



# 2023 EAFP CONFERENCE



## Sustainability in Pharmacy, Pharmacy Practice and Pharmacy Education

*Valencia, 17-19 May, 2023*





VNIVERSITAT [ò\*]  
D VALÈNCIA  
Facultat de Farmàcia

VNIVERSITAT  
D VALÈNCIA  
Vicectorat de Sostenibilitat,  
Cooperació i Vida Saludable



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Emilia Ferrer

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**Eulogio Valenti**, University of Valencia, Spain









**WELCOME!**

# WELCOME!

## **Lilian M. Azzopardi**

*President, EAFP - Professor and Head, Department of Pharmacy, University of Malta*

## **Sustainability and Pharmacy**

The 2023 Annual Conference for the European Association of Faculties of Pharmacy is dedicated to Sustainability in Pharmacy, Pharmacy Practice and Pharmacy Education. First thoughts are what aspect of sustainability are being considered. The theme is broad because sustainability in pharmacy has various facets and pharmacy educators are responsible to contribute directly or indirectly to the different aspects.

Faculties of pharmacy are engaged in complementing the efforts undertaken by Higher Education Institutions towards contributing to the United Nations 2030 Agenda for Sustainable Development. This engagement is focused on addressing global challenges at institutional level related to inequality, climate and environmental degradation, and peace. For Pharmacy, the International Pharmaceutical Federation, launched 21 Development Goals to serve as facilitators for the transformation of the pharmacy profession in alignment with the vision of the UN Sustainable Development Goals. Within these goals, one is specifically dedicated to Sustainability.

Faculties of pharmacy are key players to contribute to: 1) pharmaceutical workforce development so as to align workforce skills and competences with evolvments in pharmaceutical sciences and pharmacy practice, 2) ecological sustainability through social and societal contributions and research and innovation to support green pharmaceutical practices in the development, manufacturing, distribution and use of medicinal products 3) pharmacy education that reflects resilience, relevance and validity in the context of meeting student expectations and stakeholders' needs.

The scientific programme addresses these three dimensions of sustainability in pharmacy and plenary sessions provide the opportunity for discussions on contributions by pharmacy educators in promoting sustainability in the pharmaceutical industry, in education and workforce development, and in pharmaceutical services. A highlight of the EAFP conference is that it serves as a networking platform where in itself networking is a powerful tool that supports sustainability- we are all learning from each other and collaborations magnify our contributions. The mission of EAFP is to serve at the forefront of developments in pharmacy education and pharmacy supporting networking within pharmacy educators in Europe and creating bridges within the global context. EAFP invests in providing Education and Research Grants so as to spur collaborations between members. I invite you to consider the opportunities provided through the grant applications which support collaboration and development.

This year's Annual Conference is being hosted in collaboration with the Faculty of Pharmacy of the University of Valencia. Unfortunately during the preparations for this conference, EAFP lost a colleague and an Executive Committee member, Professor Teresa Garrigues, who was the instrumental link in getting EAFP close to the University of Valencia. With the passing away of Teresa, most importantly we miss a friend. It is appropriate to dedicate this Annual Conference to the memory of Professor Teresa Garrigues and Professor Jeffrey Atkinson, Past-President of EAFP who also passed away earlier this year. In their honour, I invite you to discuss and share experiences of how, as pharmacy educators, we can contribute to the alignment of pharmacy towards sustainability in the broad context.



# WELCOME!

## **Hortensia Rico**

*Dean of the Faculty of Pharmacy, University of Valencia*

## **Emilia Ferrer**

*EAFP 2023 Conference Chair*

In the thirteenth century, higher education was established in the city of Valencia thanks to King James I of Aragon who had obtained a Studium Generale institution from Pope Innocent IV in 1245. However, it was not until 30 October 1499 that the Juries of Valencia drew up the Constitutions of what was about to become the first University of Valencia: a university authorised by the Papal Bull on 23 January 1501, signed by the Valencian Pope Alexander VI and by the royal privilege of Ferdinand II the Catholic. It was granted on 16 February 1502.

For more than 500 years, the development of the University of Valencia has run in parallel with the development of the city and has been an inextricable part of its urban fabric, creating spaces for teaching, research, development and dissemination of culture and science as well as knowledge exchange.

Today, the University of Valencia is the result of more than five centuries of history that have led to the accumulation of knowledge and unique documentary treasures, making it one of the top Spanish universities. The University of Valencia is one to the top five scientific centres in Spain thanks to its commitment to excellence and to the wide range of teaching and research activities offered in all areas of knowledge (basic sciences and engineering, health sciences, educational sciences, humanities and social sciences and economics and law).

On November 10, 1868, the Council of Valencia accepted the establishment of the Free Faculty of Pharmacy, which was commissioned for the delivery of these studies in the city of Valencia. Unfortunately, five years later, on September 28, 1874, the Excellent Provincial Council agreed to close the Faculty, stating the reason as the "lack of prosperity of the accountability of this corporation".

A century later, in October 1974, the studies required for obtaining a Pharmacy degree were resumed at the Technical School of Agricultural Engineers at L'antic Passeig de València al Mar, currently named Blasco Ibañez.

After a short period of transition in which the lectures were given in an annexed building of the School, which was originally destined to be the University Canteens. The lectures began in the 1978-79 course at the building which, up to that moment, had been the Faculty of Sciences (current Office of the Principal of the University) and which were free due to its transfer to the Burjassot Campus.

It was at that time, that the procedures for the construction of a new building started. They were finished on September 30, 1992, with the inauguration of the current Faculty at the Burjassot Campus. This building was awarded with the National Architecture Award the following year.

# WELCOME!

Today, the Faculty of Pharmacy offers Degrees in Pharmacy, Human Nutrition and Dietetics, Food Science and Technology, Gastronomic Science and a Double Degree in Pharmacy and Human Nutrition and Dietetics. It also offers official Masters Degrees in Research and Rational use of Medicines, Public Health and Health Management, Personal and Community Nutrition, Food Quality and Safety and Tropical Parasitic Diseases. The internationalisation of the faculty is reflected by the agreements for the mobility exchanges between more than 60 European Universities.

The mission of our Faculty of Pharmacy is to train competent professionals at European Professional Standard, and to encourage prestigious research with international implications that will contribute to the development of our society. Through training and research, we promote the dissemination of science and culture, and also the reaffirmation of democratic values of the society. Therefore, different values are embodied in the actions of the Faculty of Pharmacy, such as, excellence, innovation, solidarity and cooperation, and sustainability.

The Faculty of Pharmacy of the University of Valencia is proud to organise and host the European Association of Faculties of Pharmacy (EAFP) Conference on "Sustainability in Pharmacy, Pharmacy Practice and Pharmacy Education". It is an honour for us that the EAFP has entrusted us with organising this conference, we have therefore worked tirelessly to develop an innovative and up-to-date programme that enables us all to address the current and future situations that face the pharmaceutical profession, and also the most important challenges that will be presented to us in the training of future pharmacy professionals.

We have prepared a Congress with the participation of international researchers from different European Pharmacy Faculties, the Pharmaceutical Industry, Health Authorities, Professional Associations and Non-Governmental Organisations. The congress will take place over three days, the first day will be dedicated to Sustainability in Pharmaceutical Sciences, the second dedicated to Sustainability in Pharmacy Practice and the final day to Sustainability in University with different plenary sessions, oral and poster presentations, and workshops.

Due to its climate and size, Valencia is a city that invites you to explore its streets and experience its abundant beauty and vibrant atmosphere. Therefore, we have arranged a social programme to complement the Conference that will allow us all to enjoy the company of our colleagues in a more relaxed and convivial atmosphere.

We hope that all attendees will have an enjoyable experience during both the scientific and social programmes.

**Welcome to the EAFP 2023 Conference,  
and Welcome to Valencia!**

***Teresa Garrigues.** Her cheerful, vital, and fighting character was a constant throughout her life and that is the memory we must keep. We were privileged to be able to share the day with her. The expressions of affection that were received from the faculty members and people from other Centers of the UV and across Europe, indicate the scope of her personality, and it is that which was impossible not to love Teresa.*





# SCIENTIFIC PROGRAMME

*Valencia, 17-19 May, 2023*





## Wednesday, May 17<sup>th</sup>, 2023

10:00

12:30

### Pre-Conference: Workshop

Chair: **Dra. Noelia Pallarés** (Univ. Valencia)  
**Sandra Lopes Guerreiro** (Farmamundi, Valencia)

Pharmaceutical Industry Sustainability in Pharmaceutical industry:  
A future approach

### Coffee break (11:00 - 11:30 h)

Chair: **Dr. Juan Manuel Castagnini** (Univ. Valencia)

**Salvador Gutiérrez Igual, Cristina Prieto and Ester Piquer** (Official College, Valencia)  
**Mar Larrosa Flor**, (Official College, Castellón)

Present and future pharmacy services

13:00

### Registration

15:00

### Opening Ceremony

**Prof. Pilar Serra Añó**, Vice-Principal Sustainability, Cooperation and Healthy Life, University of Valencia, Spain  
**Prof. Jordi Camarasa**, Spanish Dean's Conference, University of Barcelona, Spain  
**Prof. Hortensia Rico**, Dean, Faculty of Pharmacy, University of Valencia, Spain  
**Prof. Lilian Azzopardi**, President EAFP, University of Malta, Malta

Commemoration of Prof. Teresa Garrigues, past-EAFP Executive Committee member and Prof. Jeffrey Atkinson, past-EAFP President

15:45

### Plenary I: Sustainability in Pharmacy

Chairs: **Prof. Eulogio Valenti** (Univ. Valencia)  
and **Prof. Borut Božič** (EAFP)

**Prof. Gorka Orive** and **Unax Lertxundi**, University of Pais Vasco, Spain  
The environmental impact of pharmaceuticals: current situation and possible solutions

**Prof. Gianni Sagratini**, University of Camerino, Italy The new concept of "Pharmacy of services" and the Master degree reform

16:30

### EAFP Awards

17:00

### Coffee break

17:30

### Oral communications

18:15

Chairs: **Prof. Maria Luisa Ferrandiz** (Univ. Valencia)  
and **Prof. Christian Cavé** (EAFP)  
(4 presentations selected from abstracts of 10 min each)

18:30

### Social Program: Valencia Tour

20:00

### Welcome reception: Botanical Garden





## Thursday, May 18<sup>th</sup>, 2023

9:30

### Plenary II: Sustainability in Pharmaceutical Services

Chairs: **Prof. Javier Pereda** (Univ. Valencia)  
and **Prof. Kristien De Paepe** (EAFP)

**Professor Ralph Altieri** and **Dr. Ozge Ozer**, International Pharmaceutical Federation (FIP)

Trend analysis of ensuring sustainable pharmacy and pharmaceutical education

**Dr. Amparo Esteban Reboll**, Dept. Universal Health and Public Health, Valencian Government, Spain

Sustainability in public health pharmacy practice

10:45

### EAFP scholarships and mentorships

**Prof. Lilian Azzopardi** (EAFP)  
and **Prof. Andries Koster** (EAFP)

We are here to support our members

10:45

### Oral communications

Chairs: **Prof. Carmen Montesinos** (Univ. Valencia)  
and **Prof. Jouni Hirvonen** (EAFP)

(5 short presentations selected from abstracts of 5 min each)

11:15

### Coffee break and Poster presentations

11:45

### Dean's forum

Chairs: **Prof. Lilian M. Azzopardi** (EAFP)  
and **Prof. Dimitrios Rekkas** (EAFP)

**Prof. András Süle**, President EAHP, Péterfy Hospital, Budapest, Hungary

**Dr. Jorge Batista**, PGEU, Professional Affairs Advisor

### Stakeholder's Round Table Discussion:

The Context of Sustainability in Pharmacy

12:30

### EAFP General Assembly

13:30

### Lunch break and poster presentations

14:30

### Parallel workshops

Chair: **Prof. Carla Soler** (Univ. Valencia)

**Dra. María Blázquez Blázquez** (Farmamundi, Valencia)

**Dra. Rosita Rotella** and **Dra. Maria Trelis** (Faculty of Pharmacy, Valencia)

Social responsibility and cooperation for sustainability

**Dr. Tanja Fens**, Pharmacy Game International,

Univ. Groningen, the Netherlands

How to implement sustainability elements in a Pharmacy programme

16:00

### Oral communications

16:45

Chairs: **Prof. Josefa Tolosa** (Univ. Valencia) and **Prof. Daisy Volmer** (EAFP)  
(4 presentations selected from abstracts of 10 mins each)

20:00

### Social Program: Gala Dinner



## Friday, May 19<sup>th</sup>, 2023

**10:00**

### **Plenary III: Sustainability of Pharmacy Education**

*Chairs: **Prof. Ana Melero** (Univ. Valencia)  
and **Prof. Dimitrios Rekkas** (EAFP)*

***Catarina Silva and Rahaf Alsayeed**, European Pharmaceutical Students' Association (EPSA)*

Pharmacy education: Reflecting students' needs in the near future

***Dr. Javier Pereda**, Faculty of Pharmacy, European Pharmaceutical Students' Association (EPSA)*

Aligning the Faculty of Pharmacy of the University of Valencia with sustainable development goals

**10:45**

### **Oral communications**

*Chairs: **Prof. Mónica Fernández** (Univ. Valencia)  
and **Prof. Patrizia Santi** (EAFP)*

*(4 presentations selected from abstracts of 10 min each)*

**11:30**

### **Coffee break and Poster presentations**

**12:00**

### **Workshops roundup**

**13:00**

### **Closing and future perspectives**









# PLENARIES

### 1.1 The environmental impact of pharmaceuticals: current situation and possible solutions



**Gorka Orive**  
*University of Pais Vasco,  
Spain*

Full Professor of Pharmacy & Pharmaceutical Technology at the University of the Basque Country in Vitoria in Spain. Researcher at the University Institute for Regenerative Medicine and Oral Implantology - UIRMI and scientist at Networking Biomedical Research Center on Bioengineering, Biomaterials and Nanomedicine, CIBER-BBN.

One of the pharmacist (as scientists) with more international articles in Spain by the age of 46, with 362 international papers, 70 national articles, an H-index of 82 and over 23.900 citations. In the recent "Top Scientific Rankings" classification prepared by Stanford University, Gorka heads He is a relevant science communicator during the pandemic in twitter:

@gorka\_orive (more than 112,000 followers). Dr. Orive is scientific advisor of different Pharma companies and has founded his own company Geroa Diagnostics ([link](#)) about Alzheimer's diagnosis by salivary biomarkers.



**Unax Lertxundi**  
*University of Pais Vasco,  
Spain*

Unax is a hospital pharmacy specialist working as the Chief Pharmacist in the Araba Mental Health Network, Osakidetza, the public Basque Health System. He also belongs to the Bioaraba Health Research Institute and holds a Board Certification in Psychiatric Pharmacy. His research focuses on sustainable pharmacy and the safe use of medicines, especially in addressing drug pollution issues from a healthcare perspective. He is one of the promoters of the Basque Sustainable Pharmacy initiative, and one of the organizers of the postgraduate about Pharmaceuticals in the environment of the University of the Basque Country.

#### ABSTRACT

Pharmaceuticals are essential for the prevention and treatment of multiple diseases. However, in recent years it has been known that they can be considered as emerging contaminants. Their presence in the environment give rise to disastrous consequences, such as the virtual disappearance of certain vulture species caused by the anti-inflammatory diclofenac, the potential appearance of multi-resistant bacteria due to the presence of antibiotics, or the collapse of entire fish populations due to estrogen-induced feminization. Pharmaceutical pollution is a complex problem, which encompasses multiple agents with often conflicting interests, difficult to approach and solve. The present conference aims to describe the problem and the most relevant evidence that demonstrates the presence and impact of drugs in the environment, as well as the potential solutions that can be proposed to reduce this problem that directly affects the achievement of the objectives of sustainable development.



### 1.2 The new concept of “Pharmacy of services” and the Master degree reform



**Gianni Sagratini**  
*University of Camerino  
(Italy). School of  
Pharmacy*

He is full professor of Food Chemistry at School of Pharmacy of University of Camerino. The activity research of Prof. Sagratini is documented by 180 publications in international scientific journals present in the database with ISI impact factor (H index 35), by 196 communications in national conferences, international and workshops, by 7 chapters of a books. In addition, Prof. Sagratini is the inventor of 4 patents. His research focuses on: a) Development of new analytical methods for the analysis of bioactive molecules in foods by extraction techniques such as SPE, SPME, LLE, and instrumental techniques such as LC-DAD-MS, LC-MS-MS, GC-MS, b) Characterization of substances with nutraceutical activity in food and plants by using the analytical techniques mentioned above, c) Study of new systems of packaging for the storage of food. Prof. Sagratini is the coordinator of the Bachelor degree in Gastronomic Sciences and is the Director of School of Pharmacy at University of Camerino.

#### ABSTRACT

The recent pandemy related to COVID-19 has unequivocally highlighted the important role of pharmacies as territorial reference points for the citizen. It is evident that the trend is increasingly that to recognize the role pharmacies playing in promoting health services by guaranteeing the access to traditional healthcare facilities. The role of the pharmacy has undergone a deep transition from the traditional role of mere distributor of medicines to the role of distributor of services connected with healthcare; nowadays the citizen goes to pharmacy not only for buying medicines but also for performing diagnostic tests such as glucose, cholesterol and blood pressure measurement, or vaccines, for buying food supplement, dietetic food, nutraceuticals, cosmetics and for having advices about it. Considering the actual priorities and needs of our society, it is crucial for the Universities to prepare modern and professional young pharmacists, that will be able to lead the new roles of pharmacies in the territories. The Italian Ministerial Decree 1147 of the last 10 october 2022 designed the new Master degrees in Pharmacy and Industrial Pharmacy, that the Universities have to apply for remodeling the cultural preparation and formation of the future pharmacists.

### 2.1 Sustainability in Public Health Pharmacy Practice: Therapeutic Optimization and Integration Program



Amparo Esteban Reboll es especialista en Medicina Familiar y Comunitaria y ha trabajado en el ámbito de Atención Primaria desde 1985, como médica de familia, coordinadora de centro de salud, y directora médica de Atención Primaria del Departamento de salud Valencia-Hospital General.

Tras su paso por la Escuela Valenciana de Estudios de la Salud (EVES), en la actualidad ocupa el puesto de subdirectora general de Optimización e Integración en la Dirección General de Farmacia y Productos Sanitarios de la Conselleria de Sanitat Universal i Salut Pública.

#### **Amparo Esteban Reboll**

*Dept. Universal Health and  
Public Health, Valencian  
Government, Spain*

#### **ABSTRACT**

In 2008, in the face the upward trend in health spending in most OECD (Organization for Economic Co-operation and Development) economies, researchers from the Institute for Health Improvement (IHI) developed what is known as the triple aim model in health, focused on a triple objective for the healthcare environment.

At the national level, some measures have been established in the pricing policy of the National Health System with the aim of managing the incorporation of new medicines more efficiently. These measures are called Shared Risk Agreements, and they can be financial SRA (based on discounts or spending caps on specific products or indications, or agreements based on clinical results (Payment for Results Schemes). These agreements apply to medical order products that are dispensed in hospitals.

Regarding the Valencian public health system, we have been forced to address changes in the structures and processes that govern corporate strategies for the rational use of medicines and health products. All of this is to ensure the development and compliance with the provisions of the Real Decreto Legislativo 1/2015, which aim to provide the greatest benefit to both patients and society as a whole.

The core principles on which the strategy of the General Directorate of Pharmacy and Health Products is based are the same as those of the triple aim:

- Pharmaceutical policy oriented towards patients and citizens.
- Optimization, which includes efficiency, sustainability, safety and results orientation.
- Coordination of the pharmaceutical structures of the public health system.

### **2.1 Sustainability in Public Health Pharmacy Practice: Therapeutic Optimization and Integration Program**

Transversal to all strategic lines, our community strategy, the development of which is defined in the Therapeutic Optimization and Integration Program of the Valencian Community (POeIt), published in October 2021.

All these principles that govern the Program are guaranteed through the following actions:

- a) Shared responsibility at all levels, managers and care providers, and by all professionals.
- b) Establishing a collaborative network to increase process efficiency, reduce resources consumption, and promote greater equity.
- c) The representation of the departmental commissions in central commissions.
- d) Effective implementation of decisions.
- e) The knowledge and monitoring of the activity and results.
- f) Transparency and dissemination.

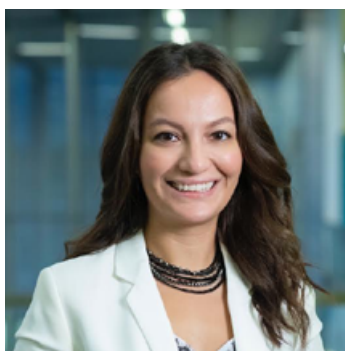
### 2.2 The environmental impact of pharmaceuticals: current situation and possible solutions



**Biosketch**  
**Ralph J. Altieri**  
*PhD for EAFP*

Ralph J. Altieri, PhD is Professor and Dean, University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences that ranks in the top 10% in research and top 15% among all US pharmacy schools. His career in research and education spans over 40 years. He conducted NIH funded research programs for over 15 years primarily in the area of neural control of airway function prior to becoming associate dean for academic affairs. As associate dean, he was responsible for leading conversion of the BSPHarm program to the PharmD degree program. He had administrative oversight of an innovative ACPE accredited online post-BS PharmD program for US and Canadian practicing pharmacists that is now in its 25th year. Subsequently, that program was expanded to the rest of the world and is the only US accredited international online post-BS PharmD program. As Dean, he has garnered over \$30M USD in grants to support research programs in the school and increased school endowments 10-fold.

He is a member of the International Pharmaceutical Federation (FIP) and initiated international efforts in his school that have led to partnerships with pharmacy schools worldwide including development of a PharmD program in Cairo, Egypt, an ambulatory care program in Qatar and with the campus' Center for Global Health clinic in Guatemala. He holds leadership roles in FIP as Chairperson of FIP Education, member of FIP ExCo, Bureau, and Congress Programme Development Committee, continuing Director of the FIP UNESCO UNITWIN global program, and formerly as President and Immediate Past President of the Academic Pharmacy Section (AcPS), and AIM Advisory Committee. He conducts outreach efforts on behalf of FIPed to pharmacy organizations worldwide in the United States, Asia, Europe, Latin America and Africa, including AACP, AASP, EAFP, IACP, IPSF and UNITWIN Program. In 2016, he was awarded FIP Fellow.



**Dr Ozge Ozer**  
*Education and  
Professional Development  
Manager, International  
Pharmaceutical  
Federation (FIP), Turkey*

Dr Ozge Ozer is a highly accomplished pharmacist and academic professional with a strong background in pharmacy and pharmaceutical sciences. With a PhD in Social and Administrative Pharmacy, Dr Ozge brings a wealth of expertise to her role as the Education and Professional Development Manager at the International Pharmaceutical Federation (FIP).

Passionate about global health, Dr Ozge actively contributes to initiatives that promote equitable access to quality healthcare worldwide. Through her work at FIP, she leads transformative academic and professional projects aimed at advancing pharmacy and pharmaceutical education, fostering leadership development, and addressing pressing global health challenges.

With extensive experience and knowledge in pharmaceutical policies, communications, and media relations, Dr Ozge leverages her expertise to shape strategic partnerships and collaborations that promote excellence in pharmacy and contribute to improving health outcomes on a global scale.

For inquiries or collaboration opportunities in the field of global health and pharmacy and pharmaceutical education, please feel free to reach out to Dr Ozge Ozer at [ozge@fip.org](mailto:ozge@fip.org).

### 2.2 FIPeD Trend analysis of ensuring sustainable pharmacy and pharmaceutical education

#### ABSTRACT

FIP Education (FIPeD) is an integral component of the International Pharmaceutical Federation (FIP). FIPeD is composed of the Academic Pharmacy Section (AcPS), the Academic Institutional Membership (AIM), the FIP UNESCO UNITWIN Programme and the Workforce Development Hub (WDH) currently transforming into the FIP Hub. Other contributors to FIPeD include the Professional Secretary of the Board of Pharmaceutical Practice (BPP) and the Scientific Secretary of the Board of Pharmaceutical Sciences (BPS) and observers from ECPG and IPSF. FIPeD units have been very busy the past three years during the pandemic producing numerous reports, guidance, toolkits and digital programmes. Each year, BPP conducts a trends analysis in pharmacy practice from its various sections and in pharmacy education from the AcPS which also is a member of BPP. We selected the BPP-AcPS 2022 trends report as the foundation of this presentation as it addresses contemporary issues within pharmacy education that are supported by FIPeD resources. Four trend areas were selected: (i) international movement to online education and global virtual pharmaceutical education extended to include digital health in pharmacy education; (ii) expansion of the number of pharmaceutical education institutions globally extended to include student enrolment issues; (iii) increased importance of pharmaceutical support personnel; and (iv) movement towards integration of science and practice in pharmaceutical education. For each of these selected trends, resources from FIP that support them are provided and discussed along with upcoming resources underway at FIP and the 2023 FIP World Congress in Brisbane. All of these resources are geared towards supporting needs-based education that underpins sustainability of pharmacy education which provides for a competent and sustainable pharmacy workforce.



### 3.1 Pharmacy education: Reflecting students' needs in the near future



Catarina Silva is a recent pharmaceutical graduate from Lisbon, Portugal. She is the current Vice President of European Affairs of the European Pharmaceutical Students' Association (EPSA), fighting for pharmaceutical students' rights and needs, whilst carrying their voice on professional matters. As part of her duties she is also an intern for the Pharmaceutical Group of the European Union (PGEU). Catarina has held several positions in Students' Associations throughout her studies. In the Students' Association of the Faculty of Pharmacy of the University of Lisbon, she served as Head of the Scientific Innovation Department and as the Chairperson of the Annual Congress. She has also been involved in a Research Project on "Patient experience data in medicines' assessment for regulatory purposes", one of the fundamental objectives from the strategic reflection document "EMA Regulatory Science to 2025".

**Catarina Silva**  
*European Pharmaceutical  
Students' Association  
(EPSA)*

#### ABSTRACT

Under the scope of Sustainability in Pharmacy Education, EPSA will present their vision on best practices for teaching methodologies and the contribution of students to the decision making process of establishing the best pharmaceutical curricula, preparing them to be Europe's future healthcare workforce. Through the presentation "Pharmacy education: reflecting students' needs in the near future", EPSA will also point out some of the key aspects that European pharmaceutical students feel should be integrated during the pharmacy degree, namely on topics such as digital health, soft-skills and vaccination.

### 3.2 Aligning the Faculty of Pharmacy of the University of Valencia with sustainable development goals



Javier Pereda is an Associate Professor in the Department of Physiology at the University of Valencia. In his research group, "Molecular Therapies," he studies the role of fibroblasts in pulmonary pathology, particularly in fibrosis and lung cancer. For several years now, he has held the position of Vice Dean of Innovation, Communication, and Culture at the Faculty of Pharmacy. He is the president of the Sustainable Development Goals (SDG) Commission at the Faculty of Pharmacy, and thus, he is responsible for implementing sustainability in all aspects of university life at the institution.

#### **Dr. Javier Pereda**

*Faculty of Pharmacy,  
University of Valencia,  
Spain*

#### **ABSTRACT**

According to sociological, environmental, and anthropological studies, the world is dangerously approaching an unsustainable situation that could be irreversible. To address this, the United Nations has proposed 17 Sustainable Development Goals to be achieved by 2030. As part of this effort, universities, and specifically faculties, have a significant responsibility. Our center, through the Faculties for SDGs project, has made significant organizational efforts to align with the 2030 Agenda, focusing on key areas such as management, research, and most importantly, teaching. After a diagnostic and training phase on SDGs, we have developed a strategy for implementing these goals in our courses. The newly-formed SDG committee has facilitated the necessary teaching changes through innovative educational methods. The Center's innovation plan (PIC) and the teaching innovation projects (PID) requested by our Faculty have played a crucial role in this process. Numerous courses have incorporated SDGs into their teaching through these projects, which is reflected in most of the teaching guides. These new strategies complement and strengthen the excellent work done by our Faculty in previous projects, which were fully aligned with the SDGs.









