

CONFERENCE ABSTRACTS

European Association of Faculties of Pharmacy (EAFP) Conference Proceedings 2022

Towards Pharmacy 5.0 Education

Hosted by the Department of Pharmacy, University of Malta

Providing cross border healthcare

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Introduction: The Cross-Border Healthcare Directive is applicable in all European Union (EU) Member States. Medical prescriptions are an important resource for the provision of health care and efficient pharmaceutical care for the patient. EU countries are gradually replacing existing paper medical prescriptions with electronic prescriptions (e-Prescriptions). The EU aims to have a cross-border electronic healthcare system that will enable EU citizens to obtain e-Prescriptions anywhere in Europe.

Method: Medical prescription templates and national rules for prescription medication were collected from selected EU countries between June and December 2020. The most common prescription forms were obtained mainly by contacting National Contact Points for cross-border healthcare and members of the Pharmaceutical Group of the EU. It was not possible to identify patients, prescribers, or places of issue.

Results: Every country has its own rules for prescription medication and at least two types of prescriptions - paper prescription and e-Prescription. National prescription forms in EU countries differ formally and visually. The common differences are the various content of the form, the validity of the prescription and the number of available forms.

Conclusions: Even though the ongoing COVID-19 pandemic sped up the process of introducing electronic prescriptions significantly, it is still a requirement to either have a paper medical prescription or a paper copy of the electronic prescription to collect medicine from a pharmacy in the majority of the EU countries.

Acknowledgement: This work was supported by the EAFP Partnership for Education Development (PED) Grant

Connecting older adults with students through interprofessional telecare

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Introduction: The United States (US) academic pharmacy accreditation standards require experiential learning that enhances the formal curriculum through activities termed co-curriculum, which can be developed by the school, student organisations, community partners, or local or state pharmacy associations. Co-curriculum activities are meant to promote student achievements in problem-solving, patient advocacy, interprofessional collaboration, cultural sensitivity, communication, self-awareness, leadership, innovation/entrepreneurship and professionalism. Of the many activities in the programme, it was decided to exemplify one that meets many of these intended outcomes using a telehealth approach. When pandemic-related restrictions limited the usual in person community-based education activities, the authors created a community support programme called Connecting Older Adults with Students Through Interprofessional Telecare (COAST-IT). The goals of the programme are to: (1) reduce social isolation and loneliness

of older adults, (2) improve student conversation skills with older adults, and (3) increase student awareness of geriatric challenges.

Method: Pharmacy, dental, advanced nursing and medical students are paired with older adults in ten different US states, all of whom have experienced social isolation. Students contact their partners via phone twice monthly and participate in monthly educational geriatric expert sessions via Zoom. Outcomes were measured via call tracking and pre-/post-programme surveys.

Results: To date, COAST-IT has resulted in >350 student/partner pairs and >5000 calls over 16 months. Over three-quarters of students (77.8%) reported being fairly/very confident in their ability to talk with older adults after the programme, up from 52.2% at the start. Some older adults and students reported reduced feelings of loneliness and isolation. Students became more comfortable using telehealth to provide care to older adults.

Conclusions: Pharmacy students can contribute to community health outcomes by reducing social isolation and loneliness while practising communication and empathy. The COAST-IT programme has been a beneficial and safe telecare replacement for in-person community activities.

Collaborative online international learning (COIL) programme: Your career opportunities worldwide – learning from the experience and personal view of professionals in the sector

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Introduction Degrees in Pharmacy, Biotechnology and Nutrition & Dietetics courses offer a wide range of career opportunities, but many students are unaware of these and feel disorientated when deciding on their professional future. In a global context, employers demand qualities such as intercultural communication skills, team-working skills, networking abilities and international collaborative experience. The COVID-19 pandemic has limited access to global mobility. Collaborative Online International Learning (COIL) programmes enable students to gain an international experience without travelling abroad. In this COIL project, students from Torino, Coventry and CEU-San Pablo Universities worked collaboratively to research the worldwide professional opportunities related to their degrees.

Method: This COIL included: *Introductory session* with icebreaker and intercultural activities; *Teams' online meetings*, where professors from three Universities guided and supervised the students' work; *Interviews of the students' teams* with two to three professionals of Pharmacy, Biotechnology or Nutrition & Dietetics; *Conferences* by relevant professionals; and *International Congress* where information gathered by the students through oral communication was prepared and presented. It also included plenary conferences and a workshop on LinkedIn.

Results: This COIL programme involved three Universities, 38 professors, 111 students and 76 professionals (from 11 countries working in 60 institutions). More than 400 people from 40 different countries and 60 Universities were registered at the Congress. 41 interviews with professionals, 12 conferences by 32 speakers and one International Congress were organised. More than 80% of the students agreed that the COIL allowed them to improve their soft and intercultural skills, made them more employable and increased their motivation to work abroad. 90% of the students considered this COIL to be useful for their professional future.

Conclusions: These excellent results highlight the benefit of COIL programmes for students and their careers. This led the authors in 2022 to organise a second edition of the COIL programme with a possible international visit included.

Interprofessional education and competencies: Development of an assessment tool for pharmacy practice

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Introduction: Interprofessional education (IPE) activities have an impact on the development of healthcare students' competencies. Best practices for assessing the impact of IPE have not yet been identified. The aim was to design outcome assessment methodologies capable of evaluating IPE on pharmacy competencies development.

Method: An innovative IPE tool was designed and validated through a three-step Delphi technique by two multidisciplinary panels of experts composed of Maltese and international healthcare professionals. The tool was distributed to Doctorate in Pharmacy students (N = 35) and alumni (N = 16) of the same course, who all had experienced IPE-based placements. Internal consistency of the tool was assessed by Cronbach's Alpha test. Kruskal Wallis was used to compare mean core competency scores between groups of participants clustered by gender, age, year of study, years of practice and area of practice.

Results: The developed 'Interprofessional Education on Pharmacy Competencies (IPEPC)' tool consists of ten statements divided into four core competencies, namely: 'Values-Ethics for Interprofessional Practice', 'Roles-Responsibilities', 'Interprofessional Communication' and 'Teams and Teamwork'. The tool was completed by 32 students and 14 alumni of the Doctorate in Pharmacy course. The tool shows adequate internal consistency between the statements in each of the core competencies (Cronbach's Alpha values > 0.07). All statements received a mean score higher than 4 out of 5 (5 being the highest agreement). 'Roles/Responsibilities' core competency received the highest score.

Conclusions: High scores received by all statements of the IPEPC tool showed the critical role of IPE on pharmacy competencies. IPE helped to provide confidence in the 'Roles/Responsibilities' core competency. The tool is useful to evaluate IPE pharmacy competencies and improvement of person-centred care.

Student conferences: Integrating and contextualising learning in practice

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Introduction: The Master of Pharmacy degree must produce graduates with integrated scientific knowledge and clinical practice skills (GPHC, 2021) along with the professional attributes and resilience to thrive in all sectors of practice. Graduates need to communicate effectively with a diverse patient population, and to provide compassionate, person-centred care, whilst also being equipped to contribute to the knowledge and evidence base through research.

Method: A half-day conference was organised for each year group, focused on programme year themes: Year 1: People and Medicines, Year 2: Pharmacotherapy, Year 3: Advanced Therapeutics, Year 4: Professional clinician. Patients were involved as speakers and panellists to provide an insight into their lived experience of conditions taught in each academic year e.g. dementia and to provide context to the reality of concepts such as shared-decision making and personalised care. Sessions led by alumni and expert practitioners aimed to inspire student future career paths, introduce postgraduate study and development opportunities. Recent graduates provided insight to Year 4 students about maximising their foundation training year, and Year 3 students shared their reflections with Year 1 students. Voluntary organisations promoted the benefits of volunteering in providing health advice to the homeless community or emergency response first-aid. Students could view posters from previous student projects, PhDs and staff and visit stands with representatives from training providers and patient groups.

Results: Over 400 students attended. Overall feedback was positive, with students commenting 'it was very interesting to get real life experience from staff and patients' and '...helpful to prepare for the future'.

Conclusions: The integration of conferences within the curriculum can be an effective strategy to introduce students to a professional conference environment, networking and research poster presentations. Tailored sessions provide context, integration and real-life application of curriculum content.

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Team-based learning in social pharmacy

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Introduction: The method Team Based Learning (TBL) is not just 'group work' but a well-defined method including strategically formed, permanent teams, pre-reading (literature, podcasts etc.), individual Multiple-Choice Questions (MCQ) to assess understanding of pre-reading (Readiness Assessment Test = iRAT) followed by team MCQ (tRAT) with the same questions for discussion requiring consensus (Team-Based Learning Collaborative, n.d.). Students have the possibility to write an appeal with reference to the pre-reading if they believe their answers were wrongly marked incorrect. This feedback enables the teacher to identify what was difficult to understand, and can address these topics in a brief, clarifying lecture. Lastly, the students apply the knowledge – for instance in case discussions in groups followed by voting for suggested solutions and arguing their case in plenary discussions.

Method: Thematical analysis of student feedback in the forms of focus groups, written and oral course evaluations.

Results: TBL was assessed by the students as the number one teaching method to help them learn. When asked to grade a list of learning activities from 1 to 5, only TBL preparations and reading the textbook got average grades over 4 (4.7 and 4.6 respectively). The students highly appreciated that teachers explained how activities are connected, how to use various learning resources and the contents included. The focus group showed that students retained knowledge best from TBL-sessions because they were challenged to think for themselves and to discuss, while traditional lectures were quickly forgotten. TBL also improved the students' teamwork skills.

Conclusions: TBL is a method which motivates most students and promotes learning better than traditional lectures.

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Impact of simulation in pharmacy practice on student's perception of learning, knowledge and skill acquisition

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Introduction: Simulation in Pharmacy Practice (SPP) was included in the Pharmacy Master of Science (M.Sc.) Curriculum in 2018-19. SPP was part of the following courses: Pharmaceutical Care (fifth year), Legislation and Pharmacy Management (fifth year) and Pharmacology and Pharmacotherapy (fourth year). SPP included problem solving and interaction with simulated patients in an environment that imitates a Community Pharmacy. The following topics were included: Cardiovascular risk assessment and pharmacotherapy, dispensing medicines, counselling on minor symptoms, pharmacotherapy follow-up and monitored dosage systems (MDS). The aim was to identify if SPP improved student perception of learning and their knowledge and skill acquisition.

Method: The perception of learning was evaluated by a Likert questionnaire (1 to 5) made to fifth year students at the end of 2018-19 course. Results were expressed as median, IQR. Student's knowledge and skill acquisition were assessed by an exam at the end of the Pharmaceutical Care course. The cases about 'counselling on minor symptoms' and 'cardiovascular risk assessment' were selected and their scores (0 to 10) were compared within the years 2017-18 (no simulation in pharmacy practice), 2018 - 19 (simulation in fifth year) and 2019 - 20 (simulation in fourth and fifth year). Results were expressed as Mean \pm Standard Error.

Results: The students perceived that SPP helped them develop skills in communication (4.1), integration of knowledge (5.1), understanding of adherence (5.2), cardiovascular risk assessment (4.1), pharmacotherapy follow-up methodology (4.1), minor symptoms counselling (4.2), dispensing protocol (4.1) and MDS preparation (5.0). Scores in cardiovascular risk assessment improved from 6.1 ± 0.3 (2017-18) and 6.4 ± 0.2 (2018-19) to 7.3 ± 0.2 (2019-20). Scores in minor symptoms counselling improved from 6.3 ± 0.3 (2017-18) to 7.7 ± 0.2 (2018-19) and 8.7 ± 0.2 (2019-20).

Conclusions: There is a positive impact of SPP in student perception of learning and knowledge and skill acquisition.

Factors influencing pharmacy technician students' motivation to learn from students' perspective

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Introduction: The constant changes in life in modern society, dictated by the economic, social, political and ecological and the ongoing COVID-19 pandemic situation, affect a wide range of activities, including higher education. Research on students' motivation is relevant because it helps to clarify learning motivation issues. Not only for higher education teachers, but also for students, it is important to know the problems affecting learning motivation in order to increase students' motivation for learning and to achieve a better quality of studies. In this dynamic and difficult time, every higher education institution must look for new methods and ways to develop a creative and independent personality traits in students, so they are motivated and capable of learning, deepening their knowledge and seeking continuous improvement.

Method: Analysis of scientific literature and legal acts regulating pharmaceutical activity in Lithuania and the method of empirical research - an anonymous questionnaire. Research subjects were pharmacy technician students from Kaunas University of Applied Sciences. The processing of the obtained data was performed in IBM SPSS 22.

Results: The vast majority of students rated their motivation as high. A comparison between students from different courses found that third year students rated their motivation the highest. Pharmacy technician students are most motivated to study by the desire to acquire education (4.8 of 5 points), the desire to acquire knowledge and the desire to have a higher education diploma (4.7 of 5 points) and the desire to work in a well-paid job (4.6 of 5 points). These motivational factors motivated third year students the most. As one of the most demotivating factors, students indicated changes in pharmaceutical legislation that could impact their employment opportunities.

Conclusions: Learning is mostly motivated by the desire to acquire education and have a profession, the desire to acquire professional knowledge and the desire to have a higher education diploma. Comparing students of different courses, it was found that the above factors motivate third year and second year students the most.

Innovative use of a mock-trial as a teaching/learning/assessment strategy in pharmacy education over four years

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Introduction: Mock-trial is a common active-learning strategy in law education, but prior to implementation at one institution in 2015, limited literature existed for its application in pharmacy education. The Center for Advancement of Pharmacy Education (CAPE) 2013 outcomes and Accreditation Council for Pharmacy Education (ACPE) 2016 standards mandated graduate competencies in advocacy, communication, education, problem-solving, professionalism, and innovation. This presentation describes development, implementation, and lessons-learned from a mock-trial innovation in two Doctor of Pharmacy programmes over four years.

