International Pharmaceutical Federation

“Responding to the Pandemic Together” Programme

Episode number 23:

Remote Laboratory Courses Across Pharmacy Schools During COVID-19: Are You Ready?

Delivered by the FIP-AIM and FIP-AcPS

Moderator

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Welcome to the “Responding to the Pandemic Together” events

FIP’s Special Online Programme on COVID-19

These webinars aim to

I. Provide relevant informatio and the pharmacy workforce on Coronavirus SARS-CoV-2/CO

II. Share and discuss strategies ers - including our Member Organisations – in response

III. Describe sector or area-spec aches adopted across pharmaceutical science, practice and educat

IV. Engage frontline workers of now about the realities facing them around the world.

V. Discuss the implications of t ety, supply, shortages that have been exacerbated by COVID-19, across our nations and regions.

VI. Consider the impact of this disease on patients across age groups and with concurrent conditions.

VII. Assess and discuss the evidence behind treatments and the process of developing therapies, vaccines and

To share ideas on webinar topics we should feature, or if you’d like to share your story on dealing with the pandemic please email

lina@fip.org

Important Links & Resources

FIP Covid-19 Information Hub

A comprehensive FIP webpage containing all of our resources and outputs relating to COVID-19, including recordings of previous webinars.

Link: https://www.fip.org/coronavirus

FIP Facebook Group: “COVID-19 & pharmacy”

Link:https://www.facebook.com/groups/covid19andpharmacy/

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About the International Pharmaceutical Federation *(FIP)*

- The International Pharmaceutical Federation (FIP) is the global federation of national associations representing four million pharmacists and pharmaceutical scientists around the world.

- FIP's mission is to "*Improve global health by supporting the advancement of pharmaceutical practice, sciences and education.*" FIP's vision is a "*world where everyone benefits from access to safe, effective, quality and affordable medicines and pharmaceutical care*".

- FIP was founded in 1912 in the Netherlands.

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FIP Academic Institutional Membership (AIM)

The only global network of Academic Pharmacy Leaders

160 Pharmacy & Pharmaceutical Sciences Schools from **55** Countries

To join AIM and find out more:

aim@fip.org

GALF 2020 registrations and programme:

http://aim.fip.org/media/pdf/GALF-2020-Flyer.pdf

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	Toyin Tofade	Dean Howard University College of Pharmacy	United States

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	Abla Mahmoud Albsoul	Dean School of Pharmacy The University of Jordan	Jordan

Region	Name	Position & University	Country
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Region	Name	Position & University	Country
Western Pacific	**Paul Gallagher**	Professor National University of Singapore Department of Pharmacy	Singapore
	Carlo Marra	Dean, Professor School of Pharmacy University of Otago	New Zealand

Announcements

FIP Digital Events House Rules

1. This webinar is being recorded and live streamed on Facebook
2. The recording will be **freely available** at www.fip.org/coronavirus and on our YouTube channel
3. You may ask questions by typing them into the Q&A box
4. Your feedback is welcome (webinars@fip.org)

Learning Objectives

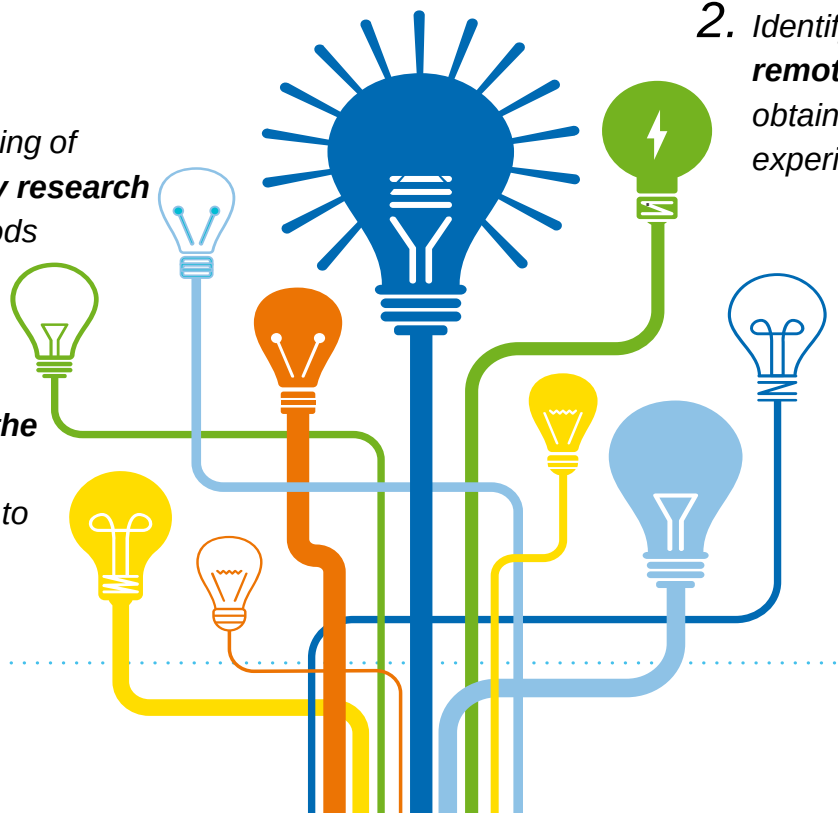
1. *Highlight the **expertise and skills of pharmacy laboratory educators** in remote laboratory instruction*

2. *Identify **best practices for remote laboratory instruction** obtained from the preliminary experience during COVID-19*

3. *Discuss methods of **assessment** of remote laboratory instruction*

4. *Elaborate **challenges of the "new norm" of remote instruction** when applied to laboratory courses*

5. *Discuss remote handling of **pharmacy laboratory research** during out-of-lab periods*



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Co-organisers / Planning committee

Workforce Development Hub (WDH)

- **Shaun Gleason**, PharmD, MGS - University of Colorado Skaggs School of Pharmacy - USA

FIP WDH WDG#1 Academic Capacity – Global Lead

- **Toyin Tofade**, MS, PharmD, BCPS, CPCC, FFIP - Howard University - USA

FIP:

- **Nilhan Uzman**, Lead for Education Policy and Implementation

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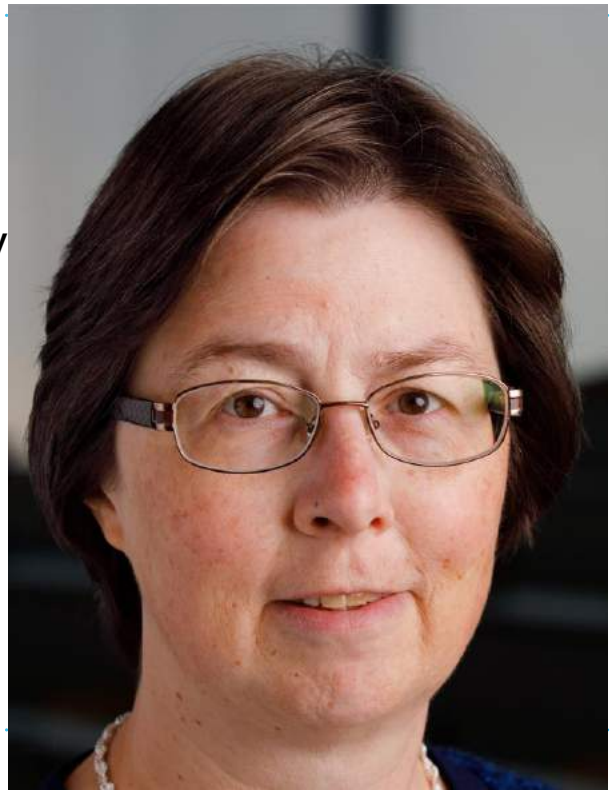

Panelist 3

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HyFlex Compounding Lab

A Response to Lab Needs under COVID-19 Conditions

Prof. Indiran Pather

Howard University
College of Pharmacy, USA

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Introduction

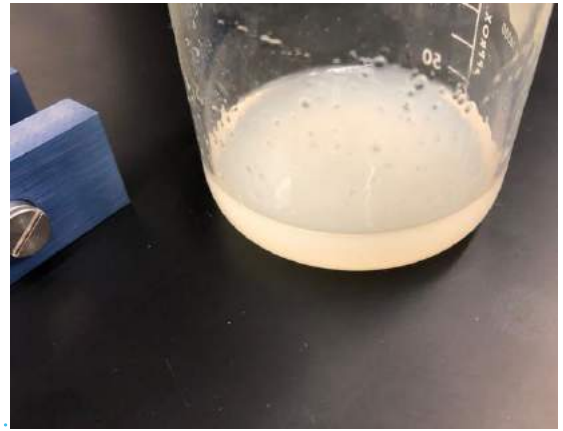
- Terminology (**classroom teaching**):
- Hybrid - partly online and partly in class (fixed schedule)
- Hyflex - derived from hybrid and flexible
  - Lectures streamed - students come to class as time permits (flexible)
  - Working professionals: benefits of face-to-face (SF State Univ)
- **HU Lab HyFlex Model**
  - Mainly online: videos
  - Few live labs with social distancing
  - Students assigned to time slots – attendance not mandatory (flexible)