# WORKSHOPS

## 1.1 Sustainability in Pharmaceutical Industry – current and future challenges

### Sandra Lopes Guerreiro

*Global Quality, Health Safety & Environment Director at ESTEVE*

Sustainability is a word since long used to describe the role of the pharmacists in the pharmaceutical industry. Due to a robust technical and scientific background, pharmacists have always worked in areas like quality, regulatory, pharmacovigilance or clinical trials, assuring that the good practices standards were met, the patient safety secured and the company reputation protected. Pharmacist's skills have evolved over years, with more and more pharmacists doing roles in marketing, supply chain, market access and leadership positions like CEO.

With the climate change and the pledge to save the planet, the pharmacist's mission has to evolve to protect another element: the Environment. Sustainable molecule research, sustainable packaging development, responsible waste management and secure sustainable value chain are only a few examples of areas where the pharmacists can play a key role into the pharmaceutical companies' mission and fight climate change.

Lack of sustainability-related expertise and talent, is leading to differentiated employability benefits for roles who can contribute to meet sustainability targets, opening an opportunity for pharmacists. Pharmacists are well-respected profession and have a role as educators. Not limited to pharmaceutical companies and respective suppliers, but in society overall, where education should start from early ages. ESTEVE is an international pharmaceutical innovator with a rich Spanish heritage and the medications we supply today help millions of patients worldwide. Esteve Química is a European leader in contract development and manufacturing for small molecule intermediates and active ingredients. According to the 2019 Davos World Economic Forum, climate change represents the greatest risk to the global economy, and therefore requires a global response from all sectors of society. ESTEVE is fully committed and working to reduce our carbon footprint, because the health of the environment affects the health of people.

## 1.2 Present and future pharmacy servicesday

### Muy Ilustre Colegio de Farmacéuticos de Valencia

#### Salvador Gutiérrez Igual

*Community Pharmacy Care SPFs (SPF)*

Foro AF-FC defines Community Pharmacy Care SPFs (SPF) as “those healthcare activities provided from the Community Pharmacy by a pharmacist who uses his or her professional skills to prevent disease and improve both the health of the population and that of the recipients of medicines and medical devices, playing an active role in optimizing the process of use and the results of treatments. These activities, aligned with the general objectives of the health system, have their own entity, with definition, aims, procedures and documentation systems, which allow their evaluation and remuneration, guaranteeing their universality, continuity, and sustainability”. In this way, MICOF has developed a catalogue of its own professional services oriented to the needs of pharmacists with the aim of improving the quality of care offered to patients such as: medication review, personalized reconditioning systems, etc.

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#### Cristina Prieto

*Meeting the educational needs of pharmacists*

Continuous training results are of vital importance for healthcare professionals, especially for pharmacists who, due to their direct contact with patients have a duty to practise sanitary education to assure their well-being.

MICOF as a sanitary organization, identifies the training needs that pharmacists have. On the basis of these necessities, MICOF’s training department, designs several and multidisciplinary training courses arranged to the different pharmacist modalities using updated tools to achieve the target.

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#### Ester Piquer

*Xarxa Patients: educating in selfcare and empowerment of patients*

Active patients comprise of patients, caregivers, and family members. These have shown an increased interest in their chronic pathology. Since the appearance of this necessity, MICOF in collaboration with Escuela de Pacientes de la Escuela Andaluza de Salud Pública, has created Xarxa Patients.

Xarxa Patients is a project that constructs an active patients’ network (xarxa in Valencian) which has the aim to put in contact patients who have a chronic pathology in common, educate them in healthy habits and management of their pathology. It will count with sanitary professionals for specific training and solve doubts.



## 1.2 Present and future pharmacy servicesday

### Muy Ilustre Colegio de Farmacéuticos de Castellón

#### **Mar Larrosa Flor** (COLLABORATIVE DISPENSING)

*Outpatient Dispensing: Hospital Pharmacy Services and Community Pharmacies working together for the patient's benefit*

The pandemic has brought Hospital Pharmacy and Community Pharmacies working together to guarantee the dispensation of hospital dispensed medicines for outpatients closer to patient's home, with active participation of Pharmacists Association (Colegios Oficiales de Farmacéuticos - COFs) playing a significant role in the in the coordination and contacts between the parties involved and the distribution channels.

Focusing on maintaining treatment continuity with full guarantees of pharmaceutical care even though not being dispensed in the hospital's outpatient pharmacy but in the community pharmacy, moreover, reducing the patient's sanitary risk of attending to the hospital facilities.

The great reception from patients, community and hospital pharmacists and sanitary administrations has led collaborative dispensing to being established as a new Pharmaceutical service in Comunitat Valenciana.

## 2.1 International Pharmaceutical Cooperation, a Professional Opportunity for Solidarity – International Cooperation in Farmamundi

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### María Blázquez Blázquez

*Farmamundi, Valencia, Spain*

Farmamundi is a non-profit organization with more than thirty years of experience in the health sector that works to ensure the universal right to health to vulnerable populations in impoverished countries through four mission areas: Cooperation for Development, Humanitarian Action and Emergencies, Education for Development and the Humanitarian Procurement Area.

This procuring activity supplying medicines, nutraceuticals and medical supplies within the framework of international cooperation, is accredited by the European Commission since 2013 as a reliable and guarantee center of choice for humanitarian aid supply operations.

The World Health Organization (WHO) recognises the important role of pharmacists in these aid supply operations, the donation process and in the distribution of these medicines.

The WHO guidelines for medicine donations (1) emphasize the role of the pharmacist in ensuring that donated medicines are appropriate for the recipient population, are of good quality and are handled and stored properly.

The figure of the pharmacist is essential in ensuring that medicines are donated and distributed safely, appropriately and effectively.

Given the current complexity that characterizes the international humanitarian supply of medicines, the role of the pharmacist is crucial, as a guarantor of the quality and integrity of medicines throughout the entire distribution chain, especially in the context of humanitarian cooperation where the WHO guidelines of medicine donations must also be observed.

1 OMS. Guidelines for Medicine Donations Revised 2010. Ginebra: OMS. 3rd Edition

## 2.1 Review and implementation of a program to support the prevention and treatment of maternal child malnutrition

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Nutrition is a fundamental part of health and development. Better nutrition is associated with improved child and maternal health, stronger immune systems, safer pregnancies and deliveries, reduced risk of non-communicable diseases and longevity. Nutritional deficiencies are a major health problem in developing countries, with serious health consequences such as physical and mental growth failure.

The overall objective of this project is to reduce the rate of maternal child malnutrition and improve the health status of the most vulnerable population groups in a rural village of Madagascar through the organization of educational events and the promotion of local foods with high nutritional value.

The proposed interventions are integrated into the activities of Change Onlus, a non-profit association that works through social and health interventions in the municipality of Ampefy, a rural village located in the Itasy region of Madagascar. Change Onlus carries out health prevention education campaigns and, in particular, the activities planned in this project are a complement to the malnutrition support programme that has been active in the health center since 2016. The project also aims to evaluate the potential benefits of Moringa, a plant of high nutritional value that is abundant in the intervention area, as a dietary supplement during pregnancy. Moringa leaves, the most widely consumed part of the plant for nutritional purposes, contain several bioactive compounds: they are an excellent source of essential amino acids, vitamins and minerals, including iron, calcium and vitamin C, which are crucial for maternal and foetal health.

## **2.1 Health Promotion and Implementation of a point of care for the beneficiaries of the NGDO BEL AVENIR-AGUA DE COCO in Madagascar**

### **Maria Trelis**

*Faculty of Pharmacy, Valencia*

Thanks to funding from VI Call for Development Cooperation Projects of the Universitat de València, we have launched our project for health promotion and diagnosis and treatment of parasitic diseases and malnutrition in Madagascar. It is an intervention that combats in combination schistosomiasis, geohelminthiasis, malaria and malnutrition among children and women of reproductive age. Next to the NGDO medical centre, a "point of care" has been set up with a laboratory and dispensary where parasitological and nutritional analyses are being carried out and anti-parasite treatments and supplements are being administered. This intervention will be complemented with talks-workshops on health and hygiene for the staff involved, beneficiaries and their families, with the aim of encourage hygiene conditions and daily habits in homes that favour the prevention of diseases and try to make the intervention as sustainable as possible. The activities have been designed in collaboration with Malagasy educators, so that all planned actions and materials have been prepared from the perspective and vision of the Malagasy community ensuring a deep respect for the social characteristics of the beneficiaries, their uniqueness and their own cultural values. UV students (pharmacy, medicine, social work, nursing, psychology), professors (Parasitology and Nutrition) and administrative and service staff of the faculty of pharmacy are involved in this project.

## 2.2 How to educate pharmacy students to work sustainably in the future? Examples from the international educational model “The Pharmacy Game”

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There is a need to embed sustainability in the pharmacy curriculum. The health care system and pharmaceutical industries are a major contributor to climate change. Future pharmacists need to be leaders to ensure sustainable production, supply, prescribing, and disposal of medicines.

The Pharmacy Game educational tool, combining simulation and serious gaming has trained students for skills needed in everyday practice. Various universities from around the world use the Pharmacy Game.

To explore (1) how we can use the Pharmacy Game to teach students how to deliver more sustainable pharmacy services, and (2) what questions should be answered to initiate sustainable educational directions in future.

Three universities, University of Groningen (UG), Vilnius University (VU) and Vrije Universiteit of Brussels (VUB), presented examples from their teaching practice on the following topics: “The Pharmacy Game, transformative tool for innovation in pharmacy education” ; “Sustainability initiatives originated in the time of the COVID-19 pandemic” and “Game activities using contemporary instruments and topics” accordingly.



## **2.2 How to educate pharmacy students to work sustainably in the future? Examples from the international educational model “The Pharmacy Game”**

Afterwards a broader group of professionals divided in two working groups discussed directions and areas where pharmacy curriculum could contribute towards delivering sustainable pharmacy practices.

In the Pharmacy Game, through the years, there have been multiple changes implemented, reflecting the current needs in healthcare. Some examples reflecting sustainability include, hybrid and online teaching, elements of interprofessional education, equality, entrepreneurship, and environmental awareness. The questions that need to be answered to initiate sustainable educational directions in future are: “Which competencies do pharmacists in practice need to work in a sustainable way?” and “How can those competencies be taught in the existing curriculum?”.

The Pharmacy Game can be used to develop skills needed for sustainable pharmacy services. Clear scope of the competences and areas for development need to be established in the pharmacy curriculum to enhance sustainable practices in future.









# ORAL COMMUNICATIONS

## 1 Collaborative Scholarship: A Model for Enhancing Faculty Development and Research in Pharmacy Education

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**Keywords:** *Scholarship of Teaching and Learning (SoTL), educational research, faculty development, educational development*

The Centre for Pharmacy at UiB has prioritized the development of educational competencies, leading to the establishment of the FREMFARM project in 2021. This educational research initiative seeks to promote active teaching methods in pharmacy education and strengthen the connection between research and educational practice. With a special focus on faculty development, the Centre aims to foster collaboration between researchers, educators, and practitioners.

Due to the increasing pressure on faculty members to conduct research within their disciplines and demonstrate a scholarly approach to teaching<sup>1</sup>, the implementation of the collaborative scholarship model has become necessary. This model provides a practical way for academic staff to engage in the Scholarship of Teaching and Learning (SoTL). It involves a structured collaboration between faculty-based academic developers and teaching academic staff through a project<sup>2</sup>.

In this intervention, we will demonstrate how the collaborative scholarship model has been successfully applied across various courses at the Centre for Pharmacy. We will also share concrete tools and ideas for conducting small-scale practice-based research on teaching. Our academic staff has warmly embraced the collaborative scholarship model, as it equips them with the necessary tools to explore alternative pedagogical approaches to teaching and provides opportunities to share their work in the spirit of SoTL.

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2. Weaver, D., Robbie, D., Kokonis, S., & Miceli, L. (2013). Collaborative scholarship as a means of improving both university teaching practice and research capability. *International Journal for Academic Development*, 18(3), 237- 250.



## 2 Global Health Challenge in Pharmacy

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### Introduction

The Global Health Challenge is an innovative pedagogy about scientific topics in the field of Health. The students have to develop an innovative project (device, service, application, etc.) unpublished yet and have to manage the creation of their business as a self-entrepreneur.

### Method

The students constitute their own team (4-5 students) and have to find a yet undeveloped project in Health domain based on research (scientific literature/websites) or their own experience. They will be challenged by mentors to define the main scientific questions, a SWOT analysis and the financial, ethical, legal and environmental aspects of their project. At the end, they have to defend it in front of a jury of experts.

### Results

The overall objective of this kind of challenge is to facilitate the transition from student life to professional life by promoting the development of their spirit of initiative, self-confidence and the application of the global knowledge acquired (hard skills), their soft skills and transversal competences. Mentors create a stimulating and inspiring environment to make the students motivated by exerting a positive pressure (competition for ranking), the visibility of the project by experts, and the constant interactions between mentors and students. This challenge has already been organized at different levels of study (3<sup>rd</sup> year of Pharmacy, master, PhD), trainings (pharmacy, medicine, engineering), durations (2 days up to 1 month) and contexts (Summer Schools, teaching in Cameroon). Students are always very creative and have a lot of fun!

Conclusions: Students gain invaluable experience in teamwork and problem solving while competing against others. This teaching activity is based on reverse pedagogy and on project work with guidelines, so easy to transpose to new student audiences. This year, we are proposing this challenge as part of a European Blended Intensive Programme (BIP) with the Universities of KU Leuven and Parma.

## 3 Knowledge and Attitude about Drug Pollution in Students from Five Spanish Schools of Pharmacy

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### Introduction

The presence of pharmaceuticals in the environment is a problem of growing concern. European Commission adopted the 'European Union strategic approach to pharmaceuticals in the environment' which focusses on actions to reduce the risk of drugs in the environment, including how environmental aspects can be part of medical training programs.

Surveying the knowledge of pharmacy students about pharmaceuticals pollution will provide updated information about the training needs that may help developing new actions related to the training and dissemination of this emerging issue.

### Method

A validated self-administered questionnaire was completed by 1289 pharmacy students from five different Spanish Schools of pharmacy: La Laguna, Valencia, Santiago de Compostela, Sevilla and Vitoria-Gasteiz. The questionnaire consisted on 24 questions: 13 about knowledge on drug pollution, 8 related to attitude and 3 to opinion.

## 3 Knowledge and Attitude about Drug Pollution in Students from Five Spanish Schools of Pharmacy

### Results

The majority of respondents could not identify basic terms about drug pollution: around 80% of responders did not know "One Health" or "emerging pollutant", and around 90% did not know that diclofenac caused the catastrophic vulture decline in Asia. Although 54% of the participants totally agree that pharmaceuticals negatively affect the environment, they were not aware of their existence in our drinking water (50%) and wastewater treatment plants (30%).

The importance of this topic and their attitude in the acquisition of new knowledge got a very high score (>8 points out of 10), while training in this area during Pharmacy degree was poorly scored (2.6 out of 10).

### Conclusions

Knowledge about key concepts related to pharmaceuticals in the environment can be considered poor among surveyed Spanish pharmacy students. However, they consider that drug pollution is a very important issue and have a very good attitude towards acquiring knowledge related to this area, and they judged training about pharmaceuticals in the environment during Pharmacy degree was very scarce.

## 4 The Dutch Approach to Sustainability in Pharmaceutical Curricula – UU examples

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In several government supported agreements like the 'Dutch Green Deal Sustainable Healthcare 3.0' [1] and 'The Dutch Chain Approach to Pharmaceuticals in Water' [2] it is stated that all Dutch healthcare curricula within universities should implement sustainability within their course program. As a consequence a government commissioned workgroup of all stakeholders was tasked with the development of a strategic, multilayered and practical approach and in 2022 the evidence based but still very intuitive 'Guidelines for the Implementation of Planetary Health in Academic Healthcare Curricula' [3] was presented. This guideline not only gives examples of subjects and skills to be implemented, the scale of implementation, etc. but also on how to overcome setbacks, motivate co-workers and use the power of the student population. This (poster) presentation will give an overview of how the guideline can be used to develop a strategy for implementation of sustainability within any healthcare curriculum with examples of our own Department of Pharmaceutical Sciences at Utrecht University.

<sup>1</sup> Ministerie van Volksgezondheid, Welzijn en Sport, "Green deal Samen werken aan Duurzame Zorg," 2022.

<sup>2</sup> Ministerie van Volksgezondheid, Welzijn en Sport, "Ketenaanpak Medicijresten uit Water," 2018.

<sup>3</sup> E. Van Bree, J. Mattijsen, L. Warmerdam and E. De Ridder, "Planetary Health: Handreiking voor onderwijsimplementatie in universitaire zorgopleidingen.," Ministerie van Volksgezondheid, Welzijn en Sport, 2022.



## 5 Embedding the Un Sustainable Development Goals into the Pharmacy Curriculum

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### Introduction

De Montfort University (DMU) is the only Higher Education Institution in Britain to be a global hub for one of the UN Sustainable Development Goals- SDG16 to promote peace, justice and strong institutions. DMU subsequently committed to embed sustainability into all taught courses. Staff and students across the institution need to be equipped with an understanding of the challenges of sustainability and sustainable development; with opportunities to contribute locally and globally to the public good.

### Introduction

The programme team identified opportunities throughout the pharmacy programme to increase awareness of the SDGs and global healthcare challenges. Students have an assessed discussion each year on a global health topic:

**Year 1:** Differences in pharmacy regulation and education between the UK and another country

**Year 2:** How control measures can reduce the spread of a chosen infectious disease and achieve the aims of SDG3 (Health and Wellbeing) and SDG10 (Reduced Inequalities)

**Year 3:** How an international healthcare programme for a non-communicable disease can achieve the aims of SDG3, SDG10 or SDG12 (Reliable consumption and production)

**Year 4:** How a chosen country is working towards reducing premature mortality by a third by 2030 (SDG target 3.4), and how their strategy is tailored to the needs of their population

Themes of inequality and inequity are explored throughout the programme; through themes within case studies, volunteering and global travel opportunities. Students also consider sustainability aspects of pharmaceutical formulation and production.

### Results

Students have found these activities "insightful", and facilitated an enhanced sense of belonging for our international students and recognition of the challenges in their home country. Students recently visited Dubai and many have volunteered with a charity providing healthcare to the homeless.

### Conclusions

The UN SDGs are an engaging focus for pharmacy students to appreciate the key challenges to address in global healthcare.

## 6 Improving Student Confidence in Lab learning through Problem-based Learning

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### Introduction

Faculty teaching the laboratory course on manufacture of non-sterile medicines at the University of Bergen experienced that the students reported high levels of stress related to the course. The feedback specifically pointed to the emphasis on product quality and yield that is required to pass the experimental part. This end-result focus was perceived as particularly overwhelming and shifted student attention from learning to concern about outcomes. To address this challenge, a problem-based learning (PBL) activity was developed, as a collaboration between faculty teaching the course and a faculty-based educational developer. The aim was to achieve meaningful learning in the laboratory<sup>1</sup>, increase student confidence, critical thinking and problem-solving skills by empowering students and increasing student agency.

### Method

An existing lab activity was re-designed, moving from traditional classroom teaching to more student active learning. The classroom was flipped, and students had to investigate and assess the correct formulation through group work, literature search and discussion within groups and with teacher before the practical lab work. A post lab workshop was conducted to review the process and discuss conclusions. Students used audionotes<sup>2</sup> to reflect on their learning process. Data collection included pre- and post questionnaire<sup>1</sup>, observation, and focus group interview.

### Results

The data collected demonstrated increased student confidence in practical lab work, which led to reduced student stress, and consequently improved critical thinking and problem-solving skills. As a result, students focused on their learning, mastering the new skills, and reflected more, instead of fretting about outcomes. Students reported increased enjoyment in the learning environment and increased collaboration among peers. Furthermore, data showed the importance of teacher feedback and guidance through the process.

### Conclusions

Adopting novel student-centered teaching methods improved the outcomes of the laboratory as a learning arena, by increasing student agency, fostering significant learning.

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<sup>2</sup> Abdulwahed M, Nagy ZK. Journal of engineering education. 2009;98(3):283-94

## 7 “Myth or Fact under Pressure”: Active Learning through Real World Simulation

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### Introduction

Pharmacists are often confronted with new and unfamiliar situations. Moreover, when patients raise any question/concern, they usually expect a quick but trustful answer, which requires a prompt evidenced-oriented literature search. We analyzed the students' perspective concerning an assignments designed to train these situations.

### Materials and methods

Pharmacology II is a curricular unit of the Integrated Master on Pharmaceutical Sciences of the Faculty of Pharmacy of the University of Porto, Portugal (4th year, 1st semester). Students (2-3/group) were asked to answer a “myth or fact” question in the context of cardiovascular or endocrine pharmacology, within a limited time (same day). They were guided to use a maximum of two systematic reviews and/or meta-analysis to solve the problem. At the end of the semester, students were asked to anonymously respond a survey to grade the contribution of this assignment to the acquisition of certain skills (scores 1-low to 5-high) and to answer few open questions.

### Results

69/156 students responded to the survey. When the highest scores (>4) were considered, students highlighted the development of critical thinking as well as planning and time management capacities as skills for which this assignment contributed most (81% and 83% of the students, respectively). Also, 80% of the students considered that this assignment contributed to their education as a future pharmacist with a grade>4. Development of creative thinking was the skill that less students graded >4 (46% of the students). Qualitatively, the “real world scenario” was identified as a major strength of the assignment.

### Conclusions

We report an assignment that contributes to pharmacy education mostly by training critical thinking and plan and time managing skills, which are relevant in certain situations of the pharmaceutical profession.

## 8 Sustainability Initiatives in Dutch Community Pharmacies

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### Introduction

As the world population age, medicine use increases and with that also the impact to the environment. This creates a need for concrete actions from the pharmacists. In this study we aim to explore the current sustainability initiatives in community pharmacies in The Netherlands.

### Method

An online questionnaire was developed, containing 16 open and closed questions. It served to explore various sustainability aspects, such as: delivery of medication, collection of medicinal waste, reduction of (medicine) waste, Individualised Distribution Systems, pharmacy building, and future initiatives. The questionnaire was distributed via email and LinkedIn towards community pharmacists. Results were collected in April 2022.

### Results

A total of 120 community pharmacists filled in the questionnaire. The explored aspects resulted in the following: 27.5% of the pharmacies use (one or multiple) ways of green delivery electrical vehicles. Collection of medicines waste was encouraged by active communication at the counter (75.0%), posters (45.8%), leaflets (12.5%), or a special retour box for medication waste in the pharmacy (8.3%). Furthermore, 50% of all pharmacists participate in regional or national initiatives to reduce medicine waste. When looking at the pharmacy building, 90% has LED-lighting and on 25% solar panels are installed. Furthermore, around 60% of the pharmacists work paperless. The most mentioned sustainable initiatives planned for the coming year is to purchase an electrical delivery car, followed by placing solar panels and working paperless.

### Conclusions

There are various sustainability initiatives undertaken across the community Pharmacies in the Netherlands indicating the awareness for interventions towards sustainability. Further research might serve for better informing about the impact of these initiatives on the reduction of the carbon footprint per type of intervention. This is necessary to provide a substantiated advice on which interventions are best to implement first.



## 9 International Co-operation in Course Development focused on the Online Pharmacy Market and Falsified Medicines

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### Introduction

Online pharmacy market is a rapidly growing sector of pharmacy. This trend has been significantly influenced by the COVID-19 pandemic that accelerated online purchases of goods and services. Our aim was to implement an optional course or module that introduces the topics related to purchasing medicines online and preventing the use of unregistered, substandard, and falsified medicinal products to the education of pharmacists.

### Method

In the project academics from two member universities of the European Digital UniverCity Alliance, Masaryk University and University of Pécs were involved. The topics were selected based on literature research and previous experience in this field and planned their inclusion in a one-semester course blending asynchronous lectures and synchronous seminars. To support co-operation between students and their active participation, students' group project tasks were assigned at the beginning of the semester.

### Results

Both involved faculties chose their own model of implementation: inclusion to an existing obligatory course (Brno) and design of a new elective course (Pécs). During the semester regular meetings of the students and academics took place via MS Teams/Zoom in previously scheduled time slots. For sharing study materials and instructions, a Moodle course was created that included video presentations of selected theoretical topics. Project work was conducted in mixed groups of students from both universities and their results were presented in an online session at the end of the semester.

### Conclusions

Our two-year experience with this activity points out the usefulness of online tools that can enhance international co-operation in education and the opportunities for "virtual mobility" for pharmacy students. Online activities and students' individual or group homework can be combined with the classical on-site teaching method. Because of the heterogeneous composition of the students in our courses, small group work seems to be a suitable way to increase the involvement of students.

## 10 Exploring the Accuracy and Feasibility of OpenAI in Clinical Pharmacy: A Comparative Study with Expert Clinical Pharmacists

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### Introduction

The introduction of ChatGPT, a novel artificial intelligence (AI) chatbot that has taken the world by storm, marked a new era in information retrieval. The emergence of AI technology has sparked interest in healthcare and is a useful tool for clinical pharmacists as it can help them access the latest drug information and provide guidance on medication-related problems.

### Objective

The aim of this study was to compare the knowledge and interpretive capabilities of OpenAI with those of clinical pharmacy experts around the world by processing pharmacotherapy cases to investigate the reliability of the medical information provided.

### Method

In a descriptive study, ChatGPT's ability to answer twenty pharmacotherapy cases was compared to that of clinical pharmacists around the world. Cases were administered over several weeks. The data were analyzed in terms of the overall rating of ChatGPT over time, the rate of correct answers, and the acceptability of explanations to the questions. Overall scores were compared with those of clinical pharmacists, and responses were compared by continent.

### Results

There was limited consistency in the responses ChatGPT gave to several cases. However, there was a correlation between acceptable explanations and correct answers, with ChatGPT's overall performance being lower than that of the clinical pharmacists. The performance of clinical pharmacists in the United States was excellent compared to the rest of the world.

### Conclusions

OpenAI knowledge and interpretation skills in these twenty pharmacotherapy cases were not yet comparable to those of clinical pharmacists around the world. Artificial intelligence is about linking human knowledge to a variety of applications that are currently being developed. Pharmacists must have the opportunity to learn about AI through continuing education. To ensure that our profession is prepared for future developments in healthcare, the education system for pharmacists must remain adaptable as these technologies rapidly evolve.

## 11 The Effectiveness of Team-Based Learning in Pharmaceutical Education: a Survey of Student Perceptions

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### Introduction

Team-Based Learning (TBL) is an active and student-centered approach that enhances understanding of course objectives by promoting teamwork, communication, and collaboration skills among students. TBL allows students to apply course concepts to real world-projects. Group diversity is prioritized to ensure a dynamic learning environment and to promote trust and collaboration, students remain in the same groups throughout the course. The TBL method was implemented for the first time in three courses in the pharmacy program at the University of Iceland (UI). This study aimed to determine whether the TBL approach was beneficial to students' learning.

### Method

An online survey was administered to a cohort of 70 students who had completed the three courses within the BS/MS pharmacy program. Participation was voluntary and anonymous. The survey solicited the students' perceptions and experiences of TBL, with responses being recorded on a 5-point Likert scale. Of the total cohort, 51% participated in the survey.

### Results

Results indicated that all students either agreed or strongly agreed that they invested time in reviewing course material in preparation for TBL sessions. Additionally, 94% of students expressed pride in their contributions to TBL sessions and 86% of students agreed or strongly agreed that TBL helped them to understand the course material.

### Conclusions

TBL was positively received by students within these courses. The majority of students invested time in reviewing course material in preparation for TBL sessions, indicating a dedication to the learning process. High levels of pride in contributions to TBL indicate a positive team environment and a sense of ownership. These findings suggest that TBL promotes student engagement, teamwork, and learning outcomes. Further research could explore TBL's long-term impact on students learning.

