

MEFANET

+
2022

15th international conference of medical
and healthcare academic institutions
in Czechia and Slovakia



2–3 November 2022, Brno, Czech Republic



**Cooperation on
the effective use
of technology
in medical and
healthcare
education reflecting
on the challenges
of today**

editors



**DANIEL SCHWARZ
MARTIN KOMENDA**

MUNI MED

Conference partners



WELCOME WORD

Dear colleagues and students,

we are pleased to welcome you at the 15th year of the MEFANET conference, which traditionally brings together education technologists, teachers, and students from faculties of medicine and faculties of healthcare sciences across Czechia and Slovakia.

We believe that the program of this year's conference has been carefully prepared in accordance with what MEFANET strives for:

“Cooperation on the effective use of technology in medical and healthcare education reflecting on the challenges of today.”

The event is supported by Erasmus+ funded medical education project entitled CLUEDUP: Collaborative Learning Using Escape Designs and Pedagogies. The conference programme encompasses an interactive session, a symposium, two keynote lectures, two sessions with short communications and a guided poster tour. Besides general concepts of medical and healthcare education, the conference program focuses on how medical educators and medical education technologists grasp the wide field of technology-enhanced learning.

The interactive session VS4all will enable participants to explore existing approaches, use-cases and new trends in virtual scenarios, virtual patients, and serious games - mostly used within various collaborative learning instructional designs. The invited lecture by Panagiotis Bamidis (Aristotele University of Thessaloniki) will form an opener of this session and will uncover exciting field of Escape Room Pedagogy.

The symposium SIM4all will be oriented more on technology. It will bring together clinicians, educators, biomedical engineers, and experts in new materials to discuss the potential of 3D printing not only in clinical applications but also for use in medical and healthcare education. Pros/cons of 3D printing and VR/AR technologies are expected to be a hot topic of the discussion, fitting perfectly with the previous keynote lecture by Petr Štourač (Faculty of Medicine, Masaryk University), focused on simulation medicine.

We thank all participating speakers and authors of the conference proceedings contributions. It is our sincere hope that this year's conference will become another valuable asset for the MEFANET community.

On behalf of the programme committee and organization team

Daniel Schwarz, Martin Komenda, Eduard Lenner, Jaroslav Majerník

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CO-ORGANISERS

Faculty of Medicine, Masaryk University
Institute of Biostatistics and Analyses, Ltd., a spin-off company of the Masaryk University

GENERAL INFORMATION

Conference venue

WEDNESDAY – Hotel Continental congress centre

THURSDAY – Hotel Continental congress centre

Catering

Lunch is included in the registration fee and will be served in the congress centre restaurant to all conference participants for both days.

Registration of participants at the conference venue

2 November 2022 from 09:00 to 16:30

3 November 2022 from 08:00 to 12:00

Information for authors

- //// A data projector, PC connected to the internet, laser pointer and microphone are available for the lecture.
- //// All equipment is available for testing before the conference or during breaks.
- //// Technical support will be available for the whole time of the conference in the congress hall.
- //// Your presentation file will be uploaded to the PC at a registration desk.
- //// It will be also possible to upload your presentation directly to the PC in the congress hall; however, we do not recommend this due to time issues.
- //// Create your presentation; we recommend pptx format, eventually export to pdf.
- //// Duration of a standard lecture (including discussion) should not exceed 15 min.
- //// Authors of posters will receive information on poster presentation at a registration desk.
- //// Official languages of the conference are Czech, Slovak, and English.
- //// Poster dimensions: from A3 to A0 format.

We kindly ask lecturers to stay within the time limit for their presentations.

Wednesday

2 November 2022

Morning session

09⁰⁰–16³⁰	//////	Registration
10⁰⁰	//////	Conference Opening
10²⁰	//////	Keynote: Escape Room Pedagogy & Collaborative Learning
11⁰⁰	//////	VS4ALL: Interactive Session on Virtual Scenarios for Medical Education, Continuous Professional Development & General Public Health Information Awareness
12¹⁵	//////	Lunch

Afternoon session

13³⁰	//////	Short Communications: Educators & Pedagogy I.
14⁴⁵	//////	Coffee Break
15¹⁵	//////	Short Communications: Educators & Pedagogy II.
16³⁰	//////	MEFANET Coordination Committee: Open Meeting
18³⁰	//////	Welcome Reception

Thursday

3 November 2022

Morning session

09⁰⁰–12⁰⁰	//////	Registration
09³⁰	//////	Posters: Guided Tour
10⁴⁵	//////	Coffee Break
11⁰⁰	//////	Keynote: What We Used to Think About Simulation Medicine and What We Know Now
11⁴⁵	//////	Lunch

Afternoon session

13⁰⁰	//////	SIM4ALL: Interactive Session on Simulation Technology including 3D Print
14³⁰	//////	Coffee Break
15⁰⁰	//////	Short Communications: Education Technologists
16⁴⁵	//////	Conference Closure, Farewell

AB



STRA



CTS

KEYNOTE LECTURE I

10²⁰–11⁰⁰ WEDNESDAY

ESCAPE ROOM PEDAGOGY & COLLABORATIVE LEARNING

Panagiotis Bamidis

Aristotle University of Thessaloniki

Medical and healthcare education has relied heavily upon training for practice in the transitional period between science training on campus and apprenticeship in clinical practice. Students learn to practice safely, before being exposed to the patient: they learn to apply their knowledge: reasoning, decision-making, interprofessional skills, and patient management.

This keynote brings together collaborative learning and escape room pedagogy. It uncovers some of the outcomes from the CLUEDUP project (Collaborative Learning Using Escape Designs and Pedagogies), which mission lies in enriching collaborative pedagogical approaches with novel instructional designs coming out from escape room pedagogy.

Combining online collaborative learning activities and the escape room philosophy allows multi-professional learning in a patient context, to supplement reduced face-to-face experiential training in healthcare.

Creating scenarios in virtual/mixed/augmented reality (VR/MR/AR) environments allows remote training, thereby enabling mitigation or reduction of training/education in relatively costly face-to-face simulation centers.

This work was supported by the CLUEDUP project funded from Erasmus+ program of European Union.

INTERACTIVE SESSION

11⁰⁰–12¹⁵ WEDNESDAY

VS4ALL: INTERACTIVE SESSION ON VIRTUAL SCENARIOS FOR MEDICAL EDUCATION, CONTINUOUS PROFESSIONAL DEVELOPMENT & GENERAL PUBLIC HEALTH INFORMATION AWARENESS

Multiple authors

Various institutions

VS4ALL is planned to be an interactive session on virtual scenarios for medical education, continuous professional development & general public health information awareness.

Three various stakeholders will demonstrate/discuss the potential of virtual scenarios and virtual patients for the education of students/doctors/public: (i) Academic stakeholder = CLUDEUP consortium will be represented by the first keynote on collaborative learning and escape room pedagogy – the session opener. (ii) Professional stakeholder = continuous professional development projects being delivered in Czechia by Institute of Biostatistics and Analyses Ltd. (iii) Public stakeholder = a project called National health information portal under the umbrella of the Ministry of Health of the Czech Republic, which mainly focuses on health literacy improvement using serious gaming scenarios.

SHORT COMMUNICATIONS: EDUCATORS & PEDAGOGY

13³⁰–16³⁰ WEDNESDAY

STUDENT FEEDBACK ON THE USE OF THE OSCE METHOD IN THE FINAL EXAMINATION OF NURSING TECHNIQUES AND SKILLS

Ivan Farský, Martina Lepiešová, Mária Zanovitová

*Jessenius Faculty of Medicine, Comenius University in Martin, Jessenius Faculty of Medicine,
Comenius University in Martin*

The measurement of clinical skills performance continues to pose a challenge for nurse educators. The objective structured clinical examination (OSCE) has gained acceptance as a benchmark for clinical skills assessment. The OSCE is defined as “an approach to the assessment of clinical competence in which the components of competence are assessed in a well planned or structured way with attention being paid to objectivity” (Harden, 1988, p. 19). In the OSCE, students must address and resolve various simulated clinical situations that are representative of real clinical practice. This cross-sectional study aimed to identify student feedback on the OSCE method used in the final examinations of nursing clinical techniques and skills within the Nursing Techniques course.

In 2022, 146 students enrolled in Nursing Techniques course for 1st year nursing and 2nd year general medicine students. The course was organized into practical sessions oriented on training basic nursing techniques. The final exam was performed using OSCE as a station-based assessment. Students were informed about the method of examination by the OSCE method at the beginning of the course and during the course they had access to an e-learning course with all OSCE protocols. Twenty six OSCE stations were set up, whereas students were randomly assigned, one to one station. At each station, two teachers assessed students’ clinical competence and skills related to simulated scenario, using OSCE protocols to provide formative feedback and summative evaluation. Students’ perceptions on this assessment method were gathered immediately after the exam through student feedback survey. Survey forms contained 13 statements on selected aspects of the OSCE using Likert scale from 1 to 5 to measure students’ views (1-strongly disagree; 5-strongly agree). Two statements were negatively worded (OSCE as stressful experience; OSCE time consuming). Data were analysed using descriptive statistics.