Method: First professional year pharmacy (P1) students were assigned controversial topics to research and debate in courtroom-style format. The mock-trial is the final exam in a required P1 course, necessitating application of knowledge, skills, and attitudes from respective course content and evidence-based practice principles. As a self-directed group project, mock-trial actively engaged students in learning and research, literature critique/evaluation, critical-thinking, communication, teamwork, and professionalism. Student-peer evaluations of teammates also contributed toward individual students' scores. Controversial topics covered either a pharmacotherapy debate, or a health policy issue relevant to contemporary pharmacy practice. Students debated topics including pharmacist-provider status, behind-the-counter status for statins, pharmacists' contraceptive prescribing authority, and the pharmacist and medical marijuana. Each institution obtained Institutional Review Board approval.

Results: Strategies and lessons-learned from four-years implementation incorporating over 300 student-pharmacists debating eight different topics in 16 mock-trials at two institutions will be presented and discussed. Faculty-judges and student-jurors rated student-participants' content/knowledge, critical thinking, application/ discussion of federal/ state law, citations/ references, visual aids, delivery/style, and active listening. Statistical analysis, including inter-rater reliability, compared faculty-judges' and student-jurors' evaluation of performance.

Conclusions: Results from faculty-judges' and student-jurors' evaluations consistently indicated students performed well, and were able to apply their knowledge, skills, and attitudes gained from previous required courses, and were consistent with and student-peer evaluations. Mock-trial can be replicated and implemented in other courses/ institutions to support faculty- teaching and student-learning.

Chemotheca-based innovative didactic tool for medicinal chemistry courses

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Introduction: Didactic innovation is always a relevant issue in modern Medicinal Chemistry academic courses. The use of interactive web-based platforms is well accepted, especially in the new students' generation. The Chemotheca tool (Ortuso *et al.*, 2018) has been adopted as a pilot project in several courses (Bachelor degree in Pharmacy, Hospital Pharmacy specialisation and Life Science Doctor of Philosophy (Ph.D.) programme) at Università Magna Græcia, Italy, since the 2017-2018 academic year with relevant interests from the users. A new specific version of this tool, called EDU-Chemotheca, designed explicitly for innovative didactic purposes, is proposed to the European Medicinal Chemistry scientific community involved in Pharmacy courses with the aim to promote a modern educational model.

Method: The original Chemotheca virtual database (COST, n.d.a) is the tool for promoting the culture of chemical sharing within the scientific community of the 'Multi-target paradigm for innovative ligand identification in the drug discovery process' MuTaLig COST Action CA15135 (COST, n.d.b). It is based on open-source environments running under Linux OS and implemented by PHP and Python programming languages. It includes a JSME molecular editor and MySQL database storage.

Results: A Python engine computes, on the fly, 70 molecular descriptors (such as Lipinski's rules, CNS bioavailability, PAINS matching, LogBB, LogP, total polar surface area, molecular weight, etc.) using the OpenBabel and Pybel libraries. A fingerprint-based algorithm prevents duplicate structures. Outputs currently implemented are SMILES, 2D and 3D SDF and MOL2 file formats which allow to interface the in-house chemical databases with most of the *in-silico* methods and tools.

Conclusions: An innovative and modern web-based training platform, already tested with Pharmacy students following undergraduate and graduate courses, is proposed as a possible novel educational model for Medicinal Chemistry courses to the scientific community.

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MOOC about medicines: A perspective tool for lifelong learning

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Introduction: A MOOC (massive open online course) is a free-access e-course for everybody. MOOC provides an affordable and flexible way to learn new skills. As the population ages, drug-related topics have become popular in society, besides there is a growing trend towards misconceptions and myths about pharmaceuticals. 'Medicines down to earth', developed in 2019, was the first MOOC from the Institute of Pharmacy, University of Tartu, Estonia, to provide a short introduction about pharmaceuticals, from the lab to patient. The topics of the MOOC involved history, manufacturing, composition, administration and utilisation of medicines as well as an overview of service provision in community pharmacy. The aim of this study was to discuss the impact of MOOC as a tool for continuing education, based on a learner profile.

Method: Demographic indicators and course feedback in 2019 - 21 were analysed.

Results: There has been great interest in participating in the MOOC course. Since 2019, there have been 1933 registered participants, and of them 1558 (81%) successfully graduated the course. The average share of graduates in all MOOC courses at the University of Tartu in 2020 was ca 45% (Tartu Ulikool, 2021) Many students also took this course as an elective subject, and 97% have completed it successfully. More than 80% of the participants were women and the majority under the age of 40. In different years 3-8% of the course participants were 61 years of age or older. The professional and educational information about the participants in the course registration form was voluntary. According to data provided, a quarter of the participants had a medical or educational background.

Conclusions: The MOOC is a flexible tool for continuing education. The course was particularly popular among middle-aged individuals with medical and educational backgrounds.

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The development and validation of a globally applicable pharmaceutical development framework

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Introduction: The imperative of meeting current global healthcare challenges requires advancing pharmacy practice and ensuring the delivery of quality services to improve patient outcomes in a global context. This research aims to design and develop a valid and consented set of global goal-oriented pharmaceutical development frameworks and corresponding indicators to support and guide systematic practice transformation needed to meet the national and global pharmaceutical healthcare demands of changing population demographics.

Method: A mixed-methods approach was used. Preliminary exploratory fieldwork was conducted to evaluate the appropriateness and acceptance of a systematic set of proposed global pharmaceutical development goals (PDGs) by conducting a series of international expert focus groups. This was followed by recruiting global pharmacy leaders from differing sectors and nations who participated in a modified nominal group technique to further develop the content of the initial PDGs framework. In a subsequent study, a qualitative modified Delphi approach was employed by a panel of international pharmacy experts and leaders to ensure the credibility and content validity of the framework outputs and to generate consensus on a final matrix of the proposed global PDGs.

Results: The initial analysis of the nominal group study indicated that there was a need to conduct further modifications to the content of the proposed DGs. This was done by embedding the conceptual framework of the previously published global Pharmaceutical Workforce Development Goals (2016). The subsequent modified Delphi consultation and consensus generation produced a realistic global consensus-driven version of a PDGs framework, comprising 21 discrete practice-related development goals ready for deployment.

Conclusions: A systematic global set of PDGs was developed for ensuring the sustainable advancement of pharmaceutical practice and supporting the needs-based roadmap for global pharmacy practice transformation. In addition, this provides a foundation for evidence-based indicators and metrics to be developed to measure and monitor the progress of implementing these goals.

Incorporating case-based discussions within a medicines information advanced experiential placement

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Introduction: The Department of Pharmacy at the University of Malta offers a three-year international post-graduate Doctorate in Pharmacy programme in collaboration with the University of Illinois, Chicago, United States of America. Within this course, students may opt for a Medicines Information Advanced Pharmacy Practice Experiential rotation. This rotation includes a case-based discussion (CBD) designed to structurally assess students on the delivery of patient care.

Method: An advanced pharmacy practice case is selected by the preceptor for preparation as a CBD by each student. The case is selected by the preceptor to strategically practice a research-based environment to facilitate the students in developing required workplace skills. During the case assignment the preceptor explains the goals of the activity. Students are expected to apply critical appraisal skills in managing patient care, identify care issues and discuss holistically an action plan.

Results: The CBDs are delivered by students in front of experienced preceptors and structurally evaluated by two assessors including preceptors and programme coordinator. The Clinical Case Presentation Evaluation Form assesses for clarity, accuracy and validity of the case discussion together with problem identification and skill in delivery of the discussion. The structured assessment form is utilised to deliver constructive feedback to the students, which enables the identification of key areas of improvement and to further elicit reflections on patient-centred care.

Conclusions: The application of CBDs using carefully chosen cases by the preceptors supports critical thinking skills and reflection on clinical pharmacy interventions by the students. Throughout the process of organising, collating the data and delivering the CBDs, students are empowered to take initiative, engage in clinical decision making, and use problem-solving skills using actual patient-specific factors.

Multimedia resources in pharmacy education: A lab experience

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Introduction: During the COVID-19 pandemic crisis, teachers were forced to suddenly adjust their teaching methods. The phenomenon was particularly challenging for teaching laboratory classes at a time of full lockdown. Visual memory shows the personal ability to process images and this type of memory is very important for enhancing learning and processing of information. This experience aimed to develop pedagogical strategies to help the students' learning process in a particular moment, as well as to use the methods developed to enhance future learning of pharmaceutical techniques within pharmacy education.

Method: Multimedia resources were used to produce short videos of the preparation of laboratory assignments for pharmaceutical technology classes. In synchronous online classes, the videos were watched, commented on, the compounding preparation record was performed and at the end of the class the video was shown once again to consolidate the compounding process. In a first approach, in 2019/2020, students did not repeat the assignments in person and carried out their assessment remotely. In a blended-learning approach, with different students in 2020/2021, they had the opportunity to return to the lab to repeat the experiment protocols viewed online and perform the assessment in person.

Results: There was no relevant difference between the grades obtained with classical face-to-face teaching (before the pandemic) and with the use of e-learning/blended-learning methodologies. However, students with online exclusive learning reported that they would have liked to repeat the assignments face-to-face in the laboratory. The blended-learning students reported that seeing the videos before the experimental work helped their memory and execution, leading to the perception that the video resources are useful.

Conclusions: A combination method of multimedia resources to stimulate visual memory and practical execution of the activity may have a synergistic effect on learning and acquisition of practical skills.

Pharmacy students' perspective on online lectures during the COVID-19 pandemic: A case study from the University of Belgrade

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Introduction: Synchronous lectures tend to be used as the prevalent method of online instruction, irrespective of notable differences and obvious limitations when compared to their in-person delivery. Study aim was to assess students' perspective on online lectures held during the emergency remote teaching (ERT) shift due to the COVID-19 pandemic.

Method: Students were invited to take part in online survey related to their experience with ERT. Survey included 25 items related to: satisfaction (14 items), motivation (three items), interaction with peers and lecturers (four items), and perceived challenges (four items). A 5-point Likert scale was employed. Statistical analysis was performed using the SPSS software.

Results: A total of 387 students participated in the survey. The majority of respondents (79.3%) were junior students. Among the respondents, 72.6% reported no previous experience with online learning. Although a relatively high level of satisfaction was reported (mean score 3.91 ± 0.75), challenges were also scored relatively high (3.05 ± 0.99), while interaction was scored somewhat lower (2.98 ± 0.73), and the lowest mean score was observed for motivation (2.73 ± 0.58). Students reported having trouble maintaining motivation, concentration and focus during online lectures, which usually took many hours per day. Interaction with peers was reported as unsatisfactory (2.48 ± 1.46), whereas it was more feasible with lecturers (3.24 ± 1.42). Students were quite satisfied with the ability to organise their time flexibly (71.4%), and with the workload (54.5%), while they were less convinced that online sessions provided enough opportunities to reflect on what was learnt (50.1% agree, 25.1% neither agree nor disagree).

Conclusions: The results obtained indicate that students are somewhat hesitant with respect to online lectures as the main mode of instruction. Lectures, generally, place students in a passive role, which is further increased in online delivery. In order to support students' engagement and success, online lectures should be combined with more active instructional strategies.

Moving forward from the COVID-19 pandemic: Do students see eLearning as an integral part of their future learning environment?

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Introduction: The COVID-19 pandemic caused a paradigm shift in the way study material was presented and how learning was assessed at the Faculty of Pharmaceutical Science in Iceland. The pandemic resulted in an unplanned shift from classical on-site lectures and problem-based learning to online activities through Teams, Zoom, Canvas, and other platforms (hereafter collectively termed eLearning). The way forward, post-pandemic, has been under discussion. Within this context, the aim of this study was to explore the students' view regarding what platform of teaching would benefit their learning environment in the future.

Method: A survey was sent to all registered pharmacy students using Google Forms. Participation was voluntary and anonymous.

Results: The response rate was 25.8% (n = 55). Majority of students (96%) either partially or fully agreed that access to lectures (streaming lectures or pre-recordings) improved during the pandemic compared to pre-pandemic. Students were asked if they had a good overview of their education when it comprised of both on-site and eLearning (on a scale of 0 - 10, with 10 being a complete overview), 69% of students gave an overview score of 7 or above, showing that this combination was not problematic in terms of oversight. When asked what combination of on-site and eLearning would be most beneficial for their education moving forward, nearly 75% of students preferred to have the main focus on eLearning with some on-site activities. Only 9% of students preferred to have all lectures and learning activities on-site, whilst 14% of students preferred to have all learning via eLearning platforms.

Conclusions: It is evident, from the students' point of view, that eLearning will become an integral part of the future learning environment at the Faculty of Pharmaceutical Science, University of Iceland. Most students appreciate face-to-face discussions and problem-based activities to some extent, so a combination of eLearning and on-site activities will be the way forward beyond the pandemic.

How to maintain students' activity in gaining knowledge and practical skills during online education era?

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Introduction: A pharmacy programme offered by the Faculty of Pharmacy of Jagiellonian University includes 11 semesters of full-time studies leading to the Master of Pharmacy diploma. The curriculum is strongly focused on obtaining multiple laboratory and professional practical skills. Approximately 65% of the curriculum consists of practical teaching, including obligatory practices in pharmacies. The pandemic restrictions introduced at the beginning of 2020 impeded practical teaching and compelled implementation of distance learning. Laboratory classes were partially conducted face-to-face, while some of them were moved to online teaching platforms. This raised many concerns about the sufficient quality of the practical skills of the students, as well as their activity and participation in the learning of pharmaceutical technology.

Method: Online platforms were used to create tutorials on pharmaceutical compounding and processing (videos, photos, description, comments), self-assessed tests, quizzes, and online seminars were introduced. To increase the activity of the students, they were awarded for preparing test questions and answering questions prepared by others on the online platform. The effect of the changes were evaluated by comparing the pass rate of the exam in pharmaceutical technology (practical and theoretical).