## 12 Development and Implementation of Blended Learning and Serious Gaming for Integrated Pharmacy Education

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### Introduction

Blended learning (BL) is an educational approach that combines online teaching materials with in-classroom methods. Serious Gaming (SG) uses visualisation technologies and simulation to contextualise the student's experience in a realistic environment.

### Methods

From 2020 to 2022, newly developed BL and SG modules were introduced in the Master's programme. BL cycles include nine themes: (1) use of scientific sources and fact-check, (2) medication review, (3) interactions, (4) advanced pharmaceutical compounding, (5) addiction, (6) side-effects and intoxication, (7) medication use in specific populations, (8) interpreting laboratory values, and (9) counselling pregnancy and lactation. SG comprises a 4-week programme in which students are trained in a real-life simulation pharmacy. This includes helping patients who (virtually) consult the pharmacy, compounding and maintaining the digital extension of the pharmacy (e.g., website and social media channels). Every team also records a podcast about a pharmacy-related topic and develops a business case of an innovative pharmaceutical care service. Student feedback was collected in a qualitative and quantitative way.

### Results

Student feedback confirmed learning goals as more than 80% experienced both BL and SG as a method to translate theoretical knowledge into practical skills. The provision of general feedback at the end of each session (BL) or day (SG) was well received. Considering BL, about 70% of students found the covered topics intellectually challenging and stimulating. Almost all students stated they were encouraged to think more critically and to apply knowledge in a more critical way. For SG, positive aspects included learning to collaborate, becoming competent in observational learning and the contacts with particular cases and situations different from their internship. Negative remarks for both BL and SG included a high workload and friction within the teams.

### Conclusions

BL and SG enable advanced integrated pharmacy education. Student experiences with both integrative learning methods are clearly positive.



## 13 Development of a course accreditation gap analysis tool to support professional development courses for the pharmaceutical workforce

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### Introduction

Technology, Artificial intelligence and Big data are amongst the evolvments that lead to transformation in pharmacy which highlight the contribution of lifelong learning and professional development courses. At the same time, ensuring robust professional courses adds value to the relevance of the development courses to empowerment of the pharmaceutical workforce to embrace transformation.

### Aims

To develop a tool to support the design of accredited professional development courses addressing pharmaceutical workforce and which target scientific and pharmaceutical advancements.

### Materials and Methods

A thematic analysis was undertaken from the requirements for course accreditation as set by the Malta Further & Higher Education Authority (MFHEA) as reflected in the Malta Qualifications Framework. Themes identified were used to develop the "Course Accreditation Gap Analysis Tool (CAGAT)" which is a checklist, intended to encompass the list of requirements necessary for course accreditation. The CAGAT was validated by an expert panel consisting of two academic pharmacists, a pharmacist with experience in quality and, two members within the Malta Laboratories Network- Institute for Scientific Development.

### Results

The developed "Course Accreditation Gap Analysis Tool (CAGAT)" consists of 6 headings namely: Organisation information, Course information, Requirements and Learning Outcomes, Lecturers and Teaching Method, Delivery of the course and Post course delivery. The checklist can be completed within a maximum of 10 minutes. All members of the expert panel, (N=6) agreed that the CAGAT is easy to use and assists the user to identify missing gaps of information required to provide an accredited continuous professional course.

### Discussion

The developed CAGAT assists in the design and delivery of accredited courses intended for the pharmaceutical workforce allowing the sharing and enhancement of expertise in fields such as forensics, medical devices expertise and quality management systems. The CAGAT identifies gaps in the organization's current management system and the requirements for courses accreditation targeting professional pharmaceutical workforce development.

## 14 Simulation - Based Education Implementation in Pharmacy Program

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### Introduction

Simulation is one of the teaching strategies that has been used widely in health profession education. Pharmacy profession has evolved with the progression of the pharmacist role with the emphasis on patient-centered care. Lithuania is expanding pharmaceutical care services in community pharmacies, so new knowledge is relevant for pharmacy students. Simulation teaching tools have been implemented in the Pharmacy program aiming to enhance student's pharmaceutical knowledge, clinical skills and communication competencies.

### Method

Several simulation tools were implemented in the Faculty of Pharmacy. (1) Imitation pharmacy connected with direct video transfer to seminar room, which allows to on-line discussion of students and teachers. (2) Drug safety program Inxbase, which is the tool used of Lithuania E-health system for daily practice of doctors and pharmacists. (3) E-Prescription class integrated with electronic health records and practice-management system, adapted for students- to educate the E-Prescription system peculiarities. (4) Health and beauty service laboratory, equipped with blood pressure measurement, blood oxygen monitoring, immunodiagnostics, diabetes monitoring system, respiratory inhalers, etc.

### Results

Student learning outcomes were assessed through interim assessments and during the final exam, which had an Objective Structured Clinical Examination (OSCE) component. OSCE was organized with 4 stations: management of pharmaceutical documents, clinical pharmacy services, pharmaceutical technologies and drug analyses. Feedback from students was collected on the time for completing tasks, evaluation criteria, student experience during exam, student preparation for OSCE, etc. Most of students evaluated the OSCE positively, gained courage, confidence and experience in completing tasks within a limited time frame. However, most of students reported that experienced stress during OSCE examination.

### Conclusion

Pharmacy education simulation tools have positive outcomes regarding students' communication skills, patient counseling and clinical pharmacy knowledge. However, the student's attitude and psychological disposition is an important factor in improving teaching and assessment forms.

## 15 Pedagogical Escape Room for Medicine Dispensing and Patient Counselling – Students' Perceptions

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### Introduction

Escape games refer to different tasks and problems based on time-limited stories (1). They are perceived as motivating, constructivist learning environments that enable active learning and community problem-solving (2). Escape rooms enhance teamwork skills and integration of subjects and 21st century skills i.e. active participating, problem solving, and logical reasoning.

The pharmaceutical escape room was built on the campus in the spring of 2022 as part of pharmacy students' Project Work course in 2021-2022. The game focuses on medicine dispensing and patient counselling using real-world scenarios and tasks. The game is aimed at second-year pharmacy students who are about to start their first internship. The aim of this study is to explore students' perceptions of the escape room.

### Method

Second-year pharmacy students (n=68) participated in the escape room in the spring of 2023. Each game included an introduction to the game and its learning objectives, and a post-discussion after the game. Students filled in an electronic feedback questionnaire after the post-discussion. Students' perceptions were assessed by statements with a 5-point Likert scale (1=weakest agreement, 5=strongest agreement). Quantitative methods were used in the analysis.

### Results

Of the students, 75% strongly agreed that the escape room was well constructed and motivated to play. 88% strongly agreed that learning in the escape room was enjoyable, and that escape games should be used more in pharmacy studies. In addition, the majority of the students (81%, 79%, and 72%, respectively) strongly agreed that escape game promoted logical reasoning, problem-solving skills, and active participating.

### Conclusion

The pedagogical escape room worked well for engaging students to solve medicine dispensing and patient counselling tasks as teamwork, as well as enhancing 21st century skills. Escape room is an innovative way to enhance students' motivation to learn in a collaborative way.

<sup>1</sup> Fotaris P, Mastoras T. Escape Rooms for Learning: A Systematic Review. In: 13th European Conference on Games Based Learning, 2019; Denmark.

<sup>2</sup> Nicholson S. Creating Engaging Escape Games for the Classroom. *Childhood Education* 2018; 94(1): 44-49.

## **16 A Sustainable Approach To Internationalization In Pharmacy Education Through Virtual Exchange Programs: The Strategy Of The Faculty Of Pharmacy At University Ceu-San Pablo (Spain)**

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### **Introduction**

The Faculty of Pharmacy at University CEU-San Pablo (CEU-USP) is devoted to internationalization. Indeed, it exchanges more than 100 students per year through the Erasmus+ program or through International Bilingual Programs in collaboration with the Universities of Chicago and Boston. Another goal of our Faculty is to improve sustainability in pharmacy education. Virtual international exchange programs, such as COILs (Collaborative Online International Learning), allow students and educators from different countries to collaborate and exchange ideas on various topics, including sustainable pharmacy practices. Moreover, COILs eliminate the need for international travel, which can significantly reduce carbon emissions.

### **Method**

Virtual exchange programs typically involve several online activities, including an introductory session with icebreaking activities. Under the guidance of their professors, students work together in teams to complete a specific project. They then present their findings through oral presentations or written reports. Throughout the program, students are evaluated, and feedback is collected through satisfaction surveys.

### **Results**

The Faculty of Pharmacy has organized 15 virtual international exchange programs in the last three academic years (2020-2021 to 2022-2023), with the participation of over 120 professors and 1,100 students from 12 different degree programs and 22 universities across 15 countries. These programs have helped students enhance their intercultural, communication, and teamwork skills. The projects have included students enrolled in the degrees offered by our Faculty of Pharmacy (Pharmacy, Biotechnology, Nutrition and Dietetics, and Optics and Optometry), and students from health and non-health related programs, such as Marketing, Architecture, and Business Administration, resulting in multidisciplinary learning experiences.

### **Conclusion**

The Faculty of Pharmacy at CEU-USP has developed a strategy to promote internationalisation and sustainability in education through virtual exchange programs that facilitated the collaboration of more than 1,200 students and professors from 15 different countries without the need for travel, significantly reducing the carbon footprint.



# ORAL COMMUNICATION

Friday,  
May 19<sup>th</sup>, 2023

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## 17 Continuing Education in Soft Skills: 20-Year Experience in Workshops for Health Professionals

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### Introduction

Continuing education is essential in the health sciences. Our non-profit scientific institution has organized various courses to train postgraduates and professionals in key competences that are insufficiently covered in pharmacy and other biomedical degree programmes. Here we analyse and share our vast experience in developing and delivering training courses targeting soft skills over the last two decades.

### Method

Since 2004, we have designed workshops for health professionals to develop competency in five essential tasks: 1. How to prepare study protocols; 2. How to write scientific papers; 3. How to design and deliver oral presentations; 4. How to interact with journalists; and 5. How to disseminate research projects in short videos. Two to four trainers deliver these courses in different formats: in English or Spanish and face-to-face (16 hours over 2 days) or online (synchronous or asynchronous). All workshops are eminently practical. Participants complete anonymous satisfaction questionnaires (Likert scale 0–5) at the end of each course.

### Results

From 2004 through 2022, we held 212 iterations of the courses to teach these five tasks: 193 (93%) face-to-face and 19 (7%) online. Courses trained 6,179 (70% women) professionals in 47 cities (40 in Spain and 7 abroad); 4,325 (70.0%) completed the satisfaction questionnaire. Mean overall course satisfaction score was 4.6 of 5.

### Conclusion

Pharmacists and other health professionals attending these courses were highly satisfied. Independent institutions like the Dr Antoni Esteve Foundation can contribute to continuing education in the health sciences by focusing on essential competences that fall outside standard university curricula.







# POSTER PRESENTATIONS



## 1 **Generating and Validating of Global Indicators and a Monitoring Framework for the Fip Development Goals**

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### **Introduction**

In September 2020, the International Pharmaceutical Federation (FIP) launched the FIP Development Goals (DGs) framework, representing an integrated set of 21 Development Goals to shape and better guide a systematic and sustainable advancement and transformation of pharmacy practice nationally, regionally and globally. This research aims to develop a set of evidence-based progress indicators aligned to the 21 FIP DGs framework that will support long-term monitoring of progress in the transformation of pharmacy practice supported by the FIP DGs across workforce/education, practice and pharmaceutical science.

### **Method**

A content analysis of the relevant collated data from global published reports by WHO and FIP was undertaken. This was followed by a Delphi process of an international Expert Group to identify and establish initial consensus on potential indicators aligned with the published FIP DGs framework. In a subsequent study, the Delphi method's outcomes were used to conduct a global cross-sectional online questionnaire to construct and validate the relevancy and availability of the proposed indicators and generate the final list of global FIP DGs indicators.

### **Results**

The Delphi consultation produced an initial consensus on the development of 21 proposed lists of 165 unvalidated indicators aligned to the 21 FIP DGs. The analysis of the subsequent cross-sectional questionnaire generated a final list of 109 "Usable" indicators after meeting two pre-determined statistical criteria and validated by the wider professional engagement in a global context ready for deployment.

### **Conclusion**

A global set of correlated, validated transnational evidence-based indicators was developed to monitor FIP DGs' progress worldwide and support countries in the process of transformation for their workforce, education, practice and pharmaceutical science. It will also enable the development of a global dashboard for global trends monitoring, which in turn will help provide global insight for sharing best practice development, inform/reform policies, and aid advocacy for the profession over the decade ahead.

## 2 Knowledge, Attitude, and Readiness of Pharmacists in Iraq toward Medication Therapy Management for Patients with Attention Deficit Hyperactivity Disorder: A Cross-sectional Study

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### Introduction

Medication Therapy Management (MTM) is a patient-centered, collaborative service that optimizes drug therapy and improves clinical outcomes, including quality of life. Pharmacists play a critical role in MTM service and are uniquely positioned to provide comprehensive medication management for patients with attention deficit hyperactivity disorder (ADHD).

### Aim

The aim of this study was to assess the knowledge, attitude, and readiness of Iraqi pharmacists regarding MTM service in general and medication management of ADHD patients.

### Method

A cross-sectional study was conducted among 480 Iraqi pharmacists working in community pharmacies in Baghdad. Data were collected using a pre-validated 34-item self-administered questionnaire divided into four sections that capture sociodemographic data, knowledge, attitudes, and readiness to provide MTM service and ADHD medication management. Cronbach's alpha was calculated for reliability analysis. Chi-square test was used to compare two categories, whereas student's t-test was used to compare two means.

### Results

Results showed that only 26.5% of pharmacists had good knowledge, 30.4% had good attitude, and 30.8% had high readiness regarding MTM service and ADHD medication management. Multivariate analyses revealed that a higher number of hours worked per week in the hospital was significantly associated with a lower likelihood of a high attitude, whereas experience with MTM, high knowledge, and high attitude were significantly associated with a higher likelihood of high readiness.

### Conclusion

The findings of this study indicate that knowledge, attitudes, and readiness regarding MTM service and ADHD medication management are inadequate. Therefore, there is an urgent need for effective educational strategies to better prepare pharmacists for their potential role in the community, particularly for the provision of MTM service and ADHD care. In this way, pharmacists can better assist patients in managing their medications, improve clinical outcomes and ultimately increase the efficiency of the overall health care system.

## 3 Halophytes – Key Resources in Promoting a “One Health” Approach

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### Introduction

Europe exhibits remarkable biodiversity, particularly concerning wild-growing plant species, which have traditionally been used as an alternative to conventional plant foods, fodder, and for medicinal purposes. Some of these species are extraordinarily well adapted to conditions of high abiotic stress and are called extremophiles. Among these, halophytes stand out, a group of relatively rare species with a high tolerance to salt stress, in some cases withstanding salinity levels exceeding 1000 mM. To thrive in these extremely difficult circumstances, these species have evolved mechanisms to maintain water and ionic balance and defend against oxidative stress. As part of their defense strategies, it is worth noting their ability to synthesise several metabolites with highly relevant biological properties.

### Method

A comprehensive review of the published scientific literature on halophytes was conducted, with emphasis on their potential applications in both agri-food and pharmaceutical sectors.

### Results

The potential of halophytes, although enormous, remains largely untapped. They can be produced on saline soils, whose agronomic value is low, and irrigated with sea or brackish water, their cultivation represents an important contribution to solving food security problems. Apart from their role as food/feed, extracts of these species rich in bioactive molecules can be used as antioxidants and antimicrobials, either incorporated directly into food/pharmaceutical matrices or used as components of bioactive packaging or of smart textiles; finally, they can be used as biopesticides and still contribute to the discovery of new drugs. Furthermore, they can help with climate change mitigation.

### Conclusion

Halophytes are a key resource for the future and can play a major role in improving not only sustainability in pharmacy, but the health of the planet as a whole.

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## 4 Pharmaceutical Deontology: a Problem-based Learning Approach

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### Introduction

Pharmaceutical Deontology is a set of principles and rules of ethical nature which, considering historical and scientific adjustment, the pharmacist must respect in the exercise of his professional activity. Its knowledge is therefore crucial for students being future pharmacists, hence mandatory in their curricula.

Problem-Based Learning (PBL) methodology is based on the contact with the problem to be solved in the first place and then searching for the knowledge to present its resolution. The advantages of using PBL are well documented and the most important are: the increase of the student's responsibility in their learning; the increase of the interaction between the students and the teacher, the promotion of their participation; the creation of an interesting and motivating environment leading to a greater focus in subjects; the development of self-learning competencies needed in the future. The ability to solve problems and the integration of knowledge into professional life are skills that are expected to be developed for the future.

This study aims to find an alternative method to make the learning of this course more effective and appealing, opting for a PBL approach instead of classical lecture teaching.

### Method

The PBL approach was applied to the learning of Pharmaceutical Deontology subjects circularly: teacher interaction as a facilitator of topic presentation; case presentation; problem identification and analysis; literature search; teamwork and discussion; presentation of an effective solution and rationale; teacher interaction as a facilitator of result analysis.

### Results

A real-world case study is presented. The outcome is to empower students with skills to think critically about the knowledge they need and to know how and where to get that information.

### Conclusion

PBL is an alternative teaching method that can lead to successful learning of Pharmaceutical Deontology, driven by real-world cases.



## 5 Pharmacy Student Training for Pharmacist-led Vaccination Services in Malta

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### Introduction

A vaccination training programme was developed and delivered to pharmacy students in the first year of the pharmacy course for the first time during academic year 2021-22. This training programme involves: 1) Three hands-on laboratory practical sessions using injection simulators to practise preparation and reconstitution of vaccines and administration via the intramuscular, subcutaneous and intradermal routes, 2) Three observation sessions within the National Immunisation Service-Primary Healthcare, and a 3) First aid course. Upon successful completion, a skills checklist and pharmacy-based vaccination delivery certificate are issued. Skills in documentation post-administration and management of post-vaccination reactions are practiced. The aim was to assess knowledge, skills and confidence of pharmacy students who followed the vaccination training programme.

### Method

A self-administered questionnaire was developed and validated. The questionnaire consists of three sections: Participant demographics, knowledge on preparation and administration of vaccines, and skills. Following ethics approval, the questionnaire was distributed to all students (N=17) who completed the training programme.

### Results

Sixteen students (12 female, 4 male, age range 19-29 years), completed the questionnaire. Fifteen students are aware of errors during storage, preparation and administration of vaccines, and how these can be prevented. These 15 students are aware of contraindications. All respondents believe that the training equipped them with necessary skills required for preparation and reconstitution of vaccines from vials and ampoules. Fifteen students prefer to administer vaccines to the adult group ( $\geq 16$  years) over paediatrics. The preferred route of administration is the intramuscular (n=11) over the subcutaneous route (n=5), and the preferred site of injection is the deltoid (n=8), followed by the upper arm (n=6) and thigh (n=2).

### Conclusion

After undergoing the training programme, students generally feel confident to educate the patient regarding vaccines and on any concerns they may have, to prepare and reconstitute vaccines, and to administer vaccines, confirming the adequacy of the training programme.

## 6 Joint Master Programs in Pharmacy – Evolution in Higher Education

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### Introduction

The Medical University of Plovdiv (MUP) is one of the five universities providing pharmacy education in Bulgaria. According to the Regulation on Uniform State Requirements for the acquisition of master's degree in pharmacy, the training is full-time with a duration of not less than five academic years and students are enrolled in a single-cycle degree program. However, in the contemporary working environment, it is imperative that classical curricula are adapted to the rapidly changing conditions and growing demands of pharmaceutical science and industry. The goal of our project was to implement two joint master's programs for pharmacist as a second level of their education.

### Method

The project implementation started in 2022. The curricula of the joint master's programs were prepared based on similar programs in other European universities and the latest educational trends in pharmacy. Various subjects were introduced, and curricula were discussed with pharmacy graduates, employers, and were approved by the MUP's Academic Council. The accreditation dossier has been submitted to the National Evaluation and Accreditation Agency.

### Results

Two joint master's programs were developed within the framework of a project called OMNIA, dedicated to the modernization of educational processes in the today's university in partnership with two renowned academic institutions in Bulgaria – the Institute of Molecular Biology of the Bulgarian Academy of Sciences, and Plovdiv University "Paisii Hilendarski", thereby providing a multidisciplinary environment for a competency-based learning model. Digital transformation, electronic resources, and cloud technologies will be introduced in the educational processes.

### Conclusion

Students enrolled in the joint master's programs will become a part of a creative environment with access to modern facilities and equipment used in the pharmaceutical industry. Through a range of courses, students will develop essential skills and competencies. On a larger scale, they will gain knowledge about the global health problems of modern society.

## 7 Assessment Of Students' Performance and Satisfaction with a First-Year Osce in an Undergraduate Pharmacy Curriculum

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### Introduction

The role of the pharmacist in patient-centred care demands that graduates demonstrate academic achievement but also possess skills and reach levels of clinical competence. The acquisition and ongoing skills assessment should be instilled early in the undergraduate pharmacy curriculum. The Objective Structured Clinical Examination (OSCE) is a valid method to assess skills. The aim of this study was to test first-year pharmacy students' performance and satisfaction with an OSCE implemented for the first time at the University of Navarra.

### Method

OSCE comprised seven stations and incorporated several methods of assessment: standardized patients, skills laboratory, skills handling microscope, multiple choice test, and written report. A post-OSCE satisfaction survey was used.

### Results

119 students completed the OSCE. The average score was 7.0 (4.8-8.9). Students received the highest scores in the identification of medicinal plants 9.0(4.8-10) and in skills handling microscope 8.5 (2.5-10). 98% of students achieved a passing grade for stations with standardized patients, average score 8.0 (3.4-10). The lowest scores were recorded in anatomy 4.0 (0-9.0) and in drug calculation skills 4.4 (0-10). 112 students completed the satisfaction survey. The majority (92.9%) perceived the OSCE to be a valuable experience. About 93% believed that it tested clinical competence better than other traditional methods. 97.3% of the students expressed that the content of the stations was appropriate to the topics worked on during the course.

### Conclusion

The implementation of an OSCE into the first year was highly valued by students and facilitated the objective of integrating scientific knowledge with clinical skills. Students' communication and patient-care skills were developed in the first year to boost their confidence at the student-patient interactive station. OSCE enabled students to contextualize and assimilate their knowledge embedded in the process of becoming a pharmacist. It also fostered feelings of professional identity, responsibility, and a patient-centred care.

## 8 Student project uu: A comparison of the environmental impact of plastic pipettes and glass pipettes within a Utrecht University Laboratory Skills Course

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### Introduction

The role of the pharmacist in patient-centred care demands that graduates demonstrate academic achievement but also possess skills and reach levels of clinical competence. The acquisition and ongoing skills assessment should be instilled early in the undergraduate pharmacy curriculum. The Objective Structured Clinical Examination (OSCE) is a valid method to assess skills. The aim of this study was to test first-year pharmacy students' performance and satisfaction with an OSCE implemented for the first time at the University of Navarra.

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119 students completed the OSCE. The average score was 7.0 (4.8-8.9). Students received the highest scores in the identification of medicinal plants 9.0 (4.8-10) and in skills handling microscope 8.5 (2.5-10). 98% of students achieved a passing grade for stations with standardized patients, average score 8.0 (3.4-10). The lowest scores were recorded in anatomy 4.0 (0-9.0) and in drug calculation skills 4.4 (0-10). 112 students completed the satisfaction survey. The majority (92.9%) perceived the OSCE to be a valuable experience. About 93% believed that it tested clinical competence better than other traditional methods. 97.3% of the students expressed that the content of the stations was appropriate to the topics worked on during the course.

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## 9 Sustainability assessment of lab coats at Microbiological Laboratories class I and II

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At the Pharmacology Department of the Utrecht University, 2 different categories of lab coats are used and cleaned separately due to strict safety regulations: Microbiology Level-I (ML-I) coats (polycotton) are washed bi-weekly and used for an average of ten years before disposal in the waste. ML-II coats (polypropylene/polyethylene) are not suited for washing/sterilization and therefore discarded after 1-2 months. These coats contribute to high costs, excessive textile waste and environmental impact. Within two student projects it was investigated which adjustments could be made to improve circularity of lab coats in terms of reducing waste and environmental impact (1) and whether the available lab coat alternatives could be more sustainable compared to the current models (2).

In the first project, the R-ladder framework suggested rethinking the composition of materials to reduce material impacts, finding alternative end-of-life treatments, and extending the lifetime during use for both types of lab coats. 100% cotton or bamboo was recommended as an alternative material of future lab coats because of the environmental impact, supply availability, reuse, sterilization, and recycling possibilities in the Netherlands. Furthermore, lab coats in the end of life stage can be reused or repurposed.

The second project made use of a comprehensive framework which considered the environmental and the social impacts of each lab coat alternative, by using an Environmental Life Cycle Assessment (E-LCA) as well as a social risk assessment. Results showed that the recycled polycotton scored significantly better than the currently used polycotton lab coats. Increasing the lifespan of a lab coat also increases the eco-impact of the washing cycle per labcoat, which is another parameter to be optimized. From a social perspective, it is important to engage suppliers by emphasizing the importance of increased knowledge about social risks to improve this aspect in lab coat supply chains.

# POSTER PRESENTATIONS

## 10 Implementation of the Training Course “Monitored Dosage System (MDS)” For Students in the last year of The Pharmacy Degree

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### Introduction

The Pharmacy Practice Classroom (PPC) of the Faculty of Pharmacy of University of Seville (FPUS) began to work in 2018 with the aim of increasing professional practice skills of Pharmacy students. Monitored Dosage System (MDS) is a system of aid in the adherence to the treatment; the pharmacist organizes the oral solid forms that a given patient takes, in a reconditioned blister packaging, that indicates the day and time in which they should be administered, according to the prescribed dosage regimen. Andalusian Council of Colleges of Pharmacists (CACOF) offers the training and accreditation work of registered pharmacists for the correct elaboration of PDS, according to the Standard Work Protocol (SOP). Through an agreement between FPUS and CACOF, the training is assumed by the FPUS within the subject “Pharmaceutical Care and Medicines and Health Practice”

### Method

Meetings are held between teachers and CACOF, in order to set the course content. Theoretical part is based on the SOP of CACOF and the document “Agreed criteria between the different Autonomous Communities and the AEMPS, for the preparation of Monitored Dosing Systems (MDS) by the Pharmacy”. In the practical part, using data from the drug treatment of a simulated patient, students have to fill in the corresponding documents and prepare the MDS according to the SOP instructions. After completing the training workshop, a certificate will be issued to students who can present at the Official College of Pharmacists to be validated.

### Results

The training workshop MDS is being carried out since 2018, in the PPC. 1307 student have obtained the certificate that enables them to do MDS. Even in the supervised internship period, students can collaborate in that assistance service

### Conclusions

Pharmacy student training is increasingly up-to-date, including activities that prepare them for professional life once they finish their studies.

## 11 Evaluation of an Updated Course in Pharmaceutical Chemistry

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### Introduction

First year pharmacy students at the University of Malta follow a study unit entitled 'Pharmaceutical Chemistry.' The study unit consists of 6 ECTS and is delivered via 42 hours of lectures. The study unit was updated to include applications of chemistry to pharmaceutical and physiological processes.

### Method

Course content was updated to cover topics related to validation of methods of pharmaceutical analysis, interpretation of analytical data of relevance to pharmacy, and thermodynamics and kinetics. All students following the newly updated study unit for the first time were invited to rate the course content and delivery of lectures. Students were given a total of 13 statements on the content and organisation of the study unit, lecturing methodology and method of assessment. For each statement, students were asked to choose between 'Strongly agree', 'Agree', 'Not sure', 'Disagree' and 'Strongly disagree.' Students' knowledge development was assessed through a 3hour written assessment consisting of 5 questions based on short questions.

### Results

Out of a total of 15 students, 14 gave feedback about the study unit. The majority of students (n= 10) agreed that the content of the study unit met their initial expectations. All students agreed that the study unit was well organized, delivery of lectures was clear and lectures were delivered through use of appropriate media. The majority of students felt that the method of assessment enabled them to demonstrate achievement of the intended learning outcomes (n=9). The workload involved and time allocated to the assessment were considered fair (n=12).