Students considered the OSCE to be fair (4.82 ± 0.58) and objective (4.75 ± 0.66) and method to assess their clinical competence and skills. Feedback provided was rated highly valuable (4.78 ± 0.53), helping to identify strengths and weaknesses (4.67 ± 0.67). Students experienced the OSCE as a pleasant (4.64 ± 0.68), moderately stressful (2.99 ± 1.48), moderate time-saving (2.50 ± 1.43) experience. They declared they learned something new during the OSCE exam (4.69 ± 0.69) and were stimulated to continue learning (4.53 ± 0.73). Students would prefer the OSCE as an assessment method in other courses (3.83 ± 1.16), instead of written tests (3.97 ± 1.17) or oral exams (4.05 ± 1.00) and also as a teaching method (4.48 ± 0.84).

The OSCE was well accepted overall by the students, who described it as a pleasant experience, fair and objective method of examining their nursing skills. Last but not least, it stimulated them to further learning. The faculty members also considered the OSCE valuable because it provided

them with information about clinical aspects that was difficult to acquire with other types of tests. They also noted that it allowed them to integrate and assess competencies and provided a more objective evaluation than other assessment tools used in clinical training. Supported by the grant KEGA 025UK-4/2021.

Kega 025UK-4/2021 Implementation of Objective Structured Clinical Evaluation (OSCE) methods in the teaching of medical students.

DIDACTICS OF SOCIAL INTERACTION IN INTENSIVE CARE

Natália Beharková

Faculty of Medicine, Masaryk University

The abstract presents a specific concept of teaching in intensive care using interactive approaches and online tools.

The use of e-learning focusing on improving students' communication skills, including videos of the most commonly used terms related to the provision of basic nursing care in Czech sign language increase the didactic potential. The use of a variety of interactive teaching methods with strengthening of practical skills and training of communication techniques with regard to the specifics of social interaction in intensive care positively influence the readiness of students for clinical practice.

The aim of the course Didactics of social interaction in Intensive Care is to strengthen the students' soft skills. The course is conducted in the form of independent lectures and exercises. Topics are sequenced to reflect the cognitive, psychomotor and affective goals set. Emphasis is placed on the acquisition of skills necessary for communication and social interaction of critical care health professionals.

Students can use e-learning (interactive syllabi), which was created in 2020 within the project Support for soft skills of students of selected non-medical health professions (Masaryk University Development Fund). A significant strength is that twelve areas focused on communication in healthcare have been developed, based on multidisciplinary cooperation with the Teiresiás Centre of Masaryk University, a clinical speech therapist, a psychologist, a special educator and a teacher for the deaf. In the chapter Communication with a hearing impaired patient, educational videos are prepared in Czech sign language using, among other things, the most common terms in nursing care and commonly used words (e.g. days of the week, courtesy phrases). The structure of the text of the e-learning chapters describes the aim and learning outcomes, basic characteristics and specifics of the topic, communication strategies, recommendations for practice, questions for reflection and a set of questions to test knowledge. This encourages problem solving and an active approach by students to deal with unusual situations.

The seminars are conducted in the form of practical exercises with discussion and evaluation. Students practice effective communication techniques, interpret appropriate and inappropriate attitudes of the health care professional, role-playing techniques are used in model situations with the student's own experience as a patient, family, health care professional, patient together. Students try out alternative ways of communicating with a patient with impaired communication skills or the basic principles of crisis intervention. Mastery of dying and death issues, including communication with the bereaved, is an important part of communication skills. Activation teaching methods are used, supplemented by specific aids related to the topic under discussion, such as providing care and communication with a visually impaired patient.

The introduced methods of interactive approach in teaching, training of model situations with the use of e-learning support of study materials based not only on theoretical knowledge, but especially practical experience of e-learning authors in the care of people with disabilities increase the soft skills of students and contribute to their better preparation for clinical practice. Last but not least,

they also contribute to the awareness of one's own values and ways of behaviour in social interaction both in professional and personal life. The effectiveness of the applied interactive approaches with blended learning is verified in model situations in contact teaching.

DIGITAL CONCEPT MAP AS A STRATEGIC TEACHING TOOL FOR NURSING STUDENTS

Gabriela Štefková, Jana Michaková, Lucia Dimunová, Beáta Grešš Halász

Faculty of Medicine, Pavol Jozef Šafárik University in Košice

Flexibility in the use of different learning platforms and students' digital skills are becoming important factors in undergraduate nursing students' education. This study focuses on the application of a strategic teaching method by creating digital concept maps using a software application in an online environment. Aim: This research sought to answer the question of whether concept mapping is an effective method of online learning using a software application in a nursing program.

This exploratory study was conducted as part of the institutional project VVGŠ – IPEL No. 2021-1862 aimed at developing e-learning in teaching through mind mapping. We evaluated the teaching method of creating a digital concept map using software in an online environment using a non-standardized questionnaire that was educational and exploratory in nature. The project took place in an academic setting in the winter and summer semesters of the academic year 2021/2022. The educational objectives, activities and assessment in the context of concept mapping were aligned according to the curriculum and the responsible teacher of the course. To achieve the learning objective, the ContextMinds software (www.contextminds.com) was used, which allowed an appropriate choice of language for working with the software, a manageable user environment and the creation of a school workspace. The data were analysed using SPSS version 25.0. The results of the analysis are presented using mean, median and standard deviation. Paired t-test, analysis of variance (ANOVA) and Pearson's correlation coefficient statistics were used to determine if there were statistically significant differences between the variables of interest.

In the study set, students expressed positive attitudes towards the view of concept mapping with which they can link different types of information, develop analytical skills and retain the learning. An interesting finding was that students were unable to visualize theoretical knowledge with clinical learning using concept mapping. Year of study and field of study significantly correlated in relation to the opinion of the concept mapping method using software application. First year nursing students disliked learning the concept mapping method using software application $\chi^2 = 7.321$, $p = 0.026$, the user environment in the concept mapping software was easy to use for nursing students $\chi^2 = 11.259$, $p = 0.024$ compared to public health and physiotherapy students. First and third year nursing students from the nursing major would not prefer to create a digital concept map in a group actively during class ($p = 0.001$).

Creating a digital concept map in an online space was a newly implemented teaching method that brought a new perspective to nursing education. We feel that teaching with concept mapping is ideal for shaping a new generation of healthcare professionals who are exploratory, critical, active and communicative. However, further research is needed to give this educational method a chance to be applied. Evidence that confirms its success through other learning platforms, technologies, validated tools to evaluate the teaching method and pedagogical process will enable educators to transform traditional teaching into innovative and meaningful learning.

VVGŠ (IPEL) No. 2021 – 1862 entitled, "Developing critical thinking in teaching through electronic mind map".

HIGH-FIDELITY SIMULATIONS FOR PARAMEDIC STUDENTS IN A REAL-LIFE ENVIRONMENT

Jindra Holeková, Jan Pospíchal

Portal of Faculty of Health Studies University of Pardubice

Model situations have their irreplaceable place at our faculty. Each major completes at least one during their studies. Nurses, radiology assistants and midwives have situations focused on acute and critical conditions in the hospital environment, social health workers deal with first aid in their work environment. Paramedics have day-long simulations like this every semester.

Some simulations are part of the driving and navigation skills course. He participates in it Third-year students are divided into four groups and in them they walk around Pardubice throughout the day and provide pre-hospital care to patients who are in a real environment. The route is almost 11 kilometers long and the students can complete it in about 7 hours even with the completion of the tasks. This year, the event will take place on November 15, and in addition to the permanent locations (emergency service, hospital, student dormitories), we managed to arrange one location at the castle. The situation is that a costumed tour was taking place in the exhibition area and the tour guide collapsed. He is unconscious but breathing. One of the visitors calls EMS. Another interesting simulation will take place in the center for the disabled. The man will be lying next to the cart under the eight steps he rolled down. Two surprises await the students here. First of all, it will be a real quadriplegic and secondly, there will be no referee in the stand and everything will be transmitted by a camera system. There are nine simulations in total. The last day's simulation will also involve cooperation between student firefighters and student rescuers.

Of course, the results from this year's individual habitats are not yet available, but last year two simulations had the greatest benefit. One of them was a 12-year-old girl with an asthma exacerbation who needed to be given intravenous corticoids. This girl was being treated for oncology and had to be given medicine through a subcutaneous port, which the extra actually had implanted. The second simulation was helping an anesthesiologist in the operating room, who prescribed a lot of drugs, a peripheral venous catheter, performing a securing attempt and applying a transfusion. It was also necessary to prepare tools and assist with intubation. The most students messed up was the situation where the elderly man had chest pain, but there were no signs of ischemia on the EKG. It took a few minutes longer and if the students did not repeat the EKG, they did not administer the correct medication and the patient died. On the contrary, they coped best with an anaphylactic reaction, which was solved correctly by all 12 teams.