Online Component

- Each TA assigned a few preparation types
  - Practices making product (eg suppositories)
  - Consult professor, as needed
  - When proficient, record a VR video – special camera
- Videos of most preparations in syllabus
  - Includes preparations to be made hands on
    - Students can review and
    - Be efficient when they come to lab
- Other preparations – review : > understanding and exam prep

Points of Emphasis in Videos

- Where feasible, video will emphasize
  - Correct procedures for major steps
  - Results of common errors



Videos

- HU presently “deep cleaning” entire building
  - Labs not open yet
- Video recordings when labs open
  - Sample video ⇒ Lab Safety

https://drive.google.com/file/d/1VWGTKsoKcHjGh7YIu4wdH4EjklL3wkQS/view?usp=sharing

Comparison: Regular and HyFlex Labs

Regular labs

- Hands on lab only
- One regular lab session (3 hours)
- Work in groups of 3-4 students
- Each lab: 1 type of dosage form, eg suspension
- Each lab: 3-4 formulations (different suspensions)
- Lab reports graded

HyFlex Lab

- Shorter hands-on lab plus videos of other lab exercises
- Two shorter labs (1.5 hours)
- Students work individually
- Each lab: 1 type of dosage form, eg suspension
- Each lab: 1 formulation (one suspension)
- Questions on all formulations (including videos) graded

Protection

- All students tested for COVID-19 before coming on campus
- Personal Protection Equipment for lab provided by HU
  - Includes mask, gloves, eye protection
- Temperature check on entry to lab
- Sanitization procedure for lab
  - Each student wipes down lab bench, stool etc before and after use
  - All students exit lab before next batch of students enters
  - Professor is the last to leave lab: sanitizes door handles

Potential Issues and Assessment

Potential Issues

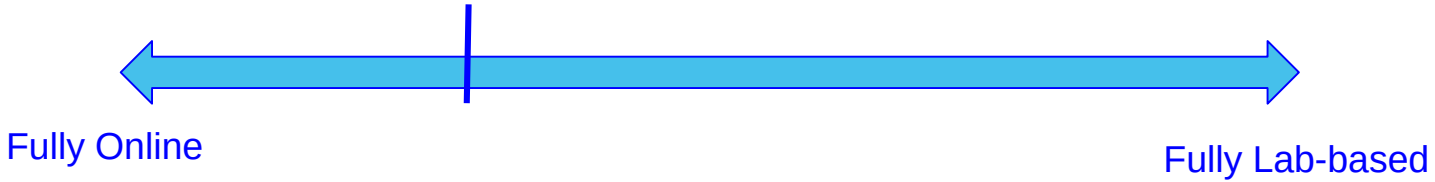
- Students confusion re: schedule
- Students arriving late
- Sanitization and PPE causing stress
- Not maintaining social distance
  - At balance (2 students/ balance)
  - At fume hood (for VOCs)
- Bench containers - short of chemicals

Assessment

- Understanding procedures
- Formulation components
- Lab safety issues
- Correct labelling
- Suitability of dosage form for specific therapeutic outcomes
- Patient instructions on correct use
- Calculations

Final Thoughts

- The COVID-19 situation is changing almost daily
- Our model can be modified in either direction



- Thanks to Dr. X. Simon Wang for displayed video and videos for class

Adjusting Compounding Courses due to Campus Changes during Covid-19

Skaggs School of Pharmacy and Pharmaceutical Sciences
UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

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Prof. Susan Finstrom
University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences, USA

Sterile Compounding Lab

Spring 2020 Semester

- Lecture, reading assignment, and quiz completed by all 1st year students
- Hands-on laboratory training (4 students at a time attend 1 ½ hour block in mock sterile compounding room)
  - *Approximately one-half of the class received hands-on training*
  - *The other half has not received this training, but instead:*
    - Watched two previously recorded videos which covered handwashing/garbing and withdrawing medication from a sterile vial
    - When feasible, the plan is to offer the hands-on training to those students interested

Compounding Elective

Fall 2020 Semester

University of Colorado Anschutz Medical Campus policies

- Application process for in-person learning—ongoing process
- Class size will be limited by campus Covid 19 response
- Unknowns at this time:
  - *How many students?*
  - *How campus check-in policy will affect students' attendance?*
  - *What will be the required sanitization process?*

Plans for Hybrid Learning in Compounding Elective

Fall 2020 Semester

- Continue reading assignments from compounding textbook
- Quiz through the online learning management software
- Host synchronous Zoom session (1 hour)
    - *Three professors discuss with students the types of dosage forms being prepared, the pharmaceutics principles of importance, the types of ingredients used in the dosage form, and the clinical use of the dosage form*
- View video-recorded demonstrations of techniques required/helpful
- Students come to the compounding lab to prepare the preparations assigned for the week (2 hours)

Adapting Pharmaceutics to Coronavirus Quarantine with Kitchen-Based Labs

Prof. Peter J. Rice

University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences, USA

Skaggs School of Pharmacy and Pharmaceutical Sciences
UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

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Kitchen-Based Pharmaceutics Labs

Pharmaceutics at the University of Colorado

- P1 Spring Semester; 4 credits ; didactic and lab
  - •weights and measurements
  - •dissolution and assay of ascorbic acid tablets by titration
  - •capsules
  - •solutions — guaifenesin solution
  - •suspensions/emulsions — kaolin-pectin suspension
  - •topicals — diphenhydramine cream
  - •sterile products

Kitchen-Based Pharmaceutics Labs

Pharmaceutics Laboratories

- Goals
  - reinforce concepts and didactic material
  - techniques for mixing ingredients in compounding pharmacy
  - emphasize choices made in compounding (vehicles, flavors, etc)
- Philosophy
  - pharmaceutics and compounding techniques are universal
  - “if you can make a good emulsion, you can make good gravy…”

Kitchen-Based Pharmaceutics Labs

- "remote teaching" begins after Spring Break
- just like that … no access to laboratories or chemicals
- What we considered:
  - delay of laboratories until students return to campus
  - removal of lab content from the course
  - best we can … compounding in the kitchen

Kitchen-Based Pharmaceutics Labs

Emulsions/Suspension Lab: Cesar Salad Dressing

- trituration of solid ingredients
- creation of an emulsion
  - aqueous phase
  - lipid phase
  - emulsifying agent
- addition of solid ingredients to emulsion
- digitally recorded presentation for synchronous class
- handouts, discussion and online practice quizzes
-

Kitchen-Based Pharmaceutics Labs

What we learned ...

- an alternative to canceling live laboratory sessions
- Advantages
  - •demonstrations are more engaging than scientific sessions
  - •students can try the recipes and techniques at home
- Improvements
  - •having the right recipe is essential
  - •right equipment is also helpful

Impact of COVID-19 on Laboratory Research

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Prof. Tom Anchordoquy
University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences, USA

Impact on Laboratory Research

- Research labs closed from March 13th to May 18th
  - *Only researchers with Covid-19 projects allowed in labs*
  - *Researchers with animal studies were forced to sacrifice animals*
- Research was restarted gradually
  - *1 PhD student resumed experiments on May 19th*
  - *Mask and gown to be worn whenever in building, campus check-in required*
  - *Computer work still to be done remotely*
- Second lab staff member allowed on June 4th
  - *Other staff were allowed at a different shift with a maximum of two staff members present at any one time*
  - *Social distancing and donning mask and gown still required*

Impact on Laboratory Research

- Impact on research and student progression
  - *PhD students lost several months of lab time, some having to restart projects due to the interruption*
  - *Didactic classes continued remotely during the campus shutdown*
  - *It remains challenging to start new students as someone needs to train them, but social distancing requirements make this difficult*

Utilizing Virtual Cleanroom for Sterile Product Compounding Instruction

Dr. Chelsea M. Baker

Purdue University
College of Pharmacy, USA

PURDUE UNIVERSITY | Department of Pharmacy Practice

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Utilizing Virtual Cleanroom for Sterile Product Compounding Instruction

PURDUE UNIVERSITY | Department of Pharmacy Practice

Dr. Jamie L. Woodyard

Purdue University

College of Pharmacy, USA

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Virtual Cleanroom

Use at Purdue University College of Pharmacy

- **Two sterile product focused labs** within the skills lab curriculum
- **First-year student** pilot in Spring 2020
  - *Hands-on sterile compounding*
  - ***Virtual cleanroom*** *activities*
- Expansion to **second-year in 2021**
- Plan to incorporate **hazardous and chemotherapy** medication scenarios