### Conclusions

The updated course supports students to design and plan validation of pharmaceutical analysis, interpret analytical data and appreciate thermodynamic and kinetic principles as applied to pharmaceutical processes. The course was positively evaluated by students who valued the relevance of the content and were satisfied with the way the study unit was organized and delivered.

## 12 Service-Learning in the Promotion of Health Education and Healthy Lifestyles: an Innovative Initiative from Pharmacy and Nutritional Sciences

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### Introduction

The Service-Learning Project (SLP) is an educational approach that combines community service activities with the student's own learning in real-world situations. The aim of this SLP is to plan and hold several workshops on health education led by undergraduate students and geared towards teenagers to promote healthy lifestyles. This project is funded by the Program for Innovation and Good Teaching Practices of the University of Granada (22-23).

### Method

16 students from the Degrees of Pharmacy, Human Nutrition and Dietetics and Food Science and Technology, were distributed in 3 working groups: Medication Use, Healthy Food and Eating Disorders. The workshops were carried out along November 2022, in coordination with the City Council, in secondary schools in Guadix (Granada), through an interactive presentation. An ad hoc questionnaire was developed for the adolescents, which included multi-choice test questions to measure knowledge about this, and an opinion question using a Likert scale (0-5 points). For the analysis, a simple imputation of missing data was performed by assigning the mode. Frequency measures (prevalence and percentage) and position measures (mean and standard deviation) were also calculated.

# POSTER PRESENTATIONS

## **Results**

A total of 12 sessions were held, in which 373 teenagers participated. The global evaluation of the Medication Use workshop was  $8.43 \pm 1.32/10$  points. The teenagers scored an average of  $3.84 \pm 1.02/5$  points for knowledge and valued the workshop with  $4.59 \pm 0.74/5$  points. The overall evaluation of the Healthy Food workshop was  $8.08 \pm 1.40/10$  points. Knowledge scored an average of  $3.51 \pm 1.08/5$  points and opinion obtained  $4.58 \pm 0.83/5$  points. The Eating Disorders workshop obtained an overall rating of  $8.38 \pm 1.38/10$  points. The teenagers obtained an average of  $3.74 \pm 1.10/5$  points for knowledge and rated the workshop with  $4.65 \pm 0.71/5$  points.

## **Conclusions**

The implementation of the SLP, under Teaching Innovation Project of Faculty of Pharmacy, allowed to provide health education and healthy lifestyles to teenagers. The workshops increased knowledge and were perceived with high satisfaction by attendants.



## 13 Launching an Objective Structured Clinical Examination (Osce) for the Evaluation Of Pharmacy Training Placements. Results of the first pilot study at the University Of Granada

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### Introduction

The six-month training placement undertaken by final year undergraduate students in Community or Hospital Pharmacy enables students to apply their acquired theoretical knowledge in a work environment. To evaluate it, the Objective Structured Clinical Evaluation (OSCE) has become the gold standard in competency-based assessments for healthcare degrees such as Pharmacy. The aim of this pilot study was to test and validate an OSCE for the evaluation of training placements in Pharmacy.

### Method

The coordinating committee was comprised of 12 lecturers from six departments, divided into station teams. In order to construct the specification table, seven competencies and their specific weights were delineated. Six stations were designed, five of which consisted in simulated patients in a community pharmacy setting and one was a static station with written questions about common situations in community and hospital pharmacy. Structured checklists with specific items were developed to be objectively evaluated by each examiner. A questionnaire to explore students' perspectives was designed.

### Results

22 training placement, 7 master's and 5 undergraduate students voluntarily participated in the pilot OSCE undertaken in July 2022. Respectively, the mean overall score was  $57.35 \pm 6.92$ ,  $58.04 \pm 9.20$  and  $47.97 \pm 5.47$  out of 100. The highest scored station was "Dispensing of prescription medication" ( $67.96 \pm 11.44$ ) and the lowest was "Dispensing of narcotic drugs" ( $36.35 \pm 20.36$ ). Regarding the competencies, the highest scored was "Communication" ( $79.87 \pm 10.7$ ) and the lowest was "Pharmacy management" ( $38.73 \pm 16.78$ ). 79.4% of students passed the evaluation (86.4% of training placement students, 85.7% of master's students and 40.0% of undergraduates). A high opinion of the OSCE was obtained, with a mean of  $4.32 \pm 0.91$  out of 5.

# POSTER PRESENTATIONS

## **Conclusions**

OSCE is a suitable method for the assessment of competencies acquired during Pharmacy student's training placements. This pilot study allowed the testing of its practical development and the identification of its strengths and performance gaps for future implementation.

## 14 Proposing A Competency Matrix for Pharmacists in Wholesale Distribution

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### Introduction

Pharmaceutical graduates in pharmaceutical wholesale distribution are expected to lead processes ensuring safety and quality of the products, ensure patient access and resilience in distribution processes and function as a Responsible Person (RP). The aim of this research was to develop an educational competency matrix for the RP role.

### Method

In an earlier study, a competency framework (RP-CF) for the RP position in wholesale distribution was developed and six validated competency clusters were identified: Leadership, Wholesale distribution, Monitoring and reviewing, Management of outsourced activities, Documentation and Quality Management System 1. A competency matrix was extrapolated from the RP-CF to summarise and provide guidance on RP competencies. Competencies present in the competency clusters were grouped into three competency bubbles (CB): Generic Pharmacist Competencies, Technical Competencies and Good Distribution Practice (GDP) Competencies. A triangular matrix was proposed to interlink these three CBs and the six competency clusters.

### Results

The 6 competency clusters were positioned in the matrix in relation to how strongly or weakly related they are to the competency bubbles. Wholesale distribution consisting of 21 competencies is common to all 3 bubbles and is positioned at the centre of the matrix. Management of outsourced activities and Reviewing and Monitoring, including 10 competencies, were strongly associated with the generic CB and technical CB. The remaining three competency clusters including 25 competencies were strongly associated with the GDP CB and generic CB competencies.

### Conclusions

The competency matrix provides a summary of the relationship of the RP competency clusters to general, technical and good distribution practice required competency development. Validation of this matrix would ensure its robustness for application in pharmacy education programmes.

**Reference:** 1. von Brockdorff B, Azzopardi LM. Competencies for the position of the responsible person in good distribution practice. *Pharmacy Education*. 2023;23(1):30-8.

# POSTER PRESENTATIONS

## **15 Are the current Teaching Strategies, in the Pharmacy Programme in Iceland, facilitating Students' Learning?: A Focus Group Study**

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### **Introduction**

Teaching strategies in the Faculty of Pharmaceutical Sciences have shifted in the past 5-8 years, from large summative assessments to a combination of formative and summative assessments throughout the course. Accelerated teaching is also becoming more common. However, the effect of these changes on the students' learning environment has not been assessed. This study aims to determine the students' perceptions regarding these changes.

### **Method**

We interviewed both BS and MS students in the Pharmacy programme in separate focus groups (n = 5 and n = 4 respectively), the interviews were transcribed, and thematic analysis was conducted. Review from the University of Iceland Science Ethics Committee was obtained before the start of this research. Students' participation was voluntary.

### **Results**

Students responded positively to the combination of formative and summative assessments, reporting that having more assignments throughout the course helped them stay on track. Additionally, inclusion of a final exam as a summative assessment aided in summarizing the course material and improving their ability to remember the course material in the long run. The students were also positive towards the accelerated teaching format, where a course is taught a part of the semester, as it helped them keep pace with the study material and to connect between the core concepts in the course more efficiently. However, students noted that this format might not be suitable for courses with heavy course load, and that accelerated teaching courses that only spanned one week and were 1-2 ECTS, was insufficient to comprehensive understanding of the subject matter.

### **Conclusions**

Based on the positive response from students, it can be inferred that these new teaching strategies have enhanced their learning experience. These results will guide questionnaire development to evaluate the impact of these changes on students' stress levels and well-being for BS and MS Pharmacy students.

# POSTER PRESENTATIONS

## 16 “Documentation And Scientific Methodology” in the Degree in Pharmacy: Analysis of an Experience from the Perspective of Reflection and Innovation

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### Introduction

The students for whom the consolidation of our teaching project is intended are the five groups of the first year of the Degree in Pharmacy at the University of Valencia, who study the subject Documentation and Scientific Methodology.

### Method

Through 4 consecutive innovation projects we have developed the following strategies in order to provide a general overview of pharmacy and medicines, as well as the different techniques and sources of information for their study: Improvement in the acquisition of the competences of the subject; Achievement of ethical values and the importance of interdisciplinarity; Implementation of teaching methodologies using ICT- based tools; Encouragement of group work and cooperation between students; Enhancement reached in student learning, motivation and satisfaction in terms of success rate.

### Results

The current reflection leads us to consolidate a teaching project that includes i) the integration of contents related to the Sustainable Development Objectives (SDGs) established as priority lines of action of the University of Valencia, such as health and gender equality and Open Access information; ii) the implementation of active learning methodologies (digitalized subject handbook, interactive forums in Moodle, media strategies called “pharmaceutical pills”) and iii) modifications in the organization of teaching and evaluation of the contents which implies online questionnaires within a continuous evaluation and a final exam.

### Conclusions

We think that the strategies, methodologies, as well as the analytical tools applied, both quantitative and qualitative, show an improvement in the assimilation of learning at the level of content, skills, and attitudes, with the integration of the SDGs in academic life. The consolidation of this teaching innovation project is being adapted to the same subject in other related degrees of the Faculty of Pharmacy such as Human Nutrition and Dietetics and Food Science and Technology.

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# POSTER PRESENTATIONS

## 17 Antibacterial Gymkhana: preventing Antimicrobial Resistance

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### Introduction

The Antibacterial Gymkhana is a recreational-educational activity to raise awareness about the prudent use of antibiotics and the importance of bacterial resistance in human, animal and environmental health.

### Method

The 1<sup>st</sup> Antibacterial Gymkhana was held on November 17, 2022, in the CEU Sports Area of the University Cardenal Herrera-CEU, coinciding with World Antibiotic Awareness Week.

It is based on the integration of core subjects (Pharmacology and Microbiology). Participants were organized into mixed teams of 4 students (2 Pharmacy and 2 Veterinary Medicine). Each team had to successfully complete four skill tests, based on four sports, with a particular theme based: volleyball-prevention, soccer-diagnosis, basketball-treatment, and paddle tennis-mechanisms of bacterial resistance.

Each team was assigned a clinical case, the common thread of the activity, with four related questions linked to the theme of each sport test. After passing each test, they must answer the question about the clinical case related. The winning team was the one that has answered all the questions correctly and has completed the tests in the least amount of time.

### Results

Of the 60 students enrolled, 52 finally participated (46.15 % Pharmacy and 53.85 % Veterinary Medicine), so they formed 13 teams of 4 people. The most represented courses were 1<sup>th</sup> Pharmacy (15) and 5<sup>th</sup> Veterinary Medicine (12).

The average time the teams spent completing the gymkhana was 17.12 minutes.

The four questions were answered correctly by seven teams.

45 of the 52 participating students assessed the activity through a satisfaction survey. The average score given was 9.55/10, and 100% of the students indicated they would like to repeat the activity.

### Conclusions

The antibacterial gymkhana mixes fun with learning about the correct use of antibiotics and strategies to combat bacterial resistance, highlighting the need for health professionals to contribute to curbing this important public health problem.

## 18 Behavioral, Gene, and Protein Neuroadaptations Associated with Cannabidiol-Mediated Modulation in an Animal Model of Perinatal Alcohol Exposure

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### Introduction

Fetal alcohol spectrum disorder (FASD) includes neuropsychiatric disturbances related to gestational and lactational ethanol exposure. Available treatments are minimal and do not modulate ethanol-induced damage. Implementing animal models that simulate this complex situation has become an urgent clinical need. The main goal of this study was 1) to set up a new animal model of FASD with associated behavioral, protein and gene expression disturbances and 2) to analyze the effects of early and chronic cannabidiol (CBD) administration on these alterations in male and female offspring.

### Method

C57BL/6J female mice were exposed to a voluntary ethanol consumption paradigm (28 days) and crossed after achieving stable intake of higher ethanol. The ethanol administration (3 g/kg/12h, p.o.) started from gestational day 7 to postnatal day 21 (PND21). On the weaning day (PND21), pups were separated by sex and CBD administration began (30 mg/kg/24h, i.p.), evaluating its effects on different emotional and cognitive aspects. At the end of the behavioral evaluations, real-time PCR and immunohistochemistry analyzed gene and protein expression changes.

### Results

Rodents exposed to the animal model of FASD showed higher anxiety and depressive-like behaviors and higher emotional reactivity. In addition, cognitive impairment was observed in different behavioral tests. These behaviors were accompanied by alterations on the stress axis and cannabinoid receptor gene expressions. In addition, an essential reduction of other neuronal markers in the hippocampus was observed by immunohistochemical analyzes. CBD normalized FASD model-induced emotional and cognitive disturbances, gene expression changes, cellular plasticity, and structural features with sex-dependent differences.

### Conclusions

These results suggest that CBD's early and repeated administration modulated the long-lasting behavioral and neurobiological alterations induced by the FASD model, paving the way for further exploring its usefulness in children with FASD.

# POSTER PRESENTATIONS

## 19 Usefulness of Spect in the Planning of Liver Radiotherapy: a Review of the Literature

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### Introduction

Radiotherapy(RT) treatment in oncology is used to treat liver tumors. The liver is a sensitive organ to RT, which can induce loss of liver function and, consequently, death of the patient. Current clinical tests do not provide an accurate estimate of liver function. Knowing the location of functional liver tissue could be very useful for tailoring RT strategies. This review studies the radiopharmaceuticals available for the use of Single Photon Emission Computed Tomography (SPECT) in planning hepatic RT(SBRT).

### Material and methods

A literature search was performed in Pubmed and Medline from 2017 to 2022 with the keywords: SBRT OR SABR OR radiotherapy AND liver AND SPECT diagnosis. 137 articles were found, among them, 5 articles focused on SPECT to assess liver functionality which were included in this study. The types of radiopharmaceuticals, and their applicability in RT planning were also studied.

### Results

There are several radioisotopes use as radiopharmaceuticals that assess liver functionality. Tc-99m mebrofenin, which is uptaken by hepatocytosis, indicates liver dysfunction when the uptake is decreased; the combination of 99mTc-3PRGD2 and 18F-FDG; Tc-99m-Tc-GSA, which has affinity for the asialoglycoprotein receptor of hepatocytes; and 99m-Tc-sulfur colloid is used after radioembolization and for pre-surgery volumetry. In addition, the use of 99mTc-sulfur, which reflects the distribution of Kupffer cells, has been investigated. The use of SPECT with different radiopharmaceuticals seems to be indicated in Child Pugh B 7-8 cirrhotic patients, in countable and diffuse liver metastases, and in patients undergoing hepatic irradiation. All these indications suggest the use of these radiopharmaceuticals to reduce the risk of toxicity in high-risk patients.

### Conclusions

Different radiopharmaceuticals used with SPECT can implement new tools to support RT treatment by adapting the radiation dose to specific areas of the liver with poor functionality, protecting those with good hepatic reserve and thus improving oncology patient´ survival.

## 20 Students Academic Results in Pharmaceutics based on Peer Tutoring

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### Introduction

Active learning in higher education can be achieved in various ways, one way is to activate students in peer tutoring. It is known that academic results from students can be enhanced by involving them in composing test for their peers and participate in practice test. This study aims to see if academic results improve after participating in a peer kahoot quiz - whether this will cause the students to instinctively look more closely at the chapters from which they have participated in a peer quiz. Also, to see if the students who submit questions from certain chapters do better than other students. The research question is there a difference in academic results if students participate in peer quiz prior to test?

### Method

Data was collected by in Inspira and learning results was recorded from different sections of all partial exams. Learning outcomes was compared between chapters. The student number from Inspira was used for processing and anonymity insured during processing. The academic performance of the questioner was compared with the academic performance of the students who took the quiz. Significant differences were assessed using SPSS one-way ANOVA and two-way ANOVA.

### Results

Academic results are higher for questioners than other peers result and when no peer quiz are held there is significant lower academic results than when peer quiz are held.

### Conclusions

This study provides evidence that peer tutoring through kahoot quizzes can significantly improve academic results in higher educations. The results showed that students that participated in peer quiz prior to the test performed better. Additionally, students who submitted questions for certain chapters performed better than their peers. These finding suggest that active learning methods such as peer tutoring can enhance academic outcomes in higher education.

# POSTER PRESENTATIONS

## 21 Integration of ESG criteria in RESEARCH

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The research of the Faculty of Pharmacy and Nutrition of the University of Navarra carries out in the three departments (Pharmacology and Toxicology, Pharmaceutical Chemistry and Technology and Food Science and Physiology) or in one of the two of the research centers (Center for Nutrition Research and Institute for Tropical Health) that make up the School. Each one has specific lines or areas that encompass all its research work but all of them are related with the two PhD programs, one of them in "Medicines and Health" and the other one in "Food, Physiology and Health". They have been distinguished during several years with the "Mention towards Excellence" and have been positively evaluated by the National Agency for Quality Assessment of Universities. Associated with these doctoral programs it is worth mentioning the four Master's programs. Professors and investigators from foreign institutions participate in the Programs, giving seminars, either in the co-direction of doctoral theses, facilitating mobility actions (both of doctoral students and of the professors themselves) etc. It is remarkable that the 62% of doctoral theses presented in our Faculty in 2021 obtained the International Mention in the title of Doctor.

Moreover, for the undergraduate students with interest and motivation for the research, we have enclosed an optional subject named "Experimental Research" which allow to develop a personal research project supervised by a tutor.

Finally, and considering the interest for the introduction of sustainability criteria in the research, the faculty is adapting some research lines towards healthy and sustainable diet, valorization of residues, use of supercritical fluids as solvents and recycling waste.



# POSTER PRESENTATIONS

## 22 Early Career Teaching And Learning Program in the School Of Pharmacy (Radif)

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### Introduction

In the School of Pharmacy of the University of Seville about 15% of the teaching staff are early career teachers with less than 5 years of experience. Furthermore, there are an increasing number of researchers that participate in teaching and some of them without previous educational experience. This program is named RADIF (acronym from its denomination in Spanish) and was awarded by the Secretariat for Educational Innovation of the University of Seville. RADIF aimed to offer a specific training in teaching focused on Pharmacy, including planning, innovative teaching methodology and competency assessment methods.

### Methods

The program was launched in September 2022 with 20 places offered. Training courses included: teaching programming, administrative and legal requirements, student motivation, ICT resources for instrumental laboratory, active methods for learning (gamification, flipped classroom and escape room as teaching methodology) interactive presentation tools, competency assessment and evaluation and dissemination of results. A tutor from among the faculty was assigned to each participant to develop a teaching own project.

### Results

Out the 32 early career teachers who pre-registered to participate in the program, 20 were selected to enter the program. Moreover, 16 professors were involved in training courses and 21 participated in mentoring program. Courses have been planned from October to June. Participants were members of 14 different departments. Projects will be presented in the first edition of Educational Innovation Conference of the Faculty of Pharmacy that held in June 2023 and will be published in a specialized journal. Participants, mentors and professors are involved in the organization of the Conference.

### Conclusions

The program RADIF has had an excellent acceptance among the Faculty of Pharmacy, as all teaching departments have participated. This program promises to improve coordination among different subjects and facilitate the participation of staff in educational innovation activities.

# POSTER PRESENTATIONS

## 23 Organization of the series of Talks and Workshops about Professional Possibilities at the School of Pharmacy of Sevilla

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### Introduction

The students of the School of Pharmacy seek innovative approaches to their professional careers after completing their Pharmacy studies. To meet this need, the Orientation and Tutorial Action Plan (OTAP) for the 2022/23 course has prioritized offering students learn about their professional opportunities after obtaining their degree.

### Methods

In response to this objective, the School of Pharmacy has organized the Series of Talks and Workshops about Professional Possibilities (STWPP), providing students with the opportunity to explore different aspects of the community pharmacy, hospital pharmacy, industry, distribution, research, teaching, military pharmacy, and inspection, among others. To participate, students had to register for their field of interest, attend the talk or workshop, and complete a satisfaction survey. All sessions were led by experienced professionals in their respective fields.

### Results

The STWPP attracted an average of 40 students per session, all of whom reported high levels of satisfaction. Community and hospital pharmacy were the most popular topics, with the highest attendance rates, while research had the lowest attendance. The presenters expressed their satisfaction with the experience and indicated their interest in returning for the next course.

### Conclusions

Overall, the STWPP was successful in achieving its objective of informing and guiding students about their professional possibilities after completing their Pharmacy studies. The diverse range of topics covered in the talks and workshops, along with the involvement of experienced professionals, made the STWPP a valuable learning experience for the students. Going forward, the Faculty of Pharmacy can use this feedback to develop new initiatives and programs that will continue to support and guide their students in their professional careers.

# POSTER PRESENTATIONS

## 24 Strategies for Maintaining Students' Attention during the Teaching Process of subjects taught in the field of Pharmacy

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### Introduction

It is quite difficult to interest students especially during the theoretical part of the teaching process. They are used to many stimuli from the environment and they often consider learning in the classroom as something very static, lifeless or even boring. However, by responsible planning and using original motivational methods, the teacher can awaken students' attention and eliminate boredom in the classroom.

### Methods

Literature review was prepared by summarizing of experience of university teachers from different fields (pharmacognosy, pharmaceutical botany, pharmaceutical technology and social pharmacy).

### Results

The students must understand the importance of new information and its usefulness in the practice. It is unacceptable for the teachers to read lectures monotonously. It is more appropriate to present the topic in teachers' own words with particular experience from the lecturer's life and with space to discussion. Lectures can contain anecdotes or jokes related to the topic. Therefore, students perceive visual information better than the spoken one it is desirable to use interesting pictures, diagrams, graphs or brainteasers. Interesting short videos, podcasts or electronic databases facilitating exam preparation (e.g. [www.rxforms.eu](http://www.rxforms.eu); [www.naturaldrugs.eu](http://www.naturaldrugs.eu); [www.liecivebyliny.eu](http://www.liecivebyliny.eu)) will certainly diversify the teaching process. In addition, it is appropriate to stimulate the tactile and olfactory senses of the students by brought samples (fragrant dried plants, smelly chemicals, etc.). If there is still enough time a role-play (e.g. pharmacist versus patient) will make the lecture livelier. The end of the lecture can be aimed to the repetition in the form of interactive quizzes (the use of mobile phones applications or simply hand voting). An unexpected location of the lecture organization (e.g. university garden, laboratory, etc.) can also attract.

### Conclusions

Learning is easier if the lecture is dynamic, students have space to express their own experience and they are having fun.

Acknowledgments: This work was supported by Grant 010UVLF-4/2021.

# POSTER PRESENTATIONS

## 25 The Benefit of Using an Interactive Whiteboard in the Teaching of Professional Subjects in Pharmacy Education

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### Introduction

The modernisation of the educational process requires many changes. It includes the incorporation of information and communication technologies representing the tool of active learning. The use of interactive whiteboards in the educational process in Slovak primary and secondary schools is common. However, they find their application in higher education to a much lesser extent.

### Methods

We used research publications available online.

### Results

The incorporation of various didactic means into teaching allows for ensuring better illustration in conveying information to students. The interactive whiteboard enables the integration of written text, images, videos, sounds and diagrams, which can increase the involvement of students in the pedagogical process. These elements find their application not only in learning new topics but also in evaluating and checking the acquired knowledge. Several authors point out the various advantages of using the whiteboard. It offers easy and quick updates of teaching materials, easy storage of notes written during a class, quick accessibility of different media, more fun and less stereotyped form of teaching. Quantitative studies suggest that students perceive interactive whiteboards as beneficial because they enable them to be better engaged in the learning process. The usefulness of whiteboards is also perceived positively by university students. The literature further indicates that the use of interactive whiteboards increases meaningful interaction and promotes active learning through student engagement.

### Conclusions

Interactive virtual aids increase the efficiency of practical education by using abstract thinking, consolidating knowledge and creating a pleasant and modern environment.

Acknowledgments: This work was supported by Grant 010UVLF-4/2021.

# POSTER PRESENTATIONS

## 26 Possibilities of Lichen Collection, Extraction And Identification Of Species

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### Introduction

Lichens are symbiotic organisms of fungi and algae, or cyanobacteria. The result of their symbiosis is the production of extracellular secondary metabolites. Thanks to their secondary metabolites, lichens are characterized by antimicrobial, antiviral, antiprotozoal, antipyretic, antitumor, or photoprotective effects.

### Methods

The experimental investigation of lichens characteristics, their extracts, and their metabolites is preceded by the collection of individual species naturally occurring in the territory of Slovakia. The collection is followed by the identification of lichens using atlases and analytical methods. The cleaning of the thalus precedes the extraction of lichens.

### Results

From a global perspective, lichens are classified by their mycobiota, with an estimated number of up to 20,000 species. In Slovakia, we currently register 1,695 species of lichens. Another approximately 130 taxa are among the potentially threatened species, or there is insufficiently relevant data on their occurrence. Currently, 15 lichen species are protected by law in Slovakia. During the lichen collection in nature, we use books in the form of atlases of Slovakian lichens and websites. The identification itself uses the techniques of TLC and HPLC. After the cleaning of the thalus, the lichens are extracted. There are several traditional and modern extraction methods. In the preparation of extracts, we use ultrasound-accelerated extraction. After evaporation in a rotary vacuum evaporator, the extracts are ready for further experiments.

### Conclusions

Research on new lichen species and their extracts leads to the discovery of new characteristics that can be applied in medicine and pharmacy.

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## 27 Project-based Learning and Sustainable Development Goals (SDG) in the Pharmacy Degree

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### Introduction

Project-Based Learning (PBL) is a didactic technique characterized by the resolution of a real problem using interdisciplinary knowledge. It is a highly valuable methodology by integrating aspects such as: document analysis, bibliographic consultations, creativity development, strengthening of communication skills and teamwork (Tobón 2006).

In this work, this didactic technique has been applied to the knowledge, analysis and dissemination of the Sustainable Development Goals.

### Methods

During the 2021/22 and 2022/23 academic years, 10% of the work time and the qualification of the Clinical Nutrition and Dietetics subject in the Pharmacy Degree were dedicated to Project-Based Learning. Groups of 5-7 students carried out collaborative work to publicize and disseminate aspects related to SDGs associated with food and/or nutrition.

To analyze the goodness of the didactic technique, two surveys were carried out, one at the beginning to verify their previous knowledge on the subject and another after the presentation of the projects. With them, the degree of student satisfaction and acquisition of generic and specific skills was verified.

### Results

The works were related: 73% with SDG 3; 6.7% with SDGs 2, 4, 12 and 14. In addition, the results of the surveys were positive and reflected the promotion of knowledge on the subject and the involvement in achieving the goals of the 20230 Agenda on issues related to feeding.

### Conclusions

Through the application of the PBL, key aspects in the design of Research Projects were identified, especially those related to autonomy, student entrepreneurship, epistemic principles related to the rationality of the project and the debate and flexibility in changes of opinion on the aspects studied.

## 28 Optimizing the Study Sequence in a Biopharmaceutics-Pharmacokinetics Course

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### Introduction

Biopharmaceutics and Pharmacokinetics are two independent branches of science usually taught together in the same course as they complement each other. However, there is some variability in the sequence followed by different faculties of pharmacy to teach this course. Due to the time constraints usually affecting university teaching, it would be interesting to know whether a specific sequence might facilitate the planning but also the acquisition and learning of the competences included in the teaching guide. To this end, we have compared the results obtained by the students in different academic years where the sequence was modified.

### Methods

The grades obtained both in the partial and ordinary call exams in 2019-2020 (pharmacokinetics-biopharmaceutics) were analyzed and compared to those from 2021-2022 and 2022-23 (biopharmaceutics-pharmacokinetics) in the English-taught groups.