Day-long simulations have a very positive response every year. Students will refresh their already acquired knowledge, learn non-technical skills and practice the performances that are performed in the EMS. We hope that even this year's varied situations will be successful for the students.

PILOTING TBL LESSONS: WHAT WE ACHIEVED BY INTRODUCING ESCAPE-ROOM FRAGMENTS

Tamara Skříšovská, Jan Dvořáček, Daniel Schwarz

Faculty of Medicine, Masaryk University

Team-Based Learning forms a substantial component of teaching at the Simulation Center of the Medical Faculty at Masaryk University. Theoretical Backgrounds of Clinical Medicine is one of the cover courses.

In typical TBL settings, students work with a virtual scenario, solve the best possible answers in individual and team readiness assessment tests, discuss with facilitators and content experts, and are provided with preclass-reading materials beforehand.

So far, we have organized four runs of TBL evening schools for students participating voluntarily 12 lessons in total. One of the sessions was enriched with several elements from a fragmented escape room: puzzles & riddles. Data describing students' attitudes were collected through an online questionnaire.

Active instructional methods, such as TBL with virtual patients, can shift student attitudes to learning towards more positive experience.

This work was supported by the CLUEDUP project funded from Erasmus+ program of European Union.

SIMULATION CENTER LF OU SIMLEK

Ivona Závacká, Peter Ihnát

Faculty of Medicine at University of Ostrava in Ostrava

The simulation center, alias the Training Hospital, will serve medics, students of non-medical health fields, as well as experienced doctors. It will enable them to transfer the studied theory into practice in a very effective way and avoid errors in patient care due to lack of experience in performing a certain procedure, for example due to the possibility of repeated training of different procedures.

Thanks to state-of-the-art patient simulators and top IT technology, it is possible to simulate situations that students will face in real practice. Almost all spaces are equipped with camera and sound recording, through which professional guarantors will supervise the students during their actual training. The obtained image records will be used to analyze the correctness of the procedure of all sub-steps within the intervention or action - debriefing.

It is a two-story building, the equipment of which resembles a real hospital, there is an emergency room, an intensive care unit with modern equipment, an operating or delivery room. Paramedic students will be the first in the Czech Republic to have their own operating center in the simulation center, in which they will learn to receive emergency calls. In preparation for all kinds of situations they will encounter in practice, for example, a small training apartment, an area for abseiling and, last but not least, also a model of an ambulance will help them. The operating room offer spectrum of surgical and laparoscopic operations. In addition, they will practice their surgical skills in microsurgery on state-of-the-art operating microscopes in the field of neurosurgery, plastic and reconstructive surgery.

In the field of ophthalmology, new eye equipment is located here, including a state-of-the-art virtual reality ophthalmology simulator for intraocular surgery training.

However, future physiotherapists will also learn in the training hospital. Three modern, fully equipped gymnasiums with rehabilitation beds, equipment and REDCORD suspension systems will help them prepare for practice.

In turn, general nursing students will appreciate the practical hospital room. In the simulation center, there is a faithful copy of the delivery room with the most modern birth simulator.

Teaching in a training hospital will give students a greater sense of security in their future practice, they will encounter routine cases, but sometimes also rare ones. But sometimes the goal will just be for them to learn to work together, to communicate well or to assess their own strengths.

CZ.02.2.67/0.0/0.0/18_057/0013366 Simulation Centre "Practice Hospital", CZ.02.2.69/0.0/0.0/0.0/18_056/0013365 Simulation - Innovation - Practice = modern way of education at the Faculty of Medicine.

SIMULATION SURGERY AT LFUK IN THREE PLANES

Pavol Vítovič

Faculty of Medicine, Comenius University in Bratislava

Medical education is a dynamic system. However, we face a serious problem in medical education and that is the lack of student-patient contact in clinical placements. One way to educate and prepare medical students for their professional practice is to implement simulation-based learning practices. The Faculty of Medicine of Comenius University in Bratislava, by establishing the Institute of Simulation and Virtual Medical Education (ISMEV LFUK), follows these trends and the result is seven simulation centres created within the clinics of LFUK, where both theoretical and clinical subjects are taught. For the winter semester of the school year 2022/23, a new centre oriented towards simulation teaching of surgical subjects taught to students of the 3rd-6th year was opened. The aim is to create an educational platform that will allow students to acquire the skills necessary to master surgical procedures.

The teaching of surgical subjects begins in the 3rd year with the subject "Surgical Propedeutics" and continues until the 6th year where "Surgery" is one of the four state subjects. As part of these subjects, students participate in clinical placements, with one of the placements always taking place in the newly established simulation centre. Discussions at LFUK resulted in the creation of a continuous two-stage course of simulations in surgery:

1) Surgical suturing: teaching of the basics of surgical suturing is carried out on artificial skins, which are produced by the Institute of Surgical Suturing in cooperation with the Bratislava Society of Medics (BSM). The skins are made of silicone and gel, their structure is three-layered (epidermis, mesodermis, endodermis), pigments are used for their production to make the final effect realistic, including the surface finish. By changing the manufacturing process, it is possible to create skins of different thickness and texture according to the specific need. The produced skins are placed on stands printed on 3D printers at the disposal of the Institute for the Study of the Human Genome. The educator creates a cut on the skin, which the student has to sew. In this way, all types of basic knots are progressively worked through. The teaching of surgical suturing is part of the course "Surgical Propedeutics" (3rd year).

2) Fundamentals of laparoscopic skills: the teaching of the fundamentals of laparoscopic skills is carried out in a classroom equipped with laparoscopic trainers with complete equipment (graspre, dissectors, scissors, needles and training modules). The aim is to acquire skills in orientation in 3D space (patient) by observing a 2D environment (screen). In addition to the supplied modules, the Institute designs its own laparoscopic modules according to the teaching requirements, for this purpose we use Autodesk Fusion 360 and the students of the Faculty of Medicine also participate in the whole process. We print suitable modules on a 3D printer. The teaching of laparoscopic skills is currently being carried out for the 4th year students within the subject "Surgery" and prospectively also for the 5th year.

3) Laparoscopic simulation. In conjunction with the financial support of the LFUC, a state-of-the-art LapMentor laparoscopic simulator was procured. The Institute also has an older, fully equipped Lap VR simulator. Through both simulators we are currently creating a third level of surgical simulation.

The third level will be for interested undergraduate students who plan to pursue surgical specialties in their careers. In collaboration with colleagues from surgical clinics, we are creating the content of a compulsory elective course focusing on the use of the embedded modules in both simulators. Also, students who have completed the surgical suturing and/or laparoscopic simulator lab sessions have the opportunity to try the same tasks in a virtual environment on the simulator. The Institute of Surgical Medicine has also started to organize courses for surgical professionals, with the aim of creating a comprehensive organized program as part of the attestation process.

The COVID-19 disease pandemic significantly affected the teaching process at LFUK and thus the simulation teaching of surgical subjects was fully launched only in the school year 2022/23. Currently, the centre is used on a daily basis by students of LFUK performing part of their clinical practice in surgical disciplines. As simulation teaching can be measured, we collect preliminary data from work on laparoscopic simulators in order to compare the performance of a specific procedure at the beginning and end of the lesson (time, success rate, etc.). Based on this data, the simulation can then be qualitatively and quantitatively evaluated and optimized to maximize student knowledge retention. The possibility of producing your own aids and tools makes it possible to make simulations more fun and varied, especially if the students themselves participate in their production.

The implementation of simulation education in the teaching of surgical subjects was a logical step towards improving the quality of medical teaching, which built on the already established simulation curriculum at LFUK. On the basis of the positive reactions received so far (both students and teachers), it can be concluded that the chosen procedures are promising and have their justification. Already in the next academic year 2023/24 we are planning with the establishment of all three grades in the teaching of surgical subjects at LFUK.

TRIAGE IN VIRTUAL REALITY: NEW ELEMENTS IN PARAMEDIC EDUCATION

Alena Lochmannová, Michal Šimon

Faculty of Health Care Studies at University of West Bohemia

The use of games as a teaching method can be recommended at any stage of education. Situational games focus on identifying and solving problems in life, which are specific, difficult phenomena that call for a need to deal with them, requiring committed effort and decision-making. The essence of the method is to solve problems that reflect real-life realities. The main strengths are considered to be the focus on practice, the emphasis on concreteness and training in decision-making.