Results: The obtained results indicate that the introduction of additional activities for students, and the switch to a partial online education, did not affect the quality of pharmaceutical technology teaching. In addition, it even increased the overall first term exam pass rate from 72% in 2020 to 86% in 2022.

Conclusions: Additional activities introduced via online platforms made the teaching more flexible and self-manageable by the student, thus increasing their activity in learning. Moreover, the better access to knowledge complemented the classes conducted in previous years, which in turn resulted in a higher exam pass rate.

Simulation-based training in professional competences and skills in pharmacy education

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Introduction: Recently, the use of simulation training in health professions has become increasingly popular. At the Medical University of Plovdiv simulation training is represented in the Pharmacotherapy course for students from the fifth year of study. However, with the advancement of technology, it is imperative that classical teaching methods be adapted to the rapidly changing conditions and the growing demands of learners. The aim of this project was to implement a simulation pharmacy in the Faculty of Pharmacy, which would be used as a learning environment for students.

Method: The project realisation started in the academic year 2020 - 21. A working group was established to perform the main project tasks: clarification of the concept and design of the facility, finding funding, infrastructure construction, providing IT equipment, medical devices, and other necessary products, and organisation of training activities.

Results: 'PharmaSimCenter' was established and put into operation. The center consists of two training laboratories – Pharmacy SimLab and Pharmacy SkillsLab. SimLab is a demonstration model of a pharmacy creating a real environment for students. The trainees work in small groups using the latest technologies for expert training and research skills; access to the individual areas in the pharmacy is provided, including: a pharmacy counter, consultation area and workstations. The computers are provided with pharmacy simulation programmes for teaching in 'Pharmaceutical care', 'Pharmacology and pharmacotherapy', 'Social pharmacy and legislation', etc. Additionally, students can acquire skills for interprofessional communication, critical thinking, decision making, and teamwork. SkillsLab has the necessary devices (blood pressure and glucose monitors, inhalation devices, etc.) for practical training. During the academic year 2021 – 22, the simulation pharmacy has been used to carry out practical activities in three modules – arterial hypertension, diabetes, and pulmonary drug delivery, to integrate prior knowledge.

Conclusions: A simulation pharmacy has been established as a model tool to teach key competences and skills in patient care, drug therapy management and communication.

The implementation and development of a new master program in a faculty of pharmacy from Romania

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Introduction: In Eastern European countries, the National Pharmacovigilance Systems are in an incipient phase, thus their improvement could ultimately result in an enhancement of patient safety. In order to achieve this purpose, an Agence Universitaire de la Francophonie (AUF) educational pharmacovigilance project addressing pharmacists and physicians was implemented in 2013 at the Iuliu Hațieganu University of Medicine and Pharmacy Cluj-Napoca, Romania. This project demonstrated the necessity of pharmacovigilance education for increasing knowledge and abilities of healthcare professionals.

Method: A new Master programme, 'Pharmacovigilance: Drug safety monitoring', has been developed since 2013 by a group of professors and researchers from the Faculty of Pharmacy and Drug Information Research Center from Cluj-Napoca, Romania. The Master's curriculum was developed based on other European pharmacovigilance master programmes.

Results: To date, this is the only pharmacovigilance Masters programme in Romania accredited by Romanian Agency for Quality Assurance in Higher Education in 2013. The number of Master's students has doubled from 2013 to 2020, the students being mainly graduates of the Faculty of Pharmacy, but also Medicine and other specialisations, from all over Romania. In 2017, curricular changes were made to core elements of the modular curriculum in accordance with WHO-ISoP, four disciplines undergoing changes. In recent years, Master students were also involved in medical education activities for the community. A survey among graduates showed that about 40% of them work in the field or related fields of pharmacovigilance upon master graduation. 5% of the graduates continued their Master's studies with Doctoral studies in pharmacovigilance.

Conclusions: This programme enhances the pharmacovigilance knowledge and skills of its students with the purpose of integrating them in specific work positions and for the development of the pharmacovigilance system in Romania.

Developing interactive augmented reality platform for learning laboratory skills in pharmacy

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Introduction: Teaching and learning of laboratory skills is undergoing a revolution as digitalisation offers new innovative approaches. In pharmacy education, adequate training in laboratory skills is essential for students. At the same time, the challenge for the educator is to provide each learner enough personalised, real-time guidance while a student group is working in a teaching laboratory. This is a common challenge in study programmes where the student to teacher ratio is high, such as in pharmacy programmes. The hypothesis was that augmented reality (AR) technologies could offer valuable solutions.

Method: The aim was to develop an interactive AR learning environment to support students' learning and performance in teaching laboratory. Second year pharmacy students (n = 16) were assigned to experimental and control groups. The experimental group worked with AR smart-glasses that provided guidance during the work, with think-aloud and gate-questions related to choosing correct laboratory tools and reagents. The control group worked in traditional way.

Results: The results showed that the interactive AR was more effective in fostering performance compared to traditional laboratory instruction, and prevented most of the mistakes. The AR group considered the real-time guidance and feedback provided by the digital platform supportive for their learning and performance, especially at critical work phases. Surprisingly, only minor differences were found in tasks measuring students' understanding of the content knowledge.

Conclusions: For the first time, an AR platform was introduced for teaching laboratory skills in pharmacy education at the university level. The authors found that an AR environment embedded with supportive elements could offer a valuable digital educational tool, which provides individual and real-time guidance for the learners as well as support to the educators in their teaching practices. Although digital technologies are not expected (nor aimed) to replace teachers, it is evident that they have potential in various ways in science laboratory education.

Pharmaceutical marketing education with online serious game for students across Europe

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Introduction: The 'serious game' is a pedagogical innovative approach to the Pharmaceutical Marketing class as an efficient way to implement learning by doing. Five European Universities from European Alliance for Global Health (EUGLOH), use an online English serious game, on pharmaceutical management, helping attendees to fully comprehend the marketing decision process and impacts on the company's results (Kaufman, 2012).

Method: Students from various backgrounds (marketing, biotechnology, pharmacy, language, etc.) from Level 3 to Doctorate degree level, participated in a co-modal simulation (CESIM, n.d.). Teams managed the marketing operations of a pharmaceutical company and compete for the leadership position, in two markets with four customer segments. Teams sell up to six drugs, with two active principles, varying efficiency and features. Participants are provided with a decision-making methodology and tools, inciting them to simulate different scenarios, analyse forecasted results and benchmarking against competitors. The game runs over nine rounds spread across four days. Teams also deliver management reports, corporate strategies, advertisement and interculturality videos.

Results: The decision-making process covers a range of corporate strategic areas such as product life cycle, management, positioning, advertising, pricing, sales forecasting, marketing, Research and Development, revenue and profitability. The winning criterion is share price on the last round. Students participate fully due to competition induced by the game, develop their understanding of the complexity of marketing operations in a dynamic competitive environment, gain more by this method than with other practical works or market study assignment.

Conclusions: Participants gain invaluable experience in teamwork, problem-solving while competing live all over Europe with an open-mind to interculturality. This game is already embedded in the curricula of several Masters programmes (for example Development of Drugs and Health Products) in University Paris-Saclay and EUGLOH partners with 300 participants this year (third edition).

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Pharmacy internship access: Fernando Pessoa University experience

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Introduction: The Pharmaceutical Sciences Master Degree at Fernando Pessoa University (UFP) is ruled by Directive 2005/36/EC, amended by Directive 2013/55/EU, which establishes a six months internship in a community pharmacy or a hospital pharmacy. Access of students to internships is defined by the internal internship regulation of UFP, which takes into account the subjects that have not been awarded by date of enrollment (no more than two subjects) and the arithmetic average of the grades of approved subjects. Ideally, students should attend the internship after completing the curricular plan, which means they have achieved all theoretical and practical competencies. The non-approved courses imply a lack of some skills as well as the need to attend classes during the internship. This study aims to find a relationship between course grades, non-approved courses, and internship performance.

Method: Data were retrieved by searching the UFP databases of Pharmaceutical Sciences Masters Degree. The research covers a ten year period (2011-2021) and includes non-approved courses, course classification means, and internship grades. Data were analysed by SPSS software and a correlation test was applied.

Results: 655 students were included. After the result analysis, a moderate negative correlation between the existence of non-approved courses and the course classification means was found. A low correlation was found between course classification mean and internship performance. The results did not demonstrate a correlation between non-approved courses and internship performance.

Conclusions: Although theoretically, the existence of a negative correlation between non-approved courses and internship performance seems logical, the results do not support this theory. These results could be explained by the low number of non-approved courses having an insignificant effect on the overall internship performance, the type of non-approved courses, and the fact that the compulsory internship defined by the European Directive only targets some areas related to the pharmaceutical sciences competencies.

Advanced experiential placements: Challenges and opportunities for preceptors

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Introduction: The Doctorate in Pharmacy course offered by the University of Malta, Malta, in collaboration with the University of Illinois, Chicago, United States of America, offers six-week advanced experiential placements. Preceptors for the placement at Medicines Information guide international post-graduate doctorate students through an advanced clinical experiential education.

Method: In 2016, before the first cohort of doctorate students were admitted to the programme, the Pharmacy Department at the University of Malta offered a preceptor development programme for hospital clinical pharmacists. This short, intensive, training programme included sessions by speakers from University of Illinois, Chicago and the American College of Clinical Pharmacy in relation to clinical pharmacist activities and roles as preceptor. This programme focused on how students rely on experiential rotations to explore the application of clinical pharmacy theory in practice and to prepare them for role modelling and student mentorship as preceptors themselves. Preceptors need to be able to prioritise areas during the post-graduate rotation to guide students to reflect on real-life, dynamic patient care situations.

Results: The preceptor development programme served to highlight effective preceptorship skills for postgraduate international clinical pharmacy rotations. The requirement to balance strong communication skills, assessment skills, teaching and leadership skills with technical skills is key to successful role modelling. Applying this educational preceptorship amidst a variety of cultural and pharmaceutical differences, and integrating students within local practice is essential for enhancing the educational experience. Moreover, presenting diverse learning scenarios and maximising clinical exposure during the experiential placement are fundamental for the students' successful learning experience.

Conclusions: Preceptors can benefit from a rewarding professional experience in addition to a satisfying preceptor-student relationship, when integrating students into their daily activities by bringing out their best potential. It is important for preceptors to periodically perform self-assessment and identify areas that require further improvement.

Initial sessions of degree in pharmacy internships: Face-to-face versus virtualisation

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Introduction: Curricular external internships are a compulsory element of Pharmacy degrees, by the European directive, of 30 ECTS. In the 2019/20 academic year, Specific Training Sessions were organised for the first time for fifth year students prior to their internships. A programme divided into five practical/theoretical workshop presential modules was proposed (electronic prescription, pharmaceutical care, magistral formulation, pharmacovigilance and research in pharmacy). During the 2020/21 academic year, due to the health emergency caused by SARS-Cov-2, it was necessary to hold it in a hybrid mode (face-to-face and online, 20/80%). The third edition (conducted in the 2021/22 academic year) has returned to face-to-face attendance but kept some virtual sessions. The objective of this study is to evaluate the experience of the implementation and subsequent virtualisation of the Pharmacy Degree Internship Initial Sessions and assess the satisfaction of the participants after three years of experience.

Methods: Evidence has been collected through a satisfaction questionnaire completed both by students and speakers. The questionnaire was carried out using Google Forms tool with 26 questions in the first edition, 20 in the second and third, on a Likert-type scale. In addition, open questions were included to allow participants to express suggestions.

Results: During the first initial sessions, retransmission of virtual sessions at specific times was adopted to refresh access to electronic prescriptions and actions of pharmaceutical technicians. The use of this technology received a positive evaluation from 70% of the students. The good acceptance of this methodology, as well as the pandemic situation in the second year, made this tool essential for more virtualisation.

Conclusions: The answers received after the first and second edition of the programme made it possible to introduce improvements that contributed to improved overall evaluation from students. The Initial Sessions have been, both in the face-to-face and virtual modalities, a very satisfactory experience for students, teachers and organisers. This initiative has made it possible to integrate knowledge, acquire skills and develop abilities, helping to establish a frame of reference and increase the interest of students in collaborating with pharmaceutical professionals before their internships and their insertion into the world of work.

Coordination between academic tutors and professional tutors in training placements

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Introduction: Supervised Training Placements are the practicum of higher pharmacy studies. The students carried out their training placements for six months in Community Pharmacy and in Hospital Pharmacy Services (European Parliament and Council of the European Union, 2005). Students must acquire skills defined by the Faculty of Pharmacy based on the regulations on the pharmaceutical profession (Boletín Oficial del Estado, 2007). Each student is assigned to an academic tutor responsible for their supervision during the period of the Supervised Training Placements, and a professional tutor with whom students have the opportunity to practice all the knowledge previously acquired and learn the competences, skills and capabilities they have to acquire during their stay in community pharmacy or hospital pharmacy. Each academic year more than 250 professional tutors participate in the Supervised Training Placements. Thus, the coordination between academic and professional tutors is important to ensure the correct training of these students for their subsequent employment. The aim of this study was to implement an efficient system for monitoring student learning and to make the necessary didactic tools available to professional tutors.

Method: Academic tutors of Supervised Training Placements have designed a protocol of action in which chronology and the type of contact with professional tutors have been defined, and a document for collecting information. In order to evaluate the results of this activity, a survey was developed to assess the opinion of professional tutors.

Results: The coordination mechanisms developed, and the decisions taken have allowed the researchers to improve the quality of the seminars for the students attending their training placements.

Conclusions: Coordination between academic tutors and professional tutors is important for the optimal development and learning of students in Supervised Training Placements.

