social media are Web 2.0-based applications that allow the production and exchange of the user-generated content. They create highly interactive platforms through which individuals and communities share, co-create, discuss, and modify the content. Social media have influenced the way how individuals and communities communicate and their influence is evident in the field of medical education as well. Social media serve as a platform for the primary publication of the content. They also allow sharing and real-time discussion of the content and provide a novel form of peer-review.

Advantages of using the new technologies in the medical education are obvious: the content is generally free of charge, and available regardless of time and space on computers and mobile devices. Most importantly, handheld devices bring #FOAMed to the bedside.

However, the plethora of content and somewhat anonymous users brings about risks as well. Predominantly, it is the patient and provider privacy. Information overload, questionable credibility of certain sources, selectivity of the focus, problematic external validity of the recommendations across the globe and bias are other concerns which have led to the discussions on the charter of #FOAMed. Absence of pre-publication peer-review emphasizes the importance of critical thinking and should stimulate reading primary sources and challenge interpretation.

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ADVANCED PATIENT SIMULATORS IN TEACHING ANESTHESIOLOGY AND EMERGENCY SITUATIONS

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D2.1 TECHNOLOGY-ENHANCED LEARNING AND TEACHING IN ACUTE MEDICINE

Keywords: *simulation, anesthesiology, error*

Simulators and the use of simulation have become an integral part of medical education, training, and research. The developments and applications are very fast. Different types of simulators can be distinguished: computer-based or screen-based microsimulators versus mannequin-based simulators. Realistic simulations are a useful method to show mechanisms of error. The anesthesia crisis resource management is the standard for human factor-based simulator training.

Clinical excellence is not achieved by the medical knowledge alone. Human factors and the interaction of team members, as well as organizational conditions in the system of care, also play major roles. Therefore, the study of human performance is very important. The health clinical institutions must provide appropriate organizational characteristics to allow safe patient care practices (e.g. improve safety culture, integrate effective incident reporting and analysis systems). The introduction and spread of crisis resource management training, including the application of realistic simulation exercises, is likely to improve patient safety in anesthesia and other acute care domains.

Observation of anesthetists during routine operations or in the handling of adverse events (using realistic patient simulators) has improved our knowledge of critical decision-making and team interactions. Future progress on patient safety in anesthesia will require interdisciplinary research and training, improvements in systems safety and organizational learning, and the involvement of all levels of the health care industry.

The most important part of simulator training that goes beyond specific technical skills is the self-reflective (often video-assisted) debriefing session after the scenario. The debriefing is influenced most strongly by the quality of the instructor, not the fidelity of the simulator. Simulators are just the tools for an effective learning experience. The education and training, commitment, and overall ability of the instructors are of utmost importance.

USE OF E-LEARNING ON EMERGENCY MEDICAL SERVICE IN SOUTH MORAVIAN REGION

Jana Kubalová

Emergency Medical Service of South Moravian Region

D2.1 TECHNOLOGY-ENHANCED LEARNING AND TEACHING IN ACUTE MEDICINE

Keywords: *e-learning, emergency medical service, Faculty of Sports Studies, first aid training*

E-learning has been used only as a supplement to full-time study programmes at ZZS JMK (emergency medical service of South Moravian Region). It is mainly used to distribute teaching materials and to test acquired knowledge. E-learning at ZZS JMK is a relatively new teaching method which has not been used for a long time. For that reason, it is not possible to evaluate the results statistically. The most frequently used forms are short videos, texts, photos, series of photos and tests. E-learning at ZZS JMK uses the environment of ZZS JMK web pages or intranet. Last year e-learning formed an integral part of the courses within the framework of the project of further training for health-care professionals in South Moravian Region. Moreover, it was used for our

employees as a part of our internal training focusing on communication in crisis. Next year materials for ZZS JMK, HEMS members (helicopter medical service), will be completed. E-learning programme has been created in close cooperation with Faculty of Sports Studies. Based on this fruitful cooperation, which has been lasting since 2008, a lot of teaching materials focusing on first aid training for non-expert public as well as for the specialists have been made.

E-LEARNING IN ANAESTHESIOLOGY

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D2.1 TECHNOLOGY-ENHANCED LEARNING AND TEACHING IN ACUTE MEDICINE

Keywords: *e-learning, anaesthesia, issue, challenges, problems*

Definition of e-learning is rather vague. The simplest one is that e-learning is the use of telecommunication technology to deliver information for education (and in some definition also for training). Problems of developing high-quality educational material are described on our own experience. Low-cost e-learning means usually PowerPoint presentation only. Including a variety of multimedia elements, and interactive questions is both time- and money-consuming. This is why these interactive courses are usually not freely accessible. We decided to use middle way: to gain a grant to pay for professional help with multimedia, to resign for interaction and to enable free access.

The project consisted from many steps: write a project and ask for money, write a text of the manual, find relevant images, obtain consent for material protected with copyright, obtain consent of ethic committee and patients participating in videos, develop instructive videos with the use of professional firm, put all parts together on the web-sites of our faculty, announce the accessibility of educational materials to other medical and similar faculties and wait for feedback.

Using this approach we produced several multimedia e-learning projects: Basic life support (in Czech and in English), Advanced life support (in Czech and in English), First aid (in Czech) and Textbook of anaesthesia (in Czech). These materials are permanently accessible at websites of the Third Faculty of Medicine, Charles University in Prague and we try to innovate the content if a new substantial knowledge appears. We obtained several positive reactions from colleagues from other faculties, we found even some our videos presented at YouTube and we noticed an increased knowledge of our students during examination. The difference between knowledge of Czech and English-speaking students is apparent in first aid, where materials are in Czech only. Next year, we plan to translate First aid to English with help of some students who are native speakers and with financial support of our faculty.

We are aware that our materials lack interactive approach, but to add this dimension exceeds our possibilities as we participate in routine work of the department.

We feel that producing a high-quality e-learning is not only a matter of enthusiasm. According to the author's personal opinion there are several limiting factors why there are so few e-learning materials in our country that have all attributes of complete e-learning courses: lack of time of the authors, lack of money for technical support and last but not least lack of appreciation of this activity. Any textbooks, e-learning courses etc. are taken into account in the course of evaluation of scientific activity of university or high-school teachers, but only articles in journals with impact factor are counted.

Acknowledgement: Several projects of FRVŠ, Prvouk and internal grant from the Third Faculty of Medicine, Charles University in Prague

VIRTUAL REALITY IN ADVANCED SIMULATIONS OF INTENSIVE CARE SCENARIOS

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D2.1 TECHNOLOGY-ENHANCED LEARNING AND TEACHING IN ACUTE MEDICINE

Keywords: *virtual reality, physiological modeling, simulation, 3D graphics, problem-based learning, simulation-based learning, serious games*

Truly immersive virtual reality where medical students could acquire professional knowledge and skills, while no real patient is in danger, is the Holy Grail of medical e-learning.

This presentation will briefly tell the story of our recent development towards this Holy Grail. We will share our experience with the transformation of one example problem-based scenario in acute medicine, Surviving Sepsis, into a virtual reality simulator. The simulator combines 3D graphics for the virtual reality context, nodal structuring for problem-based learning context and physiological models for simulation-based game component.