This is a car accident module that reflects and also transfers into a simulation virtual and fully immersive environment a real car accident in which 6-9 participants are affected. The student arrives at the scene of the accident in an ambulance where they learn about the details of the scene. Upon reaching the scene, their main task is to report to the dispatcher, triage and secure the injured persons. This is a semi-structured scenario, as the student does not have a clear predetermined progression through the plot and can influence it themselves.

This module deals with a mass casualty incident involving a car crash. A paramedic arrives first on the scene in the evening and has to carry out the basic processes that are carried out in such a situation. The layout of the accident and the individual injured is such that a space of no more than 3x3 meters is actually needed (one of the conditions for a training room). Evening time was

chosen to simulate poor visibility conditions and thus create a more challenging situation for decision making. The module is so far designed for a 2-car accident, but there is room to induce a larger scale accident. The scene itself is supplemented with sounds such as screams and cries of the injured, as well as ambulance and engine sounds. The aim is to create as synergistic an experience as possible, so that users can experience complex situations using this technology and practice their knowledge of how to handle them.

In this method, training is done in 2 basic methods: the METHANE and the START triage. In terms of METHANE, it involves reporting an accident to the dispatcher using a walkie-talkie, for these training applications the walkie-talkie has been replaced by a tablet where the user selects the correct answers according to each letter. For the training part, the letters are separated by name and the user can only select the correct option. For the test version, a generator is designed that randomly scatters the letters, and in addition to the correct answer selected, it also checks in which order the user started to report the accident. The already selected buttons are underlined to the user to give a better overview. This help principle can be switched off. In addition, the tablet serves as a confirmation signal when the crew must announce that they have arrived at the scene. When triaging according to the START method, the user controls the basic functions by which the patient is triaged into one of 4 basic colours. For the treatment of children and teenagers, the JUMP-START method is used to ensure that the paramedic attends to them among the first injured. For the implementation of the application, this means that it is watched to see if the children have been treated urgently.

TEACHING GYNAECOLOGY AND OBSTETRICS IN GENERAL MEDICINE

Matěj Anton, Emil Havránek, Ingrid Sisková, Martin Huser, Vít Weinberger

Faculty of Medicine, Masaryk University

Gynaecology and obstetrics teaching faces the same problems as other subjects: high student numbers, little effective practical training and lack of active involvement in the clinic. These factors are mirrored in negative course evaluations and disinterest in the subject after graduation.

Gynaecology and obstetrics are taught at Masaryk University Faculty of Medicine in the 5th year for 3 weeks, as well as a two-week summer internship. The course ends with a state examination in the 6th year of study. Our aim was to increase the quality and efficiency of teaching and to make the field more attractive to graduates. An important role was played by the launch of the Simulation Centre (SIMU) of the Faculty of Medicine in 2020.

When developing the new curriculum, we encountered the problem of insufficient definition of what a graduate should know. We therefore created over 200 learning outcomes, which we then categorised by nature as practical skills suitable for simulation training, or theoretical knowledge suitable for e-learning and seminar discussion. We always kept in mind the guiding principles: 1. to teach the fundamentals of the field, 2. to prepare students for practice in the clinic, and 3. to give each student a hands-on experience in a safe simulated environment.

The most important was the transfer of the first week of practical teaching to SIMU. The study group of over 20 students is always divided into stations of 4-6 students where they work independently on tasks of varying degrees of complexity. They always start with basic skills such as examination or working with documentation, then move on to simulated scenarios through applied exercises. Day 1 and 2 are dedicated to gynecology (physical examination, ultrasound, simulation), Day 3 and 4 are dedicated to obstetrics (technique and mechanism of delivery, simulation), Day 5 focuses on surgical skills (suturing, laparoscopy, instrumentation). We use a wide variety of teaching modalities and simulations. Absolutely essential for effective practical teaching is e-learning, for

which we have created a teaching portal of the Gynaecology and Obstetrics Clinic. In addition to information on the teaching in the semester, it also contains study materials for the state final exam.

The new programme is now in its second year and is subject to constant modifications. Its usefulness is reflected in student evaluations and increased attraction to the field (recruitment to the program for motivated StargGyn students, interest from alumni). We consider good preparation prior to teaching and maximum student activity in practical practice and focused discussion as absolutely essential. The introduction of new teaching methods was also a big challenge.

This work was supported by projects Masaryk University Strategic Investments in Education SIMU+ (CZ.02.2.67/0.0/0.0/16_016/0002416) from European Regional Development Fund and Masaryk University 4.0 (CZ.02.2.67/0.0/0.0/16_015/0002418) from European Social Fund.

POSTER SESSION

9³⁰–10⁴⁵ THURSDAY

FOREIGN BODY ASPIRATION IN CHILDREN: MULTIVARIATE ANALYSIS OF THE PROGNOSTIC VALUE OF CLINICAL AND RADIOLOGICAL FINDINGS

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Aspiration of a foreign body (FB) is an emergent condition, typical of toddlers. Incorrect diagnosis resulting in lasting presence of foreign bodies leads to chronic wheezing, recurrent pneumonia and sudden life-threatening airway obstruction. Our aim was to evaluate the significance of three predictive factors: incident history, auscultation and lung X-ray findings as indications of bronchoscopy.

A total of 117 patients with an average age of 35 months underwent bronchoscopy (M: 60.68%, F: 39.32%) for suspected FB aspiration between 2017 and 2021. Including statistical analysis, we evaluated: age, sex, anamnestic data (history): presence/absence of aspiration moment, occurrence of cyanosis, dyspnoea, fever, auscultation and lung X-ray findings, while in the case of FB presence: FB location, extraction method and duration of its presence in the body. Statistical analysis was performed using SPSS 20.0 (IBM). Descriptive analysis was used to show basic trends in demographic variables, as well as the results of the analysis. The chi-square test was used to determine the significance of the data. A value of $p < 0.05$ was considered a significant difference.

Univariate analysis: Foreign body was present in 54.7% of cases (organic FB:44.4%), most often localized: right bronchus(31.62%), removed with a flexible bronchoscope(58.5%). Foreign body presence correlates with emphysema and auscultation on lung X-ray and unilateral difference and stridor on auscultation. Presence of pneumonia does not affect the auscultation and X-ray findings when the patient is indicated for bronchoscopy. The most sensitive diagnostic approach is chest X-ray (84%), the most specific is auscultation (60%) according to our results.

Multivariate analysis: Positive Predictive Value (PPV) of the following combinations showed the most promising results (auscultation/history/ X-ray): +/+/(72%), +/-/(72%), +/-/(55%). The lowest positive predictive value(23%) is attributed to positive history when no other diagnostic method is positive (-/+/-).

Multivariate analysis confirmed the high predictive value for a positive auscultation and X-ray finding for the presence of foreign body. For history, aspiration witness, fever and dyspnoea we did not register statistical significance in our study, however the presence of emphysema and auscultation findings (unilateral difference and stridor) correlate well with increased aspiration probability.

COULD BE SIMULATION-BASED EDUCATION IN CARDIOLOGY HELPFUL FOR BETTER AND FASTER STUDENT LEARNING IN ACTUAL CLINICAL PRACTICE?

Zuzana Pella, Dominik Pella

Faculty of Medicine, Pavol Jozef Šafárik University

Could simulation-based cardiology education be conducive to better and faster student learning in clinical practice? Practice shows that the introduction of teaching using simulation techniques is beneficial for every aspect of medical education. During classical education, students are given access to information and knowledge that would be more difficult to access under other circumstances. The simulation offers the possibility to try individual actions in an environment “where life cannot be revived”, thereby reducing the stress load, eliminating risks for the patient, and, last but not least, the given action can be repeated countless times.

We divided students into two groups. The first group of students participated in the first complete simulator education at the Center of Simulator and Virtual Medicine. The practical lecture consists of training auscultation technics of the heart and lungs, forwarding to simulated scenario management of acute coronary syndrome before a practical lesson on Internal propaedeutics on actual patients at the 1st Cardiology department of the East Slovak Institute of the Cardiovascular Diseases. The second control group absolved at the first full clinical practice on the actual patients and followed with education in simulated conditions.

Participants were divided into two groups. Both groups of students were participated from practical lectures with actual patients, as in the condition of the simulated scenario. The reverse order of lectures created space for comparing the management and the approach to the patient of both groups of students by using an Objective Structured Clinical Examination known as OSCE. Students completed a questionnaire oriented to self-evaluation, too.

The study students' results were significantly better in the first group (the group with simulation education first and after that in the practical lesson). During performing practical results on actual patients, students from group one showed better knowledge (clinical symptoms, physical examination) and faster reactions (to conclude primary patients' clinical diagnosis) than in the control group (the group where the simulated scenario was after natural patient management). The questionnaire results show that students prefer the first training simulation education before real practical lessons as they evaluated themselves as more confident and better prepared. That results are also helpful for medical lectors because students are more prepared for practical lessons.