### Results

Grades corresponding only to the multiple choice test in the partial exam (affected by the sequence) revealed no significant changes due to the altered sequence among the academic years compared. In the ordinary call (including the two branches) the grades were drastically reduced but again no significant differences were detected among years or sequences.

### Conclusions

There is no relationship among the sequence pattern used and the grades. The students always obtain better grades in the partial exam regardless of the contents included.

## 29 Harmonization and Educational Marketing of the Program of Pharmacy with European Universities Partners

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### Introduction

International cooperation contributes to the development of the global education system, solves a number of urgent tasks to strengthen international solidarity and partnership in the field of higher and postgraduate education; contributes to the alignment of training levels of specialists of different countries; is an important tool in ensuring the quality of education in accordance with international standards. A single world educational space is being formed, which is expressed, firstly, in harmonization of educational standards, curricula of specialties of universities in different countries.

### Methods

A comparative analysis of educational programs "Pharmacy" of "Asfendiyarov Kazakh National Medical University" was conducted. The comparison of educational programs "Asfendiyarov Kazakh National Medical University" and European universities (Medical University of Gdańsk, Poland, Lithuanian University of Health Sciences, Kaunas, Lithuania, University of Ljubljana, Slovenia and other European universities).

### Results

Based on the comparative analysis it is planned to introduce a new educational program of continuous training 4+1 with the award of a master's degree. In European universities the period of study is 5.5 years with a master's degree, including at the end of theoretical training is provided practice for 6 months. Term of study will be 5 years (300 credits), of which 240 credits will be distributed, In the educational program "Pharmacy" from programs of other universities were included such disciplines as "Fundamentals of Internal Medicine", "Social Pharmacy", "Hospital Management", etc. Year 1 graduate course (60 credits) will consist of the disciplines of the master's degree level EP "Pharmacy".

### Conclusions

The analysis allows us to conclude that the main difference between the educational programs is the implementation of training in the bachelor's and master's degree in one cross-cutting program with a master's degree in specialty "Pharmacy". Convergence of educational programs on the content of the disciplines of the leading universities of the university for more than 50% allows in the future to develop joint educational programs for academic mobility of students, but the risks in this process can be inconsistency levels of training in drawing up individual curricula of students and reducing the share of implementation of academic mobility programs.

## 30 Design and Implementation of Objective Structured Clinical Examination (OSCE) as an Assessment Tool of Professional Clinical Skills in School of Pharmacy

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### Introduction

OSCE is an assessment tool based on the principles of objectivity and standardisation, which allows the assessment of student performance against standardised scoring schemes by trained assessors. The aim of this work is to design and implement OSCE as an evaluation tool of the Pharmacy training placements.

### Methods

A 3-year pilot was planned. It included: constitution of OSCE committee, competences mapping, design of practical stations and evaluation rubrics, training of participants, management of space and time and analysis of reliability and validity of this novel evaluation tool. Student satisfaction with the system was assessed by a Likert questionnaire.

### Results

In 20/21, 2 stations were designed: 1 static and 1 dynamic (dispensing). 19 students (8%) performed the OSCE and logistics and adequacy to the evaluation method was high (4-5). However, the students' assessment of their own performance was low (2) and improvements related to communication of instructions were detected (3). In 21/22, 5 stations were designed: 3 dynamic and 2 static (paediatric dose calculation and pharmacovigilance and referral) stations. 61 volunteer students (25%) enrolled in the OSCE which was organized in 3 rounds and 2 shifts. 44 professors belonging to all areas of knowledge from the Faculty of Pharmacy and 4 members of the administration and service personal section were also involved in this activity. In 22/23 we plan to increase considerably the number of students enrolled in OSCE, reviewing its potential value in ratings as well as to expand this evaluation method to all students (more than 200) matriculated in Training Placements of Pharmacy Degree during 23/24.

### Conclusions

OSCE pilot study allowed us to optimize the evaluation of training placement process. Moreover, this activity promoted coordination and interactions between faculty and professionals. Several areas in which pharmacy students require further training were also identified.

# POSTER PRESENTATIONS

## 31 Raising Sustainability Awareness Through an International Summer School in the Faculty of Pharmacy of The University of Valencia

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### Introduction

From the establishment of the Sustainable Development Goals (SDG) by The United Nations, the inclusion of sustainability aspects in the universities curricula has been a trending topic. Universities have the social duty of training future professionals not only in academic aspects but also in sustainability awareness.

### Methods

The international Summer School "Fermented Food for better Nutrition, Health and Sustainability (FERNUTS)" took place on June 2022 at the Faculty of Pharmacy of the University of Valencia (UV) funded by the collective short-term mobility program of the FORTHEM Alliance within the Food Science Lab (<https://www.forthem-alliance.eu/get-involved/students/collective-short-term-mobility>) and the Faculty. This course consisted of conferences by prestigious speakers in the field of functional and fermented foods, visits to research centers and companies, presenting projects in this topic, and cultural activities. The program highlighted the relevance of including sustainability in research and food production and was complemented with work group to create an infographic related to course contents and SDG. The opinion of the students was collected through a survey, presenting a 5-point rating system from "poor" to "excellent".

### Results

Twenty-two students of Bachelor, Master and PhD level from University of Jyväskylä (4), University of Burgundy (1), University of Latvia (1), University of Palermo (7) and UV (9) participated. We gather a group of high-quality speakers and conduct very interesting visits that gave the students a real and practical vision, especially related to food sustainability. The speakers belonged to prestigious universities, research centers and companies from four countries (Denmark, Italy, Thailand and Spain). The students showed great involvement and expressed a high degree of satisfaction regarding all the activities.

### Conclusions

Twenty-two students of Bachelor, Master and PhD level from University of Jyväskylä (4), University of Burgundy (1), University of Latvia (1), University of Palermo (7) and UV (9) participated. We gather a group of high-quality speakers and conduct very interesting visits that gave the students a real and practical vision, especially related to food sustainability. The speakers belonged to prestigious universities, research centers and companies from four countries (Denmark, Italy, Thailand and Spain). The students showed great involvement and expressed a high degree of satisfaction regarding all the activities.



## 32 Analysis of the Final Degree Project Subject in the last Four Years at the Uah Faculty of Pharmacy

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### Introduction

The subject "Final Degree Project-(TFG)" in the Pharmacy degree at the University of Alcalá is a compulsory subject of 6 ECTS credits, which can be taken in both semesters of the fifth year, although, as established by current Regulations, it can only be incorporated into the student record after having passed the remaining 294 credits. The TFG offer can be carried out through two modalities, either at the student's proposal to a teacher (Annex 2) or through the weighted offer made by the different Departments (Annexes 1 and 4). In order to plan and optimize the teaching related to this subject, the data corresponding to the last four years have been analyzed.

### Methodology

Between the years 2018 and 2022, the total number of students enrolled in the subject, its distribution among the three calls available for its defense, the assignment modality, the bibliographic or experimental nature and the grades obtained have been computed.

### Results

The number of students enrolled in the TFG subject remains between 143 and 176. Between 72 and 81% make their defense in the ordinary call taking place in July and practically 50% of the students obtain an A or A+ grade.

### Conclusions

The number of students who have participated in this subject is relatively constant. In relation to the assignment modality, in the last two years it has been detected that the percentage of students who choose the annex 2 modality has been reduced to approximately one half. On the other hand, most of the papers presented are bibliographical.

## 33 Development of an App in Pharmaceutical Care Practices Classes

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### Introduction

The use of mobile devices during class is uncontrollable, which results in a significant decrease in the degree of attention in class. Therefore, a new way to combat this general attention crisis is proposed: using a didactic app that involves the student. Despite the controversy around the use of phones in educational environments, gamification emerges as a complementary element to traditional teaching techniques to increase student attention and motivation and promote essential qualities such as information seeking, learning, and better social skills. An educational app will be designed to test the knowledge of students of the subject Pharmaceutical Care while overcoming the different screens in an "adventure mode".

### Methodology

The project is divided into six phases, according to chronological order and foreseen tasks: Elaboration Phase; Pilot phase; Evaluation; Improvement phase; Execution and Implementation phase; and Data dissemination and reporting phase. The project will be developed during two academic years, 2022-2023 and 2023-2024, at the Faculty of Pharmacy of the University of Granada.

### Results

Elaboration Phase: Selection and adaptation of clinical cases to the use of the app plus the app design and development.

Pilot phase: Use of the app in intervention groups. Results and comparison with control groups will be measured through opinion and satisfaction questionnaires.

Improvement phase: Analysis of the results obtained, identification of elements for improvement and incorporation of new functionalities.

Implementation phase: Students will use the app in enhanced Pharmaceutical Care practices, and evaluate the tool.

### Conclusions

This app will allow teachers to monitor students' progress in real time. The creation of this notebook will involve the interdepartmental union of the three departments that make up this subject, avoiding duplication/overlapping of content and optimizing the use of resources, going from having 3 paper notebooks to a digital one. Teaching coordination and collaboration between departments is promoted.

# POSTER PRESENTATIONS

## 34 Towards Sustainable Development Goals (SDGs) from the Subject of Toxicology

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### Introduction

Universities are one of the key actors in the process of leading the transformation of society towards sustainability, not only because of the impact generated by their own activity, but also because of their responsibility in the training of future professionals.

The Sustainable Development Goals (SDGs) are integrated into the toxicology seminars in order to provide students with knowledge and skills related to the SDGs, and to promote debate and critical thinking.

Toxicology as interdisciplinary science, is related to almost all the SDGs, especially SDG3 (Good Health and Well-being) and SDG12 (Responsible Consumption and Production).

### Method

The subject of Toxicology is taught in the fourth year of the Degree in Pharmacy at the Universitat de València and is structured into theory classes, laboratory practice, tutorials and seminars. The Toxicology Seminars students are divided into subgroups of 3 or 4 students that prepare a report on a topic related to the subject together with a presentation and its defense.

### Results

In the seminar activity, a first session was set up with a discussion with the students to find out their prior knowledge about the SDGs, and to select which SDGs are related to the Toxicology subject. After dividing in groups and distributing the topics on different aspects of Toxicology, they were asked to reflect on and relate the SDGs and their targets to the selected topics, and to produce a slide including the SDGs and possible interventions for improvement.

### Conclusions

The activity was a success, as it facilitated discussion among the students on the importance of sustainability at all levels (environmental, economic and social) and the role of toxicology in achieving the SDGs.

**DSN Australia/Pacific. (2017).** GETTING STARTED WITH THE SDGS IN UNIVERSITIES.

[https:// https://reds-sdsn.es/wp-content/uploads/2017/09/University-SDG-Guide\\_web.pdf](https://reds-sdsn.es/wp-content/uploads/2017/09/University-SDG-Guide_web.pdf)

## 35 Substance Abuse Prevention through Collaborative Learning of University Students in Secondary Schools

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Pharmacognosy students of the Degree in Pharmacy at the University of Valencia developed an educational project with High school students to inform them about associated problems derived from the consumption of substances of abuse. Methodologies such as flipped classroom, gamification, and an educational pill were implemented using the teaching platform of Pharmacognosy, Power-Point, YouTube and Kahoot. The activity was evaluated by two questionnaires: one prior of the activity with three blocks of information (socio-demographic, risk perception, and patterns of consumption); the other at the end of the activity to know the degree of satisfaction and its usefulness. Both were assessed on a five-point Likert scale and data was processed using SPSS 28.0. The sequence of actions of the activity described previously [1] followed these steps: 1) initial questionnaire to High school students; 2) autonomous work by university students under the supervision of the teachers; 3) development of the activity by university students at High schools (PowerPoint presentation, watching the video, practice in the laboratory, Kahoot, training evaluation questionnaire). The participants were 129 High school students aged 15 to 22 and 21 university students in their 20s. The latter presented the main plant-based drugs that adolescents start with, followed by a practical demonstration on the tobacco leaf to capture their interest and facilitate understanding. The activity was enriching for the university students, in this way they developed competences aimed at promoting health of the Secondary students by motivating them to improve their habits, reconsider their perception of risk and dissuade them from drug use.

[1] Giner, R.M. et al. (2022). Prevención del consumo de sustancias adictivas: estudiantes del Grado en Farmacia implementan estrategias de innovación educativa y aprendizaje colaborativo en Secundaria. In J.M. Esteve-Faubel, A. Fernández-Sogorb, R. Martínez-Roig, J.F. Alvarez-Herrero (Eds.) Transformando la educación a través del conocimiento (pp. 460-472). Barcelona: Octaedro

# POSTER PRESENTATIONS

## 36 La Nau-Biociencia: scientific divulgation projects carried out through service-learning and gender perspective (SDG5)

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### Introduction

The project consists of the preparation by the students of press releases, tweets and videos on the results obtained by the research groups of the University of Valencia, with a gender perspective (Sustainable Development Goal 5, SDG5), for their divulgation on social networks and for teaching purposes.

### Methods

Each project has been carried out by a team with postgraduate students from Master. Each team also included PhD students in Biomedicine and Biotechnology or Biomedicine and Pharmacy, who acted as Student Mentors. Project phases:

i) Selection of the research groups valuing the role of women in science; ii) Work development including: training sessions on scientific communication and divulgation, search for information, analysis and interpretation on the scientific activity of the research groups, and preparation of scientific divulgation projects (press releases, tweets and videos); iii) Presentation and peer evaluation (rubrics) of the projects carried out; iv) Divulgation of the material produced on social networks; v) Monitoring of the project, its impact on learning and social impact (number of visits, users, questions and suggestions received,...)

### Results

The results of the project have been disseminated through the web

<https://www.uv.es/master-id-biotecnologia-biomedicina/es/master-universitario-investigacion-desarrollo-biotecnologia-biomedicina.html>

In addition, students have been given a simple evaluation survey of the activities carried out, emphasizing its usefulness for their training, and the results have been very satisfactory, with a predominance of positive opinions (median 4-5 in a scale 1 to 5).

### Conclusions

The project has been the seed of a science divulgation experience with the originality that the students are in charge of the realization of the material and this work constitutes a teaching resource to improve their skills, abilities and, ultimately, learning. Moreover, the project will have social impact derived from the usefulness of the material produced and the increased visibility of scientific research (service-learning) with gender perspective (SDG5).



# POSTER PRESENTATIONS

## 37 Analysis of Academic Performance in Pharmaceutical Technology II After Implementation of ICT-Based Learning Methodologies

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Pharmaceutical Technology II is a compulsory subject of the fifth year of the Pharmacy Degree and the Double Degree Pharmacy and Nutrition and Dietetics at the University of Valencia.

The academic results of students in 2015-2016 and 2016-2017, showed that, although the relationship of failures was not very different from other subjects, the marks obtained were very low.

To improve the learning process and reduce the observed difficulty of the students to integrate different aspects of the subject, the teaching team designed and implemented new tools based on the use of ICT, and innovative learning from 2017-2018 onwards. Teachers developed learning videos, changed the lab-course to a problem-based methodology and included an on-line self-assessment test.

The effect of the use of these methodologies in the academic situation derived from the COVID-19 pandemic was also evaluated.

We evaluated the marks obtained by students from the academic year 2015-2016 to 2022-2023.

We found a higher percentage of better outcomes (good, outstanding and Honours) since the implantation of these changes. This situation seems to indicate that the tools used were able to improve the learning of those students that they had prepared the subject obtaining better marks in the evaluation.

The academic year during the COVID-19 pandemic, showed the same trend without observing negative effects about the learning derived from the pandemic restrictions. Our data show that the teaching videos and the use of ICT tools are well accepted by the students and help them to better understand the subject and to relate concepts that improve their performance in Pharmaceutical Technology.

**Acknowledgements:** Teaching innovation projects Dr.UgDelivery (RMD17-589023) and Dr. UgDeliveryII (RMD18-840195) have been financed by the SFPIE in the calls for 2017 and 2018.

## 38 **Ealth and Ethics at the Forefront: Innovative Teaching Methods for the Acquisition of Competencies in Pharmaceutical Legislation and Deontology**

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An innovative teaching project was implemented during the academic year 2020-2021 in Pharmaceutical Legislation and Deontology. The project aimed to develop critical thinking skills among students and to encourage teamwork and collaborative learning to provide solutions to ethical problems related to the pharmaceutical profession. The project also aimed to incorporate the Sustainable Development Goals (SDGs) in the pharmaceutical professional field.

The learning objectives proposed in the project were achieved through various activities such as preparing and evaluating informed consent for a clinical trial and discussing the bioethical aspects, a seminar with a pharmacovigilance specialist, and a played-based seminar with a philosopher on ethics and morals. Infographics workshops, participative master classes, and analysing a bioethical problem related to the pharmaceutical professional activity were also carried out.

The methodology was effective for the proposed objectives, especially the development of critical thinking and the ability to reason in teams to face real problems in professional life. However, a small proportion of students did not find the methodology attractive. The lack of participation by these students and the fact that these blocks were taught in the last weeks of class led to certain activities not showing the necessary involvement on their part.

Overall, the project was successful in achieving its objectives and updating teaching from a theoretical to a practical perspective. It is a valuable example of using active learning methodologies and incorporating SDGs in the professional field.

**Acknowledgements:** The authors would like to acknowledge the support of the teaching innovation project UV-SFPIE\_PID20-135547- Implicaciones éticas de la salud, un reto de nuestra sociedad: nuevas metodologías docentes para la adquisición de competencias en Deontología Farmacéutica of the University of Valencia and all the students who took part in the project.

# POSTER PRESENTATIONS

## 39 Sustainable Workplace-based Interprofessional Education

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### Introduction

Today's healthcare is complex and requires interprofessional cooperation to provide patients the best care. Many learning activities have been developed to support health students in learning interprofessional work, but few have been based in primary care. Since 2012 the health educations at the University of Bergen and the Western Norway University of Applied Sciences have collaborated with municipalities in the Bergen area through the Centre for Interprofessional Workplace Learning (TVEPS) to provide their students with interprofessional learning experiences.

### Objective

To describe a sustainable model of offering students from the health and social sciences interprofessional learning experiences

### Methods

TVEPS now encompasses 900 students annually, from 17 education programs, placed in >100 workplace arenas. Teams of 5 students meet up in an online introduction meeting and are introduced to their task. They then spend one day at relevant workplaces and create care plans for patients. Within a week, they present their plan to the workplace staff in an online meeting facilitated by a representative from TVEPS. Pharmacy is the only profession which participates twice – during their clinical pharmacy course and during their pharmacy placement (7th and 8th semester).

### Results

Pharmacy students report that having to represent their profession in interprofessional groups gives them professional confidence, and that the group work leads to reflections on their own professional role and awareness of other professions' capabilities. The activity is also highly valued by participating workplaces and patients and has led to further collaboration among faculty from the participating institutions.

### Conclusions

Giving students from the health and social sciences access to short, interprofessional learning experiences in a workplace-based setting is a sustainable way of obtaining significant learning. Further research will explore possible effects on the workplaces and patients that are visited by the student teams.

## 40 Establishing of a New Bachelor's Degree Programme Cosmetic Products

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### **Introduction**

The necessity to introduce a new degree programme focused on the field of cosmetics arises from the fact that cosmetic products are an essential and indispensable part of the modern lifestyle. Growing awareness of health, hygiene and beauty are the main drivers of the use of cosmetic products in the global market. Our aim was to create an interdisciplinary degree programme with a potential of graduates qualified to select suitable ingredients through production, quality control, distribution, sales, and consulting services related to cosmetics.

### **Method**

The development of the new programme was based on a review of similar study programmes already existing in several countries, study offer of the Czech universities, and an evaluation of basic characteristics of the cosmetic industry and related fields in the Czech Republic. A faculty working group was established to create the parameters of the programme in accordance with the internal university and governmental regulations.

### **Results**

The proposal for the career-oriented bachelor's degree programme Cosmetic Products has been prepared. The programme is designed as a 3-years full-time study programme. Its curriculum includes obligatory and compulsory selective subjects, 12 weeks of practical training and working out and defence of a bachelor's thesis. Courses included in the curriculum are focused on obtaining adequate knowledge and skills related to the medical, chemical, technological, ecological, regulatory, and other aspects of cosmetic products.

### **Conclusions**

Graduates of the programme will be prepared for work in the field of manufacturing cosmetic products, quality control laboratory, in the sale of cosmetic substances and products, in the laboratories of certifying and regulatory authorities, and as professionals providing basic dermo-cosmetic counselling.

## 41 Analysis of Pharmacological News: Collaborative Learning and Health Promotion

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### Introduction

As future pharmaceutical professionals, our students should learn current treatments and to effectively communicate to health professionals and to patients, in a clear and concise way. This is essential to promote the correct use of medicines, in line with SDG 3 Health and Well-being. For this reason, an activity was designed, aimed to promote the active learning of Pharmacology.

### Method

We combined three learning techniques: Problem Based learning, Information and communication technologies (ICT), and Peer evaluation. Various news items related to the subject were selected by teachers. Students, in groups of four, had to analyze their veracity and critically assess whether they represented a real advance compared to current therapies by providing scientific evidence. The results of their work had to be presented as a multimedia document (less than 5 minutes). The acceptance of the activity was assessed through an anonymous survey.

### Results

All the documents elaborated by the students were mostly excellent and provided a correct analysis covering all aspects related to the subject. Although there were hopeful signs that new therapies or repositioning of existing drugs might be effective, scientific evidence showed that results were mostly preliminary, with limited results on its efficacy in patients. Students valued the interest of the press news (66.3% a lot, 28,1% fairly), the utility of the activity to promote critical thinking (68.5% a lot, 23,0% fairly) and to relate the subject with real-life situations (62.3% a lot, 22,5% fairly), while finding this activity useful and educational (43.8% a lot, 38.2% fairly).

### Conclusions

The elaboration of multimedia documents on pharmacological news allows students to enhance their communication skills that are necessary for their professional activity as pharmacists. In addition, it promotes their critical spirit and autonomous learning by relating the subject to real-life situations.



# POSTER PRESENTATIONS

## 42 Educating in Food Sustainability: The Experience of the Faculty of Pharmacy at University CEU-San Pablo (Spain)

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### Introduction

Educating pharmacy students about sustainable food practices is crucial in promoting public health and ensuring environmental sustainability. Pharmacy students play a significant role in advocating for sustainable food systems, as they are well-equipped to understand the impact of food on health outcomes. The Faculty of Pharmacy at University CEU-San Pablo (Spain) is actively involved in promoting sustainable food practices among the students enrolled in the Pharmacy degree, but also in other degrees that can be simultaneously studied with Pharmacy at our Faculty (Human Nutrition and Dietetics, Biotechnology, Optics and Optometry, and Business Administration and Management).

### Method

Several faculty members have been actively involved in promoting food sustainability through different activities: theoretical and practical teaching, workshops, virtual exchange programmes (e.g. Collaborative Online International Learning -COIL- or Blended Intensive Programmes - BIP-), research and collaborations with companies and scientific societies.

### Results

During the last years, 1 COIL, 1 BIP and several final-degree projects on food sustainability have been implemented. Theoretical and practical contents on sustainable diets have been included in the courses "Food Science", "Nutrition and Dietetics", "Epidemiology and Public Health Nutrition", "Gastronomy and Culinary Technology"; several workshops, talks and debates have been organised to disseminate sustainable food practices to the public. Two reports entitled "Food, society and food choices" have been published in collaboration with MAPFRE Foundation, providing representative data on different habits in Spain, including knowledge of sustainable dietary practices. Finally, the creation of the DANONE-CEU San Pablo University classroom "Feeding the Change" has successfully promoted the transformation of the current dietary model towards a more sustainable one.

### Conclusions

The Faculty of Pharmacy of the University CEU-San Pablo is actively involved in promoting sustainable food practices. The educational initiatives, research, and collaboration with private companies have helped increase awareness about sustainable food among university students, professionals, and the public.

# POSTER PRESENTATIONS

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## 43 Counseling is in! Counseling in the Teaching Pharmacy on the Example of the Assistant Pharmacist Curriculum of Tallinn Health Care College

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### Introduction

The aim of the course "Counseling in the teaching pharmacy" is to provide future assistant pharmacists with knowledge and skills to counsel patients using evidence-based methods and motivational interviewing. This enables finding better solutions to patients' health problems and ensures better quality pharmacy services and improved quality of life for patients.

### Method

The development of the counseling course was based on evidence-based literature, which addresses pharmacy services, their quality, analysis of pharmacy service quality, as well as principles of motivational interviewing. The volume and content of the course were modeled after similar courses from similar curriculums, as well as similar topics previously covered in the curriculum. Practitioners working in pharmacies were also involved. Motivational interviewing and other communication techniques are used in teaching and learning, taking into account the peculiarities of communicating with different patient groups. Simulation training in the teaching pharmacy is an important part of the course, where filming and joint discussion of the filmed situations play a significant role in acquiring and consolidating counseling skills.

### Results

Teaching counseling and using the methodology of motivational interviewing through simulation training has improved graduates' counseling skills, which is evident from feedback from employers and supervisors.

### Conclusions

Every year, the need for medical counseling in Estonian pharmacies is increasing, as well as its share in the assistant pharmacist's work. Due to the aging of the population and the increasing use of medication, there is a constant need to counsel patients in pharmacy work. Simulation training in counseling has helped to improve assistant pharmacists' communication and counseling skills, thereby increasing patients' medication adherence and ensuring proper and correct use of medication.

# POSTER PRESENTATIONS

## 44 In situ Pharmacokinetic intestinal absorption profile of a plant-extracted molecule: Canthin-6-ona

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### Introduction

*Zanthoxylum chiloperone* plant is used in american traditional medicine because of its antiseptic properties. Canthin-6-ona was isolated from leaves extract of the plant. This molecule presents antifungal, leishmanicidal and trypanocidal activities, thus it could be used as an economic and ecologic alternative for three-world parasitic diseases (1). Herein, we studied the pharmacokinetic properties of this extract in an *in vivo* model.

### Materials and methods

Extract samples were obtained by plant extraction at the University of Guadalupe in an ethanol mixture. The extract was diluted with an ethanol/water solution (1:4) for administration. An HPLC analytical method was developed for canthin-6-one quantification. The absorption profile of the plant extract was performed in an Douluisio in situ model of intestinal absorption in rats (n=6). The presence of the molecule in blood was also tracked.

### Results and discussion

The canthin-6-one intestinal absorption was very fast. Drug concentrations were found from the administration up to only 20 minutes afterwards. Canthin-6-one plasma levels were also cleared very fast (samples showed peaks below the quantification limit after 10 min and no more peaks afterwards).

### Conclusions

Canthin-6-one is a rapidly absorbed molecule with a short presence in systemic circulation, probably due to its adsorption to proteins. To improve its pharmacokinetic profile and reduce the alcohol concentration needed to solubilize the drug, the design of an adequate drug delivery system should be considered for further studies.

**Key words:** *Zanthoxylum chiloperone*, pharmacokinetics, Douluisio, plant extract, intestinal absorbtion.

**References:** Ferreira ME, Cebrián-Torrejón G, Corrales AS, Vera De Bilbao N, Rolón M, Gomez CV, et al. *Zanthoxylum chiloperone* leaves extract: First sustainable Chagas disease treatment. *J Ethnopharmacol [Internet]*. 2011;133(3):986–93. Available from: <http://dx.doi.org/10.1016/j.jep.2010.11.032>

## 45 Compounding Medications in a Pharmacy is still relevant

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### Introduction

The aim of our study was to modernize the regulations for preparing drugs based on prescriptions in pharmacies, as the Estonian literature on this topic is either morally outdated or inaccessible to pharmacists. In Estonia, the preparation and dispensing of extemporaneous drugs is relatively low, with approximately 28,000 extemporaneous prescriptions issued from pharmacies in 2021.

### Method

As part of the study, prescription records of drugs prepared by THCC students during their pharmacy practice from 2015 to 2017 were collected. The prescriptions were grouped according to drug forms, and the frequency of occurrence and indications of similar prescriptions were analyzed. On the basis of the more frequently occurring preparations, a technologically correct preparation guide was prepared for each group of dosage forms.