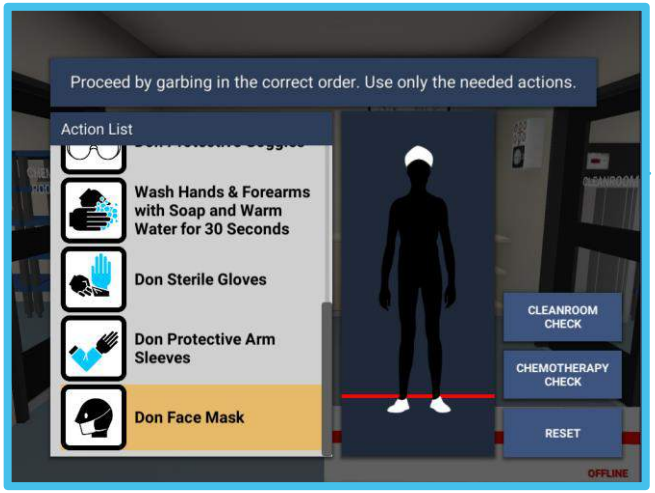
Online Virtual Cleanroom

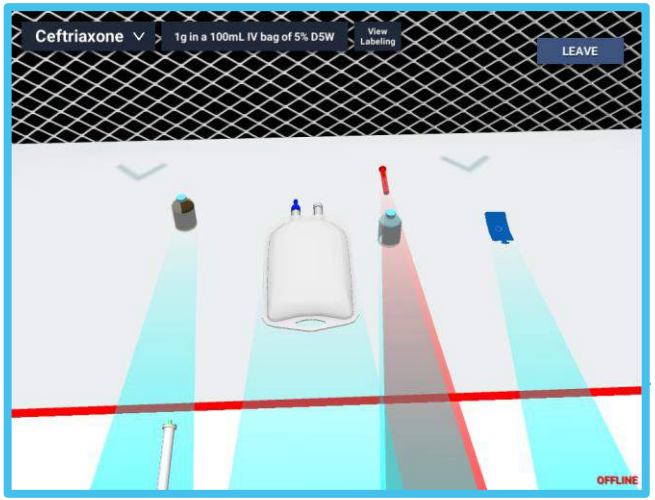
Penguin Innovations, Purdue University

Virtual Cleanroom

Tutorial Mode

- **USP <797>**
- **Reviews the following processes:**
  - Gowning and garbing
  - Gathering supplies
  - Arranging materials in hood
  - Disposal of waste





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Virtual Cleanroom

Practice Mode

- Practice IV medication preparation
- **Immediate feedback** provided
- Displays **warning messages**
- **Prevents errors**
- Performance is **recorded**

Virtual Cleanroom

Test Mode

- Simulates **“real world” scenario**
- **No feedback** provided
- Errors can occur
- Performance is **recorded**

Virtual Cleanroom

Research: Student Perceptions

- **Objective:** to determine if the virtual cleanroom in conjunction with hands-on activities in a sterile compounding laboratory improves students' confidence in sterile compounding procedures
- **Methods:**
  - Pre and post surveys administered to first year students
  - Wilcoxon matched pairs sign rank test conducted for each survey item to compare medians of pre and post surveys
  - Bonferroni multiple test correction used to control for Type I error of 5%

Virtual Cleanroom

Research: Student Perceptions Results

Indicate your confidence with the following during the sterile compounding process: (1=Highly Unconfident, 2=Unconfident, 3=Neutral, 4=Confident, 5=Highly confident)	**Increase in Median Response Confidence Interval[a]** (all p-values <0.0001)
Gowning and garbing for a **NONHAZARDOUS** cleanroom	2-2.5
Gowning and garbing for a **CHEMOTHERAPY/HAZARDOUS** cleanroom	1.5-2
Cleaning and preparing a laminar airflow workbench preparation for sterile compounding	2-2.5
Gathering the supplies needed to prepare a sterile compound	1.5-2.5
Using standard references (medication guides, package inserts) to understand the requirements and/or compatibility of products	1-1.5

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[a]Difference between median response after using the cleanroom and median response before using the cleanroom

Virtual Cleanroom

Research: Student Perceptions Results

Indicate your confidence with the following during the sterile compounding process: (1=Highly Unconfident, 2=Unconfident, 3=Neutral, 4=Confident, 5=Highly confident)	**Increase in Median Response Confidence Interval[a]** (all p-values <0.0001)
Compounding sterile products in a **HORIZONTAL** laminar airflow workbench	1.5-2
Compounding sterile products in a **VERTICAL** laminar airflow workbench	2-2.5
Recognizing when first air is blocked during the sterile product compounding	2-2.5
Identifying the procedures that occur in an **ANTEROOM**	2-2.5
Identifying the procedures that occur in a **CLEANROOM**	2-2.5

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[a]Difference between median response after using the cleanroom and median response before using the cleanroom

Virtual Cleanroom

Research: Student Perceptions Results

"The online virtual cleanroom helped prepare me for hands-on sterile product compounding".

Rating	**Number of Student Responses** (% of Total Responses) n=140
Strongly Agree	42 (30%)
Agree	68 (49%)
Neutral	17 (12%)
Disagree	10 (7%)
Strongly Disagree	3 (2%)

Virtual Cleanroom

For More Information

- https://penguin-innovations.com/

- Contact Steve Abel at: abels@purdue.edu

Pharmaceutical Technology Practicals

The shift to the “new norm”

Dr. Nicolette Sammut Bartolo

University of Malta

Department of Pharmacy

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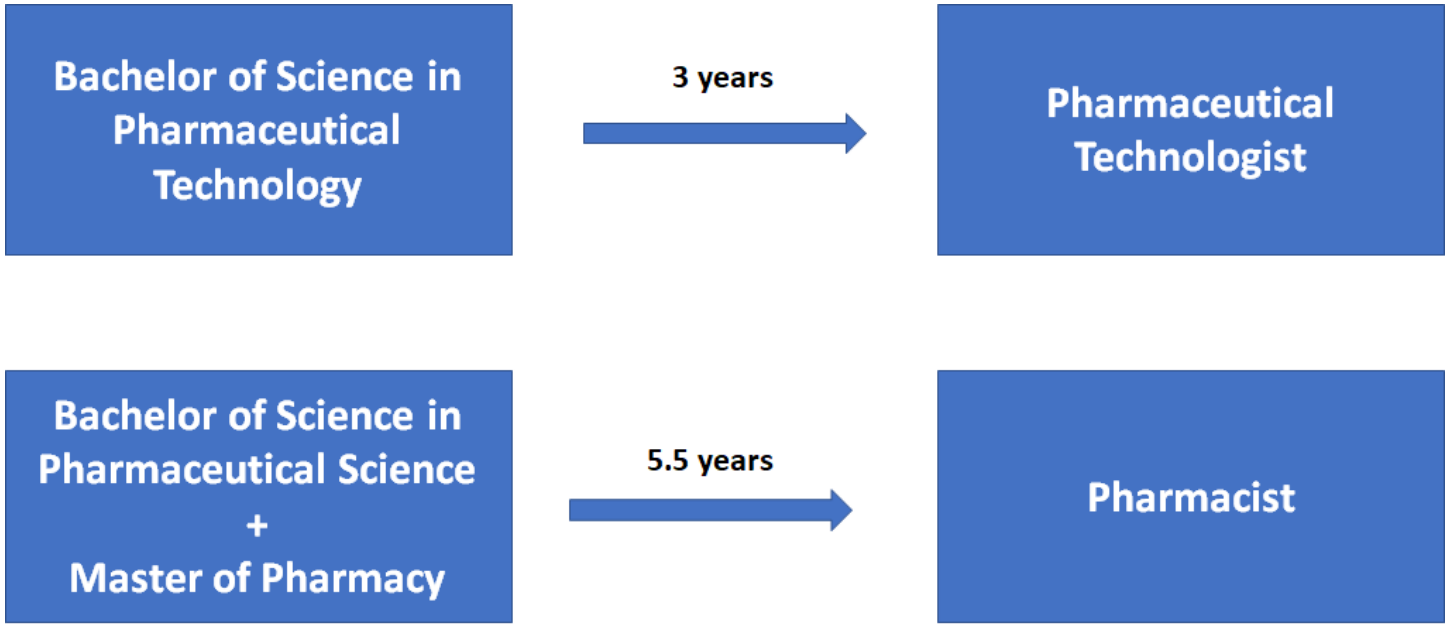
Undergraduate Programmes



Laboratory Practicals

Didactic

Practical discussion

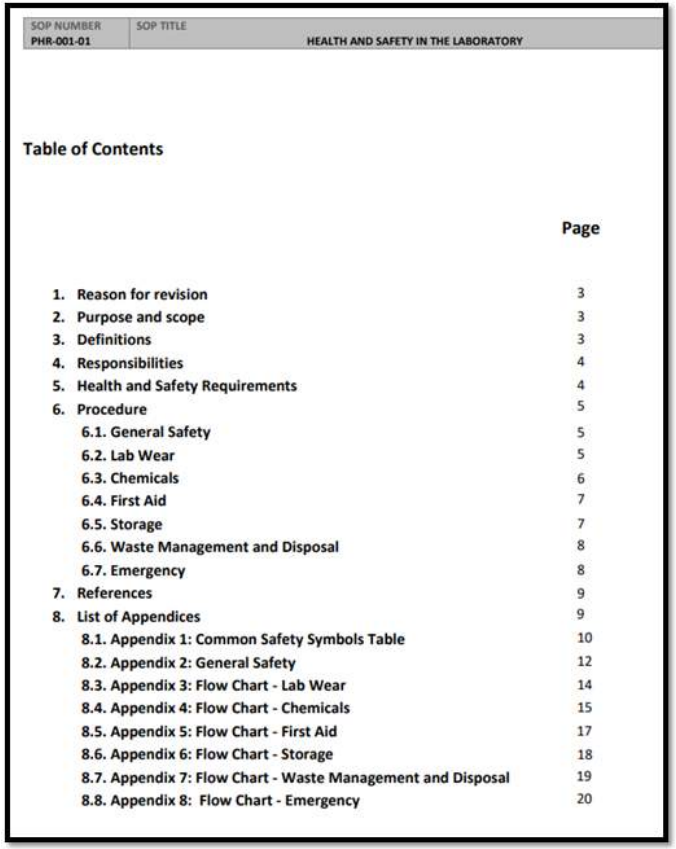
- Example: use of audiovisual material

Practical sessions

Preparation for Practical Sessions

- Health and Safety session
- Quality system
  - Standard Operating Procedures
  - Safety Data Sheets