Results show that students' knowledge and reactions during practical lessons with actual patients are more effective if they have practical lessons with complete simulation education at the simulator center first. The results help increase the level of learning quality. Questionnaires oriented to self-evaluation confirmed that also students prefer gaining knowledge in simulated conditions that can subsequently cause actual patients.

This work was supported by the ERASMUS+, 2020-1-CZ01-KA226-HE-094424, New Era in Medical Education (NEWMED).

HYMON: A NEW, INNOVATIVE, INTERACTIVE ONLINE EDUCATIONAL PLATFORM FOR EDUCATION OF HYPERBARIC MEDICINE

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The first multi-place hyperbaric chamber was built in 1965 in former Czechoslovakia. Currently, there are 9 multi-place chambers in Czechia and 7 in Slovakia. Despite the similar heritage in hyperbaric medicine in both countries, the situation differs nowadays. While hyperbaric medicine (HM) is recognized as post-graduate specialization in the form of a functional course in Czechia, HM is not recognized as a medical specialization in Slovakia. The HM is taught at various levels to the medical student in Czechia, being included in other relevant subjects, such as internal medicine, sports medicine or medical biophysics up to a self-standing semestral subject at the University of Ostrava. On the contrary, there is no formal education in this field, neither pre-graduate nor post-graduate in Slovakia as in allied health care so in medical professions. In addition, the pandemic lockdowns further restricted the access for allied health professions, medical students and physicians to the HM courses.

A Czech and Slovak INTERREG-funded project aims to create an online educational platform for medical and allied health students for hyperbaric medicine (HYMON).

To achieve our objective, the leading experts from both countries have been onboarded. The project duration is between September 2021 and April 2023. The main hallmarks of the HYMON platform will be modularity and versatility, automation, full remote capability, innovativeness, interactivity and excellence. After the development and testing, the HYMON platform will be accessible also to other local and international stakeholders and universities, since the platform and educational materials will be available in Czech, Slovak and English.

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The project is supported by the project European Regional Development Fund – HYMON (No 304011AZF1).

SIMULATIONS IN HEALTH PROFESSIONALS' EDUCATION

Lucia Dimunová, Jaroslav Majerník

Faculty of Medicine, Pavol Jozef Šafárik University

Undergraduate and postgraduate education of health professionals is guided by a system of training and continuing professional education of health professionals in accordance with the requirements of the European Union. The development of technologies and methods of health care delivery are the reason for constant monitoring of current trends in education, which means continual updating of the approach of educators to the preparation of future health professionals and specialists for their profession. Currently, the educational process is being enriched by simulation and virtual reality methods. Both methods reflect real-life conditions. They are innovative

teaching methods that allow students to practice their skills repeatedly, learn at their own pace and offer a safe learning environment.

The aim of the presentation is to present the application of innovative educational methods - simulation and virtual reality in the process of education. Authors present the practical application of these educational methods in the environment of the Centre for Simulation and Virtual Medicine at the Pavol Jozef Šafárik University, Faculty of Medicine in Košice.

This is a report on simulations used at the Center of Simulator and Virtual Medicine involving students of Faculty of Medicine of UPJŠ in Košice, Slovakia. The presentation reports the principles of simulation and virtual reality based on evidence from current research and personal experience of the authors.

The application of simulation and virtual reality methods was recently introduced at the Faculty of Medicine of the University of Applied Sciences in Košice in its Centre for Simulation and Virtual Medicine. Within theoretical and clinical courses, students and teachers can use simulators such as: the interactive table using real anatomy, an advanced nursing model of an adult human allowing training of physical examinations, and diagnostic medical and nursing procedures, a multimedia table with a software containing virtual patients, used for training and solving scenarios from the hospital and pre-hospital environment, ultrasound, laparoscopic, endoscopic, cardiologic, and respiratory simulators, and many more low to high fidelity simulators. Based on the initial experiences, we can conclude that students highly appreciate these teaching methods, perceiving them as beneficial. From the teachers' point of view, it can be stated that there is a visible development of critical thinking of students, as well as a greater interest in the topics. Both students and teachers evaluate positive experiences with new approaches in teaching. We have observed enthusiasm, a friendly atmosphere and students' interest in attending the simulations even after self-study.

The professional competence of an educator is to create an environment that supports effective learning and the development of critical thinking using appropriate educational methods. Furthermore, simulators and virtual reality provide an opportunity to train multidisciplinary among students. The application of simulation and virtual reality, based on our experience to date, appears to be effective in developing and supporting professional learning of students and healthcare professionals with the ultimate effect of improving the quality of healthcare delivery.

This work was supported by the KEGA 040UK-4/2022, Content innovation and digitisation of the compulsory subject Medical Biophysics and related compulsory optional subjects. Development Project of Public Universities 002UPJŠ-2-1/2021.

SUPPORTING OF PEDAGOGICAL SKILLS OF TEACHERS AT THE FACULTY OF MEDICINE OF THE UNIVERSITY OF OSTRAVA

Hana Sochorova, Petra Paquet

Faculty of Medicine at University of Ostrava, Rectorate, University of Ostrava

Teachers at the Faculty of medicine are specialists in both medical and non-medical disciplines who share their knowledge with students. Nevertheless, few experts in medicine have passed targeted education in pedagogical skills. The University of Ostrava supports innovative approaches in teaching not only at the Faculty of medicine but at other faculties as well in a systematic way.

Members of inter-faculty workgroup "All together" organize round tables, activation courses, create methodological materials and build so-called self-learning university. The workgroup focuses on various aspects of university-level pedagogics: preparation of syllabi/courses, methods of (self) reflexion, development of activation techniques, supporting of critical thinking etc. Improvement

of teaching quality is based on results of international research and results of the previous survey focused on teaching and learning at the University of Ostrava among students and teachers.

The survey performed at the University of Ostrava imply that while teachers identify lectures to be the most beneficial for students' development, students prefer practical teaching, work assignments and exercises. If students are actively involved in the education process, their study results will improve. Lectures continue to be the place where students are taught about theoretical fundamentals, but the way how they are structured changes. Pure monologues are waived, and the focus is given to what students do during classes.

The activities of the workgroup focus just on the support of these and others pedagogical skills. Current offer of activities and courses is being published in the newly designed internal webpage called „I am teaching at the Ostrava uni“. In addition to the activities, courses and methodical material offered, even an offer of so-called “open lectures” exist. Open lessons provide an opportunity for sharing best practices and methodological support for teachers. Teachers mutually inspire and encourage in trying new approaches and give feedback to others that helps them to push forward. At the same time, we are open to external stimuli: guests from other universities are invited, discussions with representatives of employers and regional authorities are held, and primarily, we hear those who matter the most – students.

The activities of the All Together group provide a support for teachers at the Faculty of Medicine who are willing discuss the teaching process and how to further improve its quality and/or seek an emotional and moral support in their demanding work. Our students will also feel the fact that the community works well in their learning.

We are Ostrava = modern, inspiring and attractive place for quality studies CZ.02.2.69/0.0/0.0/16_015/0002436.

VIRTUAL PATIENT IN EDUCATION PROCESS

Beáta Grešš Halász, Jakub Jánošík

Faculty of Medicine, Pavol Jozef Šafárik University in Košice

Simulation in education is a method that creates a space for clinical experience by interactive activities in a safe environment. Thus, nursing students have the opportunities and space to comprehensively link the knowledge and experience gained in pre-requisite courses such as anatomy and physiology, nursing techniques, pathophysiology of diseases in clinical courses, etc., and apply them in simulations. The classification of simulators depends on their fidelity in relation to reality. There are simulators with low, medium and high fidelity. High fidelity simulators are computer-controlled.

The Centre for Simulation and Virtual Medicine of the Faculty of Medicine of the Pavol Jozef Šafárik University in Košice has several simulators of different fidelity. Many of them are used in teaching within the field of nursing. In this contribution, we present the Body Interact simulator, which includes virtual patient cases. As a concrete example, we present our work with a virtual patient with head injury and open fracture of the right lower limb admitted to the emergency department. The task of the students is to stabilize the patient within a given time. The role of the instructor is to guide the simulation through the pre-briefing, briefing, the simulation itself and debriefing. The aim of this report is to present an educational method through a virtual patient using simulation technologies integrated into undergraduate nursing education.

Body Interact allows to build and develop decision making, critical thinking, and apply knowledge and skills to solve from simple to complex situations in a variety of settings (inpatient and pre-hospital) in a variety of clinical disciplines. Content includes assessment and its various components, involving the possibility to communicate with a virtual patient, diagnostic options, continuous monitoring, offering options and choices for applicable interventions, and opportunities for consultations by specialists from other clinical disciplines. It allows students to rehearse situations, practice, but

most importantly work with their own stress, under pressure, at different levels of difficulty from basic to advanced, and in different medical disciplines and specialties. The use of Body Interact offers operation in several languages. It contains hundreds of cases. Each case is accompanied by briefing and debriefing materials. For debriefing, Body Interact offers a summary of the activities carried out and a comprehensive and detailed assessment of students' performance (identification of correct and incorrect ones), and the knowledge applied to a particular case.