The core approach to e-learning in our laboratory is physiological modeling and simulation. For the modeling we use industrial strength tools based on Modelica language, which is an equation based language to model physical systems. For the simulation part we have created a custom tool chain which allows us to embed the Modelica models into simulators. The simulators are then used as learning objects for medical education, with or without the assistance of teachers.

Virtual reality is commonly referred in the context of 3D media. Modern 3D game engines has lowered the bar enough to make it feasible even for small teams, as we are, to actually start using 3D. Using Unity3D game engine, we have added 3D virtual patient visualizations to provide more immersive learning context to our serious games.

Recently, we have been in close cooperation with several intensive care practitioners and educators, namely from Military University Hospital Prague and AKUTNE.CZ, which had lead us into the area of problem-based learning in intensive care medicine. Node-based scenario description is often used to capture essential situations in acute medicine scenarios. We have combined the nodal-based approach with our physiological simulation-based approach to get the most out of both.

Creation of physiological models and simulation based games is a demanding task. We have mastered it to a great extent. One of our greatest achievements in this area is the translation of HumMod model into Modelica language while further enhancing it; HumMod is perhaps the most complex and largest physiological model ever created. Now, we can use this model to simulate complex states of virtual patients during simulated clinical scenarios.

However, presentation layer of our simulation games were made of 2D graphics exclusively, and we must admit, our e-learning applications were more or less of technocratic nature. Our recent addition of 3D media is moving us to the area of immersive virtual reality.

Then, the combination of physiological simulations and nodal-based clinical scenarios proves to be mutually beneficial. We have tested all this together on one example intensive care scenario: Surviving Sepsis.

Our laboratory has reached a new milestone on the way towards the use of true virtual reality in medical education and training. Now, we can combine complex physiological simulations, nodal-based clinical scenarios, 2D and 3D graphics in one learning object.

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USING PROFESSIONAL ACTORS IN SIMULATION TEACHING OF COMMUNICATION SKILLS

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D2.1 TECHNOLOGY-ENHANCED LEARNING AND TEACHING IN ACUTE MEDICINE

Keywords: *standardized patient, simulation education*

The knowledge of theoretical classes of communication skills of hospital staff is difficult to apply. The practical training lessons with standardized patients offer a better method of teaching. The use of actors as standardized patients for practical training further improves the efficacy of training. The goal of our project was to develop a methodology for creating scenarios with standardized patients (SP) and to use this methodology for development of nursing communication courses.

To develop the methodology we had to solve the following questions: who will write scenarios, how detailed should be the script and who will lead the simulation. The scenario contained written description illness, condition of disability of simulated patient, situation and task to be carried out by a trainee and guidelines for communication with this type of patient. Additional information as typical patient behaviour were given only to standardized patients. Rehearsal with SP was led by psychologists and experts. Scenario was repeatedly modified based on the analysis of audio visual records. Scenarios were developed by psychologists, nursing experts and physicians; the final scripts were written by psychologists. The semi-structured scenarios suited professional actors the best. It provided only a framework of the session and allows improvisation by the actor. We found out that maximally 8 students should be trained in one block. A psychologist leads the simulation as a trainer, he or she gives instructions to the SP (via hands-free audio link) and also leads the debriefing.

We have developed a methodology for creating scenarios, this methodology takes advantage of employing professional actors who have sufficient experience to perform with a high degree of fidelity. Rehearsals with actors prior to the simulation training and discussion with nursing experts help to improve the authenticity of simulation. The simulation training of communication skills was developed and offered to 83 nursing schools. 83% of students who participated in project believed that simulation training should be an integral part of curriculum at nursing schools, 93% reevaluated their approach to communication with patients and 85% want to attend simulation training in the future.

We introduced into nursing education of Czech Republic the use of professional actors in simulation teaching of communication skills. The 32 courses of communication skills for 47 students and 10 blocks of training for nursing school teachers were performed in 2013.

STRUCTURE OF SCENARIO FOR EDUCATION IN INTENSIVE CARE

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D2.1 TECHNOLOGY-ENHANCED LEARNING AND TEACHING IN ACUTE MEDICINE

Keywords: *simulation, education, scenario*

The scenario is basic component of simulation education. There is no consensual recommendation how to design the simulation scenario. The aim of our project was to develop structured scenario for simulation education in intensive care medicine.

The scenario is based on learning goal and should prescribe the response of simulation mannequin and other “actors” to action of learners. The description of scene and its changes is integral part of scenario as well. The educator is not only screenplay author but usually has similar role as director of play. We approach to the simulation as to a theatre play. The simulation scenario was build up similarly to script play.

We apply structured script for development of simulation of septic shock patient. The educational goal was to teach indication of vasopressor and fluids in initial phases of septic shock. The simulation room was equipped as intensive care unit (ICU) with ventilator, monitor, infusion pump, drugs. Story: The patient (intubated mannequin) is admitted to ICU for respiratory failure. The actors — students — doctor and nurse examine the patient (ABCDE), take the past medical history, drugs, allergies. Doctor recognises under-sedated patient on artificial ventilation with septic shock and starts therapy. Nurse — next student — provide the treatment. Facilitator — teacher — takes the role of family member. Points for debriefing and guided reflection are prepared. The process of tuning, our mistakes and testing of the scenario will be presented.

The structured scenario for simulation was created, it was tested on anesthetists and students. Scenario with debriefing notes is ready to be used by teachers of intensive care medicine.

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FULLTEXT SEARCH IN MEDICAL REPORTS

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D2.2 MEDICAL INFORMATICS AND INFORMATION SCIENCE

Keywords: *fulltext, search, Apache, Solr*

Search in already existing documents is an integral part of the educational process and acquiring new information. Unfortunately, finding relevant information is not always easy, because many documents are saved only in the form of free text and their search is therefore difficult. We face to the same problem when we are trying to scan medical documents such as medical reports.

And those are stored with exceptions in hospital information systems as free text. However, for example, a task to find relevant information about patients who had been in hospital with specific diagnosis and underwent specific medical procedure, makes a great sense. Even in the case of medical reports we are facing to situation, when we need to search and identify relevant records in large volumes of free text.

The solution of selection of relevant records and finding the necessary information in them is called fulltext search. It makes possible efficiently search in large amount of documents and return those that contain the search phrase in a short time. The advantage of this approach over other option is a possibility to enter long queries, including advanced operators, while maintaining a short waiting time for the result. It allows easily and quickly find relevant documents for study.

All leading database systems currently offer support for fulltext search, but some do not support the complex morphology of the Czech language, which is solved by converting words to their basic form. It is called standardization. Full support provides some fulltext libraries, in the forefront with Apache Solr.

Full-text searching is currently the best solution for searching in unstructured text. Fulltext search is, unlike common search method finding of exact matches, faster and it is in the case of normalization of words many times more precise. The proposed library Apache Solr for implementation of full-text search in medical reports is advantageous due to the good support of the Czech language in the basic installation, a wide range of settings and options for deployment over any platform; does not depend on the used database, programming language or information system. The library has been satisfactorily tested over real data from the hospital. However, there is still a need to make adjustments for effective search in this issue, especially correction

of typos made not only in writing but also in entering of words to search box and create a list of used abbreviations and synonyms for more accurate results.