Remote teaching possible



SOP NUMBER PHR-001-01 | SOP TITLE HEALTH AND SAFETY IN THE LABORATORY

Table of Contents


Practical Sessions Fall 2020
In-lab practical sessions
Virtual practical sessions

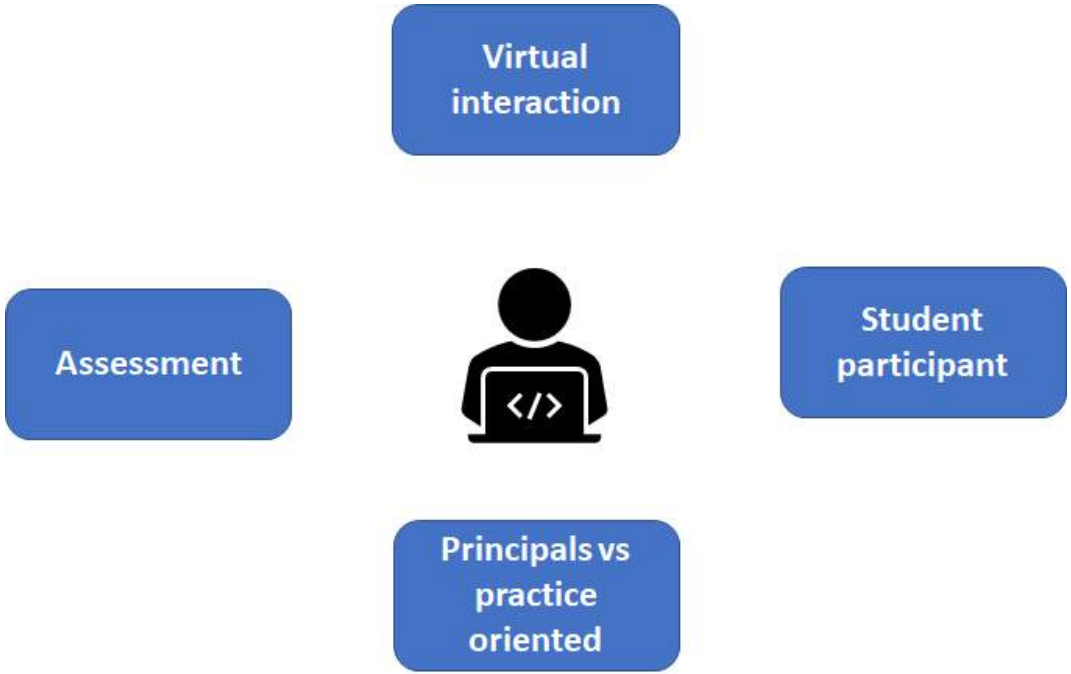
In-lab Practical Sessions

Precautions

- Limited number of students
- Work space: minimum 4m^2 per person or minimum distance of 2m
- No group work
- Students to retain same group
- Using 70% alcohol-based hand sanitisers
- Washing hands with soap and water and use of gloves
- Ventilation
- Cleaning and disinfection between groups

Office of the Superintendent of Public Health. Guidance for offices and workspaces [Internet]. June 2020 [cited 2020 Jul 6]. Available from URL: https://deputyprimeminister.gov.mt/en/health-promotion/covid-19/Documents/mitigation-conditions-and-guidances/Guidance_For_Offices_And_Workspaces.pdf

Virtual Practical Sessions



Adapting to the ‘new norm’ by applying scientific knowledge for students’ safety

Internet-Based Experiments & Learning During COVID-19: A Focus on PhD Training

Dr. Edmund Ekuadzi

Kwame Nkrumah University of Science and Technology, Faculty of Pharmacy and Pharmaceutical Sciences, Ghana

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Remote Laboratory

Running NMR experiments

Piloted the remote running of NMR experiments

- Target is PhD candidates and researchers

Virtual Learning

Learning laboratory techniques

PhD students, are encouraged to prepare for their future wet lab sessions using online simulations and videos. e.g. JOVE, YouTube, etc.

These are complemented with virtual discussions that focus on

1. Interpretation of experimental data, and
2. Critique-based understanding of experimental procedures

Overcoming the challenges

Isolated, overwhelmed and poor internet connection

However, we are motivated to keep at it, while learning new approaches, until the resumption of the normal state of affairs.

Quantitative Analysis Lab

(For Pharmacy Students)

A Shift to Virtual Learning

Dr. Susana Abdel Fattah

Lebanese International University

School of Pharmacy

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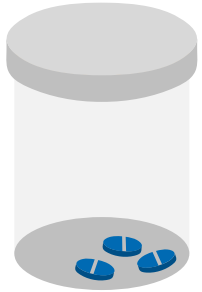
Introduction to Quantitative Analysis



Quantitative analysis is the **determination of the** absolute or relative abundance (often expressed as a concentration**)** of one**,** several or all particular substance**(**s) present in a sample

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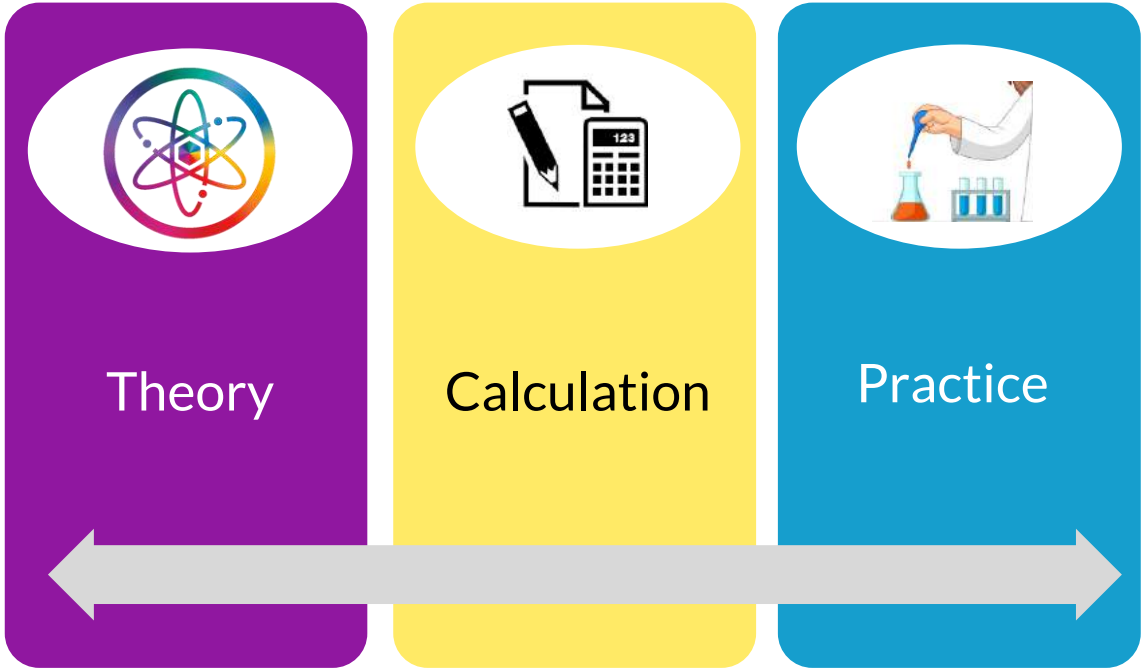
Introduction to Quantitative Analysis



Course Objectives

Describe the principles of experimental errors in chemical analysis

Define and apply techniques of volumetric, gravimetric and oxidation/reduction titrations

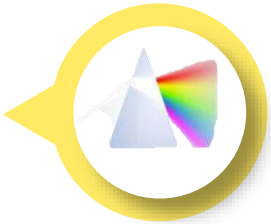
2

3

Identify the analytical terms and expressions used in analytical methods

1

4



Define and apply techniques of electroanalytical and spectroscopic analysis

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Teaching Method (Before COVID-19)

Dry Lab (50%)

Theoretical part discussed in class
Preparation work done at home

Wet Lab (50%)