Simulations are an innovation in contemporary nursing education with significant benefits in the development of linking acquired knowledge, critical thinking and decision making together. Students have the opportunity to perform and repeat procedures in a safe environment without potential harm to the patient. They can practice and manage stressful situations that many times copy reality depending on the fidelity of the simulator. Many results indicate student satisfaction at a fairly high level. According to authors' experience, Body Interact is a beneficial way to start implementing simulations in education.

Development Project of Public Universities 002UPJŠ-2-1/2021; ERASMUS+, 2018-1-RO01-KA203-049412.

KEYNOTE LECTURE II

11⁰⁰–11⁴⁵ THURSDAY

WHAT WE USED TO THINK ABOUT SIMULATION MEDICINE AND WHAT WE KNOW NOW

Petr Štourač

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Simulation medicine is an exciting field that has been impacting the education of physicians and healthcare professionals for several decades.

At the Simulation Center (SIMU), within Faculty of Medicine of Masaryk University, we combine high-fidelity mannequins with simpler modalities aimed at developing clinical reasoning, decision-making, and critical thinking skills. One such low-fidelity modality is the virtual patient.

To further develop teaching and science in the simulation center and across the faculty, we have established the Department of Simulation Medicine.

This work was supported by projects Masaryk University Strategic Investments in Education SIMU+ (CZ.02.2.67/0.0/0.0/16_016/0002416) from European Regional Development Fund and Masaryk University 4.0 (CZ.02.2.67/0.0/0.0/16_015/0002418) from European Social Fund.

SYMPOSIUM

13⁰⁰–14³⁰ THURSDAY

SIM4ALL: INTERACTIVE SESSION ON SIMULATION TECHNOLOGY INCLUDING 3D PRINT

Multiple authors

Various institutions

This symposium brings together clinicians, educators, biomedical engineers, and experts in new materials to discuss the potential of 3D printing not only in clinical applications but also for use in medical and healthcare education, including complex simulation centers.

Several short talks will focus on a variety of 3D printing applications in clinical fields of medicine. Pros/cons of 3D printing and VR/AR technologies are expected to be a hot topic of the following discussion. Another hot topic for discussion will certainly be the way of administering the processes around 3D printing.

The current practice is not optimal with regard to cybersecurity threats and data protection regulations.

A comprehensive solution at the PLM level (Product Life Cycle Management) is needed.

This symposium has been supported by the 3Diamond project funded from EIT HEALTH program.

3D PRINTING EXPERTISE DEVELOPMENT IN A SIMULATION CENTRE

Jiří Travěnek, Michal Šemora

Faculty of Medicine, Masaryk University

3D printing is a phenomenon of our time. It is a recently created, new methodology of creating various products - prints.

It is clear from the start that it will also find its application in education. But still, every workplace, every institute, every school must find a way to work effectively with 3D printing and discover what can be achieved with this technology that has unlimited possibilities.

It was obvious from the first moment of realization of the SIMU+ project at the Medical Faculty, Masaryk University that 3D printing would undoubtedly find a guaranteed use in such a modern building and in modernized teaching methodologies.

However, the successful development of any methodology requires not only knowledge but also time and the improvement of competences.

Since its opening, that is for two years, the simulation centre has focused on the topic of using 3D printing for teaching. The key point is searching for elements where the application of 3D printing can result in an increase in the quality of teaching. The necessary competences and skills of the implementation team have grown considerably over these two years. From the creation of, say, simple room and device accessories such as holders etc., to simulation instruments designed specifically for teaching that are replacing real instruments, to the first prototypes of add-ons for complex high fidelity simulators. We can print all of this in the Simulation Centre today using filament

A review of the new 3D printers we have available. The near future is to consolidate our experience and share it within the project Anatomically accurate 3D models (Erasmus+ KA2).

During the time we have been engaged in 3D printing, we have had the opportunity to create hundreds of prints that have been used to improve the quality of education and comfort of working in the Simulation Centre. The topic of 3D printing is approached broadly and many people are involved at different levels - design, modelling, testing and the printing itself. From modeling and printing the simplest tablet holders or instruction holders, to teaching instruments such as simulated ultrasound probe, refillable infusion bottle, to complex items designed for simulators such as a replacement umbilical cord for a childbirth simulator. For all of these products, we had to develop knowledge, expertise and experience.

This presentation summarizes the application of procedures and decisions that led to the development of 3D printing for the needs of the Simulation Centre of Masaryk University. Simulation medicine offers extensive opportunities for 3D printing. Over the past two years, the team at the Simulation Centre has gradually developed competencies in this field with an emphasis on use in education. From creating simple models, we have achieved the knowledge to create complex products. Currently, we are fully prepared to focus on sharing this expertise and collaborating on methodology development.

Anatomically accurate 3D models (2022-1-CZ01-KA220-HED-000089231).

3DIAMOND: SOFTWARE FOR PRODUCT LIFE-CYCLE MANAGEMENT IN 3D PRINTING APPLICATIONS

Daniel Schwarz, Lukáš Čapek

Institute of Biostatistics and Analyses Ltd., Liberec Regional Hospital

3DIAMOND represents a consortial project aiming at product life-cycle management (PLM) system capable of handling 3D printing tasks in a hospital/clinical environment.

The PLM software has been designed by a common efforts of biomedical engineers and clinical experts.

The PLM software 3DIAMOND has been powered by CLADE-IS, which is an EDC (Electronic Data Capture) system, commonly used in clinical research for the facilitation of data management in clinical studies and real-world data projects.

Due to cyber threats and privacy regulations, 3D printing needs to be handled through valid information systems rather than Whatsapp and USB flash drives.

This work has been supported by the 3Diamond project funded from EIT HEALTH program.

SIMULATION AND 3D PRINTING IN THE TEACHING OF RADIOGRAPHERS AT THE FZO PU IN PREŠOV

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¹Faculty of Health Care Professions, University of Prešov, ²Faculty of Health Care Professions, University of Prešov

The training and teaching of radiographers is normally done with the support of expensive and complicated radiology equipment, which involves safety risks associated with ionizing radiation (X-ray, CT) or strong magnetic field (MRI). In addition, the high utilization of such devices in the clinical environment complicates the teaching of radiographers during busy periods of the day

in radiology departments. Currently, there is also a huge potential to create real objects from 3D imaging data in radiology, which enables obtaining information about the state of anatomy and pathological lesions by sight and touch. The basis is the 3D printing method.

The Department of Technical Disciplines in Medicine, the Faculty of Health Care in Prešov, with the support of grant resources, built two simulation laboratories to support teaching in simulated conditions. The laboratories are equipped with modern simulation equipment, including an MRI and CT simulators, a miniPACS system with stations equipped with DICOM OSIRIX MD viewers with a connection to a 4K TV, 3D printers, three-modal phantoms (USG, CT, MRI) and other aids.

Virtual reality (VR) and mixed reality (AR) are two simulation models that are currently advancing medical education. Virtualization of expensive radiological devices and creation of model situations is possible in virtual reality. Cooperation between the Department of Technical Disciplines in Medicine of the Faculty of Health Care in Prešov and Siemens Healthcare s.r.o. is aimed at creating VR simulators of radiological devices.

In this work, we present prototypes of the VR MRI and CT simulators. The VR environment was programmed in the Unity technology program. Both VR MRI and VR CT cover two rooms, the first room with the machine console and the second with a working VR model of the MRI and CT scanners, which have a working table, controls and laser. The student is immersed in VR and can choose between several standard MRI and CT examinations. It can position the virtual patient and work with device controllers.

It is also assumed that 3D printing will enter the clinical environment and the amount of 3D printed anatomical objects and implants will grow exponentially. Therefore, radiologists and radiology technicians should be familiar with 3D printing, as it is directly related to their medical field. Experience with this technology its involvement in teaching and scientific activity, will also be presented.

The designed prototypes of MRI and CT simulators enable to prepare radiographers for future work in a safe environment. They create conditions similar to reality and at the same time remove the danger of CT and MRI devices in the form of ionizing radiation and the strong attraction of superconducting magnets. 3D printing can empower radiologists and radiologic technicians to be leaders in medical education and healthcare in the future.

SHORT COMMUNICATIONS: EDUCATION TECHNOLOGISTS

15⁰⁰–16³⁰ THURSDAY

E-LEARNING IN TEACHING AN ELECTIVE SUBJECT – EXPERIENCE FROM THE COVID-19 PANDEMIC ACADEMIC YEARS

Pavel Měříčka, Jiří Gregor, Miroslava Jandová, Pavel Navrátil, Daniel Brandejs

Faculty of Medicine in Hradec Králové, Charles University

The authors have been using E-learning course „Basis of Harvest and Preservation of Tissues“ as a support of the elective subject established at the Charles University, Faculty of Medicine in Hradec Králové (subject code FV 50012 003) since the academic year 2013/2014. Standard elective subject schedule consisted of 6 hours of lectures, 6 hours of practicals and 3 hours of a final seminar. The experience from the COVID-19 pandemic period in which the standard face-to-face teaching was partially or completely replaced by E-learning, is presented.