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Objective Structured Clinical Evaluation (OSCE) in pharmaceutical care

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Introduction: Objective Structured Clinical Evaluation (OSCE) is a method to evaluate clinical skills and competencies, which are relevant in Pharmacy studies and more specifically in Pharmaceutical Care (PC). It is an opportunity to advance educational innovations and improve the teaching-learning process.

Method: Five stations with standardised patients and written records were designed, and a checklist was elaborated in each station with different items in order to evaluate competencies. The implementation process was structured in: 1) Preparation phase, which includes theoretical design and practical planning; 2) Execution phase, and 3) Evaluation phase. The pilot study was carried on at the Faculty of Pharmacy of the University of Granada in the 2018-2019 academic year. Finally, a questionnaire was designed to explore students' opinions.

Results: The pilot study was carried out with 33 undergraduate students and 14 Master students during two days of June 2019. The mean of the global OSCE was 65.2 ± 11.3 out of 100 points, being higher for the Master student (68.8 ± 12.3) than Bachelor (63.6 ± 10.67). The best scored station was the one of 'Adherence' (86.7 ± 16.4) and the worst were both the written stations, 'Dispensing Record' (48.3 ± 20.8) and 'Medication Review with Follow-up' (46.6 ± 19.8). The best competency was technique ($15.0 \pm 3.1/20$ points). The number of students who passed the exam was 85.1% (81.8% from Bachelor and 92.9% from Master). The global score of the opinion questionnaire had a mean of 4.5 ± 0.5 out of 5. The internal reliability as measured by Cronbach's alpha was 0.769.

Conclusions: Pharmacists can enhance their skills and competencies needed to conduct pharmacy services. The use of OSCE represents a new tool to evaluate these PC skills in a way close to reality.

Objective structured clinical examination (OSCE) during the COVID-19 pandemic

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Introduction: Objective Structured Clinical Examination (OSCE) allows simulation of the interaction between the pharmacist (or the pharmacy student) and the patient in a community pharmacy or at a hospital setting. Hence, OSCE is nowadays considered the gold-standard for competency-based assessments in clinical disciplines such as Pharmacy. As a result of the pandemic situation, conventional face to face OSCE presents with challenges related to health and safety. Accordingly, alternative clinical competence assessments with similar objectives and standards for pharmacy students were designed.

Method: OSCE was conducted during the academic year 2020-21 for fifth-year students after the completion of six months of practical rotations. Students completed an exam with five stations consisting of two face-to-face stations with simulated standardised patients and three online stations developed through the online learning platform Blackboard, each one with a duration of five minutes. The stations tested student knowledge, patient counselling and communication and acquisition of technical and/or clinical skills.

Results: A total of 49 fifth-year students and ten examiners were involved in this OSCE hybrid format. The analysis of results showed that the best average grade was obtained at live stations. Comparing the results with previous conventional OSCEs (before pandemic) shows higher average grades for the hybrid OSCE celebrated in 2020-21. Amongst the participants in the hybrid OSCE, 33% of them preferred the online stations.

Conclusions: During the COVID-19 pandemic, online stations have been implemented in OSCE as an opportunity to assess clinical skills in pharmacy students. The online version was effective for evaluating knowledge. However, there were limitations in the assessment of some specific skills such as communication.

Objective structured clinical examination as a tool to evaluate the competences of the students of pharmacy versus classical exams: Comparative analysis

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Introduction: The implementation of new methodologies for assessment of competences focused on problem-based teaching constitutes a remarkable strategy to develop new evaluation tools. Objective Structured Clinical Examination (OSCE) has emerged as a gold standard in this context, due to its reliability and validity for the evaluation of clinical skills of pharmacy students. Nevertheless, OSCE is expensive, time-consuming and requires more trained personnel with clear and validated descriptors for the evaluation (Shirwaikar, 2015). In this work, a comparative correlation analysis between a classical method of evaluation, a multiple-choice test (MCT) and OSCE was carried out for the same group of students in the context of the final practical evaluation of the Degree of Pharmacy in the Faculty of Pharmacy, University Complutense of Madrid.

Method: Data were obtained from Pharmacy Degree databases corresponding to a group of 220 students at the end of their internship period, in the academic year 2020-2021. The results obtained for each student in the MCT and OSCE were analysed using a statistical software (GraphPad prism v8.0). Data were previously randomly assigned to codes in order to preserve the privacy of the students.

Results: OSCE average qualifications (7.6 ± 0.8) were one point below in comparison to MCT (8.7 ± 0.1). Almost 92% of the students obtained better results at the MCT. In fact, a moderate correlation between OSCE and MCT grades were found (Pearson $r = 0.47$), suggesting that the best students obtained higher rates in both, MCT and OSCE.

Conclusions: OSCE rates were consistently lower than classical MCT ones, although better students obtained higher rates in both OSCE and MCT. Significant differences were also found between the different OSCE stations. These results are very useful to refine the design and the descriptors for further editions of the OSCE.

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Engagement and participation in a digital classroom

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Introduction: It is easy to assume students have the same level of attention and willingness to participate in virtual lectures and seminars as they had previously whilst back in the classroom. But attention can and will disperse as students feel they can multitask and not be 100% present. It is a challenge for lecturers to find meaningful ways to engage students and encourage efficient and targeted time use while learning.

Method: The study programme was thoroughly restructured to enable more opportunities to ask questions and circle back to subjects covered during lecture. Students were asked to write down all the new vocabulary covered in the previous lecture and ask three questions which were used as rotation questions in the next lecture. Automated quizzes and tests were used on online platforms.

Results: Initial agreements with students will set the mutual expectations for achieving learning outcomes. Setting rotations for answering questions during lectures keeps students alert and engaged in the topic. The divided workload and opportunities to re-watch lectures, try out self-evaluation tests and circle back to lecture subjects in the Q & A section help students to implement new knowledge and prepare for tests. Broad time window for taking tests allows students to prepare better and relieve stress as they can choose the most appropriate time to take the test. Automated quiz banks allow lecturers to spend less time evaluating tests and randomise questions for individual tests, to ensure less cheating.

Conclusions: There is no universal approach for teaching in this new era. Learning methods must evolve to accommodate new needs and different approaches to learning and acquiring new skills. At the same time lecturers need to set boundaries for workload and try to automate online platforms as much as possible.

Development of a validated tool to identify competences relevant for responsible person position in good distribution practice

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Introduction: Defined competences or educational frameworks are not established within the European Union to define educational development for the Responsible Person (RP) position in wholesale distribution of pharmaceuticals adhering to Good Distribution Practice (GDP). The educational approach for current educational development for the accession to the RP position is topic-driven and not competency-based. This research aimed to establish competences required for the RP position, by proposing a validated Tool to identify Competences Relevant for the Role of the Responsible Person (COMP-RP tool).

Method: The development of the validated COMP-RP tool consisted of establishing six areas of expertise encompassing knowledge, skills and competences for the RP role based on current legislation and existing general pharmacy education frameworks. Knowledge, skills and competences were ranked using a five-point Likert scale ranging from 'not important' to 'essential/obligatory' via two Delphi rounds consisting of a European panel of experts representing pharmacy education, pharmaceutical regulation and industry.

Results: 63 criteria were generated for assessment in the first Delphi round: 33% (n = 21) were requirements for Wholesale distribution activities, documentation and leadership carried similar coverage; 20% (n = 13) and 19% (n = 12) respectively. The lowest three ranking categories were: Quality Management and Quality Systems (9%, n = 6), Management of 'outsourced activities' (6%, n = 5) and Reviewing and monitoring (9%, n = 6). Demographic data shows that almost half the expert panel participants (N = 16, n = 7) had 11 - 20 years of working experience and n = 4 had, over 20 years of experience. After the second Delphi round, 58 knowledge, skills and competences criteria passed the statistical elimination criteria and were retained in the COMP-RP Tool. The eliminated criteria pertained to leadership and documentation sections.

Conclusions: The developed COMP-RP tool contributes to identification of competences that are relevant to RP position and facilitates harmonization in GDP educational requirements to support patient-centric and safe wholesale distribution practices.

Simulation of the two-compartment open model with a simple hydraulic system

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Introduction: The course on Biopharmaceutics and Pharmacokinetics includes lab training where pharmacokinetic (PK) simulations are common in order to make it easier and more understandable the basic principles behind compartmental PK analysis for the students. A well-known experimental approach used to perform such simulations is based on the use of a simple hydraulic system. However, this is mainly used for the one-compartment open model whereas the PK behaviour of most drugs are better explained using a two-compartmental approach.

Method: The classical hydraulic system was adapted by including two additional feeding lines and a second flask. Two different administration modes were simulated: bolus IV dosing and zero order incorporation kinetics ($T = 40\text{min}$). Sampling was performed in the central and peripheral compartments, and the fluid renewal flow in the central compartment was considered as urine sampling. Carboxyfluorescein (CF) as model drug was measured by UV-vis spectrometry at 493 nm.

Results: Concentrations (C) and $\log C$ of CF in the different samples were plotted versus time and the profiles were consistent with a two-compartment open model. After bolus IV dosing the following parameters were obtained: $\beta = 0.006\text{ min}^{-1}$, $B_0 = 2.4\text{ }\mu\text{g/ml}$ and $\alpha = 0.07\text{ min}^{-1}$, $A_0 = 9.2\text{ }\mu\text{g/ml}$. These values were further used to estimate the rest of PK parameters. The same hybrid macro-constants values were obtained when the administration mode was changed.

Conclusions: A simple hydraulic system commonly used in pharmacy studies to simulate the one-compartment open model can be adapted to simulate also the two-compartment open model.

Remote laboratory work: Challenges and solutions

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Introduction: Remote learning has been of interest to students for a long time. And this method has been under development for decades. During the COVID-19 pandemic, remote working and study became the main alternative to contact activities. But is distance learning paying off in all areas: can remote laboratory work replace work in a laboratory class?

Method: Literature review. Collection of research and examination of data.

Results: The sudden appearance and effect of the coronavirus has caused major disruption to the education sector. Group work, acquisition of individual skills in the laboratory, and learning from mistakes are important components of the educational process. To get those competencies, virtual laboratory classes were created to continue studies. Teaching students' practical skills and evaluation of their practical skills become a challenge. Both teachers and students are positive about the solution during pandemic period to use remote laboratory work. However, most students do not agree that remote laboratory work can replace a live one. Opinions are different in terms of ease of attendance: more students would choose a virtual class over an in-person one. Although attendance at virtual classes is higher, it is more difficult to maintain students' attention and motivation. It is also difficult to assess the acquired knowledge, to ensure academic integrity.

Conclusions: Today's technology makes it possible to take remote learning to the next level. However, the online laboratory class cannot replace the live class. The most effective learning method is a hybrid of remote and live learning classes.

Pharmacy education using open educational resources produced by collaborative Erasmus+ projects

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Introduction: The 'Open Educational Resources' (OER) labels teaching, learning and research materials in any medium (digital or not), which is available, released under an open license that permits free access or use (Martin *et al.*, 2018). In this presentation, it will be described the use of the OER produced in Faculty of Pharmacy of University of Portugal in two collaborative Erasmus+ projects: TOX-OER (Learning Toxicology through Open Educational Resources), finished in 2018 and OEMONOM (Open access Educational Materials on Naturally Occurring Molecules – sources, biological activity and use), in course. Both projects targets at preparation of comprehensible, free and easily available materials for professionals, students of biomedical disciplines as well as lay persons in areas included in Pharmaceutical Sciences.

Method: In both projects the OER materials were or have been prepared by common work of experts from different fields (pharmacologists, pharmacognosists, toxicologists, microbiologists, analytical chemists and E-learning experts).

Results: In TOX-OER project a Massive Open Online Course (MOOC) (TOX-OER, n.d.) in seven languages was developed, which included a Pharmacokinetics module with four topics: Absorption, Distribution, Metabolism, Excretion, Toxicity (ADMET), Membrane and Transport Mechanisms; Membrane Transporters and Blood Brain Barrier (BBB); Absorption, Distribution, Excretion; and Xenobiotic Metabolism (Martin *et al.*, 2018). In OEMONOM project, a review paper on Khat (a recreational, chewed herbal drug) (Silvia *et al.*, 2022) was published in open source that will be used as OER in a MOOC.

Conclusions: This presentation demonstrates the potential of using OER in Pharmacy Education, namely in Toxicology field.

Acknowledgments: Co-funded by the Erasmus+ Programme of the European Union, Key-Action-2: Strategic Partnerships, Project nº 2020-1-CZ01-KA203-078218 (OEMONOM).

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The virtual classroom for quality improvement of university teaching

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Introduction: Recently, there has been a growing interest in teaching for the incorporation of Information and Communication Technology (ICT) and adaptation to the European Higher Education Area (EHEA). Therefore, one of the challenges of university education is the adaptation of content, methodology and procedures to the new learning requirements through the use of tools and technological resources offered by commercially available educational platforms.

Method: The current experience was developed in the 2017/18 (N = 167) and 2018/19 (N = 170) courses using the Blackboard learning platform as support. The students of 'Nutrition and Bromatology' in the Pharmacy Degree, University of Alcalá, can use several tools on the platform: basic educational material, videos, problems, web links and communication and evaluation tools.

Results: One of the most used communication tools was the dissemination of messages to students from the University and its instructors. This tool allows students to see important messages from the University and its instructors. Examples could be an announcement about: a change of venue for a seminar, a reminder of a deadline, or for students to know that some new material has been added to the Blackboard course. On the other hand, the application of evaluation techniques implies an improvement in teaching through the use of these e-learning platforms. The continuous evaluation allows the assessment of a progressive assimilation of concepts and competences that must be achieved in a course. The authors here propose self-assessment tests as a valuable tool for the student to judge their level of seminars knowledge. Students can receive comments on tests and other assessments quickly. The platform allows you to evaluate the student's knowledge and/or progress. The participation of students in the self-assessment in the two courses was very high, 80 - 90%.