Actual experiment performed in the lab

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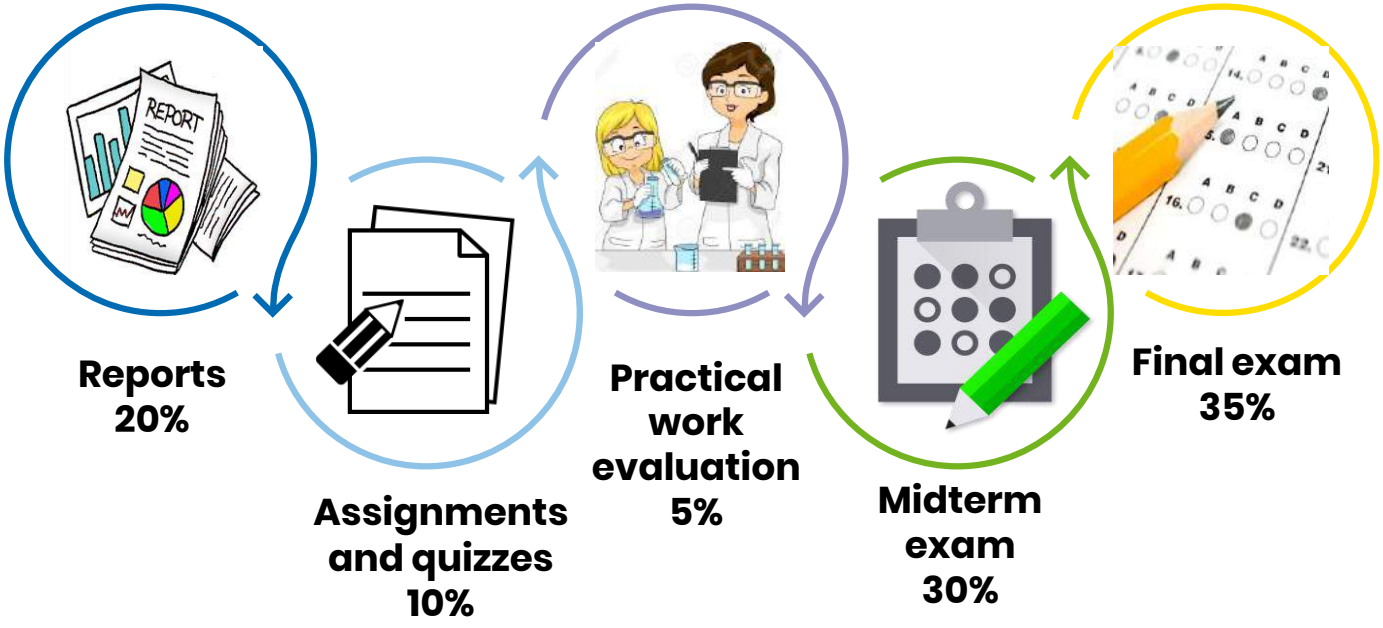
Assessment Method (Before COVID-19)



A Time of Transition

Social Distancing

COVID-19 PANDEMIC

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Challenges

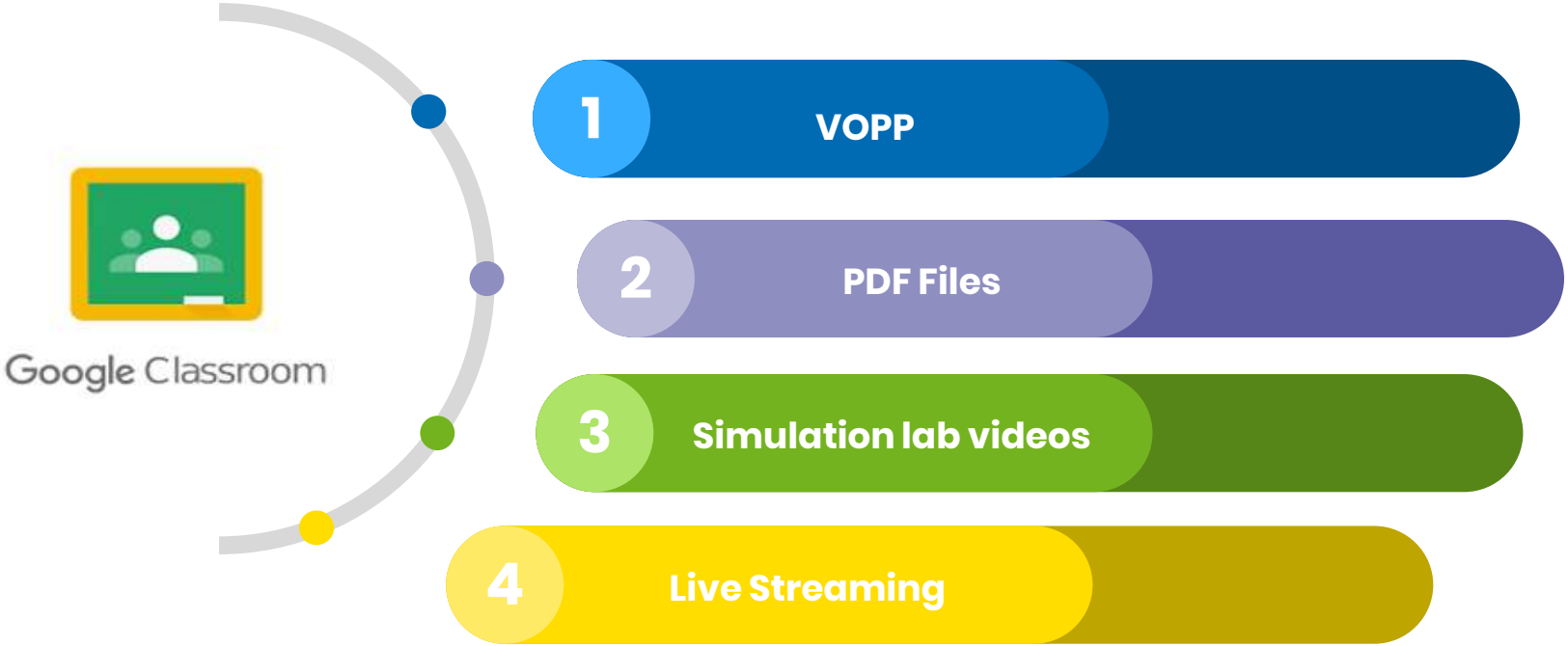
Calculations

Practice

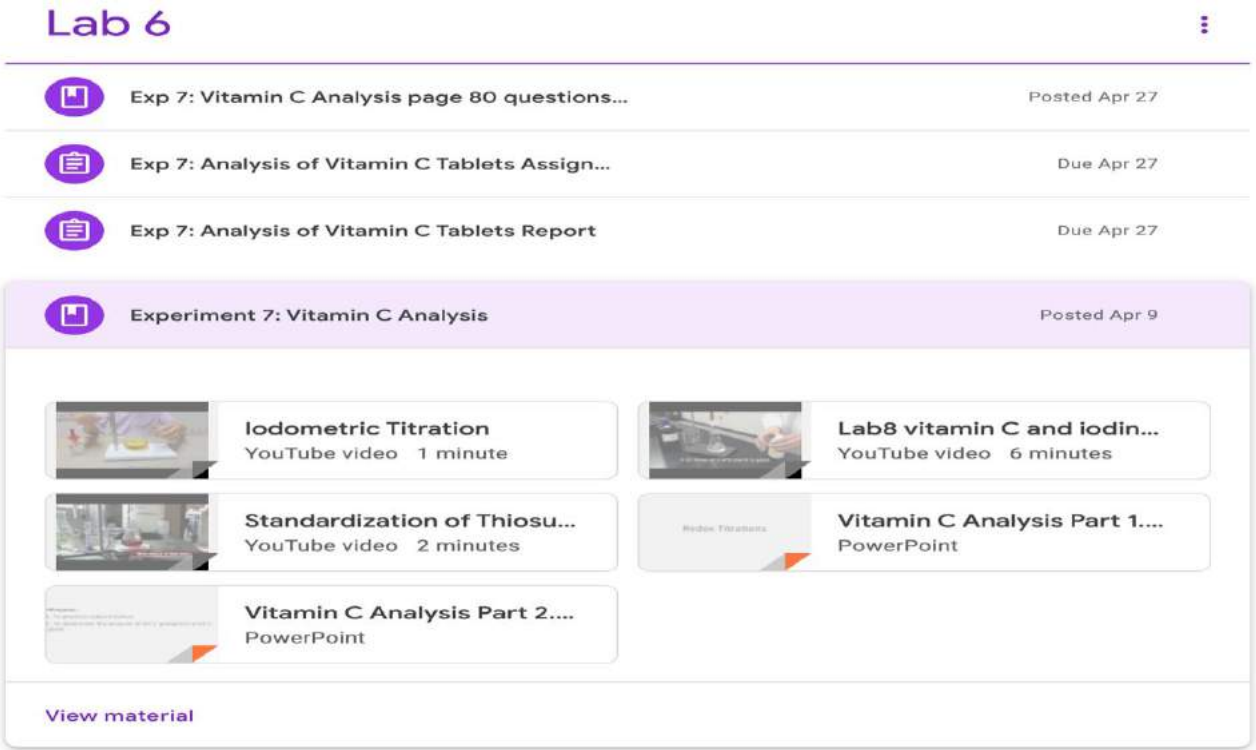
Students' willingness

Exam conduction

Teaching Method (After COVID-19)



Teaching Method (After COVID-19)



Assessment Method (After COVID-19)