### Results

Information on the groups of drug forms and prescriptions analyzed was collected in the extemporaneous drug preparation guide. The drug groups discussed in the guide are powders, liquid drug forms, and viscous drug forms. The practical part of the guide is divided into four sections: procedures related to extemporaneous drugs solid drug forms, semi-solid drug forms, and liquid medications.

### Conclusions

Extemporaneous drugs are still necessary for certain target groups such as children, elderly patients with organ failure, and patients with swallowing difficulties. The guide prepared in this study facilitates the daily work of pharmacists in conditions where extemporaneous drug preparation is required in small quantities. The guide is also an important teaching material for pharmaceutical students learning about drug technology.

**Key words:** *Zanthoxylum chiloperone*, pharmacokinetics, *Douglisio*, plant extract, intestinal absorption.

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2. Ravimiamet. Statistika aastaraamatud. [Internet]. [cited 2023 Mar 31]. Available from: <https://raviamet.ee/statistika-ja-kokkuvotted/statistika/raviameti-statistika-aastaraamatud>



# POSTER PRESENTATIONS

## 46 Learning Pills in Toxicology Seminars

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Learning Pills (LPs) are a didactic resource in audiovisual format that impact knowledge, attitudes or processes of interest for a subject or idea. LPs compress the smallest unit of information endowed with meaning, and function as short courses that serve as guidance on specific topics expressed as independent units to understand a concept [1]. They are characterized by being of short duration (10-15 minutes), and focus on a single concept, developing a specific content that can complement the traditional training strategy and optimize the transfer of knowledge. In addition, the LPs follow the social learning theory according to which learning occurs in the duet student-student while using multimedia tools. Due to these advantages, throughout the academic year 2022-2023 this methodology has been applied to the seminars on the Toxicology subject in several degrees at the Faculty of Pharmacy of University of Valencia. In the seminars, students must work as a team to prepare a report on a topic related to the subject and its presentation to other classmates. For this project, students were encouraged to prepare the seminars in video format, substituting the "traditional" PowerPoint slides. The topic was chosen by the students under the supervision of the professors. Previously, the professors provided the students with information on free programs and softwares for recording and editing the videos jointly guidelines and recommendations for their preparation. Once recorded and edited, the videos were displayed in the seminar sessions of Toxicology; afterward, the students answered questions from classmates and teachers. Almost half of the enrolled students (45%) took the seminar in this format, showing that the proposed initiative had a good acceptance. This project is part of the teaching innovation project granted by University of Valencia (UV-SFPIE\_PID-2079652).

**Literature References:** [1] Astorga MCM, Silva MJF, Litago DU. Innovación docente en el EEES: las píldoras educativas. *Revista INFAD de Psicología. Int J Educ Psychol.* 2022; 1(1): 505-512.

## 47 Implementation and Evaluation of Academic Debates focused on Agenda 2030 in the Degree of Pharmacy as Learning Strategy

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### Introduction

Academic debate is a form of active learning that encourages students' critical thinking and develops their oral communication skills. Among that, the implementation of these strategies invites the interconnection of disciplines. Here it is presented the analysis of the use of debates in the learning process of university students in Health Sciences at the Faculty of Pharmacy supported by the Sustainable Development Goals (SDG) of the Agenda 2030. The debate took place within the XIII Congress of Pharmacy Students of the University of Valencia 2023 belonging to the Project "*Al-remat-Debat*" (PID-2079760).

### Method

The topic of the debate was chosen by students focused in SDG. Students position "for" or "against" was recorded through "*Flipgrid*" platform allowing to create two teams. The jury was composed of professors related to communication and responsible for SDG tasks at the UV who used a rubric for the evaluation. Evaluation by attendants was done by the Mentimeter platform. The debate was no longer than 40 minutes with interventions of both teams and the attendants.

### Results

The topic chosen was "Is it possible a sustainable consumption of drugs that decreases the production of residues?" (SDG#3, #6, #12, #14, and #15). After the debate, the jury and the audience evaluated both teams reaching the "for" team with the highest score. The satisfaction grade was also assessed by all the participants (resulting in 4 points on the scale of Likert).

### Conclusions

The Academic debate experience turned out to have a "*WIN-WIN*" effect for both professors and students, it helped to develop communication and teamwork, to understand the interdisciplinary of health science subjects, and to process them from different disciplines. It also contributes to promoting the knowledge and application of SDG in the real life and not only in a theoretical framework.

# POSTER PRESENTATIONS

## 48 Pioneering Education In Sustainable Green Pharmacy Practice

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Based on the latest report from the Commonwealth Fund, hospital care contributes 36%, physician and clinical services contribute 12%, and prescription drugs contribute 10% of US healthcare sector carbon emissions. Pharmaceutical manufacturing facilities and human waste is a significant source of pharmaceuticals found in the environment. Based on the U.S.

Geological Survey's National Water-Quality Assessment Project (2013-15), the most commonly detected pharmaceuticals and hormones in ground water are: carbamazepine, sulfamethoxazole, meprobamate and hydrocortisone.

Reduction of the environmental footprint of healthcare is a joint effort of all stakeholders in the healthcare system. Pharmacy educators should teach students about the connection between the healthcare system and environment, however sustainability education is not mandated in the US pharmacy curriculum.

The Accreditation Council for Pharmacy Education does not require that colleges and schools of pharmacy include content on sustainable pharmacy practice in the curriculum.

The American Association of Colleges of Pharmacy and the American Pharmacist Association also do not provide clear guidelines either. The Chicago State University College of Pharmacy has a traditional four-year program, requiring 49 courses for a total of 138 credit hours. After a careful review of the curriculum, we were able to identify several courses where content on the environmental impact of pharmacy practice can be infused with the goal to matriculate practitioners who are aware of sustainable practices.

Guided by the recommendations from the Agency for Healthcare Research and Quality Report (2022), we mapped the following courses: Dosage Forms, USA Healthcare Systems, Professional Practice, Health Economics, and Patient Skills. This presentation addresses in detail how sustainable pharmacy practice content can be infused in each of those identified courses with minimal disruption in the curriculum..

# POSTER PRESENTATIONS

## 49 Innovative Educational Seminars based on Digital Tools to Disseminate Scientific Knowledge in Toxicology

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Scientific dissemination is the set of activities that interpret and make scientific knowledge accessible to society. The emergence of new types of scientific communication are due to the rise of social networks, as an increasingly predominant information channel, in a more dynamic way. In addition, the use of social media as a professional tool is nowadays a reality. Toxicology (10.5 ECTS) is a compulsory subject of the Double Degree in Pharmacy and Human Nutrition and Dietetics, which is taught at the Faculty of Pharmacy of the University of Valencia. One of the main objectives of this subject is the toxicological learning to guarantee safe foods for the population, and the participation in tutorials, practices, and seminars, to work on the didactic content, is a requirement to evaluate the student progress. Regarding the seminars, each work team proposes a topic subject-related, to perform a short presentation in public, along with an infographic digital representation, which is delivered to the teacher in advance, and all this will represent the 10% of the final grade. In the digital world in which we live, and considering that we are training future pharmacist and nutrition professionals, the aim of these innovative seminars is to instruct students to be able to employ online graphic design tools such as Canva, or scientific illustration software such as Biorender, to improve the quality of their communications. Moreover, other goal is to guide them to search for scientific literature by using different databases: Scopus, Pubmed, or Web of science, so the information they use in posters, infographics or thesis is accurate and reliable to transmit scientific knowledge about toxics in food and to reach the interested population quicker. This also would contribute to achieve food safety and improve nutrition outreach, which continues to be one of the sustainable development goals of the United Nations.

**Key words:** *Innovative seminars, food toxicology, graphic design tools, infographics*

# POSTER PRESENTATIONS

## 50 Elaboration of Audiovisual Material for the Acquisition of Professional Competencies, Continuous and Cumulative.

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### **Introduction**

There is a skills gap between post-graduate students and the demands of the job market as well as professional developments. This is particularly relevant about technological, adaptive and problem-solving skills. The following activity has been designed for the subject entitled Dietary Therapy included in the curriculum of the Double Degree in Pharmacy and Human Nutrition and Dietetics at the Faculty of Pharmacy of the Universitat de València.

### **Method**

Professors perform continuous assessment activities based on daily professional practice, facilitating the incremental acquisition of working skills. Each activity is based on the skills acquired in the previous ones. Students design and perform theoretical-practical multimedia tools based on autonomous learning using provided bibliographic resources and theoretical modules.

### **Results**

This ongoing project is currently providing contextualized training based on (or inspired by) real experiences. Students are solving these proposed situations and developing by themselves several media on social networks, in 'knowpills' format, explaining the usefulness of the learning process related to specific professional competencies.

### **Conclusions**

Focusing the learning process in solving real experiences in specific job positions is improving both the learning assimilation process and the student interest in face-to-face teaching.

## 51 Multidisciplinary Service-Learning Experiences in the Faculty of Pharmacy of Valencia

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### Introduction

Service-Learning (SL) is an educational proposal that combines learning and community service processes in a single well-articulated project where participants learn by working on real needs of the environment in order to improve it. It is a way of understanding citizenship, learning and education in values.

### Method

Students from the different Degrees of the Faculty of Pharmacy receive specific training on this methodology and work together in multidisciplinary groups (4-5 students/group), tutored by teachers. They have to carry out an analysis of the needs of their environment in matters related to health topics and decide what type of project they are going to get involved in and where they are going to carry it out. They get in touch with the association or institution that are already working in that place and schedule the activities they are going to carry out.

### Results

We started the multidisciplinary SL project in the 2017-18 academic year and we have been working on it since then. Health workshops have been held for different groups: women in vulnerable situations, children with special needs, neighborhood associations,... . Each group of students chooses the topic they are going to prepare, taking into account who the workshop is going to be addressed to. They collect information and prepare graphic or any other materials. The teachers supervise the presentations and activities prepared by the students. Assessment of the degree of satisfaction of all participants in the project is also carried out

### Conclusions

This methodology is very attractive to students. They work on both cross-cutting and specific skills and allows to work in an efficient way aligned with the SDG. The incorporation of this teaching methodology at the university level is very positive as it also enables the real evaluation of the acquisition of transversal competences in the different Degrees.



## 52 Spanish Inter-University Network for Innovative Education in Pharmacology: Creating Alliances to Improve Learning

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### Introduction

Changes in Pharmacology teaching in the last years include not only changes in the curriculum but also in the way of teaching. In this way, collaboration between teachers could be an effective strategy to improve learning. With this aim, we initiated an inter-university network as a common space for sharing the experiences and the results obtained with different methods of teaching innovation.

### Method

Creation of a Moodle platform as a digital tool. Selection of the format and the material or resource to be shared. Organization of annual meetings (presential and virtual) to facilitate the exchange of innovative experiences.

### Results

Network has been operating since the 2015 and is the only of these characteristics that, created within the scope of the University of Valencia, exists in Spain and brings together a large number of teachers (124) from different Spanish (18) Chilean (2) and Mexican (1) universities, who teach Pharmacology in different Health Sciences Degrees. The network include: i) a common space for collaborative work; ii) the creation of a repository of teaching materials (65 projects already implemented at the moment); iii) the undertake of new projects aimed at active learning (2 ongoing projects), organized thematically and with a common format, which facilitates the work of both new teachers and seniors, providing tools for active learning.; iv) the common evaluation of the implemented experiences in annual meetings.

### Conclusions

The shared use of the material provided allows us to integrate and consolidate new teaching modalities developed within the framework of innovation projects and, above all, to analyze and discuss them together in the eight annual meetings already held. The experience of the use of the teaching network demonstrated that collaboration between teachers on a global scale is the most effective strategy to motivate and improve active learning.

## 53 Development of Pharmaceutical Services Workshops as a Training Tool for Osce

M. Jiménez Ferreres<sup>1</sup>, R. Sánchez Landete<sup>1</sup>, F. Repilado Grillo<sup>1</sup>, M. Fernández Román<sup>1</sup>, P. Gutierrez Ríos<sup>1</sup>, MA. González<sup>1</sup>, E. Pascual Sánchez Gijón<sup>1</sup>, JA. Otero Gil<sup>1</sup>, A. Cosín Borobio<sup>1</sup>, I. Iglesias<sup>2</sup> (<https://orcid.org/0000-0002-6903-014X>)

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### Purpose

The OSCE test consists of the development of successive tests, called "stations", in a circuit that simulates real situations. At each station, based on a given time, the students evaluated interact with a simulated interact with a simulated patient to demonstrate certain skills. Because of the casuistry of pharmacy offices, it is necessary to establish a system of workshops so that the students have the same basis to be able to face the OSCE in an equitable way.

### Methods

A standardised method for conducting workshops to prepare students for the OSCE has been developed.

- Co-ordinating Committee: A Coordinating Committee was formed as the body responsible for the Preparation of the workshops. Its main functions were: to design the competency map, to elaborate the workshops and clinical scenarios. The members of the Committee were distributed in teams and were responsible for each station.
- Map of competencies: The basic competences to be acquired by the students were agreed and defined, so that the workshops could be developed on the basis of them, ensuring that all the students acquired all the competences.
- Workshops were developed in a protocolised way.

### Results

There were 7 workshops of 4 hours each, with a standardised and protocolised design in which the student acquired each and every one of the competences necessary for their professional development, demonstrating it in the OSCE. The students' results in the OSCE, after attending the workshops, increased by 1.75 points on average in the qualification.

### Conclusion

Network has been operating since the 2015 and is the only of these characteristics that, created within the scope of the University of Valencia, exists in Spain and brings together a large number of teachers (124) from different Spanish (18) Chilean (2) and Mexican (1) universities, who teach Pharmacology in different Health Sciences Degrees. The network include: i) a common space for collaborative work; ii) the creation of a repository of teaching materials (65 projects already implemented at the moment); iii) the undertake of new projects aimed at active learning (2 ongoing projects), organized thematically and with a common format, which facilitates the work of both new teachers and seniors, providing tools for active learning.; iv) the common evaluation of the implemented experiences in annual meetings.

## 54 Use of an Objective Structured Clinical Examination (OSCE) to Assess Intern Performance in an Advanced Pharmacy Practice Experiences (APPE) Hospital Training Rotation: Preliminary Results.

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### Purpose

Intern assessment during advanced pharmacy practice experiences (APPEs) are generally based upon each individual preceptor's perceptions without an objective measurement of intern understanding and performance. Therefore, we sought to determine whether a pre- and post-OSCE could be used to confirm that interns achieved the goals and objectives of the Hospital training rotation. The aims of this study were to determine whether a post-rotation OSCE can help pharmacy interns assess their clinical strengths and weaknesses and assess whether their knowledge and skills improved after completing hospital training period.

### Methods

Pharmacy interns undergoing APPE hospital training rotations from September 2022 to December 2022 participated in a post-rotation OSCE to assess their knowledge of various competencies developed during their formative.

### Results

31 students completed the OSCE. Throughout the five stations it was possible to test the acquired competences required for the field of Hospital Pharmacy Services. In addition, each of the 5 stations was quantified with a mark using an individualized score for each of them. The following scores were obtained (X+DS) E1: 8,29+ 1,57

E2: 7,87+ 1,80 E3: 8,29+ 1,06 E4: 5,69+ 1,95 E5: 5,39+ 1,20 TOTAL: 7,1+ 0,9

### Conclusion

APPE OSCE assessments are important tools that can provide interns and preceptors with objective evaluations of student performance. OSCEs can either be used as an alternative to perception-based assessments or integrated into existing preceptor evaluations. Furthermore, OSCEs can help preceptors identify areas that require more emphasis in their rotations.

**Key words:** *Advanced pharmacy practice experience; Hospital Pharmaceutical Care; Clinical competency; Competency assessment; Experiential Education; Objective structured clinical examination; Student perception.*

# POSTER PRESENTATIONS

## 55 Improvement of the OSCE In The Faculty of Pharmacy of the Complutense University of Madrid. The vision after 4 years

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### Purpose

Since 2020 we have been regularly carrying out the OSCE at the end of the community pharmacy tutored internship period. Since then, many changes have been made in order to reduce costs, simplify and standardize the OSCE. During these four years almost 600 alumni were evaluated which means a good sample to start a revision process. Our objective is to quantify the results of the changes made, in terms of alumni response, working hours per person, and correlation with the results of test examination conducted at the end of the pharmacy supervised practice period.

### Methods

The results of the changes introduced in each version of OSCE were compared in terms of average mark, dispersion of results and student satisfaction survey.

### Results

Keeping the basic structure of five stations (3 clinical and 2 pictorial) of the OSCE, a great improvement has been accomplished in the cost area, where a 40% reduction in the working hours has been reached. We have also reduced the overall variability of results between groups to below 10%. Finally, in the satisfaction surveys carried out before the publication of grades, students have rated the test as one of the most satisfactory of the entire degree in Pharmacy.

### Conclusion

It is of vital importance to develop a standardised process for the Objective Structured Clinical Examination (OSCE), where a scale is established with the competences acquired during the internship period and an analysis is made of the learning outcomes for the student of the Degree in Pharmacy.

**Key words:** *Advanced pharmacy practice experience; Hospital Pharmaceutical Care; Clinical competency; Competency assessment; Experiential Education; Objective structured clinical examination; Student perception.*

# POSTER PRESENTATIONS

## 56 **Stimulating Innovation and Entrepreneurship in Health and Food: A Learning approach by Building Capacity, Business Decision-making and Food Knowledge**

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### **Introduction**

*MindInnFood and Feed*<sup>1</sup> is incorporated in the "UVemprén Aprén" program. It is an initiative of the University of Valencia (UV) and designed to promote educational innovation and specialization in entrepreneurship for undergraduate, master and PhD candidate students of different disciplines but mainly food and health degrees.

### **Method**

The students submitted an idea with future perspective of innovation in the field of food and health and were selected based on their interest and initiative of entrepreneurship. All students had a background or were related to degrees of Food Science and Technologies, Gastronomic Science, Nutrition and Dietetics, and Pharmacy and mostly all belonging to Faculty of Pharmacy. The activity included a course formation of five sessions during 6 months with speakers of business, food and feed industry and food safety professionals. Topics were in the context of emotional eating, upcycling strategies in food and, food research. It concluded by recognizing the best entrepreneurship project presented at the end of the course by groups created.

### **Results**

The practice-oriented course in food innovation agrifood-based, allowed students to entrepreneur in a new food product or business in the food sector market. Skills of creativity, perception and developing ideas were treated with sessions about creativity, brainstorming and method for business decision-making (Navigate). One session dealt with the mindful-eating techniques to focus on eating experiences, body-related sensations, and thoughts and feelings about food, with heightened awareness. A session of upcycling strategies in food was presented by four companies working in Sustainable and Healthy Foods Ingredients with UpCycled Plant-Based Solutions. Whereas in the food research it was included presentations about strategies to work in food safety and new advances in food technologies.

### **Conclusion**

The complete course was welcoming by the students and the participants, with a great curiosity and collaboration on both sides. The *MindInnFood and Feed* with entrepreneurship inclusion permitted to learn by creating projects and developing team-work skills, insertion in the business world and innovation skills.

<sup>1</sup>**Acknowledgement:** University of Valencia. Programa internacional d'innovació docent en empenedoria universitària "UVemprén Aprén" i desenvolupar Projectes d'innovació educativa especialitzats en empenedoria universitària en el marc del CAMPUS UVEMPRÉN 2022.

# POSTER PRESENTATIONS

## 57 Nutritional Interview in Clinical Nutrition (NutClinROLE)

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### Introduction

*NutClinROLE* is a project of the Educational Innovation from "Vicerectorat de Formació Permanent, Transformació Docent i Ocupació " and financed by the University of Valencia, (UV-SFPIE\_PID-2075858). Its frame is based on performing training of simulation in nutrition, aimed in role-playing as an innovative methodological strategy for teaching nutrition and dietetic sciences in higher education. The aim of this work was to learn and practice skills in nutritional interviews by working on clinical cases.

### Method

Students were working by facing nutritional clinical cases related to chronic kidney failure. Learning tools used were model videos and descriptive sheets for each profile intervening in the role-playing: the nutritionist and the patient. These documents incorporate information about the patient and their pathology, including anthropometric and analytical data, the nutritionist doesn't have this information and must resolve it during the simulation. The activity was planned for students in the fourth and fifth courses of the double degree in Pharmacy and Human Nutrition and Dietetics at the University of Valencia in the academic year 2022/2023.

### Results

During the training, the students acquired knowledge about chronic kidney failure, and put into practice nutritional interviews and dietetic recommendations. It was evaluated the impact of the role-playing methodology based on their opinions before and after the activity, reporting a positive experience and increased knowledge of nutrition. Regarding the resolution of the clinical case, it has been observed that the student has sufficient knowledge to solve it, but they present deficiencies in information organization and communication skills.

### Conclusion

Role-playing constitutes an appropriate strategy to promote attitudes, healthy habits and academic and theoretical-practical training in terms of nutrition.

<sup>1</sup>**Acknowledgement:** *Financed by "Vicerectorat de Formació Permanent, Transformació Docent i Ocupació" University of Valencia, (UV-SFPIE\_PID-2075858).*



# POSTER PRESENTATIONS

## 58 Dader Method as a Tool for Learning Pharmacotherapeutic Monitoring

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Toxicology is a compulsory subject in the fourth year of the Degree of Pharmacy, at the University of Valencia. During the course, students carry out the activities of the clinical and social pharmacy, which include Pharmaceutical care. The aim of Pharmaceutical Care practice is to improve patients' health related to drug safety, effectiveness of drug therapy, and medical advice. This practice implies one of the greatest grades of pharmacists' responsibilities on the performance of their function rather than any other clinical activity. The DADER method allows the detection of patients' health problems related to drug prescriptions. The teaching method used in class for introducing the DADER method is known as Challenge Based Learning (CBL). In CBL students have to identify the problem, find out the cause of that problem, and suggest solutions. The procedure consists in: first, students resolve a clinical case study of a patient taking one or various drugs therapy; and second, students have to find out if any of the patient's health problems are caused by any of the medicines which have been prescribed and administered. This activity leads students to a more active and participative attitude because they have to look for the information on the drugs referred to as correct dose, side effects, drug interaction, etc. Among that, the final students' outcomes are presented to the professor in class, in front of their classmates, and explained from their point of view. In this regard, communication skills are developed since the appropriate solutions to solve the problems detected will have to be accepted by both, the patient and the doctor. Learning outcomes: students strengthen their knowledge, acquire skill and ability to solve problems and professor to encourage students to contribute to identify side effects that drugs can cause in patients with multiple therapy.

# POSTER PRESENTATIONS

## 59 Webquest as an Innovative Tool for Pharmacy Undergraduate Students

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Pharmacy is a five-year grade at Universitat de València that includes theoretical lessons and laboratory practice in each subject. Moreover, there are some hours of tutorial and seminar teaching that are used in some subjects to introduce tasks related to Information and Communication Technology (ICT) and teamwork. A Webquest activity has been performed during the last academic years at the seminars of Nutrition and Bromatology, a compulsory subject included in the first semester of the third year of Pharmacy grade. The aim of this task is the integration of the knowledge acquired in the theoretical lessons as well as showing the ICT tools such as search engines and official websites in order to always maintain the appropriate level of updating in the professional field. It is focused in the nutritional advice with the appropriate arguments. The task proposal is to create a questionnaire designed specifically for a 22 year-old that fits on one page in groups of four people. The questionnaire has to be answered by checking or unchecking boxes and can be printed on paper even if it has been designed online. It should evaluate both diet and physical activity during 7 days, i.e. each day the person should fill it in and add up all the days at the end. Once completed, one should be able to find out which habits need to be corrected to make his or her lifestyle healthier (referring to the general average and without pathologies or physiological states of pregnancy or breastfeeding). Students have two months to work in the task and they must upload the questionnaire in the virtual classroom before the last seminar session. The professor summarizes the best of each questionnaire proposed during the last session while promoting a discussion about healthy lifestyle. The webquest can be found at:

<https://laramanyes.wixsite.com/estilovidacinco>

**Key words:** *creativity, internet, guided-learning, ICTs*

# POSTER PRESENTATIONS

## 60 Identify for which Diagnostic Test(s) would be appropriate. The Exploration Diet presented

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The Diet Therapy subject is taught within the Degree in Human Nutrition and Dietetics and Double Degree in Pharmacy and Human Nutrition and Dietetics at the Faculty of Pharmacy at the University of Valencia. This one academic year subject focuses on the study of the dietary treatment required in different diseases, where nutrition and food are of great importance for the health and recovery of the patient. Within the face-to-face teaching, three times a week, theoretical-practical sessions are integrated with the aim of applying the theoretical knowledge acquired, to the real practice of intake assessments and preparation of diets adapted to the different pathological situations. This theoretical-practical session aims to introduce students to the evaluation of exploratory diets before carrying out diagnostic tests. The session begins with a brief explanation of the activity to be performed, then the students are invited to form pairs or trios to carry it out. A document is provided with the activity to be done, in which the student must assess the 24-hour intake presented using Food Composition Tables (BEDCA). The evaluation of the 24-hour diet is directed towards the determination of different key macro and micronutrients for the development of different diagnostic tests. To finish the activity, students are asked to discuss, after having assessed the 24-hour intake, which diagnostic test(s) would be the most appropriate. Finally, a specific task will be activated in the virtual classroom so that each student can upload their task within 24 hours. Once the task is completed, a report will be available to all students in the virtual classroom with the minimum information required for the exercise self-correction. In conclusion, also according to students' comments, this activity allows the implementation of the knowledge acquired in previous sessions on the subject related to exploration diets.

**Key words:** *exploratory diets, diagnostic tests, food composition tables, BEDCA.*

**Select preference:** oral  poster

# POSTER PRESENTATIONS

## 61 Teaching Healthy eating Habits: Emotional Eating and Quality of Consumer´s Food Choices

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### Introduction

Specialists in marketing use multisensory advertisements to enhance the choice of a hedonically rewarding food by consumers (Elder and Krishna 2010). Many studies recognize that marketing efforts can often lead consumers to choose unhealthy but emotionally satisfying food; however, limited research has explored ways that consumers can combat this mindless eating (Kidwell et al., 2015). Therefore, it is imperative to develop new and more effective ways to improve the quality of consumers´ food choices. Mindful eating is a way of helping people to relate to and approach food more positively; in fact, there is a range of mindful eating skills worth developing for trying to eat in a more balanced, healthy way, to improve your overall relationship with food, to lose weight and to achieve successful long-term weight management (Kidwell et al., 2015). Many health programs and policy mandates currently focus solely on increasing nutrition knowledge, however, eating decisions are more emotional in nature.

### Method

In this work, the MindInnFood and Feed1 project was carried out at the Faculty of Pharmacy with students from food and health degrees. It was developed through a course based on healthy eating habits where students learned the benefits of mindful eating and practiced with a local product that contained wide organoleptic properties.

### Results

This practice offered to the students not only a healthy eating habits, but also opened emotional abilities to help consumers develop emotional skills that will improve their decision-making. This teaching activity focused on the use of the new practice, effective interaction between students and lecturers and close links between teaching and research. During the practice the students shared their emotions and feelings, remarking that they multiplied their taste senses.

### Conclusion

The students learned the importance of the entire eating experience, including choosing and preparing food, while acknowledging our inner wisdom and body cues without judgment. The mindful-eating practice was proved during the sessions that it is a helpful tool to control the emotional eating for ensure well-health.

# POSTER PRESENTATIONS

**References:**

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Kidwell B., Hasford J., Hardesty D.M. (2015). *Journal of Marketing Research* Vol. LII, 105–119.

**Acknowledgement:** University of Valencia. Programa internacional d'innovació docent en emprenedoria universitària "UVEmprén Aprèn" i desenvolupar Projectes d'innovació educativa especialitzats en emprenedoria universitària en el marc del CAMPUS UVEMPRÉN 2022.

**Poster**

## 62 Preparing Pharmacy Students to Clinical Practice

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### Introduction

At the Faculty of Pharmacy (University of València), the compulsory subject 'Clinical Pharmacy and Pharmaceutical Care' (6 ECTS) is taught in the last year, just before supervised internships in hospitals or in community pharmacies.