Conclusions: Once applied to the experience of the study group and after application of assessment techniques, it is emphasised that the use of e-learning platforms improves teaching.

The COVID-19 Pandemic as a driver of education 5.0 at UAH Faculty of Pharmacy

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Introduction: In March 2020, the outbreak of the COVID-19 Pandemic in Madrid province, Spain, forced changes in the teaching and organisational methodologies of University educational centres in order to continue delivering knowledge contents that allowed students to acquire the competences and skills required by current regulations.

Method: Different surveys were carried out on possible alternative teaching methodologies and strategies to be used by the teachers responsible for the different courses in the face of the pandemic situation. They explained to students how the teaching was going to proceed using different remote channels.

Results: Different strategies such as the heuristic, discovery or playful method facilitated the teaching-learning process allowing students for the acquisition of useful knowledge, competences and skills for job placement. Innovative teaching methods were used, such as the inverted classroom or flipped classroom, cooperative learning, project-based learning or gamification, depending on the characteristics of the different disciplines. The results achieved so far have been, despite initial concerns and doubts, satisfactory, achieving the objectives and skills set at the beginning of the courses. The students have worked on specific, individual or cooperative projects, in which they have faced real problems in the context of service-learning, stimulating their critical thinking, communication, problem solving abilities, with a more practical and tangible dimension.

Conclusions: The pandemic has accelerated the implementation of an Education 5.0 project, making teachers use resources that some but not all had used previously to promote effective and quality teaching. Combining the new technological tools with traditional educational methodologies helps teachers to achieve their teaching outcomes in a more effective way without losing sight to prepare students for lifelong learning far beyond the digital.

Evaluation of virtual pharmacy students' research symposium

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Introduction: The Annual Pharmacy Symposium organised by the Department of Pharmacy, University of Malta, Malta, brings together academic staff, undergraduate and postgraduate students, collaborators and stakeholders to discuss outcomes of student research projects as oral and poster presentations. The 2021 Pharmacy Symposium was held online for the first time via the Zoom platform due to restrictions brought about by the COVID-19 pandemic. The aim was to evaluate student perception of the remote modality used.

Method: A self-administered questionnaire was distributed to students who attended the symposium at the end of the four-day symposium. Students were asked to rate on a five-point Likert scale from 'strongly agree' to 'strongly disagree' with regards to remote environment used and appreciation of the transmission of scientific information in the presentations.

Results: Out of 370 students who attended the symposium, 19% (n = 72) completed the questionnaire. Forty-four students were female, and the ages of the students ranged from 18 to 51 years. The majority of students (n = 46) were undergraduate students. The majority of students gave positive feedback (scores of 4 or 5) about the symposium: 71 students felt the virtual symposium was well organised, 69 students agreed that the platform used was appropriate, 66 students agreed that the quality of research presented was of a high standard and 57 students agreed that presentations were understandable and stimulating. Fifty-five students felt that the duration of the oral sessions was appropriate, 40 students enjoyed visiting the virtual poster gallery and 38 students found it easy to access the virtual poster gallery.

Conclusions: The virtual pharmacy research symposium was positively evaluated by students indicating that it is a suitable forum to support students in developing competencies in research dissemination and to appreciate ongoing research by other students.

Evolution of academic data in the pharmacy degree of the University of Granada during COVID-19

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Introduction: The Quality Internal Guarantee Committee of the Degree in Pharmacy is responsible for annually analysing the results of the teaching-learning process obtained from the databases of the Quality, Innovation and Prospective Unit of the University of Granada (UGR). During the academic year 2019/20, COVID-19 pandemic caused several adaptations in teaching methodologies. The objective of this work is to study the effect of COVID-19 pandemic on the performance indicators and satisfaction rate with the study plan in the Degree in Pharmacy of the UGR, and to conduct a comparative study with previous years.

Method: The following indicators were analysed: satisfaction levels with the study plan, demand rate, performance rate, overall qualifications and number of final projects (TFG) performed for the Degree in Pharmacy during last academic years.

Results: The general level of students' satisfaction with the study plan has decreased slightly in the academic year 2019/20. This decrease may be related to: a) the delay in the information on the adaptations made to the Teaching Guides, and b) the lack of teaching coordination between teachers, especially among those who teach different subjects in the same course. However, the performance indicators for pharmacy degree in this last academic year have been very positive (acceptable). A decrease in the initial dropout rate (7.7%) and an increase in the graduation, success and performance rates (52.4%, 78.8% and 88.4%, respectively), which reached maximum levels, were observed. However, failure and non-attend rates among pharmacy degree' students were lower than previous academic years (5% and 9%, respectively).

Conclusions: The health crisis caused by COVID-19 has been a great challenge for the adaptation of the Pharmacy Degree curriculum. The analysis of the performance indicators and satisfaction rate has allowed the Quality Internal Guarantee Committee to implement several improvement actions to upgrade the adaptations in teaching methodologies for the pharmacy degree.

Shaping an assistant pharmacist curriculum in the English Language in Estonia during the era of the pandemic

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Introduction: Opening a new curriculum for Assistant Pharmacists in English during the pandemic has been a challenge in many aspects. The application of technological advancements and e-learning has provided much needed support for versatile studying and allowed Tallinn Health Care College, Estonia, to incorporate international lecturers.

Method: The study programme was thoroughly analysed to find the balance for e-learning, independent work, and contact lessons for practical work. In addition to Moodle courses and Zoom lectures, new platforms were added for enhanced learning experience. Learning methods now include real-world experiences, role-play, lab-simulations, etc.

Results: The admission of the first group of international students took place in the fall of 2021. Simulations and different learning platforms enabled students to prepare for practical work and be more flexible in time management. Lecturers from other countries bring valuable and different perspectives for the Assistant Pharmacy vocation, obligations, and legislation. This enables the students to choose the next step of their career more deliberately. Students used their time for learning more purposefully and flexibly to achieve the learning outcomes.

Conclusions: Although there is less face-to-face contact, the students have stayed motivated and engaged in learning processes and have started to integrate into the community while being prepared for a vocation. Different background brings valuable experience to the group and into the learning process.

Evaluation of learning at UAH School of Pharmacy during the COVID-19 pandemic

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Introduction: The problem caused by the COVID-19 pandemic led teachers to use different tools to measure the learning process of students in a socially distanced context. For this reason, during the 2019-20 academic year, the teachers at the Faculty of Pharmacy, University of Alcalá, Spain, had to come up against the challenge of establishing a consistent, systematic and rigorous online evaluation system to screen which students had the competences and skills demanded by current regulations.

Method: A survey was designed using Google forms and addressed, from the Dean's office, to professors and lecturers of the five undergraduate courses, concerning the type of evaluation tools that they were going to use with the students in order to proceed with a sound evaluation, taking into account that data protection regulations had to be respected, rigorously.

Results: Doubts were raised about integrity and ethics when carrying out the different online evaluation tests. News appeared in the media and social networks about how to know the correct answers in a questionnaire through its source code, by hiring experts who solve the exams, or doing the activities together using the versatility of social networks that allow simultaneous collective interaction, etc. In this survey, in addition to indicating the number of tests to be performed, the teachers informed the authors about the tools available for use: short answer questions, multiple choice tests, essay or interrelated concepts questions with clear evaluation rubrics, reflection on practical cases, open-book exams.

Conclusions: All teachers learned and adapted quickly to the different assessment tools available on the Blackboard platform according to the characteristics of the course and considered that the pandemic has opened a critical window for innovative technology based-assessment methodologies.

Mapping of digital competences in the training of pharmacists: Perception of students and lecturers

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Introduction: Digital competence is one of the eight key competences for lifelong learning referring to the use of digital technologies for information, communication and basic problem-solving in an everyday context. In addition to professional knowledge and skills, digital competences are needed to support the professional careers of future pharmacists. The objective of this study was to evaluate and compare the digital competences of pharmacy lecturers and pharmacy students in pharmacy studies at the University of Tartu (IPUT), Estonia.

Method: Two cross-sectional surveys among pharmacy lecturers (N = 21, self-assessment) and pharmacy students (N = 113, self-assessment and evaluation of lecturers) at the IPUT were conducted. The survey instrument was developed based on the Digital Competence Framework 2.0. For data analysis an independent t-test was used.

Results: Lecturers (n = 21; 100%) and students (n = 31; 27.4%) who participated in the study self-assessed their digital competences mostly as good. The lecturers were more self-critical, but this was not confirmed in the students' evaluation. The highest self-rated digital competence for both lecturers (M = 3.98 ± 0.82) and students (M = 4.05 ± 0.75) was information and data literacy. According to the lecturers, the topic of data privacy (2.43 ± 1.22) as well as knowledge about copyright and licences (2.86 ± 1.17) were covered poorly during the pharmacy studies. Students, in contrast to the lecturers, evaluated highly (4.19 ± 0.95) the competence of the lecturers in terms of copyright and licences ($p < 0.001$). The application of the latest digital solutions and public e-services in the field of pharmacy in the pharmacy curriculum should be developed more effectively in order to support the development of students' professional digital competences.

Conclusions: The digital competences of both lecturers and students need to be improved in some areas. The development of digital competences at the IPUT could be supported by an action plan and specially developed courses.

Application of innovation and entrepreneurship competencies: A capstone project in a transition-to-the-profession required course

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Introduction: The 2013 Center for the Advancement of Pharmacy Education (CAPE) outcomes and 2016 Accreditation Council for Pharmacy Education (ACPE) standards include Innovation and Entrepreneurship as a domain competency for pharmacy graduates. The objective of this project is to describe the implementation of a capstone project on the application of innovation and entrepreneurship competencies in a Transition-to-the-Profession required course for final professional year student pharmacists.

Method: A capstone group project was developed by incorporating outcomes on innovation and entrepreneurship, population-based care, problem-solving, pharmacoeconomics and practice management. Students were required to identify a pharmacy practice issue for intervention and narrow it to a specific population based on literature search and health statistics. They had to conduct a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis, develop a specific, comprehensive plan for intervention, incorporate Pharmacist's Patient Care Process, propose a business plan, including a budget and funding sources. Written reports and presentations to faculty and students were also required.

Results: 18 groups of three students developed and presented innovation and entrepreneurship projects with interventions on topics ranging from vaccination clinics to home visit, contraceptive clinic, cancer prevention programme, medication reconciliation tool, Smart phone apps for smoking cessation and medication adherence, foot care clinic and travel clinic. Proposed business plan and budget ranged from U.S. \$200 to \$980,000, with a total of U.S. \$1.8 million for all 18 groups of 54 students.

Conclusions: Results suggested that students were innovative and entrepreneurial in developing capstone projects on pharmacy-based services for patient care with appropriate consideration for clinical, humanistic and economic outcomes.

Minimum requirements for a competency-based pharmacy curriculum

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Introduction: With increasing importance of competency-based educational (CBE) frameworks the question arises when a curriculum (new or re-designed) can be considered 'competency-based'. For formal evaluations it is required that clearly-defined standards are shared by all parties involved. Implementation of CBE is a complex process, which affects the organisation of content, development of skills, feedback and assessment, teacher professionalisation, and curriculum management. Given the widely divergent implementations of competency-based programmes, the question must be asked what defines a competency-based curriculum across different contexts.

Method: A recent Delphi-study among medical education experts described core components of competency-based medical education (Van Melle *et al.*, 2019), that have a strong theoretical (educational and developmental) basis. These core components were used as a starting point to suggest minimum requirements for CBE in the pharmacy field.

Results: The five identified core components (outcome competencies, progressive sequencing, tailored learning experiences, competency-focussed instruction, and programmatic assessment) appear to be suitable for defining CBE in pharmacy, but minimum requirements need to be detailed by further discussion among pharmacy educators. In addition, curricular elements need to be constructively aligned with each other to build an effective curriculum. It must be noted that evaluation of a curriculum can be based on documentary evidence only (for accreditation of the designed curriculum), but evaluation on a deeper level (for accreditation of the experienced curriculum) will require site visits, observations and interviews with faculty and/or students.

Conclusions: Five core components of CBE in the medical field can be used as a starting point for establishing minimum requirements for a competence-based pharmacy curriculum. EAFP can be instrumental in establishing a shared European 'minimum requirement standard'.

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New FIP resources to advance Pharmacy education and early career development

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Introduction: During the COVID-19 pandemic, FIP Education (FIPeD) continued to produce reports, guidance documents, toolkits and virtual programmes to advance pharmacy education and early career development.

Method: FIPeD, consisting of academic pharmacy section (AcPS), academic institutional membership (AIM), workforce development hub (WDH), university twinning and networking scheme (UNITWIN) – collaborating with Board Pharmaceutical Sciences (BPS), Board Pharmaceutical Practice (BPP), Young Pharmacists Group (YGP), and International Pharmaceutical Students' Federation (IPSF), developed resources, through consultation and validation, to advance pharmacy education and training programmes.

Results: FIPeD resources 2020 – 2022 span a wide perspective of areas: 1) *Global Competency Framework v2 (2020)* – competencies for early career development; 2) *Digital Health in Pharmacy Education report (2020) and Train the Trainer Course (2022)* – current status and development of digital health education programmes; 3) *UNITWIN Pharmacy Education in Sub-Saharan Africa report (2020) and 4) UNITWIN Pathfinder Toolkit (2021)* – led to UNITWIN Regional Workshops and Global Summit 2021, subject of the FIP Workshop at EAFP 2022 with a regional specific roadmap for the European region; 5) *FIP WiSE – Women in Science and Education toolkit (2021)* – promote positive practice environments for women in science and education; 6) *FIP AIM Enhancing academic leadership horizons in trying times virtual course (2021)* – academic leadership skills development; 7) *Global Humanitarian Competency Framework (2021)* – competencies for pharmacists working in humanitarian arenas; 8) *Curriculum for pharmacy students on substandard and falsified medicines (2021)* – collaboration with WHO; 9) *FIP handbooks for accreditors and providers of programmes supporting the FIP platform for provision through partnerships (2022)* – a new FIP programme whereby the FIP Seal assures programme providers align with the FIP mission and meet quality criteria. *Upcoming resources for 2022 include:* Competency Framework for Pharmaceutical Educators; Competency Based Education Handbook; Quality Assurance education tool; Impact of pharmaceutical workforce on health improvement and outcomes tool; Interprofessional Education Readiness tool.