The electronic study materials covered three main topics: Cell and Tissue Donation and Harvest; Low Temperature Preservation of Cells and Tissues; and Quality and Safety Aspects of Cell and Tissue Banking. The bank of questions, three short and one final tests and a database for uploading seminar theses were included in the course as well. The course was operated by Moodle and was available at the address: <http://moodle.lfhk.cuni.cz/moodle2/course/view.php?id=798>.

In the year 2019/2020 when teaching was completely turned to E-learning, 6 students were enrolled. The teacher followed the activity of students exclusively via Moodle and communication with students was limited to e-mail correspondence. In the next academic year 10 students were enrolled, the lectures remained in the E-learning regime, while practicals and seminars were performed in the standard face-to-face manner. In the academic year 2021/22 when E-learning was used again as a support of standard teaching 18 students were enrolled. All students were able to complete the course including presentation of seminar theses. There were however considerable individual differences in time necessary to complete the course, especially in the year 2019/2020.

The availability of e-learning as replacement of standard teaching led to increased interest of students in the elective subject „Basis of Harvest and Preservation of Tissues“.

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SHARING EXPERIENCE IN SCIENTIFIC SOFTWARE AND APPLICATIONS DEVELOPMENT

**Martin Komenda¹, Rudolf Ramler², Doris Hohensinger², Mario Pichler²,
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¹Faculty of Medicine, Masaryk University, ²Software Competence Center Hagenberg

The SESSAD project (Sharing Experience in Scientific Software and Applications Development) aims to share best practices and pitfalls between cross-border technical-oriented teams involved in the design and development of scientific software solutions in the academic and non-profit space, specifically in medical education and simulation education. The project outputs will help the development teams to rapidly improve inter-regional cooperation and become the basis for collaboration within the Czech-Austrian network of development institutions.

Individual meetings, specialised workshops, and dedicated shadowing activities planned in this project lead to identifying key and supporting topics in the design, development, implementation, testing and operation of web-oriented applications used for medical and healthcare education. In addition, attention is also focused on the interactive discussion between the teams, real demonstrations of deployed web applications, as well as examples of good and bad practices and experiences in the complex development process.

The following results will be presented in detail: (i) A summary description of the software application design and development life cycle, including best practice guidelines, taking into account the sub-outputs of the project (workshops and staff shadowing between the two partner institutions). (ii) Establishment of a cross-border network of institutions providing development services in the field of science and education.

Thanks to the SESSAD project, both teams are actively involved. The output of this intensive collaboration will be a summary of the most relevant recommendations from the lifecycle of web applications in the field of education.

This project is supported by the Interreg V-A Austria-Czech Republic programme within the project SESSAD (ATCZ292).

SIMUPORTFOLIO: AFTER THREE YEARS OF USE

Petra Růžičková, Martin Komenda

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SIMUportfolio represents an integration platform focused mainly on creating innovative, more advanced and dynamic features that make it easier for students and teachers to learn and, as a result, improve students' knowledge and skills for practice. This contribution aims to present the current status of the platform together with the crucial outcomes that have been achieved through the use of SIMUportfolio.

In cooperation with the management of the Faculty of Medicine of the Masaryk University, guarantors, teachers, technicians, and the development team, SIMUportfolio is constantly being developed with new functionalities. These modules always directly cover the needs of the users involved in the harmonisation and optimisation of standard education processes from the perspective of teachers and students.

In the three years of piloting the SIMUportfolio platform, many features have been implemented to support various learning and teaching domains systematically. Examples of these features involve a structured description of the curriculum fully compatible with international standards, integration

of recommended study materials, support for modern approaches to knowledge assessment and student feedback, and a complex link to warehouse management.

The design, development, implementation, and maintenance of such a large-scale system as SIMUportfolio logically entails a complex agenda of requirements prioritisation, communication with all stakeholders, testing and long-term further improvement. For successful in-house development, all these steps must be repeatedly improved to provide professional technical and methodological support.

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UNIVERSITY-INDUSTRY EDUCATIONAL CENTRE IN ADVANCED BIOMEDICAL AND MEDICAL INFORMATICS (CEBMI)

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Biomedical and Medical Informatics (BMI) is a very dynamic field undergoing rapid evolution and centrally featured in health reforms across Europe. Emerging technologies in BMI are central to making healthcare more personalized, precise, reliable, safer and cost effective. The increased interest in BMI education is leading to transformative trends in creating new educational programs at universities in Europe offering a BMI degree. New emerging interdisciplinary domains are being added to the curriculum offering additional possibilities and challenges for engineers and system scientists to be involved, but at the same time imposing new demands on core teaching and learning competencies.

The creation of new interdisciplinary programs is possible with the involvement of specialists from different knowledge domains. However, this can be difficult to implement, especially if these domains are not closely related, such as informatics and medicine. In this case, well-structured, proven training materials are useful. The Centre-BMI aims to address holistic training issues by developing interdisciplinary BMI curricula. The added value is a European-level joint cooperative effort of experts from medical, technical universities, and enterprises. The Centre will create and launch a BMI educational platform for sustained cooperation among three groups of actors (or stakeholders): technical, medical universities/faculties; enterprises which are hardware manufacturers or suppliers (i.e. medical equipment, IT devices, etc..) and e-health care software solution providers. This ICT platform is for the development, upload and update of teaching materials (i.e. lectures and lab exercises). It also contains a portal with a repository for BMI resources (i.e. BMI research and teaching materials). Project partners will be core members of the Centre. The Centre's open structure will encourage collaboration with other universities and enterprises.

The principal project outcome is the Centre-BMI with an ICT platform for online BMI education provision and delivery. It includes an online portal with facilities for the development and management of a multidisciplinary BMI curriculum. They are: a) repository for actual BMI research and teaching materials (to facilitate the exchange, flow and co-creation of knowledge); b) tools to support communication and discussion of universities and industrial experts; c) BMI open resource for students; d) informative resource. These facilities will support the cooperation and knowledge exchange between technical and medical universities necessary for the development of BMI curricula. Enterprise experts will be involved in setting up the Centre and provide in-house technological training for academic partners. Enterprises' involvement in curriculum development will result in aligning theories to practice where real world examples from real businesses will be used. Additionally, enterprises and university enterprise research offices will help inculcate

entrepreneurship to develop students' entrepreneurial skills. The portal CeBMI provides a vibrant platform to support productive cooperation between companies, and universities with supplementary and complementary expertise. This will result in a synergy of theoretical and practical approaches to very complex and real problems in real businesses.

The Centre-BMI to support educational processes and courses exploits new innovative cloud-based technology to support the creation and delivery of new courses/subjects in BMI that is complex and multidisciplinary. Courses are useful both at the undergraduate and postgraduate levels to address a wide spectrum of core competency requirements. The Centre provides an invigorating environment for the cooperation of technical, medical universities, and enterprises in BMI that will provide a pool of supplementary expertise, skills, and competencies in this area. The portal was developed under the projects ERASMUS+ 612462-EPP-1-2019-1-SK-EPPKA2-KA, KEGA 009ŽU-4/2020, APVV-18-0027

ERASMUS+ 612462-EPP-1-2019-1-SK-EPPKA2-KA, KEGA 009ŽU-4/2020, APVV-18-0027.

VIRTUAL HUMAN BODY ATLAS FOR BIOMEDICAL INFORMATICS

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Moodle MEFANET

In September 2019, new master study program on biomedical informatics at Faculty of Management Science and Informatics of University of Zilina was opened. This unique study program in Slovakia focuses on education of specialists in the development of health information systems and processing of medical and biomedical data using means of informatics. Graduates of this study program should be experts in informatics but should have also basic knowledge of medical and biomedical terminology. To make the students more familiar with non-technical topics, such as human anatomy, illustrative teaching aids are useful. Their development is the main objective of this work.

The development of teaching aids can be a time-consuming activity. Usually, a teacher needs several hours to prepare a little aid that can help students for several minutes. If we want to create teaching aids for one course for the whole semester, then this activity can take several months. A good approach in solving this problem can be involvement of students in the creation the aids.

At our faculty, special course entitled as Project Education has to be taken by master students. This course takes three semesters, and its aim is to allow students to work on real-life problems in which they can use knowledge grasp during the study. This idea motivated us to open a project education on the development of human body atlas. The atlas has been developed primarily by students of biomedical informatics. During its development, students have become more familiar with human anatomy and also have gained practical skills in the development of large medicine related software, which should be one of the main employment opportunities for graduates of biomedical informatics.