This subject offers the student the possibility of using the basic and necessary tools in the immediate future for their professional practice in the healthcare setting: application of the knowledge of medical and pharmaceutical sciences acquired to solve problems with medication, to educate the patient and to communicate information to patients and other health professionals.

### Methods

The contents are articulated in different teaching modalities: theoretical classes, practices, seminars, and tutorials.

### Results

Some practical classes are given in special classrooms that simulate the professional environment, both at the hospital and community pharmacy level. Thus, through the analysis of different clinical cases, in which the information related to the patient, his/her clinical situation and pharmacotherapy requirements students are guided to optimize the use of medications and to identify opportunities for pharmacotherapy improvement. Other activities focus on the importance of the pharmacist's integration in multidisciplinary patient care teams. The active participation of the future pharmacist in patient follow-up, in providing patients with information related to medicines and in contributing to patient health education is encouraged. In the seminar sessions, teamwork, and social commitment (service-learning) are encouraged. Different situations are resolved as medication reconciliation in care transitions, active dispensing in emergency contraception and promotion of adherence to treatment. The evaluation of all the aspects is a fundamental tool to enhance the learning and commitment of future medicine professionals.

### Conclusion

These communication skills, and information analysis, allow students to achieve competencies related with the rational use of medicines, as promoting responsible health management to guarantee the sustainability of the health system and the community health, with special attention to the most vulnerable populations.



## 63 Psychophysiological Effects of Synthetic THC (Dronabinol) Administration during Gestation and Lactation in the Offspring. A Translational approach.

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### Background

Currently, there has been a worrying increase in cannabis use during pregnancy and lactation. The amount of THC in recreational cannabis is known to have increased by more than 10% in recent years (1). The studies that have been conducted so far on the impact of fetal or newborn exposure to THC suggest significant physiological brain and psychobehavioral alterations (2). Many aspects related to perinatal cannabis exposure are still unknown. The main objective of this work has been to develop a new animal model of perinatal exposure to dronabinol, evaluating the alterations produced in the offspring with a translational approach.

### Methods

Male and female C57BL/6J mice were crossed, and after confirming gestation, the administration of dronabinol (10 mg/kg/12 h, from gestational day 5 to postnatal day 21) was started. In the offspring exposed to dronabinol, traits of anxiety, depression, and cognitive, as well as the level of alcohol consumption and motivation were evaluated. Relative gene expression of corticotropin-releasing factor (CRF) in the paraventricular nucleus (PVN) was analyzed by real-time PCR. NeuN and GFAP protein expression in the cortex was studied by immunohistochemistry.

### Results

THC-exposed offspring were characterized by increased traits of anxiety, depression, and cognitive problems, and an increased vulnerability for alcohol consumption and motivation observed in males and females. Notably, these behavioral alterations were accompanied by a significant reduction of CRF gene expression in PVN. Likewise, exposed offspring show alterations in cortical lamination, thus showing that the normal process of brain maturation is affected.

### Conclusion

These preliminary results provide relevant information about the severe consequences of perinatal THC exposure on different behavioral aspects. These can be the result of the alterations observed in the mechanisms of cortical development and the regulation of the stress axis. Further research is needed to demonstrate the brain alterations that account for behavioral changes.

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# POSTER PRESENTATIONS

## 64 Leadership skills in pharmacy education through the lens of an international educational model "The Pharmacy Game"

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### Background

Training pharmacy students to develop competency in leadership is recognized as being important, but there is no standard way for teaching and assessing leadership skills. The Pharmacy Game is an educational model integrating simulation of practice and gaming which is implemented at nine Universities around the world. This model is probably well suited to train leadership skills.

### Study objectives

This study aimed to explore how leadership skills are taught as part of the Pharmacy Game.

# POSTER PRESENTATIONS

## **Methods**

8 universities took part in this study: University of Groningen (UG), Utrecht University (UU), Leiden University (LU), Vrije Universiteit of Brussels (VUB), Vilnius University (VU), University of Oslo (UO), University of Bath (UB) and University of Nottingham (UN). We evaluated the content of the Pharmacy Game in each University to obtain the following information: 1) if an explicit framework of leadership was used and if so, which framework; 2) which elements of leadership were considered; 3) how leadership skills were trained (teaching methods); 4) which assessment methods were used.

## **Results**

Training leadership skills was implemented in the Pharmacy game across 5 universities. Examples of frameworks were: Pharmacist Competency Framework & Domain-specific Frame of Reference for the Netherlands (UG, UU, LU), and Miller's pyramid of clinical assessment (UN). Examples of elements of leadership were: general management skills (UG, UU, LU), developing strategies (UG, UU, GU, VU, VUB), entrepreneurship skills (UG, UN, UU, UB, VUB) and organizational skills (UG, VU, UU, VUB, LU). Teaching methods included testing the color typology (UG), Belbin team role test (UU, UN), online and face-to-face feedback sessions (VUB). Examples of assessments methods were: peer assessments (UG, VU, VUB), self-reflections (UG, VU, UB, VUB, UN), group presentations (UB) and competency mapping (UB).

## **Conclusion**

Across the world, leadership skills are taught as part of the Pharmacy Game in a variety of ways.

## 65 Risks in Pharmacy Practice Research

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### Introduction

The conduct of pharmacy practice research has contributed to the advancement and innovation of professional pharmacy practice. Risks could arise across the research process, from research design, recruitment process, analysis and interpretation of data to implementation of results. This study aims to identify risks in pharmacy practice research and determine ways to mitigate such risks.

### Method

The study was divided into two phases. Phase 1 involved the development and validation of a search strategy and the establishment of inclusion and exclusion criteria to identify pharmacy practice research studies considered in the study. Pharmacy practice research studies were retrieved and risks and limitations identified. Phase 2 involved the identification of risk mitigation strategies through literature review and a focus group discussion composed of two academic pharmacists and two members of the Ethics Committee of the University of Malta.

### Results

Records were identified through the Open Access Repository of the University of Malta from 2015-2022 resulting in a total of 545 titles. Duplicates, abstracts, poster presentations, and editorials were excluded leaving 235 studies for title and abstract screening. PhD studies and those which the researcher does not have access to were excluded leaving 204 dissertation studies assessed for eligibility. A total of 63 studies were included for the review, of which 28 were set in a hospital pharmacy and 20 focused on a pharmacy service or intervention. Time constraint was the most common limitation reported (n=21), which can be mitigated by designing the study with a longer data collection period.

### Conclusion

Through the identification of risks in pharmacy practice research and the development of risk minimisation strategies, this study could contribute to the improvement of the quality and robustness of pharmacy practice-based research studies.

## 66 Medication Review Program for Proton Pump Inhibitors Treated Patients in Community Pharmacy

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### Introduction

Medication review is one of the Pharmaceutical Care Services aimed to promote the safe and effective use of medications. Following the Spanish National Health System's latest reports, published by the Health Ministry in 2022<sup>1</sup>, proton pump inhibitors (PPIs) are the most consumed pharmacotherapeutic group in Spain (6.7%). In a collaborative effort involving Academia (UV) and the Professional College (MICOF), we have undertaken the analysis of the prevalence of potentially inappropriate prescriptions in the province of Valencia, using a MICOF's personal developed tool in community pharmacy, including patients who were prescribed with at least one PPI in their global pharmacotherapy.

### Method

A cross-sectional, retrospective, and observational study was performed by using MICOF's medication review program Revisem® results. Data was obtained during the second half-year of 2022 from the 172 participating patients who had, at least, one PPI included in their pharmacotherapy.

### Results

A total of 1731 drugs were used by all the patients and were analysed by Revisem®. The average number of drugs was  $10.19 \pm 3.88$  per patient. The average number of detected incidences was  $8.77 \pm 6.02$ . The number of interactions detected (706) stands out, representing 47.65% of the incidents, followed by STOPP criteria (22.16%) and precaution of use (20.09%). The remaining incidents correspond to START criteria (6.25%), duplicities (2.05%) and contraindications (1.76%). From the total number of patients that were analysed, 121 (70.35%) had, at least, one incident related to PPIs.

### Conclusions

These results show a higher percentage of incidences in PPI-treated patients. These data highlight the importance of a proper use and prescription of PPIs. Furthermore, force us to keep studying this therapeutic group to understand how to improve its management in the clinical practice.

### Literature References:

1. Prestación Farmacéutica en el Sistema Nacional de Salud, 2020-2021. Informe monográfico. Informes, estudios de investigación 2022. Ministerio de Sanidad.

## 67 **Crithmum Maritimum L.: A Sustainable Alternative of Nutraceuticals and Bioactive Compounds in the Food and Pharmaceutical Industries**

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### Introduction

Intensive agricultural practices lead to soil alterations such as salinization, erosion, and desertification. The amount of water used in agriculture is high, and allied to climate changes, we face a problem of water scarcity. To overcome these problems, the halophytes emerged as a sustainable approach. These plants grow in high-salinity environments, being found in coastal areas. They are rich in macro and micronutrients, and are a source of bioactive compounds such as polyphenols. *Crithmum maritimum* L. (Cm), a halophyte belonging to Apiaceae family, can be found in Western Europe, including the Portuguese coast. Cm is traditionally consumed as food, and condiments. In traditional medicine, its aerial parts are prepared as infusion/decoctions to treat several disorders such as gastrointestinal problems, scurvy, cough, inflammation, infections, and liver and urogenital problems. Externally, is used to treat wounds. In addition, Cm has been proposed as a cash crop in saline agriculture.

### Methods

Essential oil (EO) and aqueous extracts of Cm' aerial parts were prepared. Its phytochemical characterization was performed by GC-MS, and HPLC-PDA. The antioxidant activity was assessed by DPPH, and ABTS methods. The antibacterial activity was evaluated on *E. coli*, *S. aureus*, *B. cereus*, and *L. plantarum* by disk-diffusion method, and microdilution assay.



# POSTER PRESENTATIONS

## **Results**

Cm is a source of vitamin C, essential fatty acids, proteins, fibre and minerals. The aqueous extracts have the same phytochemical composition being constituted mainly by hydroxycinnamic acids with chlorogenic acid in higher amount. In EO, the main constituents were  $\gamma$ -terpinene followed by sabinene, and thymylmethyl oxide. Aqueous extracts of Cm exhibited antioxidant activity, and only essential oil presented antibacterial activity.

## **Conclusions**

Due to its phytochemical content, Cm has potential as preservative in food, and pharmaceutical industries. Given its nutritional properties, this plant can be used in animal nutrition, and as functional food.

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# POSTER PRESENTATIONS

## 68 Postgraduate Studies in Pharmacy and Health Sciences with positive impact on SDGs.

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### Introduction

The Pharmaceutical profession can be developed in as many ways as one can imagine, but, a pharmacist will always have the chance to show her/his commitment with the SDGs. The Faculty of Pharmacy of UPV/EHU is offering and collaborating with several postgraduate studies that cover some of them.

### Results

When thinking of sustainability, the first concept that comes to us is the environment and its conservation. Drugs are a big source of pollution through all their lifecycle. This is the topic of the postgraduate "University Expert in Pharmaceutical Contamination" (15 ECTS), launched in October 2022.

Many other SDGs relate to the right of getting proper health care, no matter where you live or come from and what language you speak. Some of these aspects can determine the quality of the health care you can get, as they may effect on the perception of the health provider. This is the main theme of the "University Specialist Postgraduate in Linguistic and Cultural Management of Patient-Centred Health Care" (30 ECTS), taught since 2021. It comes to address a well-known problem in countries with minority languages, but extending to places where displaced communities are growing.

The third postgraduate course is "University Expert in Pharmacy Care Practice" (15 ECTS). The profession has changed its focus from drugs to the needs of patients, following the resolution of the European Council in 2020 on the application of pharmaceutical care to promote the appropriate and safe use of medicines for the benefit of patients and health systems. This postgraduate will train pharmacists to provide professional pharmaceutical services in Community Pharmacy starting in October 2023.

### Conclusions

SDGs 2, 6, 9, 11, 12, 13, 14, and 15 should benefit from the first postgraduate, whereas SDGs 3, 5, 10, and 16 would thanks to the second and third ones.

## 69 Awareness about Drug Addiction in the Context of the Sustainable Development Goals (SDG) among University Students

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### Introduction

This project was part of the call Objetivo Campus Sostenibles 2023 of the University of Salamanca, which was oriented towards social innovation and sustainability on the campuses. The project titled "Drugs and addictions, what does the science have to say about them?" aimed to disseminate information and raise awareness about drug addictions in the context of Sustainable Development Goals (SDG) among university students.

### Method

It consisted on the realization of 5 different seminars about drug addictions involving several topic-related people as presenters apart from the 4 students who organized the journeys. The 5 seminars lasted 2 hours each and it was performed only one per day during the week of 6-10 March 2023. The presentations were composed of a talk about what the SDG are, which of them were related with the topic we were talking about and which were the mechanisms by which those drugs produce their effects. The talks were accompanied by several transparencies, a specialist on the topic of each seminar and some quizzes about the conferences to implicate the assistants.

### Results

A total of 55 university students assisted to the seminars. Most of them (49.1%) discovered the event because they were told about it by a friend, and 38.2% discovered the project through social media posts. The rest of the assistants were told by a university teacher. It was correct 93% of the answers of the questionnaires the participants completed at the end of each seminar, and the satisfaction rate was high in general. The contents of the presentations were correctly internalized by the assistants, and they were satisfied with almost all the aspects of the seminars.

### Conclusions

These journeys in the context of the SDG served to raise awareness among students about the danger of drug use.

# POSTER PRESENTATIONS

## 70 Implementation of Objective and Structured Clinical Evaluation (OSCE) in Pharmacy Degree at University of Salamanca

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### Introduction

Objective and Structured Clinical Evaluation (OSCE) is a type of practical evaluation, aimed at assessing acquisition of professional skills of the student through the resolution of clinical cases and skills. We have implemented this methodology into the evaluation of Supervised Practices subject of Pharmacy Degree at University of Salamanca, as a pilot experience.

### Method

OSCE is comprised of a series of stations or real situations through which students rotate consecutively on a time basis. For pilot experience, four stations of six minutes length each and one station of twenty minutes length were settled and 21 students were evaluated. Students satisfaction was gathered by means of an online questionnaire with 17 statements on a Likert-type scale and one open questions to express suggestions.

### Results

OSCE implementation results in Supervised Practices subject in Pharmacy Degree at the University of Salamanca has confirm the suitability of this evaluation methodology to measure the capacity and skills of future pharmacists. Students find this methodology adequate, although they show hesitation because of the novelty and the stress involved in facing real situations with limited time.

### Conclusions

Evaluation using OSCE methodology has shown a maximum use of students stays at Community and/ or Hospital Pharmacies. In order to reduce stress level of students, it is necessary to provide them with resources for training, such as audiovisual pills and role-play simulations.

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# POSTER PRESENTATIONS

## 71 Alterations in Glutamatergic and Neuroplasticity Key Elements in Corticolimbic Brain Regions of Suicide Completers

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### Introduction

Developing biological bases approaches for preventing suicide has become a priority. Converging evidence suggested that the glutamatergic system appears to play a relevant role in suicide, although it remains unclear.

### Method

In this study, we examined the gene expression of the metabotropic glutamate receptor 5 (mGluR5) and its scaffolding proteins Homer1a and p11 in the dorsolateral prefrontal cortex (DLPFC), amygdala (AMY), and hippocampus (HIP) of 28 suicide completers (S) (with no clinical psychiatric history or treatment with anxiolytics or antidepressants) and 26 controls (C) by real-time PCR (qPCR). Indeed, we measured BDNF gene expression and VGluT1 and VGAT immunoreactivities in the HIP by qPCR and immunohistochemistry, respectively. All samples were matched for age (C: 48.6±11.6 years; S: 46.9±14.5 years) and postmortem interval (PMI; C: 20.1±13 h; S: 16.9±5 h).

# POSTER PRESENTATIONS

## **Results**

Statistical analyses revealed a significant reduction of p11 gene expression levels in the DLPFC of S, whereas no differences were found in mGluR5 or Homer1a. Interestingly, mGluR5 and Homer1a were significantly increased in the AMY and HIP, whereas p11 and BDNF were reduced. Moreover, immunohistological studies revealed an alteration in excitatory/inhibitory balance in the HIP of S compared to C, since a reduction of VGAT-ir and an increase of VGluT1-ir were observed in this brain area.

## **Conclusions**

This study identified significant alterations in mGluR5, Homer1a, p11, BDNF and excitatory/inhibitory balance in corticolimbic brain areas of S. These results further characterize the biological basis of suicide, contributing to the identification of potential biomarkers for suicide prevention.



# POSTER PRESENTATIONS

## 72 Evolution of Academic Pharmacy Degree Mobility in the last ten years. A Survey of Students Satisfaction

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### Introduction

The ERASMUS program aims to increase the exchange of students between European higher education institutions by providing financial support to member states. Valencia is currently the top destination for ERASMUS students in Europe. This study analyzed the evolution of incoming and outgoing ERASMUS students in the Faculty of Pharmacy at the University of Valencia and the satisfaction level of the students.

### Method

The study studied the evolution of ERASMUS exchange students in the Faculty of Pharmacy at the University of Valencia from 2014 to the present. A total of 356 ERASMUS students survey were analyzed.

### Results

Out of a total of 1079 pharmacy degree students, 140 (13%) completed the ERASMUS program every year. Incoming students were always more numerous than outgoing ones, with 181 students incoming in the academic year 2022-2023. The survey results from 356 students who completed the pharmacy degree were satisfactory. The academic level of the destination university received a rating of 4.3 out of a maximum of 5.0. The students believed that their mobility experience was useful for their future careers, receiving a score of 5.0. Satisfaction with professors at other universities was rated at 4.5. Overall, the satisfaction with mobility experience received a score of 4.4 out of 5.

### Conclusions

The Faculty of Pharmacy at the University of Valencia currently has a 15% incoming and outgoing mobility rate. The evolution of mobility programs is increasing. Students are satisfied with the mobility experience, with a particular emphasis on improving their future professional opportunities and the adequate academic recognition between subjects.

## 73 Towards Excellence in Teaching Food Science: Consolidated Innovation Groups in the Faculty of Pharmacy of the University of Valencia

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### Introduction

Training and educational innovation are essential to improve the quality of university teaching aiming at the excellence. In this regard, the University of Valencia (UV) has created a registry of « Consolidated Teaching Innovation Groups » to guide efforts and optimize resources.

### Method

Professors of the areas of Food Technology and Nutrition & Food Science belonging to the Faculty of Pharmacy of the UV have applied for the call to be included in this registry. They have wide expertise in teaching innovation since they have participated in eight granted projects by the UV related to this topic. The projects were applied to the following degrees: Pharmacy, Human Nutrition & Dietetics, Food Science & Technology and Gastronomic Sciences.

### Results

Three groups with complementary lines of action have been registered: (i) DIALSOST (« Sustainability and Dissemination in Food Sciences ») -Teaching innovation group that focuses its activity on projects on food dissemination and aspects related to food sustainability ; (ii) InnoFoodChem (« Innovation in the teaching of Food Chemistry applied to food degrees ») - This group has created diverse and varied multimedia resources to enhance the learning of the Food Chemistry subject ; (iii) CIALeINED (Food Sciences and Educational Innovation) – This group intends to develop research in the use of teaching innovation methodologies in the field of studies related to food and the improvement of teaching through its application.

### Conclusions

This registry will allow the formation of stable groups of professors who will develop collaborative and coordinated innovation actions as well as can receive specific training. In addition, it means giving formal recognition and dissemination to the activities carried out by them. Finally, these kind of actions in the UV will facilitate the personal development of graduated students and expand their career opportunity.

# POSTER PRESENTATIONS

## 74 Post-graduate Course in Pharmaceutical and Regulatory Sciences

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### Introduction

Pharmaceutical regulatory sciences evolved to ensure safe, quality and effective medicinal products whilst considering access, resilience and impact on the environment. Challenges include the rapid expansion in the pharmaceutical field which requires an increase in capacity building. The regulation of innovative technologies such as medical devices, biological drugs and non-biological complex therapies increased the need for expertise in these fields.

### Aims

To develop a post-graduate course at Masters level that provides the opportunity to pharmaceutical graduates to develop competences that support regulatory sciences

Materials and Methods: The three year Master course is offered as part-time studies. The course was evolved following discussions with pharmaceutical industry and the pharmaceutical regulating agency. The needs for graduate pharmaceutical workforce development were identified, particularly the EU requirements to satisfy certification as a Qualified Person in the pharmaceutical industry.

### Results

The post-graduate course is now in its fifth intake with 48 students. The first year of the course consists of elective study units. The 48 students followed these study units: Applied physiology, biochemistry and toxicology (47), pharmacognosy (37), pharmaceutical regulation (36), pharmaceutical chemistry (36), pharmaceutical technology (28), industrial pharmacy (26), pharmacovigilance (25) and pharmacoeconomics (10). In the second year of the course, students undertake a practical reflective placement and an elective specialization study unit in one of the following options: Regulatory sciences, pharmacoeconomics, industrial pharmacy, and medical cannabis science. Thirty six students followed the second year of the course selecting the following options regulatory sciences (23) and industrial pharmacy (11). In the third year of the course, students undertake a dissertation.

### Discussion

The course leading to a Master in Pharmaceutical and Regulatory Sciences contributes to pharmaceutical workforce capacity building by empowering graduates to develop specific skills and competences meeting the needs of the evolving regulation of medicinal products.

## 75 Application of an Innovative Teaching Tool “Educational Escape Room” for the Students of Pharmacy Faculty

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### Introduction

New technologies have contributed to improve teaching and learning processes, thus diversifying teaching materials and filling the gaps of traditional methodologies. In this context, Educational Escape Room constitutes a new methodology, in line with the concept of gamification (Nicholson, 2015). Considering its great acceptance in other fields, Escape Room could be a potential approach to be implemented in University teaching activities, as class-laboratory or seminars. In addition, it would constitute a useful tool to complement the concepts studied in the subjects, leading the students to consolidate their knowledge (Sanz-Yepes & Alonso-Centeno, 2020).

### Method

In this work, an Escape Room gamification-based task was created. Different groups composed of 4-6 students must pass tests related to nutrition and food safety aspects. Each group will work on a clinical case with symptoms that can be explained by food poisoning, in which nutritional factors can interfere. Students will follow some clues related to the subjects of food safety and nutrition to solve the cases. Moreover, the experience of the students in this activity will be compared to the traditional methodology, employing tools like Moodle, Google forms or Kahoot.

### Results

In the absence of completing the activity, preliminary results showed that the students have understood the dynamics involved in the proposal. Likewise, in a preliminary way, the learning of conceptual, procedural, and attitudinal knowledge through this resource was satisfactorily resolved.

Conclusions: The application of a gamification-based task “Escape Room” significantly promoted the development of critical and deductive skills in students. It was not only a dynamic and different activity for them, but also constitutes a good, complementary didactic tool to improve their learning in the taught subjects.

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# POSTER PRESENTATIONS

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## Poster

## 76 Sustainability in Pharmacy Education: the role of COIFFA (Iberoamerican Conference of Faculties of Pharmacy)

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### Introduction

The Hispanic-American Conference of Faculties of Pharmacy (COHIFFA) was founded in 1992 in Mérida (Venezuela). Since 2006, in Nuevo León (Mexico), with the adhesion of the Faculties of Pharmacy of Portugal and Brazil, the "H" has been removed and the name of Iberoamerican Conference of Faculties of Pharmacy (COIFFA) has been adopted, even the main objective remains the same:

To participate and discuss, both nationally and internationally, on organisational criteria, training resources, development of study plans and programmes, relations with the health system, exchange programmes, pharmaceutical research, and in general on all issues considered relevant to the training of pharmacists in the Iberoamerican area.

### Method

Organization of meetings in COIFFA area with presentations, discussion and approval of documents that reflect the permanent progress of the sciences and pharmaceutical practice experienced nowadays.

### Results

The results were disseminated in national and international organizations and forums, mainly in the Iberoamerican Congress of Pharmaceutical Sciences that occurs every 2 years allowing that the members of COIFFA will be "up to date" with the important subjects of pharmaceutical research and training.

### Conclusions

The X Iberoamerican Congress of Pharmaceutical Sciences, under the theme "Opening Borders" will be held in Europe, highlighting that if the disease cross borders without permission, health also has to have the same capacity and the Faculties of Pharmacy, either from Europe and for Iberoamerica should give the example. Welcome to Coimbra, Portugal (26-28 October, 2023).



## 77 Evaluating Online Pharmacy Market participants in Germany: Analyzing Legal and Illegal Vendors with a brief comparison to their Hungarian counterparts

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### Introduction

Increased internet accessibility and online shopping convenience have led to rapid growth of online pharmacies. However, alongside legitimate internet pharmacies, a significant number of illegitimate vendors have emerged, threatening consumer health and safety. Consequently, regulatory bodies and researchers must monitor online landscape and ensure its legitimacy. This study examines Germany's online pharmacy market, with a brief comparison to our prior research on Hungary.

### Method

We used Google Trends to identify the most searched active pharmaceutical ingredients (APIs) in three categories: potentially abused substances (alprazolam and clonazepam), prescription medications (amoxicillin and omeprazole), and over-the-counter (ibuprofen and paracetamol). The Apify search engine scraper was used to collect the first 50 search engine results (SERs) for each API, using the search query "Buy API" in German. The SERs were manually evaluated, and the legitimacy of online pharmacies was verified using national drug authority listings.

### Results

Of the 300 SERs evaluated in Germany, 54.6% (n/N=164/300) led to websites offering medicines for sale, with 42.6% (n/N=128/300) legitimate and 12% (n/N=36/300) illegal vendors. The prevalence of illegal vendors was highest for potentially abused substances, at 23% (n/N=23/100). clonazepam results were more affected with 28% (n/N=14/50) compared to alprazolam with 18% (n/N=9/50). Prescription medications had an overall 13% (n/N=13/100) of the results belonging to illegal vendors, with 22% (n/N=11/50) of the amoxicillin vendors being illegal, compared to only 4% (n/N=2/50) for omeprazole. No illegal vendors were found selling over-the-counter medications. Compared to Hungary, Germany had more websites selling medicines online (54.6% vs. 31.7%) as well as a higher illegitimate vendor rate (12% vs. 5.3%).

### Conclusions

While majority of online pharmacies in Germany are legitimate, a significant number of illegal vendors are present. Hungary faces similar, albeit reduced, challenges. Actions addressing illegal sales of medicines online are vital in both countries.

## 78 A model for Interprofessional Pedagogical Knowledge Development in Pharmacy Education

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### Introduction

The “new norm” of teaching methods utilizes novel methods and environments. However, application of modern technology without clear pedagogical objectives provides no guarantee for expected educational outcomes. We aimed to identify faculty development interventions in pharmacy education to support teaching proficiency focus programs that integrate educational and pedagogical theories in order to support the ongoing curricular reforms of pharmacy education at the University of Pécs.

### Method

Our five-step scoping review approach comprised of identification of research question; identification of relevant studies; selection of studies; charting of data; summary and report of the results. Inclusion criteria were faculty development focus included pharmacy staff participants; and the interventions integrated or used a pedagogy tool or approach.

### Results

34 manuscripts met the eligibility criteria for detailed full-text analysis, and 7 articles were included in the final analysis. The key findings of the reviewed literature can be summarized in nine statements: (1) Change in faculty behaviour or approach is required for curricular transformation; (2) Competency focus is key element of curricular reform; (3) Educational expert cooperation ensures relevant pedagogy and implementation outcomes; (4) Flow of information between stakeholders ensures curricular effectiveness and optimize student benefit; (5) Faculty staff engagement factors considered for tailored course design ensure program efficacy and embed curricular development; (6) Apply relevant evidence-based data on adult teaching pedagogy and adapt to your educational settings; (7) Recognize and develop the informal/hidden curriculum; (8) Reflection on learned or experienced pedagogical knowledge is essential for implementing theory into practice; and (9) Adoption of educator roles as facilitator, motivator and formative assessor encourages student progress.