Conclusions: FIP resources have been used effectively by educators globally as guides to advancing pharmacy education. These new resources provide further guidance to

assure pharmacy education programmes prepare graduates for contemporary and future-oriented careers to meet societal needs.

Important academic skills for the future

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Introduction: When applying for an academic position within the Faculty of Pharmacy, it is common to see misleading expectations of the workload. As fresh Doctor of Philosophy (Ph.D.) graduates, many expect to devote their career to science. And occasionally share scientific knowledge with students who are excited to absorb every piece of information. However, there is no training to transfer knowledge in an effective manner. For this reason, it was believed as essential to train academics, support their personal growth and deepen the set of qualities that are vital to becoming a successful academic.

Method: To provide the academics with essential skills to cope with their role within the educational system, a set of soft-skills trainings was launched. These are focused on communication, presentation skills, stress management, leadership, mentoring and coaching, all in academic context. Trainings were delivered by two soft-skills trainers and teaching methods were experience sharing, brainstorming, theory explanations and practical exercises that aim to help transferring newly gained experience into practice.

Results: By January 2022, nine trainings were delivered. Highest interest was observed in Stress Management and Academic Presentation Techniques courses. In total, 81 participants from 22 European countries and one Asian country have attended the trainings and 45 participants filled the detailed evaluation form. Overall satisfaction was measured on the scale 1 - 10, one being the worst. 51% evaluated training with 10; 36% with 9; 7% with 8 and 4% with 7. None of the participants used rating lower than 7.

Conclusions: Soft-skills in pharmacy education has recently become a 'buzz-word'. However, it is equally important to support educators in improving themselves in soft-skills to become successful role models to their students.

Study programme for expanding competence of pharmacists

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Introduction: Vaccination as a health intervention is one of the most successful and cost-effective methods to address preventable diseases. Pharmacists are highly trusted health professionals and highly accessible across all communities. Undergraduate education, however, does not include vaccination delivery as a core qualification component.

Method: The Faculty of Pharmacy Comenius University Bratislava (FoP CU), in cooperation with the Slovak Chamber of Pharmacists (SChP) has developed the Certification Study Programme in Vaccination (CSP-V) to enlarge the scope of pharmaceutical care as a part of the Continuing Education of the health professional. The CSP-V aims to enhance pharmacists' comprehensive and working knowledge in vaccination. Five basic questions were analysed by the Working group and Expert group of FoP CU and SChP: Who will be able to vaccinate? Who will be vaccinated? Which vaccines will be used? Where will the vaccination be conducted? How to classify vaccination by pharmacists?

Results: The CSP-V authorises the certified pharmacist for adult vaccination by intramuscular or subcutaneous administration. The CSP-V lasts six months, during which the pharmacist has to complete a theoretical part and practical training. The practical training includes vaccination training, anaphylaxis and a syncope simulation, and the administration of first aid medicines. The mandatory condition is a professional practice under general practitioner supervision and vaccination documentation. In the future, vaccination will take place through certified pharmacists in a community pharmacy. Vaccination, as a medical performance, is related to national legislation. Therefore, changes in the Slovak health legislation are expected (Government of the Slovak Republic, 2004, 2010).

Conclusions: The FoP CU promotes pharmacists' competence in vaccination by developing the required knowledge and skills as an integral part of pharmacists continuing education and training and through continuing professional development opportunities.

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Point-of-care testing devices and clinical skills practical sessions: A blended learning approach

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Introduction: For the academic year 2020-21, during the COVID-19 pandemic, the point-of-care testing devices and clinical skills practical sessions for first year undergraduate pharmacy students, were converted to a blended learning approach, combining traditional in person laboratory practical training with pre-laboratory synchronous remote sessions. The practical sessions consisted of 1) three two-hour synchronous pre-laboratory sessions for all the class held using Zoom, and 2) three two-hour in person laboratory sessions for each student held in groups of three students. The in-person laboratory sessions covered: Urinalysis and blood glucose monitoring, Blood pressure, lipid profile and obesity measurements, and Injection techniques. The aim was to evaluate student perception of practical sessions delivered using a blended learning approach.

Method: A self-administered questionnaire was developed and validated by an eight-member expert panel consisting of pharmacy academics and pharmacy students in other course years. The questionnaire consists of Likert-type questions (1-Strongly Disagree to 5-Strongly Agree). The questionnaire was disseminated electronically to all (N = 24) first year undergraduate pharmacy students at the completion of the sessions.

Results: Nineteen students (13 female, age range 18 - 21 years) completed the questionnaire. The majority of students gave positive feedback (score of 4 or 5) about the blended learning approach adopted: 'Allowed me to review material covered in the remote sessions on the virtual learning environment as often as necessary and at my own pace to help me prepare for the in-person laboratory sessions' (n = 18), 'helped me to participate more in the in-person sessions' (n = 18), 'provided me with opportunities to pursue my own learning' (n = 16), and 'stimulated critical-thinking' (n = 14). Sixteen students recommended continuation of the blended learning approach for such practical sessions.

Conclusions: Students had a positive perception of practical sessions delivered using a blended learning approach and reported that the remote sessions supported the in-person sessions.

Good distribution practice training for medical device industry

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Introduction: In 2017, the European Parliament initiated the process towards a safer regulatory framework for medical devices with the change from Directives to Regulations. The EU Medical Device Regulation 745/2017 and In-Vitro Diagnostic Regulation 746/2017 came into force in 2020 and 2022 respectively. The aim is to devise a training programme on good distribution practices based on the new medical devices regulations.

Method: Feedback from medical device industry stakeholders was compiled to assess training needs. A six hours online training programme was developed. The training was delivered on two mornings. Topics were divided into five sessions, covering: 1) introductory session focusing on regulations and medical devices classifications; 2) quality and safety of medical devices; 3) case-studies of challenges experienced by stakeholders 4) CE markings and 5) vigilance of medical devices. The online delivery method adopted an interactive approach with intermittent quizzes and discussion platforms.

Results: Out of the 53 participants who completed the training, 18 were pharmacists. A total of 29 participants completed the evaluation form for the training. All the respondents indicated that the course was very useful for their line of practice with 28 participants strongly agreeing that training content was well delivered, and assisted them to adapt to the new medical device regulations. The majority of the participants (n = 20) opted for an online delivery mode, four participants indicated hybrid while five preferred a face to face delivery mode. The main reason given for online/hybrid choice was because this mode fitted well with work demands.

Conclusions: The training developed was well received by the participants who whilst gathering the required knowledge were provided with a forum to share their experiences and discuss approaches adopted to overcome challenges presented with the transition to the new MDR regulations whilst continuously ensuring patient safety.

Research-oriented elective course: Analysis for improvement

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Introduction: Among the different elective courses that pharmacy students can take in the fifth academic year at the University of Alcalá, there is one entitled: 'Initiation to Pharmaceutical Sciences Research' where the students learn about the main fields of research and the trends followed by pharmaceutical companies and research institutes. As a part of the activities developed during the course, the students have to create and design a research project related to any field in the pharmacy curriculum. They choose it freely. The objective has been to analyse the fields chosen and the marks obtained in order to optimise future editions.

Method: Data from 2014 to 2019 were analysed using Excel software.

Results: A total of 227 research projects have been designed. An increasing trend was observed with 42 students in 2014-2015 and 60 in 2018-2019. In all years, more than 50% of the projects were pharmacology-related. Secondary fields were nutrition, physiopathology, toxicology, pharmacognosy or biochemistry, all of them showing a highly variable distribution. Concerning the marks obtained they were relatively homogeneous within fields (average marks in pharmacology projects varied from 7.05 to 7.68 from 2014 to 2019). Marks were also homogeneous between fields (in 2018-2019 pharmacology 7.4, biochemistry 7.6 and nutrition 7.1).

Conclusions: According to the results analysed, the preference for pharmacology projects is clear but this fact does not seem to be related to the marks obtained in this elective course.

Project-based learning (PBL) in the Food and Nutrition field based on sustainable development goals (SDGs)

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Introduction: Project-based learning is a teaching technique based on active and collaborative learning, focused on the student's research on a real and specific problem that helps the student to acquire the basis for an inductive study. The objective of this work is for students to know and deepen the SDGs related to the area of nutrition and food science and develop projects that allow them to engage in improvement strategies for different population groups.

Method: The project has been carried out by students in the elective course of Clinical Nutrition and Diet Therapy. A total of ten groups have developed projects related to nutrition and food considering SDGs. The information was further disseminated among the target population and improvement strategies were designed in order to promote behavioural changes in the target population. The projects were co-evaluated and self-evaluated following a rubric. Two surveys were carried out, one at the beginning to collect information on their prior knowledge on the subject and after the presentation of the projects on the degree of student satisfaction, and their usefulness as a collaborative experience in the acquisition of specific and generic skills.

Results: From the different topics proposed in the projects, the students chose topics on: Consumption of sustainable food and Health promoting lifestyle and Healthy diet. In the survey initially carried out, it was found that 87% of the students had heard of the SDGs. After completing the project, the students stated that they had expanded their knowledge in this regard and highly valued this type of activity.

Conclusions: This project-based learning system is a teaching technique positively valued by students who propose different activities to be developed by pharmacists.

Introducing training on sustainable development goals in the degree of Pharmacy

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Introduction: The Sustainable Development Goals (SDG), as declared by the United Nations in 2015, should guide every human activity. This is, however, far from being accomplished. Professionals in health services can help achieve them, as can pharmacists, so long as they are strongly committed to the SDGs. The *Universidad del País Vasco/Euskal Herriko Unibertsitatea* (UPV/EHU) launched a call for educational innovation projects to introduce SDGs into the curricula, and the Faculty of Pharmacy joined this initiative with four projects to develop awareness and knowledge in several targets of SDGs 3, 4, 6, 10, 11, 12 and 13.

Method: Educational interventions were implemented in ten subjects and Final Degree Projects (FDG) of the degree in Pharmacy and double degree in Pharmacy and Nutrition and Dietetics. Selected methodologies were Problem Based Learning (PBL), Research-Based Learning (RBL), Inquiry-based Learning (IBL), Case study and Flipped Classroom. Each activity was analysed with *ad hoc* questionnaires and there was another one related to the progression along the degree.

Results: 26 professors participated in these four projects affecting most of the students of these degrees (up to 736 students). Six community pharmacists were also involved. The most employed methodology was PBL, followed by IBL. Some projects are still in progress; therefore, global gain to-date cannot be assessed. However, analysis of each activity showed that students' awareness of the role a pharmacist can play regarding SDGs increased in eight out of the 11 activities. So far, a greater commitment to SDGs 6, 12 and 13 were verified. The students assessed the activities with scores higher than 4.5 out of 5, and so did the professional instructors of students who carried out the abovementioned FDPs during their internships.

Conclusions: Short and repeated interventions are not demanding, but give rise to great results. Successful execution of these projects represents the first steps to boosting sustainability in Pharmacy degrees.

Establishing an international educational framework for radiopharmacy

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Introduction: There is no established programme outlined for radiopharmacy within pharmacy education. The aim of this study was to analyse the education on radiopharmaceuticals (RP) for pharmacists in Europe, the United States of America (USA), and Australia.

Method: A literature review was compiled describing the characteristics and education on RP in pharmacy programmes. Data was compiled by assessing curricula descriptions of schools of Pharmacy in Europe and Australia (University of Monash and University of Sydney). For Europe, website links listed on the European Association of Faculties of Pharmacy (EAFP) site were accessed. The Accreditation Council for Pharmacy Education (ACPE) guidelines for USA were appraised. The curriculum content was analysed by checking title and content of each study unit relevant to radiopharmacy and if they are compulsory or optional. Post-graduate courses and Master specialisation in RP were identified. Subsequently, an educational framework was developed. The framework considers educational components that are relevant to an understanding of RP, quality systems and regulatory aspects, safety, and patient awareness. The framework will be validated through a Delphi Method.

Results: All 81 universities registered with EAFP were analysed. From these, 47 offered information on RP in study units within a pharmacy degree programme. The University of Monash, University of Sydney and ACPE did not have compulsory topics on RP for pharmacy students.

From the 47 European universities, 36 study units covering radiopharmacy are compulsory. Seven universities offer a postgraduate course. As to content, the majority of universities covered diagnostic and therapeutic use, and production of RP. The developed education framework is divided into six categories: terminology, nuclear physics, diagnostic use, therapeutic use, production of RP and safety.

Conclusions: This study provides a snapshot of the RP-related topics covered in a pharmacy degree programme, particularly in Europe.

'I started seeing and feeling things differently, this is something that I will definitely take with me from my years of study': Reflective audio notes (RANs) in Pharmacy education

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Introduction: One of the key ideas and features of all aspects of learning from experience is reflection. It helps develop critical thinking, problem-solving, and self-directed and lifelong learning skills. Reflection practice can enable pharmacy students to build on previous experiences to deliver more effective performance in their profession.

Method: This study looks at how reflective audio notes (RANs) can help to create the right conditions for reflective learning. The RAN study was designed, implemented, and evaluated as part of the FREMFARM project. FREMFARM is a research project funded by the Directorate for Higher Education and Skills (DIKU) which aims to introduce active learning methods in pharmacy education at the centre for pharmacy at the University of Bergen. The sample consisted of the first and seventh term pharmacy students, and the data was collected using observation, post-activity focus groups, and pre- and post-activity questionnaires. A thematic analysis of the collected data with the help of NVivo12 was performed.