Search in medical text information has its own specifics that we can solve by some tools designed for text searching. An appropriate tool is Apache Solr — fulltext library that can be easily modified to the needs of the issue and provides enough power to work effectively.

SYNTHESIS OF SCIENTIFIC EVIDENCE IN A FIELD OF DIAGNOSTIC ACCURACY AND SCREENING PRACTICES OF PRE-DIABETES TYPE 2 IN CHILDREN

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D2.2 MEDICAL INFORMATICS AND INFORMATION SCIENCE

Keywords: *screening, diabetes mellitus 2 type, children*

The 347 million of people suffer from diabetes (Danaei et al., 2011). In 2004 3.4 million of people died from consequences of fasting high blood glucose (WHO, 2010). According to research carried out in Europe (Haines, Wan, Lynn, Barrett, & Schield, 2007) prevalence of type 2 diabetes in children has been increasing. In 2002 the prevalence of type 2 diabetes and impaired glucose tolerance (IGT) were Italian youths only 0.5% and 5%, respectively (Invitti, Gilardini & Viberti, 2002); however, a recent study conducted in Italy on a large sample of overweight/obese children and adolescents reported a prevalence of glucose metabolism alterations of 12.4%. IGT. Effective screening of pre-diabetes, early diagnosis and preventive programs can help to prevent type 2 diabetes. The main problem in youth population is diagnostics and screening of type 2 diabetes in children unlike adults is missing. The outbreak of child obesity and metabolic syndrome brings a need of systematic review development and on its basis built clinical practice guidelines in the field of diagnostic accuracy and screening in pediatric population. Effective diagnostics and screening of type 2 diabetes would allow us to deal with this disease at the earliest stage of development.

The main aim of this paper is to present a part of the protocol of the synthesis of scientific evidence of diagnostic accuracy and screening practice to identification of pre-diabetes mellitus type 2 in children.

Review question:

What is in terms of diagnostic accuracy, effectiveness and cost effectiveness of screening for pre-diabetes mellitus type 2 in children at different stages of ontogenetic development the most efficient existing screening method, program or test?

- ▶ Population — children with the risk of pre-diabetes development at different stages of ontogenetic development.
- ▶ Intervention — existing methods or programs for detecting pre-diabetes.
- ▶ Outcomes — sensitivity, specificity a predictive values of screening tests, effectiveness of screening practices in the context of health and costs.

Systematic search strategy aims to find published and unpublished studies, among which are included sources from literature and from the so-called “grey” literature. Search strategy in this systematic review protocol will include three steps according to JBI methodology. Initial search will be done in MedLine, Cinahl, Embase databases. Retrieved studies will be evaluated for relevance (determined by criteria) by two independent reviewers in terms of internal and external validity, objectivity and reliability. Standardized JBI tools will be used. Heterogeneity will be assessed using Chi-Square and I² index.

Results of this secondary research will bring synthesis of evidence of diagnostic accuracy and screening practice to identify the pre-diabetes mellitus 2 type in children. Scientific evidence synthesis should become a message about awareness in the field of screening strategy development. After that it should help to develop a clinical practice guideline in children with pre-diabetes mellitus 2 type.

Systematic review developed by rigorous JBI methodologies will systematically search, critically and independently appraise, and by standardized tools extract and then analysed and synthesize relevant data which will be used for information to practice, healthcare policy and other involved subjects. It will be possible to develop strategies for diagnostic and screening practices and follow-up programs on the basis of obtained data and its dissemination.

It will be possible to prevent this metabolic disease with an early identification of pre-diabetes mellitus 2 type helping diagnostic accuracy and screening practice in combination with appropriate preventive measures in children and adolescents. The research results can have significant impact to citizens of the Czech Republic public health, but also in other EU countries and the world which have been dealing with increasing incidence of diabetes mellitus 2 type and development of its on set complications.

WEB-BASED APPLICATIONS FOR WORKING OUT STATISTICAL ANALYSES REQUIRED IN BACHELOR OR MASTER DEGREE THESIS

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D2.2 MEDICAL INFORMATICS AND INFORMATION SCIENCE

Keywords: *statistical computation application, R, biostatistics, ShinyApps, statistical support*

In order to complete their thesis, bachelor's or master's degree students finishing their studies usually call for any help with statistical analysis of their data. We tried to facilitate this process in terms of working out a system of web-based applications that enable students to input their data into the web-based form of the applications and then download statistical results and plots computed by the applications. Offline texts providing guidance through correct statistical approach and suggesting an optimal final choice of a statistical method are an integral part of the whole concept and system of the applications.

The system consists of a number of online free-available applications. The core of the functionality of the system is based on programming code written in language R. The R is a free software language and environment for statistical computing and graphics and is widely used among statisticians — it ensures reliability of computations performed by the applications, written in R. Code snippets of each application were written offline in R environment and then uploaded online using ShinyApps open-source package, also written in R. Final version of each application is available on www.shinyapps.io server. Interface of each application is user-friendly; Fig. 1 shows interface of application for Harris-Benedict equation (although this is not a statistical topic). A language of choice used by the applications is English because students should be able to understand statistical outputs in foreign language. We work on Czech version of the applications, too. Statistical methods we focus on and provide them for students via the applications cover at the time partly parametric tests of inference such as t-tests, F-tests or family of ANOVA methods and others; partly non-parametric methods such as Wilcoxon tests, Kruskal-Wallis tests or Friedman ANOVA and others.

The project is still in progress and always could be improved or updated. So far we have originated applications dealing with parametric and non-parametric tests as mentioned above. Web address, where is an application available on, follows the general form https://lstepanek.shinyapps.io/name_of_application/, where “name_of_application” is a title of a concrete application, e.g. “t_test” etc. An expected way of usage of each

application is — after the choice of the optimal statistical method and appropriate application — an inputting of the student's data into online form, setting parameters of the method via checkboxes and radio-buttons and finally downloading results and plots, provided by interface of the application. The idea of giving rise to such a project of statistical computation applications reflects concrete demands and year-after-year wishes of our students. The applications are aimed not only at bachelor's or master degree's students, but at medical doctors, too. They could particularly appreciate the fact that language of application output plots and tables is English. Offline texts providing guidance through correct statistical approach and links to appropriate applications are necessary in order to guarantee at least a standard quality of statistical section impact on other parts of thesis. Fig. 2 shows a piece of flow chart helping to make a correct statistical decision.

There is no doubt about the fact that a quality of statistical results presented in bachelor or master degree thesis or research article significantly affects the overall impact of the publication. A utilization of power of an open-source statistical language R in order to develop web-based applications written in R is partly one of the way how to try to increase the mentioned quality of statistical analysis in publications and partly a way how to make the process of working out the statistical analysis easier.

HOW ARE LMS SUPPORTED TEACHING STUDENTS UK OF MEDICAL DATABASES SELECTION AND INFOMRATION SEARCHING SKILLS

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D2.2 MEDICAL INFORMATICS AND INFORMATION SCIENCE

Keywords: *medical librarians, searching skills, LMS, blended learning*

The aim of the seminar “Specialized healthcare resources and services”, integrated into curriculum of the Institute of information studies and librarianship, Faculty of Art, Charles University in Prague, both in three years bachelor and two years master programmes, was present to students the expected skills of a clinical or healthcare librarian.