25%

Reports

10%

Assignments

25%

Online Quiz

10%

Participation

30%

Final Exam

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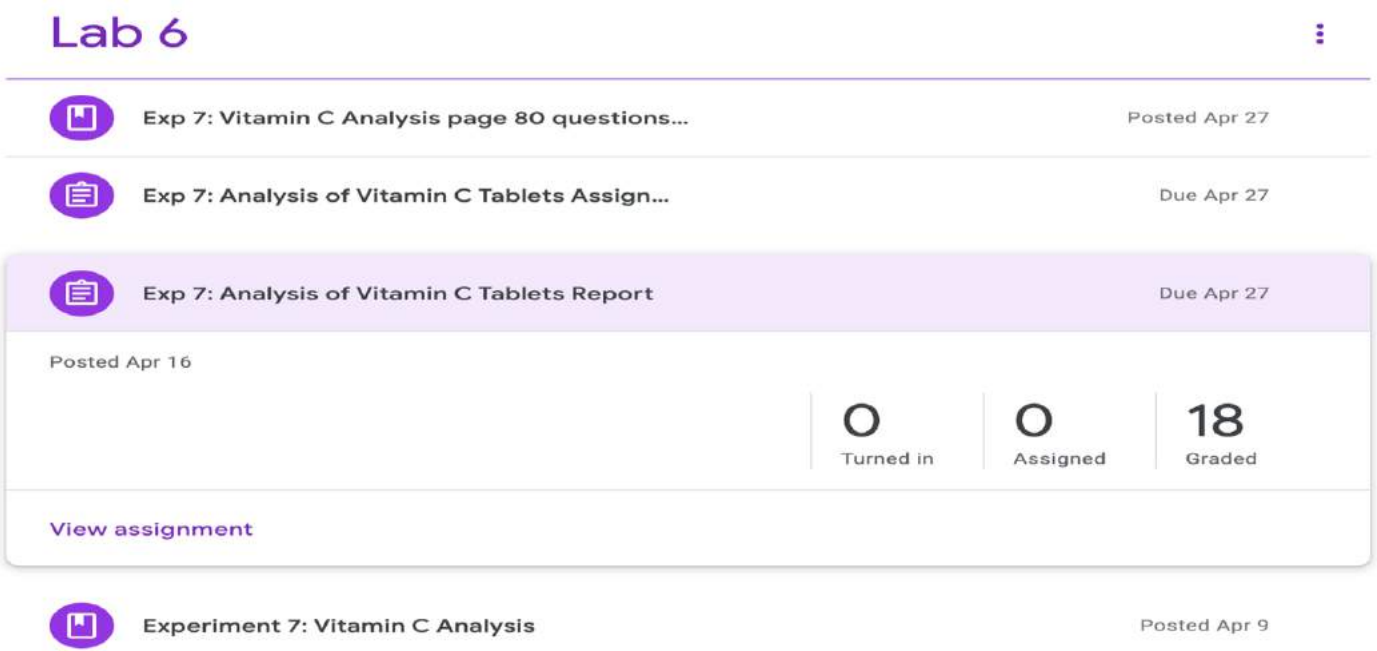
Assessment Method (After COVID-19)



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Communication Methods

Google Classroom

Google Meet

WhatsApp Groups

Email

The Lesson After COVID-19

Blended learning approaches will be tried, tested, and increasingly used.

Instructors and universities should receive more support for their role during COVID-19.

This crisis will help educators across boundaries to come together, share, and exchange experience.

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Learning Hands On Patient Care in a Hands Off Environment

Dr. Malaika Turner
Howard University
College of Pharmacy, USA

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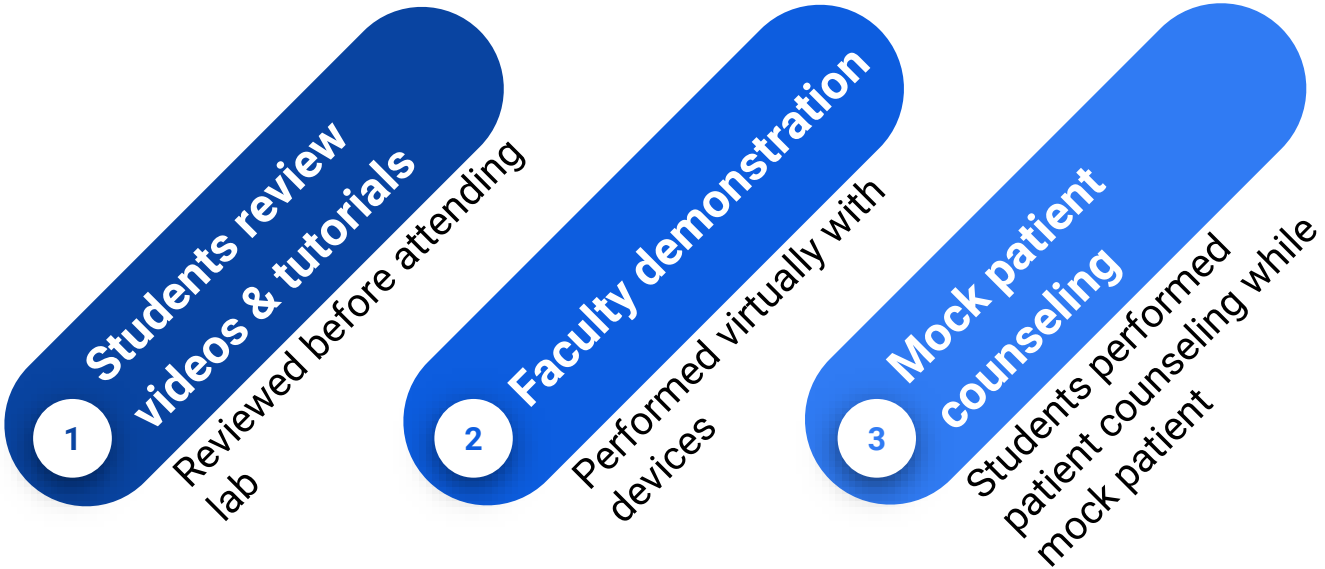
Hands On Trainings

- Device Trainings
  - *Inhalers*
  - *Blood pressure monitors*
  - *Glucometers*
- Injection techniques

Adjusting Assessments

Inhalers



Assessment

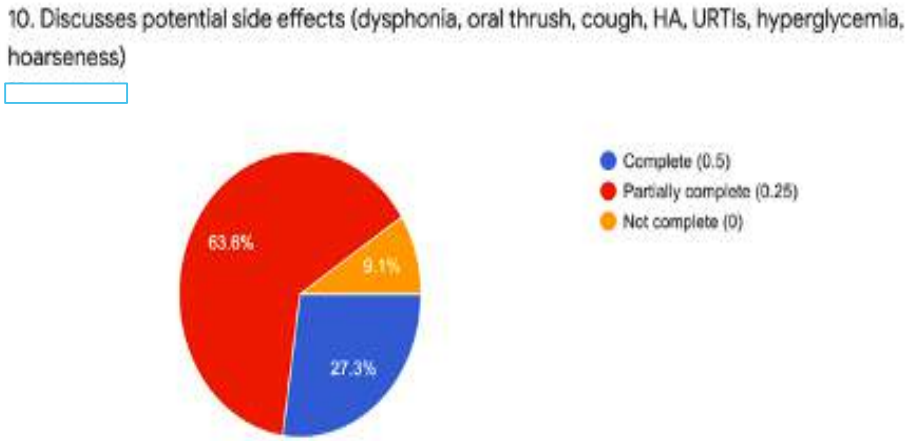
Complete, Partially Complete, Incomplete

Identifies self as pharmacist / student pharmacist and asks patients the purpose of the visit
Demonstrates how to hold the inhaler and push the thumb grip away until it snaps into place
Demonstrates how to hold the inhaler in a level, flat position with the mouthpiece towards you while sliding the lever away
Breathe out fully while holding the Diskus away from your mouth
Put the mouthpiece to your lips then breathe in quickly and deeply through the Diskus
Describes remove the Diskus from the mouth and hold your breath for 10 seconds
Breathe out slowly and close the Diskus until it clicks shut
Reminds to rinse mouth (“swish and spit”) after use
Reminds patient to not wash the inhaler and keep it in a dry place
Discusses potential side effects (dysphonia, oral thrush, cough, HA, URTIs, hyperglycemia, hoarseness)

Results and Feedback

With tools presented to the students...

- Performed 4% higher than colleagues without devices to demonstrate
- Performed counseling more timely without prompting
- Displayed more confidence in verbal explanations



The Student Perspective Regarding Remote Delivery of Lab Courses During COVID-19

Ms. Rana Mohaidly
Lebanese International University
School of Pharmacy

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The Student Perspective

Acknowledging biases

Important to address that:

- ➔ **Opinions are rarely objective.**
- ➔ **Our experiences vary greatly in any situation.**
- ➔ **Preconceptions greatly influence our experiences.**

All of this applies to Remote Learning!

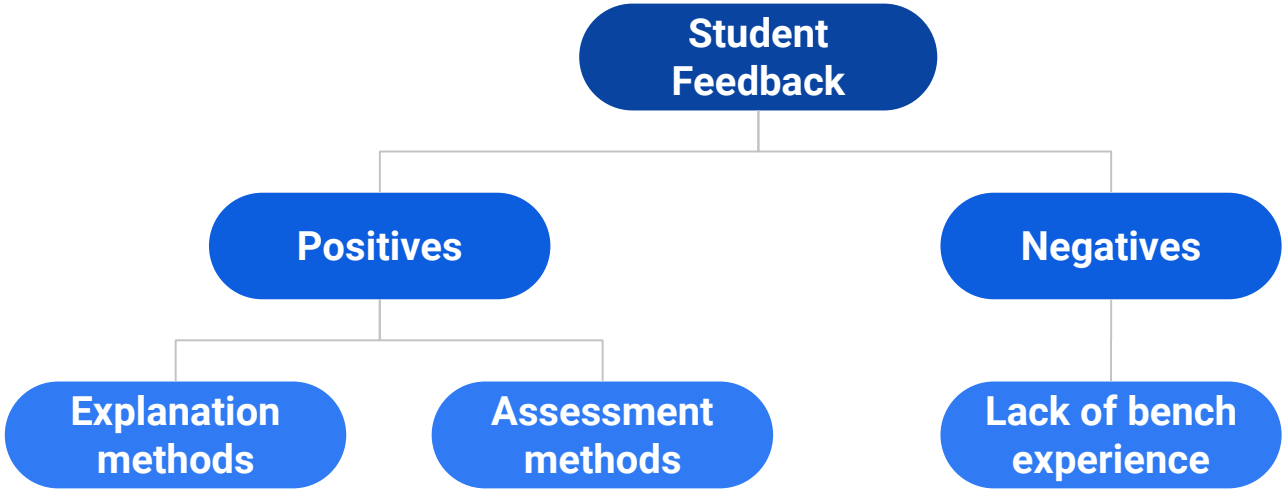
The Student Perspective

E-learning in general

A. Diversity in opinions:
   - Personally asking individuals
   - Survey results
B. Role of SOP.
C. Consistent assessment.