Results: The results demonstrated that almost 86% of the students prefer using RAN rather than written reflective notes, while 10% found it more time-consuming. In addition, students confirmed that their comprehension of how their personal thoughts and feelings are influencing their interactions with others are significantly improved after applying the RAN. Teachers reported that the RAN captures more emotions, which was a great added value to understand and assess the students' learning better. Similarly, the students reported that receiving short and concise audio feedback was very practical and useful. Nevertheless, not all of the teachers felt comfortable with the audio component, and this could pose a challenge in the long term.

Conclusions: It can be concluded that integrating an audio component into the reflective assignments offers a unique opportunity for students to bridge the theory and the complexities of practice. In addition, the RAN helped as a self-assessment tool for critically evaluating their own knowledge, performance, and beliefs. The identified limitations and challenges will be taken into consideration while redesigning the activity for the next implementation.

'I never thought that I can learn by debating': Improving Pharmacy students communication through debating in the classroom

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Introduction: The communication skills of practicing pharmacists are key in providing information and advice between patients, other healthcare practitioners, and the community. This study aims to explore implementation of debate as a pedagogical tool into Pharmacy education to improve students' communication skills.

Method: A pilot intervention for the FREMFARM project was designed, implemented, and evaluated. FREMFARM is a research project funded by the Directorate for Higher Education and Skills (DIKU) which aims to introduce active learning methods in pharmacy education at the centre for pharmacy at the University of Bergen. The sample consisted of seventh term pharmacy students, who were on average 24 years old. 100% of the students took the course for the first time. Qualitative methods were used to collect the data; pre and post short questionnaires, observation using an adapted version of the Teaching Dimension Observation Protocol and post activity focus groups. Thematic analysis of the collected data with the help of NVivo12 was performed.

Results: Results show that almost 80% of the students agree that the debate helped them to structure their thinking and to simplify their language to communicate complex concepts. Students also expressed that preparing for the debate helped them to organise their thoughts and to gather information from other subjects and make connections with other topics to prepare their arguments. However, 40% of the students found that the effort used to prepare for the debate activity was too large in relation to the gains. Some students reported transformation in their learning and change of their position and perspective after the debate.

Conclusions: It can be concluded that the debate as a teaching tool has many potential benefits to improve student's communication skills and learning in comparison to traditional learning activities. Therefore, the pilot is considered successful, and upscaling and implementation in pharmacy education next semester is envisaged.

Evaluation of pharmaceutical analysis tutorials

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Introduction: Students reading for a Pharmacy degree follow study units in Pharmaceutical Analysis in the second and third year of studies (four European Credit Transfer and Accumulation System (ECTS) each). Study units focus on sample preparation techniques and spectroscopic methods used in bioanalysis. The study units are delivered via lectures and tutorials. Tutorials were re-designed so as to support students to identify suitable methods for different applications. The aim was to evaluate feedback by students regarding the tutorials.

Method: A self-administered questionnaire was distributed to all second (n = 22) and third year (n = 18) students who attended the tutorials at the end of each study unit. Students were asked to rate on a five-point Likert scale from 'strongly agree' to 'strongly disagree' whether: the content of the tutorials met their expectations, tutorials helped enhance knowledge gained during lectures and tutorials were understandable and stimulating.

Results: 33 students completed the questionnaire. 22 students were female and the ages of the students ranged from 18 to 29 years. 18 and 15 students were in their second and third year of studies respectively. The majority of students gave positive feedback about the tutorials: 26 students agreed that the tutorials were well organised and 24 students agreed that the content of tutorials met their expectations and tutorials helped enhance knowledge gained during lectures. 22 students agreed that the lectures were understandable and stimulating and recommended the tutorials.

Conclusions: The newly implemented tutorials which focused on the application of sample preparation techniques and spectroscopic methods in bioanalysis were positively evaluated by students. Future tutorial sessions will focus on more examples and types of applications of novel bioanalytical techniques.

Identifying patient-centred training needs for pharmaceutical good distribution practice

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Introduction: Patient-centeredness in healthcare delivery recognises that a patient's values and preferences must be central in the delivery of pharmaceutical services. Within the Ministry of Health, the Pharmacy of Your Choice (POYC) unit is responsible for providing access to medicines within the national health service scheme through private community pharmacies. The service includes distribution of medicines, which are centrally procured, to the community pharmacies in Malta and Gozo. The study aimed to address the training needs for pharmaceutical good distribution practice of POYC health workforce instilling an enhanced patient-centred approach.

Method: A questionnaire aimed at assessing the core competencies of the services of the POYC workforce was compiled and validated by four pharmacists each coming from academia, hospital, community, and regulatory sectors respectively. The validated questionnaire was disseminated electronically to POYC workforce. The questionnaire consisted of open and closed ended questionnaires with a Likert scale (1 to 5, 5 being strongly agree).

Results: All members of the validation panel (n = 4) agreed that the questionnaire was feasible, practical to complete, taking not more than ten minutes to complete. The questions were concise and clear. Study findings from the distribution of the questionnaire: 27 POYC workforce indicate that the highest training need focuses on Good Distribution Practices (Mean = 4.3). The second priority is Organization and Personnel (Mean = 4.1) followed by Philosophy of Patient-Centred Care (Mean = 4.1) where the participants will capacitate themselves in building more responsive patient care.

Conclusions: An online self-paced training course focusing on the themes highlighted by the POYC workforce is designed based on an interactive participant approach.

Implementation of a framework for the MMA Academy for patient-centred excellence and innovation in regulatory sciences

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Introduction: The Academy for Patient Centred Excellence and Innovation in Regulatory Sciences, launched under the auspices of the Malta Medicines Authority (MMA), was set up to merge research, training and education into the regulatory environment, strengthening the commitment of the MMA towards sustainable development and innovation. The aim was to implement a framework for the academic platform that encompasses the elements of accreditation, collaboration and optimisation.

Method: In 2020, the Educational Planning and Academic Development (EPAD) Unit within the MMA prioritised the process for accreditation of the MMA Academy as an Educational Institution through the Malta Further and Higher Education Authority (MFHEA). Application forms for provider and programme accreditation, accessible through the MFHEA website and supporting documentation, including a robust Internal Quality Assurance (IQA) policy were compiled and submitted to the MFHEA for evaluation. Sustained liaison with national and international partners was undertaken during the process.

Results: Over a total of 250 email exchanges, minuted meetings and trainings were recorded between MMA Academy staff, the MFHEA and Pharma Consulting Walther throughout the accreditation process. The Award in Good Manufacturing Practice Programme was accredited at Level 5 on the Malta Qualifications Framework (MQF) in January 2021 following two evaluation cycles by the MFHEA. The MMA Academy was licensed as a Higher Education Institution in April 2021 subsequent to the positive accreditation of the first educational programme and an intensive review of the IQA policy by the Quality Assurance Unit within the MFHEA.

Conclusions: The licensing of the MMA Academy as an Educational Institution marks another milestone in the strides made by the professional workforce of the MMA, in collaboration with pertinent national and international bodies, to expand on advanced scientific initiatives that cascade through educational planning and academic development of accredited programmes that meet stakeholder needs and expectations.

Pharmacy-driven assessment of training needs in quality systems for laboratory personnel

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Introduction: Within a constantly evolving landscape in the scientific and technical realm, the adoption of good quality management systems for laboratory staff is an important component of every lab-based institution, organisation, and scientific centre which aims towards accreditation. This study aimed to identify the training needs of laboratory personnel within the aspect of quality systems.

Method: A self-administered 'Training needs assessment questionnaire' intended to capture the training needs of laboratory personnel on quality standards was developed. The questionnaire was validated through a focus group consisting of a quality manager pharmacist, an academic pharmacist, a scientist, and four international pharmacists undertaking a Doctorate in Pharmacy fellowship programme at the Malta Laboratories Network. The questionnaire consisted of a combination of closed-ended and open-ended questions. The questionnaire was electronically disseminated to 80 laboratory personnel based in Malta.

Results: All seven members of the focus group agreed that the 'Training needs assessment questionnaire' was clear, concise, practical and capture the data required. Out of the 50 laboratory personnel who completed the questionnaire (response rate 63%, ten were from laboratories in pharmaceutical firms. Out of the 50 respondents, the majority (n = 48) of the laboratories were testing laboratories and two were calibration laboratories. Thirty respondents highlighted training needs. The topics identified included a focus: ISO 17025:2017 (n = 10), instrument use and quality control (n = 9), measurement uncertainty (n = 5), ISO 9001:2015 (n = 3) and Good Laboratory Practices / Good Manufacturing Practice (n = 3).

Conclusions: The identification of current laboratory training needs highlights the niche of pharmacy driven interprofessional training programmes that could address the gaps identified and facilitate continued adherence to quality systems within laboratory operations.

ISO 17025:2017 Standard for Forensic Professionals: A course development

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Introduction: In forensic science, accreditation of the laboratory ensures that the service provided is robust, reliable and reproducible. This study aimed to develop a training course with a focus on ISO17025:2017 *General requirements for the competence of testing and calibration laboratories* as a case example for forensic laboratory professionals.

Method: A preliminary meeting was held with the quality manager of the forensic science laboratory to explore the gaps in knowledge and practice with respect to ISO 17025 which needed to be addressed. Subsequently the course programme consisting of learning objectives, outcomes, description of the content, method of delivery, and choice of tutors was designed. The course programme was validated by a seven-member expert panel. The training course was scheduled over 14 hours delivered in a classroom mode to a total of 22 forensic laboratory professionals. The training course which adopted an interactive participant-tutor approach was evaluated by the participants using a questionnaire consisting of Likert-type (1-Strongly Disagree to 5-Strongly Agree).

Results: All seven members of the expert panel strongly agreed that the course topics covered the individual requirements of the ISO 17025:2017, quality management systems principles, and the practical aspects of the standard as applicable to forensic sciences. Tutors included pharmacists with experience in good quality management systems and ISO standards. The training course was evaluated by 18 participants out of a total of 22. The majority of the respondents strongly agreed that the subject (n = 11), content (n = 12), tutors' knowledge (n = 14), and logistics (n = 12) met their expectations. All the participants strongly agreed that the course was well delivered and designed assisting them in their daily practice.

Conclusions: The course has provided an academic interprofessional platform for sharing the expertise between participants and experts to improve laboratory quality systems.

Joint study programme in pharmacy: A one health approach in education

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Introduction: The University of Veterinary Medicine and Pharmacy in Košice (UVMP) is the only veterinary university and one of two universities providing pharmacy education in Slovakia. UVMP has been preparing pharmacists with Pavol Jozef Šafárik University in Košice (UPJŠ). In 2016, preparation for a Joint Study Programme (JSP) 'Pharmacy' started. It enabled education within the 'One world, one health' concept, which considers interconnections between human medicine, veterinary medicine, and the environment. This is important in preventing diseases, understanding their causes and treatment personalisation. The aim is to better prepare graduates through patient-oriented education by equipping them with skills and competences that are expected from the pharmacy workforce and professionals.

Method: The JSP study plan was prepared in accordance with Directive 2005/36/EC of the European Parliament and of the Council and Regulation (EU) No 1024/2012, based on previous experience and the latest pharmacy education trends. New subjects were introduced and the syllabi were updated. The study plan was discussed with the subject guarantors from UVMP and UPJŠ, pharmacy graduates, employers, Košice Pharmacy Students Association, Pharmacy Board, UVMP's Scientific Council and approved by UVMP's Academic Senate. The JSP conditions are detailed in the 'Agreement on JSP' between UVMP and UPJŠ. The accreditation dossier was sent to the Accreditation Commission (AC) pursuant to Act 131/2002 Coll.

Results: With the AC approval, the Pharmacy education has been provided by UVMP and UPJŠ within the JSP since 2018/2019.

Conclusions: The JSP enables reinforcement and update of knowledge in pharmaceutical sciences, development of better and closer relationships with other health professionals, such as medical doctors and dentists, and with the society, development of skills and competence (wider range of compulsory and compulsory elective subjects, new thesis and rigorous thesis topics, preparing Ph.D. students), joint research projects and close collaboration of students of both universities.

Evaluation of educational seminar on the analysis of pesticides in cannabis

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Introduction: There is a need for sensitive, accurate and efficient methods of analysis to determine amounts of pesticides in herbal products intended for medicinal use, such as cannabis for medicinal use. An educational seminar on the analysis of pesticides in cannabis was organised for scientists and healthcare professionals involved in pharmaceutical analysis, evaluation of herbal medicinal products and patient safety. During the seminar, reflections on standardised methods of analysis of pesticides that could be adopted by the industry were discussed to help ensure quality, efficacy and safety of herbal medicinal products. The aim was to evaluate this educational seminar.

Method: A self-administered questionnaire was distributed to attendees at the end of the seminar. Respondents were asked to rate on a five-point Likert scale from 'strongly disagree' to 'strongly agree' whether the seminar was well organised, helped them appreciate fundamental principles of pesticide analysis and information in the seminar was comprehensive.

Results: 56 participants out of 80 completed the questionnaire. Thirty-one respondents were female and ages ranged from 20 to 64 years. The majority of respondents (n = 36) had a post-graduate education level and 25 respondents worked in industry. Positive feedback (score of 4 or 5) about the educational seminar was received: 54 respondents felt that the educational seminar was well-organised, 49 respondents claimed that the content of the seminar met their expectations, and 47 respondents felt that the educational seminar was relevant to their practice. Fifty-one respondents felt that the educational seminar helped them appreciate fundamental principles of pesticides analysis and information in the seminar was comprehensive.