Within the Project Education, students of biomedical informatics have worked on the creation of human body atlas. The atlas has been developed as an online application. Its main part is a module that allows 3D visualization of specific parts of human anatomy. Currently, the students work on the optimization of this module to allow running it with minimal requirements on computer. Furthermore, they also work on the development of a part that allows 3D animation of specific physiological processes, such as heart activity or skeletal muscle movement.

The atlas should be used not only in teaching but also in verification of knowledge acquired by students. For this purpose, we are starting to work on the development of user management module, testing module, and module for preparation of interactive tests that focus on identification of

correct parts of human body in the 3D model based on their description. Simultaneously, with the development of the online atlas, some students work on its virtual reality version. We would like to finish most of the modules within one year and hope that the final application will be available for our students in the next academic year.

In this work, we focus on presentation of new online 3D anatomy atlas developed by students of biomedical informatics for other students of this master study program. The atlas has a form of online application and its development has been supported by project KEGA 009ŽU-4/2020 “Creation of methodological and study materials for Biomedical Informatics – A new program of engineering studies at the University of Žilina in Žilina”. In future work, we would like to combine this virtual atlas with its physical version. The physical version should be prepared by 3D printing of 3D models used in the virtual atlas.

VIRTUAL PATIENT MANNEQUIN AND MEDICAL DEVICE CONTROLLED BY MATHEMATICAL MODEL

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First Faculty of Medicine, Charles University

We have developed a virtual patient mannequin with a mockup of a medical device controlled by a mathematical model of ventilation and acid base balance. The virtual patient mannequin mimics real breathing with robotized control of it. The mockup of a medical device mimics design and behavior of extracorporeal membrane oxygenation device (ECMO). Current scenario simulates several types of heart diseases and respiratory failure and shows a virtual patient state before and during treatment using ECMO.

The virtual patient mannequin is based on mannequins used in first aid lectures. We have replaced the chest with flexible ribbons connected to a small electrical engine simulating breathing. This robotized part simulates breathing mechanics based on a realistic mathematical model. Additionally, the respiratory tract is connected to a pump generating real air inflow and outflow.

The mockup of a medical device is a 3D printed copy of a real device equipped with a mini computer and mini display mimicking the user interface of a real ECMO device.

The simulator with a mathematical model of human physiology and ECMO device is executed in tablet or desktop PC which connects to the mannequin and mockup of ECMO device via local IP network.

Virtual patient mannequin and mockup of ECMO device sends signal on button press/release, knob turn, cannula connection and current tidal volume. Connected PC or table with web simulator computes dynamics of pathophysiological state. The virtual patient is visualized in real time or in accelerated time.

This prototype is now being validated in First Faculty of Medicine and we are able to deliver the similar virtual patient mannequin or custom-made mannequin/device together with simulator of human pathophysiology.

Virtual patient mannequin and mockup of medical device prototype is produced with cooperation of Inomech s.r.o. It might be beneficial in some cases to replace reality with virtual reality. This use case is now being prototyped with cooperation of VR intensive care unit (VR ICU) product of Virtual Lab s.r.o.

Thanks to Creative Connections s.r.o. COM-SYS Trade s.r.o., Innomech s.r.o. and Moravské Přístroje a.s. participating on MPO FV 20628 and MPO FV 30195. Thanks to Virtual Lab s.r.o. to collaborating on VR with medical simulators prototype.

INNOVATION IN TEACHING IN NURSING CARE IN RESUSCITATION AND INTENSIVE CARE MEDICINE AT THE DEPARTMENT OF HEALTH SCIENCES FACULTY OF MEDICINE, MASARYK UNIVERSITY

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Resuscitation and Intensive Care Medicine (RICM) is a core subject in the Intensive Care study program. Due to its importance, it is necessary for the students to acquire theoretical-practical information in accordance with Evidence-Based Nursing and Practice. Students must know the correct procedures and also have knowledge of possible complications that may arise if the appropriate procedures are not followed. Improper fixation of provided information can in the clinical practice turn into misconducts in patient care with potential fatal consequences.

For better professional preparation and support of students' decision-making process we have combined traditional and modern teaching methods. In teaching, we follow on the theoretical information that students acquire in lectures led by specialist doctors. To practice and make practical skills automatic, low-fidelity simulation models are being used in a professional classroom environment. The recommended procedure of professional operation in accordance with the thematic plan of the subject is demonstrated on the models. Methodological materials for 6 professional operations will be presented (arterial access cannulation, assistance in the introduction of a central venous catheter, suctioning from the airways in a patient on UPV, extubation of the patient, replacement of the tracheostomy cannula and catheterization of the urinary bladder in a man) including teaching scenarios with an evaluation form. Each model preparation contains student tasks, teacher activities, necessary aids (tools) or evaluation criteria.

The teaching of the subject is also enhanced with other teaching strategies. We use, for example, online interactive curricula and quizzes, worksheets, case studies from professional practice, and we conduct excursions in an accredited intensive care unit. The so-called tandem teaching has also proven successful for us. An important part of the lesson is the discussion, that helps to validate all the information that the students were provided with.

In the 2021/2022 academic year, we applied the new teaching concept to a total of 56 students of the Intensive Care study program in full-time and combined form. Verification of students' knowledge of the subject takes place through tests, which, after obtaining a sufficient number of points, are a prerequisite for proceeding to the oral exam taking place in laboratory conditions. The exam consists of four parts, and at the end of it there is a teacher evaluation and a self-evaluation of the student using a pre-prepared form, which we perceive as an important part of the student's evaluation. The structured evaluation tool contains important criteria: above all, the correctness and scope of theoretical information, care and skill in performing professional performance, as well as, for example, the ability to identify errors and correct them.

A total of 52 students successfully completed the RICM subject exam using an innovative teaching concept. Student's feedback is obtained during the teaching (formative evaluation) and after passing the exam (summative evaluation). The possibility of problem-based learning, teamwork in completing assignments and tasks, and their own model cases simulation is subjectively evaluated by students as the most important.

HIGH-VOLUME RECORDING AND LECTURE PROCESSING

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Keywords: online education, pre-recorded lectures, high-volume lecture recording

Online education is experiencing a tremendous boom especially in higher education. One of the most typical forms of online education is the use of pre-recorded lectures in the form of video. In the case of high-volume lecture recording, the preparation and organization of the actual recording and processing plays a big role. To handle a large number of video lectures, it is important to choose the appropriate technology to be used so that the recorded material does not require post-production processing.

Within the project “Podpora online vzdělávání na LF - Úvod do klinických disciplín” an implementation team, which consisted of several groups, was formed.

The graphics and IT support group took care of checking the presentations in terms of adherence to a uniform visual style. For this purpose, a template for the presentations was designed and provided. Another task of this group was to ensure that the presentations were delivered on time before the recording.

For this purpose, an application called Planner was created and made available to the presenters. In this app, the presenters booked the dates for the recording and uploaded the presentations that were checked by the graphics team and later used for the recording.

The AV/IT technical team was in charge of the actual recording of the lectures. A hardware video mixing switcher, which handled two video inputs and one audio input, was used for the filming. One video input was the camera view of the lecturer. The other video input was the presentation from the computer. These two inputs were mixed live using the mixing switcher so that the main part was the presentation and a scaled down shot of the presenter was placed in the corner of the presentation. We paid no small attention to the sound quality. In order to capture the speaker's voice as faithfully as possible, a high quality lavalier microphone was used.

More than 300 lectures from 17 subjects in Czech and English were recorded within the project. 50 full days were reserved for the actual recording, which were divided into 30-minute slots. One filming day usually contained 12 slots divided into three groups. A slot was dedicated to filming one lecture with 10 minutes reserved for preparation and 20 minutes for the lecture itself. In total, 390 slots were reserved for filming. The recorded video lectures were handed to the lecturers in all cases within 24 hours.

At SIMU MED MU for the third year we have been regularly realizing high-volume filming of lectures. Already in the second year we have developed a methodology that leads to successful realization of hundreds of recordings without the occurrence of serious problems, either technical or organizational. All filmed lectures could be used as teaching materials, and none of them had to be reshot. Almost immediately we noticed a positive response from both the students and the lecturers, which reassured us of the correctness of the procedures and technologies used to be reshot. Almost immediately we noticed a positive response from both the students and the lecturers, which reassured us of the correctness of the procedures and technologies used.

SIMULATIONS ON THE FACULTY OF MEDICINE IN PILSEN

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Keywords: *simulation center, nursing, basic skills*

In September Faculty of Medicine in Pilsen (Charles University) has started new simulation center. We will introduce simulation center, system of it's function and specific technician – nurse cooperation. In the center we are teaching basic skill and high fidelity simulation for which we are using AV technics, all of this will be explained. Integral part of teaching are our student lectors. That is why we will share our experience with them.

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