The paper presents the content and scope of the seminar, teaching methods and their evaluation with respect to healthcare librarian specialization.

The combined method of blended learning was used throughout the seminar, the lessons consisted of face-to-face lectures and a Moodle course, where study materials, tests and tasks were placed.

Main goals of the seminars were to extend the knowledge in the field of healthcare organization and to develop information searching skills including proper database selection and search strategy formulation. Search strategy and techniques, both analytic searching and intuitive searching and various searching procedures usually require an interactive training. This seminar proved the possibility of a remotely controlled training.

The advantages and disadvantages of blended learning, both for student and tutor, are defined in concluding evaluation.

EDUCATIONAL INTERVENTIONS TO TEACH EVIDENCE-BASED PAEDIATRICS: INNOVATIONS AND SUSTAINABILITY

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D2.2 MEDICAL INFORMATICS AND INFORMATION SCIENCE

Keywords: *evidence-based medicine, case-based teaching, blended learning*

The aim of the paper is to define and propose innovations ensuring sustainability of an undergraduate evidence-based course in paediatrics that has long been delivered at a bench-to-bedside learning platform with the use of a blended learning model. 5-year experience has shown that live clinical scenarios are an effective way to support practical uptake of evidence based medicine knowledge and skills. In concert with the recent published literature it is effective to work in collaborative teams comprising clinical teachers and competent medical librarians. Much attention should be paid to motivation, creative thinking development and personal commitment of the training staff.

SWOT (Strengths — Weaknesses — Opportunities — Threats) analysis was used to reveal above all weaknesses of the project from a long-term perspective. Its results helped delineate a set of complex measures to contribute to sustainability of the existing case-based paediatric course in the general medicine curriculum. For implementation of the proposed solutions we used corresponding methods, such as: (1) database creation with easy online update; (2) standard methodology of epidemiological study designs; (3) available IT tools for e-mentoring; (4) modern principles of adult teaching and learning; (5) usage of subject categories in website development.

The innovations have been defined and carried out to ensure further sustainability and increase viability of the course, i.e. (1) development of online database containing virtualized paediatric patient cases completed by undergraduate medical students with a standard structure including a clinical question and relevant critically appraised journal articles; (2) introduction of a web study workshop to help students understand a hierarchy of clinical evidence before critical appraisal; (3) continuous management of updated web-supported self-instructional materials for training of trainers; (4) e-mentoring provided by clinician-teachers and medical librarians; (5) improvement of fulltext medical information resources delivery.

A set of supportive innovative features seem to be robust enough to ensure long-term viability and eligibility of the existing case-based approach to teaching evidence-based undergraduate courses in paediatrics.

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COMPUTERIZED VISUALIZATION OF BRAINSTEM RESPIRATORY AREAS INVOLVED IN GENERATION OF TIDAL BREATHING, COUGH, ASPIRATION AND EXPIRATION REFLEX

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D2.3 SERIOUS GAMES, SIMULATION AND MODELS FOR MEDICAL EDUCATION

Keywords: *brainstem, model, reflex, tidal breathing, cough*

Recent scientific papers showed that respiratory reflexes like cough, aspiration and expiration reflex do not only have a salient role in airway defence but they also have a resuscitation potential and are able to reverse some of the functional disorders like for instance apnoea or cardiac arrhythmia. On the other hand, the respiratory centre involved in generation of these respiratory patterns is not a specific nucleus of neurons but a distinct network distributed in the brainstem and its intricate spatial organization is hard to comprehend.

The aim of our work was to summarize and in a three-dimensional view graphically visualize the data on neurons, which are active in relation to generation of given respiratory reflexes and tidal breathing. The graphical tool and the user interface was designed using Matlab® environment.

In the tabular database we included data on feline brainstem studies from relevant literature sources listed in Scopus and PubMed. Actual database contains entries for spontaneous inspiration, spontaneous expiration, cough, aspiration and expiration reflex but more respiratory reflexes can be added in the future. Each entry holds data on number, reflex or spontaneous character and type of neurons assigned to particular anatomic region and the corresponding literature reference. Visualized data locations differ in marker type, size and colour, allowing easier orientation for the user.

This graphical tool was designed for students and researchers to improve their spatial orientation of distinct brainstem respiratory areas involved in different functions e.g. reflexes.

The database designed in Microsoft Excel® is simple and flexible so users can apply their own entries, resulting from variable procedures, anytime.

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VIRTUAL CASES IN INTERNAL MEDICINE EDUCATION

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D2.3 SERIOUS GAMES, SIMULATION AND MODELS FOR MEDICAL EDUCATION

Keywords: *virtual cases, internal medicine*

Organization of practical training in medical schools faces specific problems (limited spectrum of patients). Simulation of clinical cases using information technologies is an excellent option how to overcome it.

The project E-KAZUISTIKY is an interactive problem-based learning system, generating a set of virtual patients. The spectrum of diagnoses, number of patients and criteria for passing the course can be predefined. Personal data, medical history symptoms, etc. are pseudorandomly generated for each patient. Student must

suggest an optimal diagnostic algorithm and determine correct diagnosis. Clinical findings and results of diagnostic tests are presented in multimodal manner.

The evaluation of students' performance is based on correct sequence of suggested diagnostic steps and assessment of the financial costs of each test.

The program is used in the undergraduate curriculum at the Medical Faculty in Hradec Králové. The users' hands-on experience was evaluated through anonymous questionnaires. The most appreciated attribute of the system is the game-like involvement and multimedia-supporting environment (for students) and possibility of detailed analysis of each student's performance and clear identification of weakest areas (for tutors).

The project represents a useful tool for undergraduate medical education with positive feedback from both students and teachers. The advantages are flexibility, potential for expansion into other clinical disciplines and no restrictions regarding particular disease, clinical specialty, diagnostic procedure, etc.

Take home message

Virtual cases allow overcoming limitations of practical education in medicine and arousing a positive response by users.

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LABYRINTHS TO SUPPORT CLINICAL DECISION MAKING IN PSYCHIATRY

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D2.3 SERIOUS GAMES, SIMULATION AND MODELS FOR MEDICAL EDUCATION

Keywords: *scenario-based learning, open labyrinth, decision making, psychiatry*

Education for clinical practice is a complex process, involving the development of a body of knowledge, skills and multiple aspects of professionalism. Practitioners act by synthesising a range of relevant information, identifying and testing solutions. Developing competence in this crucial process requires an approach that differs from traditional teaching, where students act only as recipients of information.

Based on our previous experience and knowledge gathered during stays in other universities, we are using branched type of virtual patients authored in the open-source system OpenLabyrinth. Our authoring approach includes three phases: (i) clinical experts develop structures and short description of all nodes of their case in powerpoint slides — i.e. in the environment which they are familiar with; (ii) the powerpoint version is taken by e-learning experts/staff and the first version of the case is developed; (iii) commenting by the clinical expert is done in several iterations including cooperation with the e-learning expert, who acts as co-author of the case; (iv) peer review and publishing the case games.mefanet.cz - the new extension of the MEFANET portal platform for serious games.