The Student Perspective

Quantitative Analysis



Future Opportunities

"Online learning is not the next big thing, it is the now big thing."

– Donna J. Abernathy

Evaluation of Pharmacy Laboratory Courses Remote Learning During COVID-19

Dr. Dalal Hammoudi
Lebanese International University
School of Pharmacy

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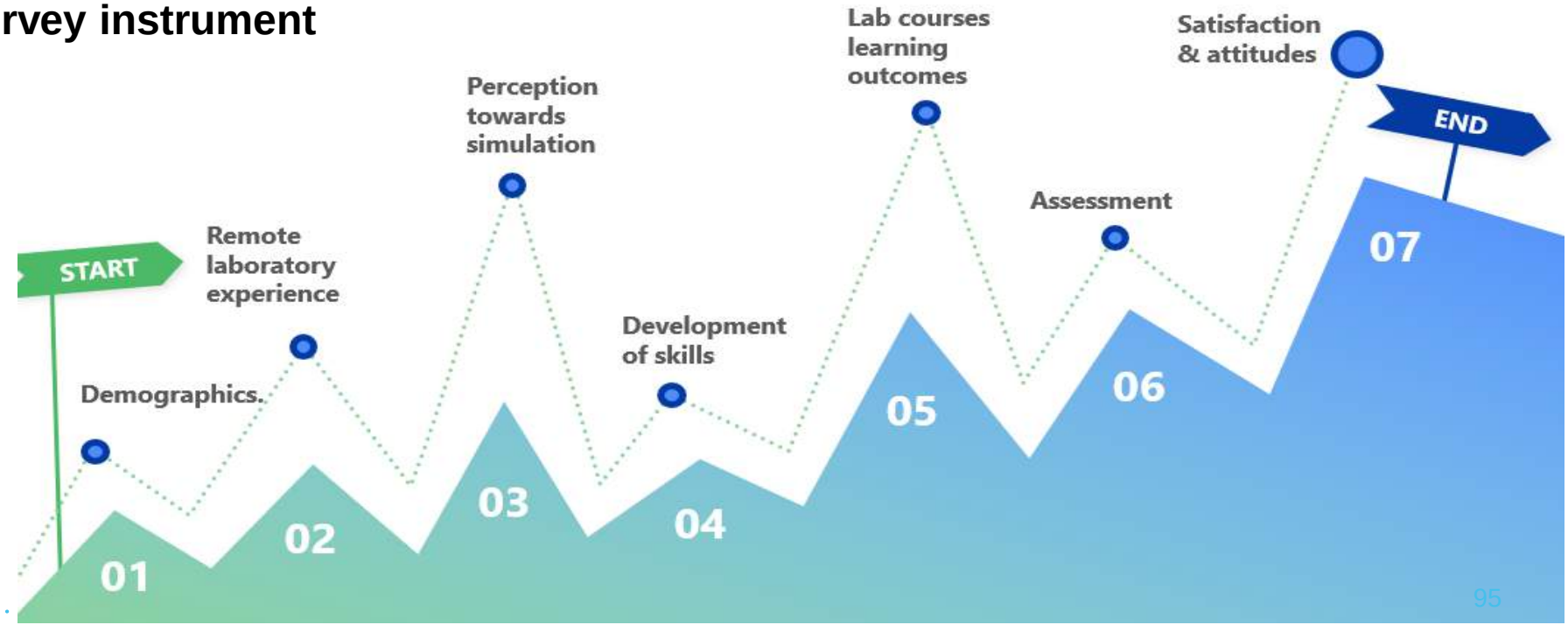
Laboratory courses – Pharmaceutical Sciences Department – School of Pharmacy

Laboratory/blended courses

- Quantitative analysis
- Pharmaceutical analysis and biotechnology
- Compounding lab
- Parenteral dosage forms

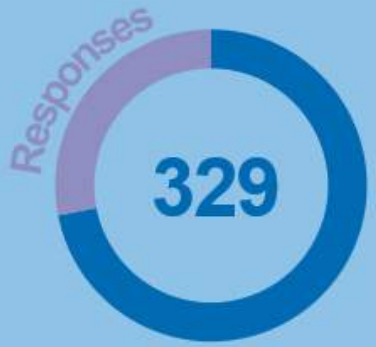
Laboratory courses – Pharmaceutical Sciences Department – School of Pharmacy

Survey instrument

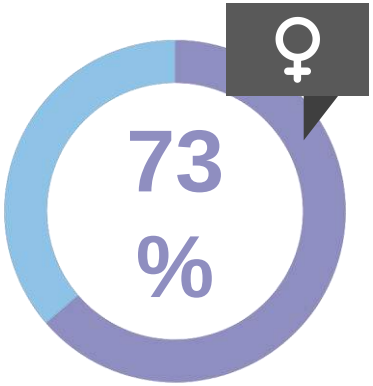


Survey results

Demographics



8 campuses



Mostly P2 (63%) and P3 (31%)

Survey results

Student experience

Remote learning tools

- 49% Handouts/manuals
- 81% VOPP
- 86% Live conferencing
- 69% Videotaped experiments
- 96% Student-based formative tools (assignments/reports/homework)

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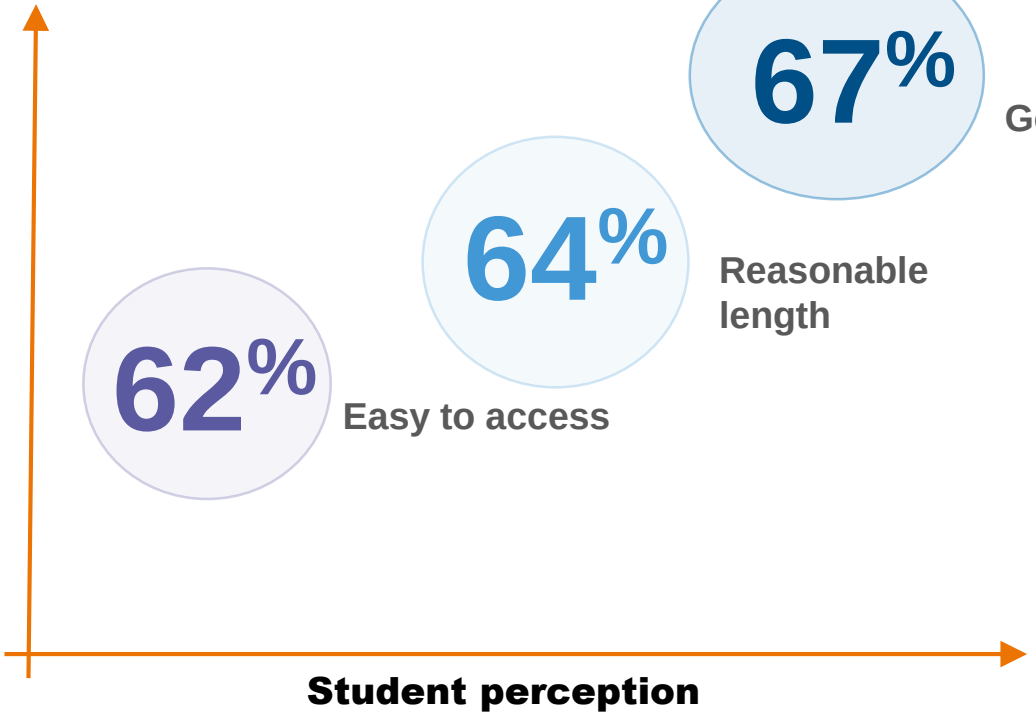
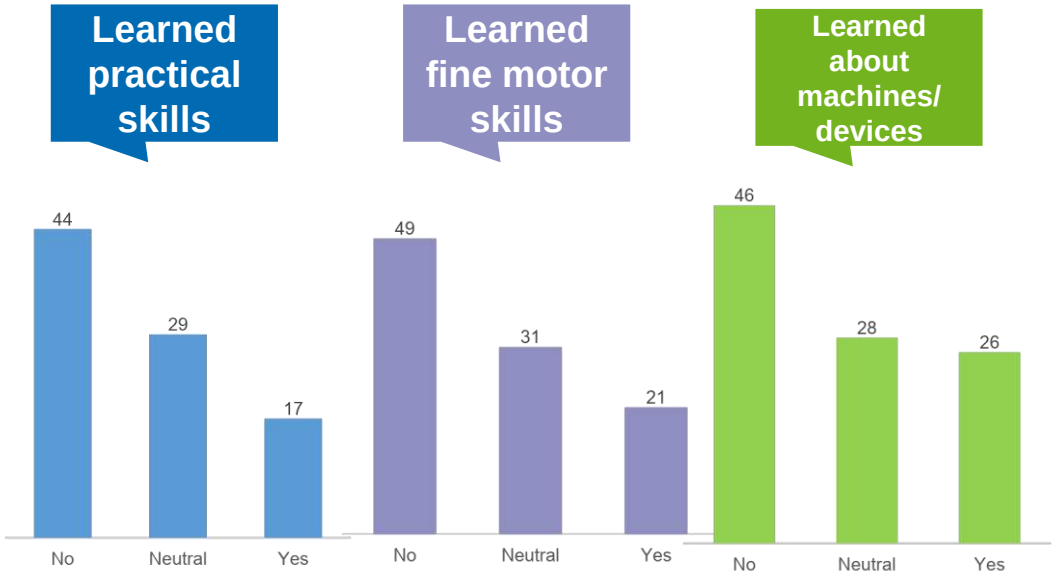
Survey results