Conclusions: The educational seminar was positively appraised by the attendees. Organisation of similar seminars in the future could help to provide opportunities for stakeholders to come together, network and collaborate in developing harmonised methods for pesticides analysis which are efficient and sustainable.

Seminar on biosimilar medicines

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Introduction: Biological medicines have revolutionised the outlook for many patients suffering from serious illnesses, such as: cancer, autoimmune and neurological conditions. With patents and exclusivity periods of proprietary biological medicines expiring, biosimilars are promising accessible therapeutic plans, whilst potential challenges are recognised. The objective was to develop an educational seminar on biosimilars for the sharing of knowledge and experiences amongst cross-sector stakeholders with an interest in the field.

Method: In August 2021, the Academy for Patient Centred Excellence and Innovation in Regulatory Sciences, under the auspices of the Malta Medicines Authority (MMA), in collaboration with local specialists and an international academic, organised an interactive seminar on biosimilars. The six-hour programme comprised of a series of presentations, a discussion and a networking session. The initiative was part financed by the Internationalisation Partnership Awards Scheme Plus (IPAS+) of the Malta Council for Science and Technology (MCST).

Results: The academic activity was awarded two Continuing Professional Development (CPD) points by the Malta College of Doctors. 75 national and international participants working in the public and private health sectors, including representatives of pharmaceutical and biotechnological companies, patient advocates, regulatory affairs professionals, policy makers, procurement officers, physicians, pharmacists, nurses, and academics participated actively. Topics encompassed development, safety, prescribing and switching, economic considerations, impact on healthcare and the future of the biosimilar market. Barriers to uptake, and factors that contribute to long-term sustainability of biosimilars, were also addressed.

Conclusions: The seminar served a good purpose to disseminate information and as a key platform amongst different stakeholders. The academic platform within the MMA proved crucial to co-ordinate and lead such educational initiatives. The nature of the seminar provided a window into the composite landscape of biosimilars and presented an opportunity for the MMA to strengthen international relationships and foster collaborative impetus for long-lasting research consortia, knowledge propagation, pharmaceutical innovation and healthcare sustainability.

Double degree in pharmacy and small and medium enterprise management in the University of Salamanca

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Introduction: The double degree in Pharmacy and Small and Medium Enterprise Management (SME) was approved by the Governing Council of the University of Salamanca (USAL) on the 31 March 2016 as the first double degree of this kind in Spain. The next academic year (2016-2017) the course was successfully implemented. At this point, the current academic year will go through the first student's graduations. In this scenario it looks appropriate to review the evolution of the degree.

Method: The analysis was based on the available results from the surveys carried out by the quality assessment area of the USAL as well as the indicators also provided by this unit for the courses 2016-17 to 2020-21.

Results: The success rates of the double degree students have been improving progressively from its launching. Although this rate is always below the value obtained for the degree of Pharmacy, it reached 78.1% in the academic year 2019-20 (last available results). The student's survey on the training programme shows that they are very satisfied with the faculty's facilities, the infrastructures and most importantly with the teaching-learning process. The lowest rated items are those related to coordination and distribution of tasks. This was also highlighted in the follow-up meetings of the students with the academic responsible. As a result of this feedback and in order to make improvements in this regard, some changes were introduced in the organisation of the training programme.

Conclusions: The double degree in Pharmacy and SMEs is consolidated in the Faculty of Pharmacy of the USAL, and the student performance rates have been stepwise improved since its implementation. Coordination is the most critical point of this training itinerary. Efforts, such as a reorganisation of the training programme, have been made in order to achieve better and more efficient coordination to fulfil the students' expectations.

Evolution of academic results in the first year of the Pharmacy degree: The last five years

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Introduction: The COVID-19 pandemic forced changes in the teaching methodologies, in both university and high school studies. After this unusual period, in the present course 21-22 the success of the first course pharmacy students of Salamanca University has been strikingly lower than in previous years. These unexpected and undesirable results make it necessary to analyse the academic yield trend of the students in the last years.

Method: The study was based on the statistics provided by the USAL's grading management programme. The results of the first term corresponding to the last five years, from the course 2017-2018 to the actual 2021-22, were analysed.

Results: During the first four years of the analysed period, the failure mean value remains nearly constant around the value of 37%. It is worthy to note that this period includes the 20-21 course in which master classes and a main part of the laboratory ones were online, due to COVID-19 pandemic. However, in the present course and despite the return to total face to face teaching, the rate of fails significantly increases to 48%. The university access exam taken by these students has been reviewed in order to make it easier to overcome the difficulties in trying to cover all topics included in the different subjects. These, apparently unreasonable results, could be due to deficiencies in the academic background of the incoming students.

Conclusions: Two years after the COVID-19 pandemic ended academic changes, a high increase in the failure percentage has been observed in the first course pharmacy students of Salamanca University. Strategies, such as an initial course, seem to be necessary to be promoted from the faculty, in order to reinforce the background knowledge of the students; which, in turn, will increase the success academic rate of the graduates in the faculty.

Pharmacy education: Part of the European Universities initiative

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Introduction: At the 2017 Gothenburg Summit, the European Council called on Member States, the Council and the Commission to take forward a number of initiatives, including: '... encouraging the emergence by 2024 of some twenty 'European Universities', consisting in networks of EU universities which will enable students to obtain a degree by combining studies and contribute to the international competitiveness of European universities'. European Universities are transnational alliances that will become the universities of the future.

Method: Analysis of the current state of pharmaceutical training in Bulgaria in comparison with other leading countries and forecasting further perspectives in the frame of the European University Consortium was performed. The consortium shares a particular interest in Biosciences and Engineering and a strong position in education and research in these areas. The principal topics to be covered in the study pharmaceutical units were identified.

Results: European Universities are transnational alliances and the Consortium, including pharmaceutical subjects summarises information about the pharmaceutical, technical, and ethical issues related to the use of a bioscience and engineering in a systematic, transparent, unbiased, robust manner. According to the issue, it was determined that the target audience that has to support the training programme include: The Ministry of Education and Ministry of Health experts, medical practitioners, pharmacists, patient organisations and business organisations. Priority in the training programme was on the modern methodology of organising and conducting bio-scientific studies, conducting scientific search (evidence medicine) and decision-making process.

Conclusions: Effective implementation of the pharmaceutical education in the progressive initiative of European University will be a big challenge but also a great opportunity for the future students to share the European values and identity, and it will be a step to revolutionising the quality and competitiveness of European pharmaceutical higher education.

Statistical analysis of similarities and differences between European Pharmacy curricula

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Introduction: The quantitative and qualitative research accumulations of the last half of the last century have produced considerable changes in all fields, including in the medical and pharmaceutical spheres. The training of pharmacy professionals should meet the ever-changing demands of the labour market and the need for specialised personnel in healthcare.

Method: In the analysis of educational plans, statistical methods were used: Helmert-Pearson test and the correlation coefficient r . The mathematical analysis of the similarity and equivalence in the number of hours assigned to groups of subjects in the curriculum was applied.

Results: Regarding the distribution of the number of hours in the curricula of the Faculty of Pharmacy of Bucharest compared to other European faculties, it was found that the dissimilarity is higher for the groups of disciplines compared to the types of didactic activities (Riga -411; Dublin -307). The analysis results show that, both in Romania and in the rest of Europe, pharmaceutical technology disciplines prevail (Bucharest = 14; Szeged = 30; Lisbon = 24); the same for the fundamental groups (Cluj = 12; Semmelweis = 16; Tours = 11). The medical and social disciplines are reduced as hours and credits allocated in the curricula, according to the values of the training function: Bucharest = 12; Cluj = 11; Sofia = 26; Tours = 11; Bucharest = 5; Cluj = 4; Szeged = 6; Tours = 6.

Conclusions: A concept of structural similarity was defined starting from the metrics and statistical correlation parameters. The correlation coefficient and the Helmert-Pearson test, were more sensitive and could be parameters used to highlight the harmonisation trends.

Conflict management: An everlasting challenge of group dynamics

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Introduction: Truthful evaluation must ground the learning process. Evaluation of group works usually assumes equal contribution of the students and can be biased since the professor is not present in all the process and students might shield one-another or feel uncomfortable with denunciations. The aim was to analyse the impact of a conflict management approach (CMA) in group works.

Method: The curricular unit (CU) of Pharmacology II integrates the Integrated Master on Pharmaceutical Sciences of the Faculty of Pharmacy of the University of Porto, Portugal (fourth year, first term). Evaluation includes group works with two to three students per group. Students were informed that the same grade would be given to each student in a group, unless unequal workload (UWk) was identified by students or presumed by professors. If so, a CMA was implemented through face-to-face analysis of the situation (involving students and professors) and definition of a consensual differentiation algorithm.

Results: UWk was suspected in seven out of 54 (13% groups). In six groups, the risk was identified before publication of the group grade and CMA was applied. In three of those, CMA ended up with grade differentiation between students of the same group, which averaged 24% of the group grade. This alteration did not alter the final grade of four out of eight (50.0%) of the students implicated, but it prevented one student from having his final grade decreased by 1/20 value, while it also prevented two non-pro-working students from having their final grade increased by 1/20 value. Some students are yet to finish their evaluations. Communication and planning skills were the major contributors to the group's conflicts.

Conclusions: Professors should be aware of non-equilibrate workload in group works, create an open environment so that students highlight problems in group dynamics, and pre-establish CMA to early identify and solve intergroup conflicts and legitimately evaluate each student.

Converging professors' and students' expectations: A path for motivation?

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Introduction: Learning outcomes and competences should be clearly defined by the professors during the preparation of a curricular unit (CU). Also, they should plan different assignments in order to lead the students to achieve distinct skills. However, professors' expectations might not match those of the students, which might result in demotivation and absenteeism. We aimed at evaluating the putative match between the expectations of professors and students concerning group work.

Method: The CU of Pharmacology II integrates the Integrated Master on Pharmaceutical Sciences of the Faculty of Pharmacy of the University of Porto, Portugal (fourth year, first term). To increase participation and motivation, 156 students were divided in 54 groups (two to three students per group) and asked to analyse a real (anonymous) medical prescription, focusing on three perspectives: pharmacodynamics, pharmacokinetics and pharmacotherapy, each guided by different professors. The task was designed to train the students not only on academic skills but also on transversal competences (social and cognitive skills, and methodological competencies). Students presented their analysis (as an oral presentation lasting ten minutes) to the class and discussed it with the professors who scored the overall performance. Professors' expectations were evaluated qualitatively and by the scored grades. Evaluation of the students' expectations are being held through an anonymous online questionnaire (via Moodle).

Results: Professors noticed that students were highly motivated/committed with the work and pro-actively interacted with the professors inside and outside the class. Professors' expectations on acquisition/integration of knowledge were mostly achieved since (56% groups scored > 1.50/2.00 with 17% > 1.75/2.00. Analysis of the students' expectations is still being evaluated.

Conclusions: Professors consider that a practical work designed to recreate the professional setting was an effective way to consolidate theoretical knowledge while motivating students. Students' feedback is still under analysis but will clarify whether their expectations were also fulfilled.

Implementation of reduced programmes for accelerated training on the basis of higher and secondary vocational education

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Introduction: The rapid pace of pharmacy development necessitates the training of specialists with medical and chemical-technological and biological education for the specialty 'Pharmacy'. At the same time, from the employers' point of view, employees with fundamental theoretical knowledge and sufficient practical experience are in demand. As higher professional education becomes mass-oriented and focused on the needs of regional labour markets, it is necessary to develop organisational and methodological mechanisms to meet the demand in the labour market.

Method: The accelerated distance learning programme is the level of higher professional education, so the requirements to the structure, conditions of implementation and results of mastering the basic professional competencies must fully correspond to this level. The creation of this programme as a type of mass, regionally oriented, higher education programmes should be the basis for solving the problem of balancing the development of labour and professional education spheres in the future.

Results: The educational program includes a cycle of basic disciplines: inorganic chemistry (four credits), organic chemistry (four), analytical chemistry (four), pharmaceutical botany (three), history of pharmacy (three), biological chemistry (four), modern information technology in pharmacy (three), pharmaceutical technology (four), analytical toxicology (four), basics of research (three), etc. The educational programme includes a cycle of major disciplines: pharmaceutical technology (four), pharmacognosy (four), pharmaceutical chemistry (four), biopharmacy (four), hospital management (three), social pharmacy (four), pharmaceutical marketing (four), clinical pharmacy (four), modern aspects of phytotoning (four), pharmaceutical biotechnology (four), basics of pharmacovigilance (four), etc.

Conclusions: The educational programme also has an elective component (disciplines) in the three educational departments of organisation, management and economics of pharmacy and clinical pharmacy, pharmaceutical chemistry and toxicological chemistry, pharmacognosy and botany and pharmaceutical technology. The educational programme is implemented with elements of distance learning, the programme of trilingualism, learning through research and dual learning.

Virtual database of medical prescriptions

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Introduction: National patterns (templates) of medical prescriptions vary considerably in individual European countries and may take the appearance of a precisely defined form or may be just a blank sheet of paper. In order to get acquainted with the medical prescriptions of different countries there is the Virtual Database of Medicinal Prescriptions created by participants of European Association of Faculties of Pharmacy – Partnership for Education Development grant.

Method: Current and verified information was provided by national associations of pharmacists or by contacted faculties of Pharmacy.

Results: The created website of the www.rxforms.eu domain can be considered as the main result of the work. It contains database of medicinal prescriptions (collected in 2020) and exists in two language modification – English and Slovak version. The webpage includes pattern forms (scans) of contemporary medical prescriptions of selected European countries and information about detailed specification, the period of the validity, limitations of the drug prescribing and information on electronic prescribing.

Conclusions: Created databases contribute relevant and mainly verified information for pharmacy students, pharmacists as well as the general public and it also can facilitate providing of cross-border medicinal care.

Acknowledgment: The authors gratefully acknowledge financial support from the European Association of Faculties of Pharmacy.