We have started to author 7 cases, of which 3 are completed and published. The cases include following topics: delirium, suicidality, anorexia, aggressiveness, psychosis, depression, child patient at the psychiatry department.

We are going to use the labyrinths in face-to-face learning/teaching rather than for self-study purposes.

VIRTUAL PATIENT IN MIDWIFERY

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D2.3 SERIOUS GAMES, SIMULATION AND MODELS FOR MEDICAL EDUCATION

Keywords: *virtual patient, midwifery, education*

Virtual patient is an interactive computer simulation of real clinical case for the purpose of medical and health education, dedicated to the area of assessment and decision training. Electronic virtual patients are becoming increasingly popular and important in modern medical education. Their content, interactive clinical cases, created mainly by doctors and other healthcare specialists. The number of virtual patients available in obstetrics and midwifery is very low. There are several open platforms — players and development environments available currently. Web portal virtualpatients.eu offers series of midwifery / obstetrics virtual patients, running on Decision Simulation platform (e.g. premature labour). These virtual patients can be translated and accommodated to local needs. Few focused applications designed by specialized institutions and interest groups are also accessible (e.g. Can you be a midwife? by Ardea Arts). Commercially available are e.g. 8 obstetric cases developed by Anesoft.

The aim of this paper is presentation of project to create own virtual patients appropriate for midwifery study programme.

In terms of methodology, a virtual patient in midwifery is an interactive computer simulation of real clinical case, in which the use of information and communication technologies with traditional face to face training is combined. The suitable, freely accessible platform for creating virtual patients is chosen in the first step and it is implemented in the workplace (in cooperation with ICT experts). Content of a clinical case is formed by experts in midwifery/obstetrics in the next phase. Partially the virtual patients for midwifery education will be based also on suitable existing cases available on virtualpatients.eu, as the international cooperation is being established.

Virtual patients can be used directly in contact teaching (teacher interpretation issues), as well as for individual study purposes. Students can solve the case, which they in practice rarely face (such as care for a women with perinatal loss, etc.), or vice versa routine clinical cases, where there are frequent errors in patient treatment. Developed virtual patients are planned to be shared within the Medical Faculties Network.

In Slovak academic field it is a fundamentally innovative didactic approach to create own custom-made virtual patients in general, especially in midwifery. Virtual patient helps to associate theoretical knowledge with the real applications in clinical practice. The benefit of virtual patients is significant for different reasons. Partially it is a compensation for the decreasing number of hospitalized patients and shortening of hospitalization time. It also improves the habits and skills of students and increases patient safety.

Acknowledgement: Supported by project Virtual and Simulation Tuition as a New Form of Education at JFM CU in Martin, ITMS: 26110230071, co-funded from EU sources and European Social Fund and KEGA NO. 025UK-4/2014 Virtual patient in Midwifery.

DEVELOPMENT OPPORTUNITIES OF EMOTIONAL INTELLIGENCE WITH REFLECTIVE STRATEGIES USING VIDEO-BASED TRAINING

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D2.3 SERIOUS GAMES, SIMULATION AND MODELS FOR MEDICAL EDUCATION

Keywords: *emotional intelligence, videobased training, reflective practice, reflection, evaluation*

Emotional intelligence (EI) means the ability for the nurse to understand not only their own feelings and reactions, but especially the feelings and reactions of patients in their care.

The importance of the concept of emotional intelligence in the context of nursing is increasingly emphasized (Beauvais et al., 2011; Codier, E., Odell, E., 2014; Montes-Berges and Augusto, 2007). Because of this are nursing teacher trying to find the new ways and approaches for the development of EI. One possible way how to do it is using of video based training. According Salbot et al. (2011) EI includes such qualities as awareness of one feelings, empathy for the feelings of the other person and regulate emotions so as to improve their quality of life. McCobe, Timmins (2006), discuss the combination of cognitive and affective processes that help interact nurses with patients. Emotional intelligence is perceived by one group of experts (Mayer, Salovey & Caruso 2004) as the ability and the rate is determined by power constructs. Other authors distinguish it from the conceptual framework of EI as a personality trait (Pérez, Petrides and Furnham, 2007) and recommend using the term emotional self-efficacy. The rate of EI as a trait is determined with selfdescriptive methodologies. Both concepts have their benefits and strengths, but also limitations (Codier and Odell, 2014).

The reflective method of evaluating the effectiveness of development of EI using videobased Training were used in our study. Data about the video facilitation in relation to EI were collected after the completion of the reflection assignments using semi-structured interviews and reflective sheets (Stetler Maram model). There were 46 students involved from master degree programme — Intensive care nursing in two following academical years (2012/13 n = 15 and 2013/14 n = 31).

The results revealed that students in both study years considered video as effective for carrying out self-evaluations and development of EI. The usefulness of video and peer-feedback for other reflection processes differed in students' view.

The student considered videobased training generally useful for all the reflection processes and improvement of EI; however they also indicated some shortcomings. The study demonstrated that student-centric pedagogies and reflective activities on student learning showed more advanced development of EI.

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USAGE OF SIMULATORS IN OPHTHALMOLOGY, ORTHOPTICS AND OPTOMETRY LECTURES

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D2.3 SERIOUS GAMES, SIMULATION AND MODELS FOR MEDICAL EDUCATION

Keywords: *direct ophthalmoscopy simulator eye optical disc macula lutea fovea*

Direct ophthalmoscopy is basic technique how to examine eye fundus. Learning ophthalmoscopy on real patient is nerve-racking job.

Simulators consists of electronic ophthalmoscope, examination head and PC. Software program of simulator offers three stages of training. First of them is focused on basic skills by manipulation with simulator. Second stage enables to students examine retina and eye fundus. Student can do analysis of retina and its structures macula and fovea. Third level of simulator tests knowledge, which students got during theoretical lectures and seminars.

Learning of ophthalmoscopy is non-pressure. Every student can make training in any time. Big advance is to make repetition and educator can make control of fixation at PC screen.

EyesiDirect means big advance in training and brings more chance for students of medicine, optometry and orthoptics.

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UTILIZATION OF SIMULATING APPARATUR EYESIDIRECT IN CLINICAL PRAXIS

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D2.3 SERIOUS GAMES, SIMULATION AND MODELS FOR MEDICAL EDUCATION

Keywords: *eyesidirect, direct ophthalmoscopy, retina*

Retina examination by direct ophthalmoscopy belongs among special investigative techniques.

Simulating set EyesiDirect, which consist from test head, direct ophthalmoscope and pc enable students to adopt skill which needs to recognize normal and pathology findings. From more common diagnosis there is possible to move to the more complex cases, discuss differential diagnosis, make appropriate therapeutic plan and determine method of treatment.

From the beginning autumn semester 2014 we learn 2 groups of medical students by this simulator. The 100% of student was able to recognize basic pathology of retina and make adjustment of ophthalmoscope.

The simulator eyesiDirect was a very useful apparatus and it moved training of direct ophthalmoscopy from laboratory to praxis.