### Conclusions

Our scoping review findings illustrate the real-world applicability of the 9 statements listed above in an interdisciplinary Hungarian implementation program model, providing scientific evidence for a coherent and comprehensive model system ensuring improvement in pharmacy education.

## 79 Digital Marketing Strategies and Solutions in the Market of Online Medicines: Development of the Online Pharmacy Marketing Evaluation Toolkit

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### Introduction

Increasing experience in online purchases, the convenience of mail-order trade, and the pandemic has fuelled the expanding market of online pharmacies. Due to deficiencies in and differences of international legal regulations of the online pharmaceutical market, the commercial practices of illegal distributors targeting the global market differs significantly from those of legal distributors targeting the national market.

### Method

To perform a systematic content analysis of online medicine vendor sites accessible by consumers in Europe via search engine results, we have revised published literature and evaluated websites in three countries (Austria, Hungary and Italy) to construct an Online Pharmacy Marketing Evaluation Toolkit.

### Results

A 36-item closed question toolkit was developed to assess "marketing-fingerprint" of online medicine vendor websites based on the 4P marketing mix (product, price, place and promotion) framework. The 11 item "Products and services" module focused on the product portfolio offered, further the commercial (e.g. customer service, discrete packaging) and professional pharmacy services including real-time counselling, electronic prescription and medication refill services. The section on the "Price" element of the marketing mix assessed 6 questions including discounts, money refund, and coupons. The third "Place" module evaluates 7 questions on payment and delivery related topics, such as price and geographical limitations on delivery, pick-up options. The final "Promotion mix" component assesses 12 promotional methods used by online pharmacies, the list includes questions on SEO, gifts, testimonials, authority approval logo, etc.

### Conclusions

Evaluation of how internet pharmacies apply and communicate marketing mix elements on their websites will likely correlate with marketing strategies and finally with website legitimacy. Based on our observations, illegal online sellers utilize hard-line marketing techniques, while legit online pharmacy websites follow ethical marketing strategies. Our toolkit and findings will support the development of ethical marketing practices and provide a valuable framework for practice oriented graduate education.

## 80 A lesson learned from the Pandemic: Effective Educational Approaches in Compounding Laboratory

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### Introduction

The COVID-19 pandemic had a great global impact and imposed sudden and drastic mitigations measures in all fields. During the lockdown period, teaching at all levels abruptly switched to on-line mode. This, from one side, guaranteed the progression of academic teaching; on the other hand, however, did not replace lab activity like pharmaceutical analysis, and compounding.

### Method

To address this issue, at the University of Parma teachers in charge of the practical course of pharmaceutical compounding (5-years master degree in Pharmaceutical Chemistry and Technology) made videos showing in detail the preparation of pharmaceutical dosage forms (i.e. capsules, solutions, suspensions, semi-solids dosage forms). Videos were edited and provided to students (Academic Year, AY, 19/20) during the lockdown. All videos were also made available as supporting materials to the students of the following (20/21, 21/22) and the current (22/23) AYs.

The pass rate of the compounding laboratory and the corresponding examination grades for the AY 19/20 were analysed and compared to the previous and following AYs. Additionally, the on-line view of the loaded video from 19/20 to 22/23 was monitored and quantified.

### Results

Once the restrictions have been lifted (June 2020), students belonging to the AY 19/20 attended a short compounding laboratory. Notably, despite the short time to practice, students showed considerable manual skills and high confidence with compounding procedures. In addition, no significant changes in passing rate were detected with respect to previous AYs. A comparable result was observed for AYs 20/21, 21/22 and 22/23.

### Conclusions

The introduction of videos as mitigating approach during pandemic turned out to be useful tools in the current teaching activity of pharmaceutical compounding. The observation of the ongoing and the next AYs will be fundamental to clearly assess the effectiveness of the approach.

## 81 *In Vitro* Evaluation of the Safety and Neuroprotective Effects at Cellular and Subcellular Levels of New Indole-3-Propionic Acid Derivatives

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Oxidative stress has been etiologically implicated in the progression of neurodegenerative diseases including Alzheimer's and Parkinson's disease. Indole-3-propionic acid (IPA) is considered a key compound for developing treatments for neurodegenerative disorders. Further, hydrazones have emerged as a promising class in the search for new treatments for neurological diseases. We assess the feasibility of the strategy to develop indole-3-propionic acid derived hybrids as potential drug-candidates for the treatment of Parkinson's disease with stronger antioxidant and neuroprotective properties. Series of indole-3-propionic acid hydrazones were synthesized and their safety was estimated in vitro on red blood cells, neuronal SH-SY5Y cells and rat brain synaptosomes. Antioxidant and neuroprotective effects of compounds were evaluated in H<sub>2</sub>O<sub>2</sub>-induced oxidative stress model on SH-SY5Y cells and 6-OHDA-induced neurotoxicity in rat brain synaptosomes. Our results showed the new synthesized compounds had excellent safety profile showing no hemolytic effects (< 5 % at the highest concentration 200 µM). The majority of compounds possess low toxicity on neuronal SH-SY5Y cells and rat brain synaptosomes. Compounds containing vanilloid (3e) and syringaldehyde (3f) fragments had no cytotoxic effects (IC<sub>50</sub> > 500 µM), followed by dihydroxy compounds 3b (IC<sub>50</sub> 265.3 µM) and 3c (IC<sub>50</sub> 275.2 µM) Furthermore, 3f did not exhibit any cytotoxic effect. The in vitro neuroprotective effects of compounds were evaluated on H<sub>2</sub>O<sub>2</sub>-induced oxidative stress model in SH-SY5Y neuroblastoma cells. All test compounds showed good protective activity comparable or even higher than the reference compounds indole-3-propionic acid, melatonin and rasagiline. In the model of 6-OHDA-induced oxidative stress on isolated brain synaptosomes, all tested compounds exhibited statistically significant effects by preserving the synaptosomal viability and GSH levels. Hence, our preliminary studies suggest that the indole-3-propionic acid derivatives have a promising potential for the development of new active substances for the treatment of neurodegenerative disorders.

**Acknowledgments:** This work is supported by The Bulgarian Science Fund, Young scientist project – KP06-PM49/3

## 82 New Technologies Applied to the Teaching-Learning Process in Pathophysiology Seminars

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### Introduction

The Pathophysiology subject of the Pharmacy Degree consists of seminars that have traditionally been planned as group oral presentations. However, the wide use of this methodology has caused a decrease in the motivation and performance of students in this activity. Furthermore, this strategy seems not to be very effective in incorporating the Sustainable Development Goals (SDGs). Therefore, we have implemented a change in the methodology, applying new pedagogical strategies that promote the use of new information and communication technologies through electronic devices, such as multimedia elements and audience response tools. The objective is to increase the attention, motivation and participation of students and encourage the acquisition of skills that allow them to integrate the theoretical contents of the subject with its applied aspect.

### Method

We have adapted half of the seminars to include multimedia elements and audience response tools, generating a compilation of video clips, audio clips, or pieces of news to carry out a critical analysis of clinical cases and the approach and treatment of diseases in the mass media.

### Results

After its implementation during 21-22 and 22-23 academic years, this innovation project has generated promising results, increasing the motivation of the students in this activity and their perception of the use of their time in classroom, the understanding and integration of contents and the incorporation of the SDGs 3, 4 and 5. Despite the wide acceptance of this type of seminars, students still prefer to maintain different methodological approaches, combining this model with oral presentations exposed by themselves. Conclusions. The introduction of multimedia resources in these seminars has significantly improved the teaching-learning process of the Pathophysiology subject, generating a positive impact on the motivation and deep learning of students, as well as the incorporation of SDG 3, 4 and 5 to the teaching of this subject.



# POSTER PRESENTATIONS

## 83 Innocampus Explora as an Interdisciplinary Platform for Promoting Sustainable Development Goals at Burjassot-Paterna Campus of the University of Valencia

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### Introduction

Commonly, a Faculty of Pharmacy develops its extracurricular activities without interacting with other faculties. Innocampus Explora was conceived in 2015 as a platform for interdisciplinary science communication in which 6 faculties of basic/health science participate. Currently, it is a project to strategically promote Sustainable Development Goals (SDG).

### Method

Every year, professors and students of each faculty from our Campus (Pharmacy, Mathematical Science, Chemistry, Biological Science, Physics and School of Engineering) are selected to carry out interesting activities. Typically, we organize two round tables, one by students and the other by professors. The topics of our activities have been chosen to show that basic/health science is interdisciplinary in nature and to promote SDG. We also award the most interdisciplinary degree final project annually. Finally, podcasts regarding science and/or our degrees are posted on social networks. The project is funded by the Office of the Vice-Principal for Lifelong Learning, Educational Transformation and Employability and the participating faculties.

### Results

We have carried out many activities to promote SDG. In 2022, a round table entitled "War and science in a global world" discussed the role of science and scientists in the war. InnoFuture was a multidisciplinary congress focused on SDG and new environmental perspectives in 2021. InnoCOVID-19 was a congress to analyze scientific knowledge regarding pandemic in 2020. "Plastics, present and future" was a round table conceived to raise awareness about the use of plastic in 2019. All the activities were a great success. Professors and students form a good working tandem to achieve our goals.

# POSTER PRESENTATIONS

## **Conclusions**

Over the years, Innocampus Explora has been an example of innovation and interconnection of different faculties to set a creative team of students and professors. Its interdisciplinary conception is ideal for science communication and strength the ability to promote SDG to the students of our Campus.

# POSTER PRESENTATIONS

## 84 "Barmacia", An Innovative Approach for Science Communication

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### Introduction

Students demand that science communication activities be more entertaining and participatory. As a result, in 2019 we started a series of colloquia that we call "barmacia" (from bar+pharmacy in Spanish). In these colloquiums, one or more guests bring up a topic that is debated among all those present.

### Method

Barmacia has been conceived to develop a scientific communication activity in a relaxed atmosphere. During the debate, participants can have something to eat or drink. For this purpose, the location of the activity is the cafeteria of the Faculty of Pharmacy of the University of Valencia. The tables and chairs are set up appropriately and the guest speaker is provided with the required material to present the chosen topic. Microphones are distributed so that participants can interact with the speaker. Barmacia is one of the innovative activities of the innovation project of the Faculty of Pharmacy. Each year, a maximum of four Barmacias are planned (one for each degree of our Faculty of Pharmacy). Our students help us to select the speaker and the topic of our Barmacias.

### Results

The success of the activity has ensured its continuity to date. The topics chosen are always of great interest and are logically related to pharmacy and to the rest of our degrees. Many of them focus on promoting the Sustainable Development Goals (SDGs), highlighting the necessary gender equality in science and in other aspects. The guests have always been top scientists or people of recognized prestige. As examples of previous Barmacia activities, we have: "science of excellence needs all of us" "Bioinformatics and cancer drugs" "Food safety" "science communication and not to die trying" "arts and science" and more.

### Conclusions

Scientific communication in a relaxed atmosphere with the best professionals to engage the debate guarantees the success of the event.

## 85 The Impact of Extracurricular Activities Developed by Students of Pharmacy

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### Introduction

Every year students of the Health Faculties of the University of Valencia, organize the Health Festival to approach public from all ages to a variety of free health services, such as blood pressure and blood glucose tests, nutritional advice, responsible use of medicine products and preventive health screenings.

### Method

With the help of 9 students of the Pharmacy Degree and 1 student of the Double Degree of Pharmacy and Human Nutrition and Dietetics, 6 workshops were organised for the population related to good health and nutrition. Also, literature of past events was consulted to decide which workshops would be more interesting to the public to develop.

### Results

The results were enriching for both the attendees and the students who volunteered as it gave them their first attempt of customer service. It was organised into several information booths where attendees were able to learn about a variety of health topics, including nutrition, disease prevention, and general health care, but most importantly, focusing on pharmacy. Visitors were also able to participate in healthy activities, such as yoga classes, zumba and group walks.

### Conclusion

The Health Festival was a great success event that provided a variety of health services and information to the community. Attendees were able to learn about the importance of taking care of their health, participate in healthy activities, and receive preventive health screenings. The event also emphasized the importance of personal hygiene and food safety, as well as emergency preparedness. Overall, this event promoted health and well-being in the community.

# POSTER PRESENTATIONS

## 86 Ingenium Alliance- Diversity, Sustainability and Excellence in Education

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### Introduction

European Universities are transnational alliances that will become the universities of the future. The INGENIUM – European University is an ambitious Alliance that brings together 10 Universities from 10 EU Member States. INGENIUM founding members are 10 mid-size Higher Education Institutions spread across the territory of the EU with a strong European vocation. After the 2022 Erasmus+ call for proposals, we now have 44 European Universities involving around 340 higher education institutions in both capital cities and remote regions of 31 countries, including all EU Member States, Iceland, Norway, Serbia, and Turkey.

### Materials and Methods

Holistic analysis of the current state of education within INGENIUM, compared with other leading alliances in the context of achieving sustainability, diversity, and excellence in education. To identify the obstacles and gaps in preparation to embrace the challenges that Europe faces and aware of the strategic role of universities in the world of the future. Transversal objectives in promoting entrepreneurship and digital learning and outreach programs supported by the sharing of best practices to be fully realised.

### Results

Research, educational programs, and joint projects connected to the Sustainable Development Goals will be encouraged and supported, involving the whole university community.

The strongly commitment to provide excellent education that is universally accessible, to generate advanced knowledge through basic and applied research and promote open societies and international cooperation.

Establishing open interdisciplinary degrees that allow students to build innovative international interdisciplinary curricula, with the ultimate objective of developing European Degrees-innovative in terms of content and learning methodologies, seizing the opportunities given by digital technologies.

## 87 Development and Implementation of a “Pass The Word” Gamification Methodology As an Innovative Teaching Tool in the Frame of “Educational Escape Room”

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### Introduction

Gamification has emerged as a popular strategy in recent years for enhancing the teaching and learning process in higher education. By incorporating game elements into the learning environment, students can be motivated and engaged, leading to active participation and improved academic performance. Gamification can be applied to various areas in university education, from encouraging class participation to evaluating and monitoring student progress.

### Method

This study utilized Educaplay (ADR Formación) as a gamification tool in the frame of an Educational Escape Room task developed for the project “AdaptaSherlockSalud” for a Nutrition course in a Pharmacy degree. A “pass the word” game was created to review key concepts of Nutrition. The students were incentivized with a reward of 0.5 point for the winning group to enhance motivation.

### Results

The students demonstrated a high level of participation, and the competition fostered organization, knowledge sharing, and teamwork. The reward for the students’ grade encouraged them to strive for victory. The professor was able to identify concepts that presented difficulties and provide additional reinforcement.

### Conclusions

Overall, this gamification activity was successful in promoting the comprehension and integration of the course material while also developing digital skills. The positive results obtained during the preliminary test suggest that this activity could be implemented as a regular activity and extended to other courses. By incorporating gamification into higher education, we can enhance the learning experience and motivate students to achieve their full potential.

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# POSTER PRESENTATIONS

## 88 From Ict to Lkt: Use of Audience Response Tools to Evaluate the Students' Comprehension

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### Introduction

There is a pressing need to evolve the teaching and learning approach by adopting methodologies that are tailored to the learning styles and skills of the new generation of students. The COVID-19 pandemic has forced a shift to mass distance education and highlighted the need to develop digital skills for teachers, students, and society as a whole. In the new context of higher education, it is critical not only to promote communication between students and instructors, among students, and among instructors but also to integrate different Information and Communication Technologies (ICT) in the classroom and transform them into Learning and Knowledge Technologies (LKT).

### Method

This study used Socrative (Showbie Inc.) as an audience response and bring your own device tool to evaluate students' understanding in real-time for the Nutrition course of Pharmacy degree. After an Educational Escape Room activity "Sherlock-Salud", a 10-minute survey using Socrative was ran to assess the students' overall opinion and comprehension of the key concepts developed during the gamification activity. The feedback obtained was used to reinforce key concepts related to the subject.

### Results

This practice offered the teacher a quick way to receive feedback from all students, promoting participation in the survey. Additionally, it allowed students to identify the most important concepts and compare what they learned with what their peers learned.

### Conclusions

The real-time visualization of results promotes active participation and the acquisition of digital skills while facilitating comprehension and integration of the topics discussed in class. By integrating ICT as LKT in the classroom, we can enhance the learning experience and prepare students for the challenges of the 21st century.

### Acknowledgements

Vicerectorat d'Ocupació i Programes Formatius de la Universitat de València "Ajudes per al Desenvolupament de Projectes d'Innovació Educativa per al curs 2022-2023" through the project "Adaptación a clase presencial de la metodología de escape room "Sherlock-Salud", utilizada para casos de estudio de Nutrición, Toxicología y Seguridad Alimentaria (AdaptaSherlockSalud)" (Renova-PID, UV-SFPIE\_PID- 2076632). In addition, Francisco J. Martí-Quijal would like to acknowledge the pre-PhD scholarship program of the University of Valencia "Atracció de Talent".

# POSTER PRESENTATIONS

## 89 Medical Devices Study Unit in the Pharmaceutical Technology Course

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### Introduction

The three-year course leading to the degree of Bachelor of Science (Hons) in Pharmaceutical Technology prepares graduates joining the pharmaceutical workforce in research and development, quality control and assessment, regulation and distribution. With the expanding area of medical devices in diagnosis, management and prevention of disease states, either as single agents or in combination products, the inclusion of knowledge and competence development in approaching medical devices serves an example of how science is related to practice in pharmaceutical education.

### Aims

To develop pharmaceutical regulatory competence in handling of medical devices

Materials and Methods: In the first year of the course, the students are introduced to medical terminology and specific terms related to medical devices. The competence development is assessed through an interactive quiz at the end of the medical devices terminology session. In the second year of the course, the students follow a 4 ECTS study unit. The study unit content provides an overview of the development, regulation, use, healthcare professionals collaboration and patient needs. The academic team planned the delivery of the study unit through a mix of active student learning sessions including reflections on practical examples, case discussions, flipped class through scientific articles selected for pre-reading and interactive quizzes to enhance student engagement.

### Results

Topics covered include: 1) classification of medical devices, 2) evolution of regulation and legislation, 3) designation, oversight and role of notified bodies, 4) quality and CE marking, ISO standards 5) product labelling, storing and handling, instructions for use and product documentation, 6) vigilance and surveillance, 7) economic operators, healthcare professionals and patient perspectives, 8) harmonization and transparency in Europe and global experiences, 9) point of care testing and practical use of medical devices in management of diseases, 10) good distribution practice in relation to medical device regulatory sciences, 11) clinical investigations and performance studies.

### Discussion

Through this study unit, the pharmaceutical technology students are supported to acquire knowledge required to work in the medical devices field, whilst understanding the ongoing challenges in the evolving area of medical devices.

# POSTER PRESENTATIONS

## 90 Implementation of Antibiotic Discovery by Student Crowdsourcing through a Service-Learning Strategy

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### Introduction

Antibiotic misuse is a public health problem due to the appearance of resistant strains in almost all human pathogens, making infectious diseases more difficult to treat. The search for solutions requires the development of new antimicrobials as well as novel strategies, including increasing social awareness of the problem. The Small World Initiative (SWI) and the Tiny Earth (TE) network are citizen science programs pursuing the discovery of new antibiotics from soil samples and the promotion of scientific culture. SWI was originated in 2012 at Yale University (United States). TE network is a similar program headed by the UW-Madison's Wisconsin Institute for Discovery (United States). In July 2017, the SWI@Spain network was created and sponsored by the group of Teaching and Dissemination of Microbiology of the Spanish Society for Microbiology. Our team at the Universitat de València participated as a foundational member. Currently, 31 groups are working in different universities from the Iberian Peninsula, under the common name *MicroMundo*, joining the efforts of nearly 100 instructors and an even higher number of secondary education schools.

# POSTER PRESENTATIONS

## **Method**

A call is yearly made to get involved students of different science degrees. The basis of the project is explained in a presentation talk, which is updated and exposed annually at the beginning of each course to attract new students. In a parallel action, an annual call is made to secondary school teachers (area of biology). They are also instructed on Antimicrobial Resistance issues and on practical aspects so that they can implement the project in their centers.

## **Results**

The five sessions of the project take place in the science laboratories of each one of the high/secondary schools participating in the project. Culture media for bacteria, sterile containers, and other materials were provided by the *MicroMón@València* teams. Some additional activities are developed (Science fairs, talks) to promote microbiology.

## **Conclusion**

This service-learning method is a good tool for on the one hand, fostering scientific interest in secondary school students. On the other hand, it has been shown to be a very useful tool for university students to become involved and understand the importance of antibiotic resistance.

# POSTER PRESENTATIONS

## 91 Integration of Esg Criteria in Master Programs

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The Faculty of Pharmacy and Nutrition of the University of Navarra has a training offer of four different master's programs, three related to medicines in a broad sense and one dedicated to nutrition studies. In the field of medicines, each master's program is devoted to one of the three main constitutive areas of a pharmaceutical company: research and development (Master's Degree in research, development, Innovation and Medicines; MIDI), manufacturing (Master's Degree of permanent training in Galenic Design and Manufacturing in the Pharmaceutical Industry; MDGFIF), and business (Master's Degree in Management of Pharma-Biotech Companies; MUGEPB). The nutrition program (Master's Degree in Food, Nutrition and Metabolism; E-MENU) provides advanced training on cutting-edge topics in nutrition and metabolism (i.e., personalised nutrition and obesity).

In the last years, one of the main objectives in these Master programs has been the introduction of sustainability criteria in the different programs, particularly in the integration of ESG criteria (Environmental, Social, Governance) as the ability to create value over time in a compatible way with the environmental and social challenges linked to the impact of the activity itself. For this purpose, our strategy has been the implementation of groups of students to solve practical cases in a collaborative way, facilitating debate and confrontation of point of views. This approach induces the active participation of students and their training in the use and analysis of data, as well as in the development of communication skills and the ability to lead with a purpose. Moreover, the students are faced to engage seriously and actively with opposing points of view on a given topic.

# POSTER PRESENTATIONS

## 92 An Active Learning Approach to Develop Student'S Soft Skills

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### Introduction

Future pharmacists should have the ability to communicate their knowledge clearly, both to specialists and non-specialists. Additionally, despite being considered core competences to potentiate their development as healthcare professionals, soft skills are still unrepresentative in Pharmacy education. To train these competences, we suggest an assignment to develop students' soft skills while keeping them motivated and involved in the learning process.

### Materials and methods

Pharmacology II is a curricular unit of the Integrated Master on Pharmaceutical Sciences of the Faculty of Pharmacy of the University of Porto, Portugal (4th year, 1st semester). Students (2-3/group) were asked to present a relevant topic in the context of endocrine pharmacology through an informative material of their choice (flyer, poster, web page, short video, PowerPoint presentation, social media post...) to effectively inform a specific target population. At the end of the semester, students were asked to anonymously respond a survey to grade the contribution of this assignment to the acquisition of certain skills (1-low to 5-high).

### Results

69/156 students responded to the survey. When the higher grade (5) was considered, 42% of students recognised that the assignment has most contributed to develop interpersonal communication, 39% to develop creative thinking and 36% to develop the ability to plan and manage time. If a rating higher than 4 was considered, the percentages of students highlighting these skills doubled (81%, 80%, 72%, respectively), while the development of critical thinking became the skill to which this assignment most contributed (84%). Also, 77% of the students considered that this assignment contributed to their education as a future pharmacist (grade>4).

### Conclusions

We report an assignment that contributes to develop soft skills in pharmacy students, while engaging them in the learning process since they decide on the final format of deliver and become aware of their role in health literacy.



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## 93 Postgraduate Course about Pharmaceuticals in the Environment

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### Introduction

The environmental impact of pharmaceuticals is an issue of growing concern. Even though healthcare professionals in general and pharmacists in particular, are experts on drugs and medicines, they are likely unaware of drug pollution, and schools of Pharmacy, around the world generally overlook the problem. We present a postgraduate course, already offered by the University of the Basque Country UPV/EHU, which aims to increase the knowledge and the awareness about the impact of pharmaceuticals in the environment, especially among healthcare professionals, as a measure to tackle drug pollution. Secondly, the initiative aims to build bridges between healthcare and environment professionals to find out solutions to the problem.

### Method

The postgraduate course is 100% online and has 15 ECTS credits: 10 theory and 5 practice (personal work). The theoretical part is divided into two blocks. The first is related to The problem and the second to The possible solutions. The final evaluation will take into account the note of the exams grade of each block and the personal work, which will be supervised by the organizers.

The international teaching panel consists of 34 different professionals, 11 of which belong to the world's top 2% scientists ranking according to the Stanford University. It is an interdisciplinary and transversal group of lecturers, some of which come from the environment world and others from the healthcare setting.

### Results

In the first edition (November 2022- June 2023) there are 10 students from different nationalities (Spain, Mexico and Germany). Final evaluation data are not available yet, but the average grade obtained in the first block is 8/10.

### Conclusion

The postgraduate course aims to contribute to solve the problem of drug pollution, via education especially to healthcare professionals, and may also help to build bridges between the environment and the health-care world.

## 94 Assessment Of Attitude Towards Interprofessional Teaching And Teamwork Among Postgraduate Foundation Trainees In Psychiatric Medicines And Clinical Pharmacy

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### Introduction

With increasing pressure on healthcare services, the importance of interprofessional collaboration has been emphasized. To prepare our future workforce, interprofessional education opportunities are crucial. Successful implementation of interprofessional education requires insight into the readiness and effectiveness of the postgraduate trainees towards interprofessional teaching and teamwork. The study aimed to explore the attitude of postgraduate trainees in a hospital setting toward interprofessional teaching and teamwork after undertaking interprofessional teaching sessions.

### Method

An electronic questionnaire was applied to all postgraduate foundation trainees in psychiatric medicines and clinical pharmacy, at Landspítali Univeristy Hospital, participating in interprofessional teaching sessions on psychiatric medications. The standardized Readiness for Interprofessional Learning Scale (RIPLS), which consists of 19 Likert scale items measuring concepts relating to teamwork, professional identity, and roles and responsibilities, was used. Additional open-ended questions were added. Descriptive statistics were used to analyse the results.

### Results

The response rate of the postgraduate foundation trainees was 87% (26/30) (62% medical residents), 73.1% were female, and the mean age was 33 years. Results indicate that the majority (96%) of participants either strongly agree or agree that interprofessional learning supports teamwork and collaboration. All participants indicated that their participation had deepened their knowledge of the topic discussed, and 92% that their participation deepened their knowledge of the other professional specialty. Total of 88% of participants felt that interprofessional teaching had increased their trust in the other profession.

### Conclusions

Both postgraduate medical residents and clinical pharmacist trainees showed a positive attitude towards interprofessional teaching and its effect on teamwork and collaboration. A particular emphasis should be put on providing interprofessional teaching opportunities.

# POSTER PRESENTATIONS

## 95 The use of laboratory animals in the didactic activity - ethical and environmental impact

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### Introduction

The use of laboratory animals is necessary both in teaching and research activities. These indispensable activities have important ethical and environmental implications. At the faculty level, the Department of Pharmacology, Physiology and Physiopathology is the only one that uses animals in didactic activity. That is why the interest in decreasing the number of animals used has increased every year.

### Method

An analysis based on the purchases made in this regard was done for the last 5 years, for the two most used species, mice and rats. Animals represent a source of waste, a source of pollution, a potential risk factor for the health of those who use them. The amount of waste produced annually as a result of the use of these animals was estimated.

### Results

The results showed that compared to the pre-pandemic period, the number of animals used decreased, in the last two years remaining constant, mice being the most used animals. The results are the consequence of using didactic methods that avoid the animal experiment among which we mention: computer programs purchased from the pre-pandemic period, the filming of a large number of experiments that were previously made in the lab, discussion of some clinical aspects applying pharmacological knowledge. Some examples will be done in this direction.

### Conclusions

The pandemic period accelerated the transition to methods that require fewer animals and the reorientation of pharmacology from an experimental pharmacology to an applied, clinical pharmacology. Reducing the number of animals used in teaching is important not only from an ethical, but also from an environmental protection point of view.

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