SIMULATION EDUCATION AT JESSENIUS FACULTY OF MEDICINE, COMENIUS UNIVERSITY, IN WIDER CONTEXT

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D2.3 SERIOUS GAMES, SIMULATION AND MODELS FOR MEDICAL EDUCATION

Keywords: *simulation*

Simulation education center (SEC) was established at Jessenius Faculty of Medicine in April 2012, in September 2012 it commenced to actively participate on education process. Nowadays it is involved in pregradual training of medical and other healthcare specialities students for the third academic year.

The focus of this paper is to summarize experience gathered running “such an unusual facility” on a Slovak medical school for mentioned period. Presented are data characterizing education process as such, as well as its reflections by students and faculty employees. These reflections are based on different feedback surveys conducted in last two years.

The present schedule shows, that SEC hosts obligatory seminars in 12 different subjects (both for Slovak and foreign students) taught at the school per one academic year, except that optional extracurricular courses, several self-study activities, occasional courses for employees, conferences and presentation activities. Simulation technologies (educational software, models and part-task trainers) are employed also in at least 4 more subjects taught outside (but in cooperation with) SEC.

Students' perception of simulation can be summarized as positive, while in feedback questioners provided by SEC in two subsequent academic years more than 90% of them consider simulations are bringing substantial increase in quality of teaching process. Still the students find a space for improvement in some aspects. The topic of simulations is also widely discussed by students in general feedback survey conducted on Jessenius Faculty of Medicine. Reactions of tutors involved in simulations are (according to SEC feedback forms and personal discussions) 100% positive. They do think simulations move teaching forward and appreciate cooperation with SEC. This attitude is unfortunately not shared by all those not involved, thus general perception of SEC by academics is quite unconvincing.

The experience gathered by own practice and the experience gained abroad calls for closer cooperation between facilities of this kind on local ground (Czech & Slovak) to best fit the modern teaching approaches to local needs, conditions and habits.

Acknowledgement: Supported by project “Virtual and Simulation Tuition as a New Form of Education at JFM CU in Martin”, ITMS: 26110230071, co-funded from EU sources and European Social Fund.

POSSIBILITIES OF UTILIZING BLENDED-LEARNING IN THE AREA OF LANGUAGE EDUCATION OF MEDICAL PERSONNEL

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D2.4 ICT ADVANCES FOR EDUCATION IN HEALTH CARE SCIENCES

Keywords: *blended-learning, language education, intercultural professional communication, communication competence, European certification*

Successful and effective communication in the health service assumes managing communication competences on a certain professional level, not only in the mother language, but also in some foreign languages. For this purpose, IMED-KOMM-EU “Intercultural medical communication in Europe” project was created, the target of which is to support the sustainable professionally orientated foreign language teaching to acquire job in the medical facilities in various EU-countries. The project connects the traditional form of education for the purpose of acquiring a particular qualification with life-long learning of already professionally active experts. Starting point of creating the multi-language educational IMED-KOMM-EU project became the possibility of “blended-learning” implementation, i.e. the combination of e-learning with the traditional contact teaching. This project is focused on the training in medical communication and includes the professional part as well as exercises focused on the knowledge necessary for successful communication in the medical facilities, including the intercultural communication.

Creation of teaching materials was preceded by extensive information search, questionnaire examinations concerning, in the first stage, establishing the claims on professional activities and associated communication competences, the foreign staff shall acquire before starting the professional activity in the certain country. The source of information became also the requirements of partners from practice and institutions educating the future medical staff, including foreigners. Based on these findings, language courses of “blended-learning” were created orientated on intercultural professional communication of foreign physicians and other medical staff not only in countries of project consortium, but also in other member states of EU. During two-year project implementation the teaching materials were continuously systematized, tested, optimized and valorised at two conferences, at Pécs University and Medical University in Varna. In the second project stage, a questionnaire examination took place in which first of all the participants of tested groups took part in which the work with already created materials took place, which enabled to optimize continuously the exercises, to bring the final form of courses in accordance with the real needs of project target groups.

The main project result is modern teaching environment, under which we understand five complete courses of “blended-learning” focused on target groups of physicians and nursing staff. Individual courses are available at web portals for intercultural medical communication in German, Bulgarian, Slovak, Czech and Hungarian. The texts and situations which could be relevant for the field of activity of course participants may be found in the modules of these courses. The target of courses is the development of four language competences, i.e. reading with comprehension, listening with comprehension, written and oral communication which are developed depending on the specific circumstances of self-study or language teaching being implemented at that time, or on used technical means. The choice of vocabulary for the written and oral communication is importantly influenced by the choice of texts, audio-recordings and video-recordings. The selection of the main grammar topics is influenced very strongly by the kind of texts, usual within medical communication. A part of study materials are also exercises focused on the development of intercultural competences. The students should acquire here the key information for the successful communication with clients, including clients from a different cultural environment. Within the project, standardized systems of tests were elaborated besides “blended-learning” courses. It is a special extensive complex of tests and examinations ECL for medical staff, i.e. for physician on C1 level and for nursing staff on the level B2 of the Common European Framework of Reference.

Courses of “blended-learning” created within IMED-KOMM-EU project represent the form of teaching combining the advantages of self-study on one hand with advantages of the direct contact between the lecturer and course participants on the other hand. The superior target of courses is the development and subsequent strengthening of key competences focused on the professionally orientated intercultural medical communication and European certification. Hereby, the project wants to contribute first of all to the life-long professional education, the purpose of which is success at the labour market, and also to strengthen the European integration. Results of project in the area of professional language certification could contribute to the creation of standardized over-regional certified language tests focused on the health service.

ONLINE TECHNOLOGY IN POST-GRADUATE TRAINING OF NURSES

Helena Michálková

NGO Seppia

D2.4 ICT ADVANCES FOR EDUCATION IN HEALTH CARE SCIENCES

Keywords: *on-line lectures, virtual classroom, post-graduate training of nurses*

Online teaching supplements and broadens the possibilities of learning. Online teaching is available to the students through the internet; it is live, no recorded lectures. The teachers and students are at the same time at their PCs and take part in the lesson in a virtual classroom. The students can see and hear the their teacher, follow his/her presentation and can ask questions. Online teaching is easily accessible because there is no need to travel; learning and teaching is done from home.

The research has been carried out by quantitative and qualitative analysis. In the quantitative analysis we focused on the students whereas in the qualitative investigation on the readers of online lectures. We were observing the motivation of the students and teachers for online teaching. We were interested in both the positive and negative feedback from online teaching participants.

The results of the questionnaire investigation:

- ▶ The most important criterion for taking up a particular course is the local accessibility of the classes.
- ▶ Another important matter of concern is the price.
- ▶ The students are satisfied with the online tuition as well as with the virtual environment where the lectures are read. They are finding the online teaching easily accessible both in terms of time and costs. They consider this type of teaching as innovative and attractive.
- ▶ The students have assessed online teaching as financially accessible, lowering the costs of learning.
- ▶ Half of the respondents have marked as negative the dependence of the online lectures on the internet and the bandwidth. One fifth of the respondents have indicated the dependence on IT as negative.

Interviews with the lecturers of online teaching:

- ▶ “What motivates a lecturer to teach online?” The motivation is the possibility of working from home, teaching during the maternity leave and thus harmonise the work-life balance. Another important motivating factor was the possibility to try out a new and innovative environment for tuition.
- ▶ “What positives can a lecturer find in online teaching?” The positives of online teaching correspond to the motivation criteria; the lecturers repeatedly stated the advantages of working from home, improving the work-life balance, little financial and time demands. The advantage of online teaching was perceived in the possibility of sharing experience with students from all over the Czech Republic and Slovakia. Another positive factor is freedom in choosing the topics and greater openness of the students.

- ▶ “What negative aspects can a lecturer find in online teaching?” The lecturers perceive it as a downside that they cannot see the students; the lack of contact with the students. During teaching they are dependent on the internet and bandwidth. Another negative aspect are certain demands on computer literacy of the students as well as limitations in building up the relationships between the teachers and the students.

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E-LEARNING IN MIDWIFERY TECHNIQUES

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D2.4 ICT ADVANCES FOR EDUCATION IN HEALTH CARE SCIENCES

Keywords: *e-learning, techniques, midwifery, bathing of a newborn*

The contribution is focused on presentation of the project which goal is to develop a study program for techniques in midwifery in an e-learning course form. Through the e-learning, this modern teaching method, we want to arrange dynamic connection between theory and practice focused on development of practical skills of midwives. Rationale and advantage of the e-learning education emerge from overloading of clinical settings by students and their limited access to some diagnostic, therapeutic procedures and nursing interventions.

KEGA project titled “Innovation of a content, form and methods to promote practical skills in midwifery (E-learning education)” financially supported by the Ministry of Education of the Slovak Republic (KEGA registration number 057UK-4/2013) is aimed as a study material for students of bachelor study program midwifery at the Jessenius Faculty of Medicine, Comenius University in Martin. It has a form of e-learning so called blended learning where we try to combine information and communication technology with a traditional presence teaching. The software package Learning Management System Moodle is used to development, distribution and administration of the course. The software package enables creating of courses with various levels of dividing and graphical design and is provided on the University server <http://moodle.uniba.sk>.

The goal of the presentation is to present selected parts of the prepared e-learning educational techniques in midwifery consisting from audio-visual teaching elements (texts, pictures, animations, videos, tables...) through various media making possible for students more clearly, illustratively and better understand selected themes and to create prerequisites to gain practical skills. It is beneficial in teaching of nursing techniques course which is practically aimed and numerous procedures, tools should be seen to be remembered for students.

The main themes, chapters of the textbook are: Prenatal care for pregnant women, Physiologic delivery, Postpartum period, Care for a newborn, Investigation methods in gynaecology and obstetrics. The chapters are further divided into subchapters. In the presentation, we present the subchapter “Bathing of a newborn”. This procedure ranks among basic skills which should be handled by students of midwifery during their undergraduate study. This procedure is demonstrated in a video form with textual description.

Through e-learning teaching we want to contribute to meet education goals in students, their improvement, more effective, flexible, faster and attractive gaining of knowledge and skills needed to handle techniques in midwifery in real life conditions of clinical settings with widened possibility of self-study as well as with goals to promote knowledge of information technologies.

Acknowledgement: Supported by grant KEGA NO. 057UK-4/2013 Innovation in the contents, forms and methods to promote practical skills in midwifery (e-learning education).

INTERACTIVE ELEMENTS IN BLENDED-LEARNING EDUCATION OF MICROBIOLOGY AND IMMUNOLOGY FOR NURSES, MIDWIVES AND PARAMEDICS

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D2.4 ICT ADVANCES FOR EDUCATION IN HEALTH CARE SCIENCES

Keywords: *nursery, midwifery, paramedic, self-assessment, on-line questionnaire*

At Mefanet 2010 conference an electronic support for blended-learning course of nurses and midwives was introduced. It consisted of a textbook, available online, and study materials, derived from, but not identical to, lectures given orally in the contact part of tuition. This support gave a good fundamental, nevertheless, self-assessment was missing. This new report concerns introduction of a self-assessment system in spring 2014.

As already mentioned, since beginning of a course for nurses (and later also midwives) some materials were prepared: an on-line available (and therefore also prepared for updates) textbook, and interactive study materials, that were also available on-line for students and it was easy to update them. Several years after this, the materials had to be adapted to a new field of study "Paramedic" (rescuer), and soon after this, we decided to add a tool for self-assessment, as this was considered quite useful for making students more active during their study; poor results of some students during the final exam showed that a form of continuous activity-checking would be very helpful. Advantage was that system of questionnaires ROPOT = "Revision, Opinion Poll and Testing" system) is already for a long time available at Masaryk University, enabling teachers to set their own questionnaires with no need for assistance by IT staff.

The main questionnaires were prepared to all basic topics common for all three fields of study (Topic 1-10, that is shared for Nursing, Midwifery and Paramedics) and additional topics for nurses (Topic 11-14). Additional smaller questionnaires were also prepared for topics shared by midwives and paramedics (Topic 1A-4A; in fact, these were shortened 11-14 questionnaires), special topics for midwives (5A-8A) and for paramedics (5B-8A), so the questionnaires filled all parts of syllabus (that serves for both e-learning and contact part of tuition). The system was set similarly as that of general medicine students several years ago: 1) students are allowed to do their self-testing from home, using any computer, and as many times as they wish 2) the only condition is that one of attempts must be completely successful, i.e. full number of points 3) filling-in all questionnaires was one of conditions for credits. All students (except individuals leaving the course without finishing it) filled it the questionnaires without problem or with simple technical problems that could be solved using another browser/computer.

Use of self-assessment questionnaires improves the motivation of students to study continuously and not just for the final exam. The passing through the questionnaires can be easily checked by teacher. It can be also used as one of conditions for credit, what matches very well with the trend of finding more than one condition for credits and certainly more than "no absence" condition. In future we are planning to use the same questionnaire system also for combined study and we believe that here its meaning may be even bigger; it can replace checking of presence, that is always problematic here.

EVALUATION OF STUDENTS IN MEDICAL AND HEALTH CARE EDUCATION

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POSTERS

Keywords: *evaluation, knowledge, examination, MEFANET*

The poster summarized activities of the MEFANET working group related to the the construction and analysis of tests with a specific emphasis on testing needs of medical schools. The primary goal is to introduce opinions, experience and best practice from various fields related to electronic examinations and share approved methodological background for building well-arranged assessment agenda including all essential parts.

We present a detailed treatment of knowledge assessment methods including possibilities of written and electronic testing. It describes various domains such as

- ▶ preferences, objectives, and problems associated with electronic form of exams,
- ▶ various environments across the MEFANET network (LMS Moodle, Rogo platform),
- ▶ usability in different phases of educational process — right time to use electronic exams,
- ▶ various forms and technologies (local applications, web applications, exam agenda in LMS, reply forms scanning ...),
- ▶ test questions creation (technical support vs. author),
- ▶ sources for questions creation (tests from other sources — trustworthiness, author law),
- ▶ students' feedback,
- ▶ assuring of source questions and exams processing,
- ▶ verification (evaluation) and many more.

The educational network MEFANET has been covering a support of activities focused on the construction and analysis of tests employed at medical and health care faculties. The methodical publications and brochures were published and many specialized workshops were organized. We have been also guaranteed practical evaluation of students at faculties involved in the MEFANET educational network.

EVALUATION OF RESULTS OF MCQ TESTS APPLIED IN ELECTRONIC FORMAT

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Keywords: *electronic tests, MCQ, evaluation, difficulty*

Testing of students' knowledge by electronic media is increasingly used by teaches in schools at various educational levels. Three years ago we have introduced electronic testing in our system of teaching practical histology using a dedicated software Articulate Quizmaker 13. This software provides immediate on-screen summative scoring of students' results, but fails in analysis of responses to single questions and in further statistical analysis of question difficulty. Here we report our innovations in collection of test results locally and their difficulty analysis up to the level of a single question.

In order to examine theoretical as well as practical knowledge of histology we use four formats of questions in our tests, namely Multiple Choice, Multiple Response, Drag & Drop and Hot Spot questions. The final test-scoring page informs students about their results showing them the achieved points in a percentage value and a minimum passing score for the given test. The software is able to register all data about each test question in html-formatted results table and, after enabling the Print Results function, the result table can be printed. In its original configuration, the Quizmaker 13 failed to collect and send these data through the network to any hardware storage for further analysis. Our modification of this examination system required re-programming of the Quizmaker's 13 report.html file to be able to send result data directly to a web server installed on the teacher's PC. This web server processes the result data into a modified results table, saves the table on teachers' PC for immediate access, and simultaneously it sends the table to a dedicated email address "histexam" located on university servers.

On the "histexam" location, the examination results are categorized by student's name, date of exam, contents of the exam etc. The downloaded result tables of every student are further manually converted to standard xls spreadsheet table and further analyzed to calculate values of summary points, net points, easiness index and difficulty index in percentage values. Based on these data, we can evaluate performance of each student, performance of groups of students undergoing the same tests and we can also compare groups of students by their performance. We also evaluate each question in the test to classify it as easy, moderate and difficult one. We presented the evaluation data in the form of columnar graphs where difficulty indices are color coded according to our own classification scale. This evaluation of tests gives us important data on the quality of tests applied but also on the overall preparedness of students for the particular topic. It can also indicate possible cheating activities of students.

Application of electronic tests is a useful tool for teachers and students alike. We consider the regular evaluation of electronic tests as very important follow-up feature of the examination procedure. It reveals improperly formulated questions, incorrect sets of distracters and overall difficulty of examinations. This activity also provides a summative information about classes of students and stimulates students in their preparation for examinations. Our further activities in this field will be directed towards development of a software-based automatic evaluation system.

Acknowledgement: Development and application of the electronic e-learning method of teaching histology practical was supported by ESF-OPVK grant n. CZ.1.07/2.2.00/28.0089 in years 2012–2014.

OUR EXPERIENCES WITH E-LEARNING METHOD OF TEACHING PRACTICAL HISTOLOGY

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POSTERS

Keywords: *histology, e-learning format, virtual slides*

Three years ago we started to use e-learning format of teaching practical histology to medical students. We have developed our own system of application of virtual slides in a classroom equipped with PC technology. In this communication, we are evaluating the impact of this method on our pedagogic effort from teacher's and student's point of view.

Each practical session contains a set of virtual slides with information on slide properties, keywords, file size, and also overview pictures of virtual slides. Additional supporting documents in pdf and ppsx formats are also available for each of the histology topic. During study of virtual slides, students can screen-copy selected areas of virtual slides viewed in the OLYvia (Olympus) viewer, and paste them into their own ppt presentations

for later revisions. Simultaneously students watch projection of virtual slides on a wide screen accompanied by teacher's explanation. For electronic testing of student's practical knowledge we prepare quizzes using Articulate Quizmaker 13 software. This software has a selective option to shuffle sequences of questions and also to shuffle all distracters in the quiz randomly on monitors of student's PCs.

The long-term application of this method brought several benefits to our teaching experience. The uniform set of virtual slides of the same quality was used for all students. Digital slides also prevented loss or breakage of this valuable teaching material. Supporting documents (guides, ppt presentations and pictures) were suitable materials for later revisions and self-study. E-learning format enabled us to introduce new models of practical teaching which support active student's approach and their engagement in group activities on digital slides. This helps with ever-increasing numbers of students at our Faculty of Medicine. This new teaching format also fulfils student's expectations to use innovative technologies (pc, laptops and tablets) during their studies. Objective evaluation and quick procedure of examination of formative and summative in-course quizzes are important benefits during practical testing. Access to virtual slides at any time, not only at set times of teaching hours, was provided through the external login (intranet, internet, multiple browsers) to the database of virtual slides which correspond to those in practical sessions. This open database of virtual slides contains short annotations of typical structures that are important for identification of slides. There were also some drawbacks recognised during our practice, like a tendency of some students to passively follow the demonstration of digital slides. They also preferred to observe histology slides in their digital form on PCs rather than to use simultaneously classical microscopes that were also available on their benches.

The e-learning format of histology practical based on virtual slides proved to be a didactically efficient method of teaching histology to medical students.

Students readily accepted to use of computers for observation of virtual slides. Teachers benefited from a uniform quality of presented slides and also from a straightforward and easy personal communication with students in the class when personal guidance and explanation was needed at student's monitors. PC-based classes of practical histology also provided an easy environment for computerized testing of student's practical knowledge. Most of the mentioned drawbacks can be prevented by proper organization of practical sessions.

Acknowledgement: Development and application of the electronic e-learning method of teaching histology practical was supported by ESF-OPVK grant n. CZ.1.07/2.2.00/28.0089 in years 2012-2014.

CLINICAL CASE STUDIES IN TEACHING OF PHARMACOLOGY AND CLINICAL PHARMACOLOGY

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POSTERS

Keywords: *case-studies, pharmacology*

The most popular way of teaching at medical faculties in Slovakia is based on so-called traditional curriculum, with subjects usually divided into lectures, practicals and seminars. Pharmacology belongs to the profiling subjects, whereas clinical pharmacology is usually an optional one. Their mastering is an important step in successful passing the undergraduate medical education.

The aim of introducing clinical case studies into curriculum of pharmacology and clinical pharmacology is to increase the retention of knowledge and their better preparation for clinical phase of study. Except of using clinical studies, students are divided into smaller groups. Furthermore, problem-based learning and interactive forms of formative assessments are used, including preparation of case studies by students themselves.

An impact of these changes was evaluated using results of retentional knowledge tests. Students' feedback evaluation was used as a marker of subjective acceptance of these changes.

Students' feedback showed significant improvement in subjective evaluation of subjects pharmacology and clinical pharmacology. Furthermore, theoretical preparation of students for respective seminars was ameliorated. However, tests of retentional knowledge did not demonstrate any significant differences between students involved in traditional and innovated curriculum.

Very high interest of students in optional subject clinical pharmacology reflects among others the positive acceptance of modern ways of teaching. Therefore, it is essential to follow the trend of innovations and to introduce new interactive forms of teaching, including preparation of database with clinical case studies, complex virtual patients, and simulations. However, more detailed assessment is necessary for real impact of these changes in clinical decision making of students.

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INVESTMENTS IN EDUCATION DEVELOPMENT