Student experience

Simulation videos



Student Perception of Skills Development



Learning outcomes of lab courses

50%

Met goals of experiments

47%

Were able to analyze and interpret results

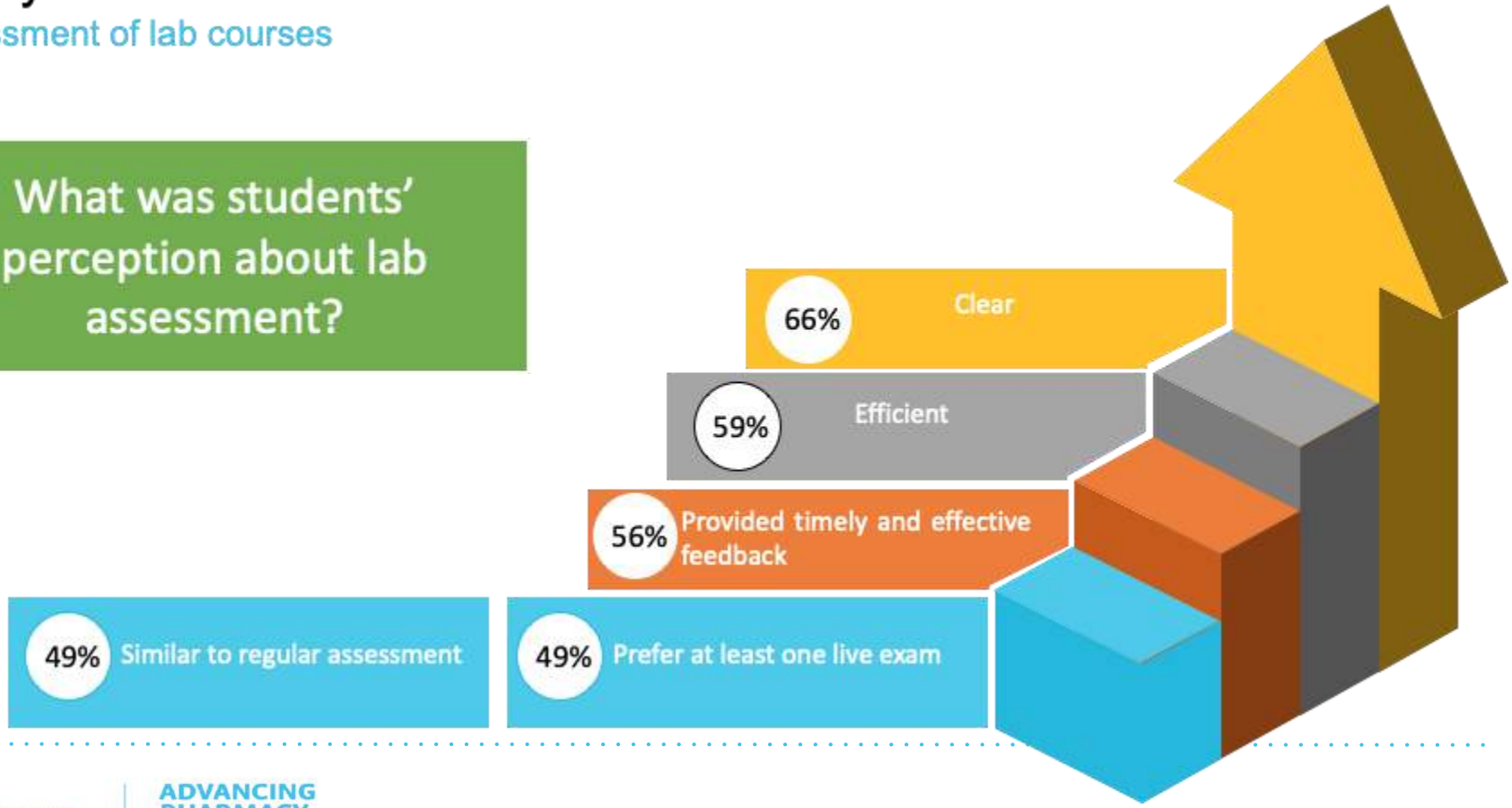
50%

Were able to write structured and organized reports

Survey results

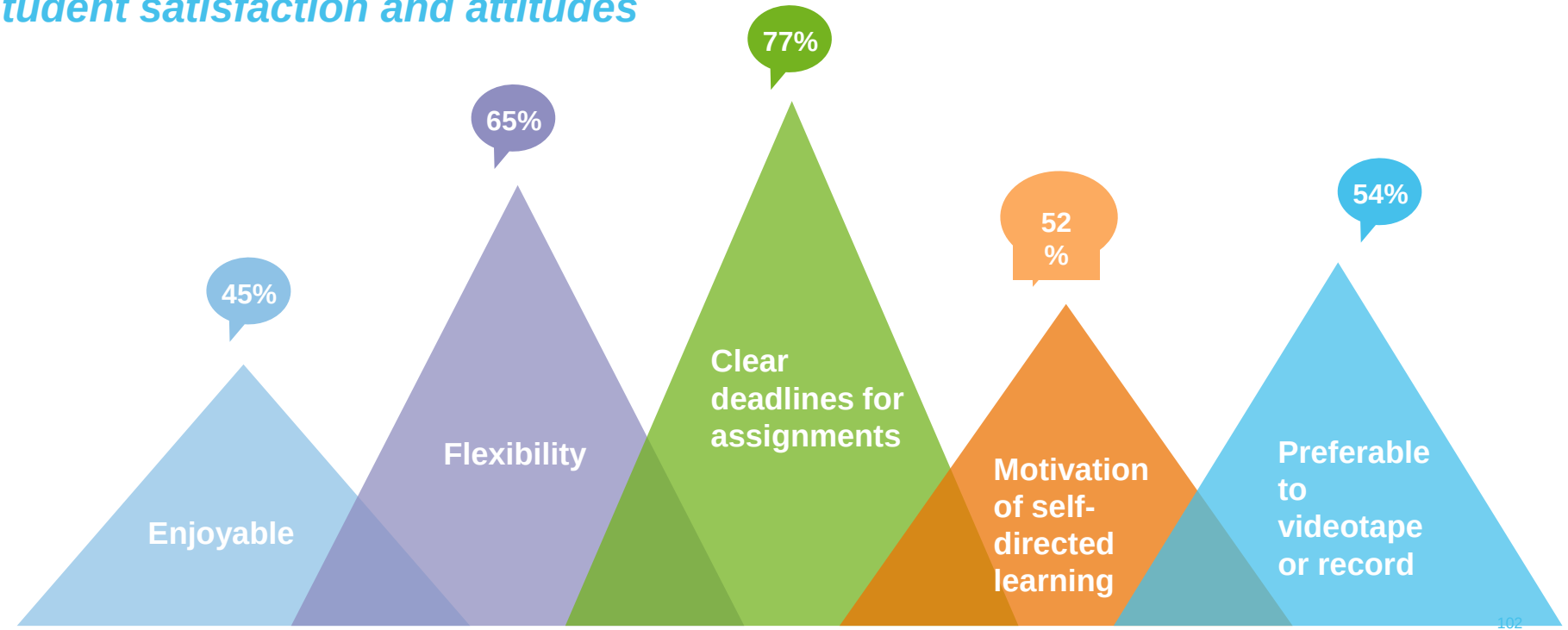
Assessment of lab courses

What was students' perception about lab assessment?



Survey results

Student satisfaction and attitudes



Pharmacy lab courses for fall 2020/2021

What are the future plans? Are we ready?

Preparation of an archive of recorded experiments

Labster

Labster: Moving laboratory experiments online partially or completely

Blended labs: Remote delivery + hands-on experiments

Key Takeaways

Are we ready?

- **Possible scenarios for the coming academic year?**
- **Identify challenges and come up with solutions**
- **Keep up motivation for online learning and research**
- **Learn new approaches; adapt to the new normal**
- **Identify unique virtual opportunities for learners**
- **Value laboratory interactions; adapt compounding and other lab courses to meet needs or remote education**
- **Always obtain and reflect on student feedback**

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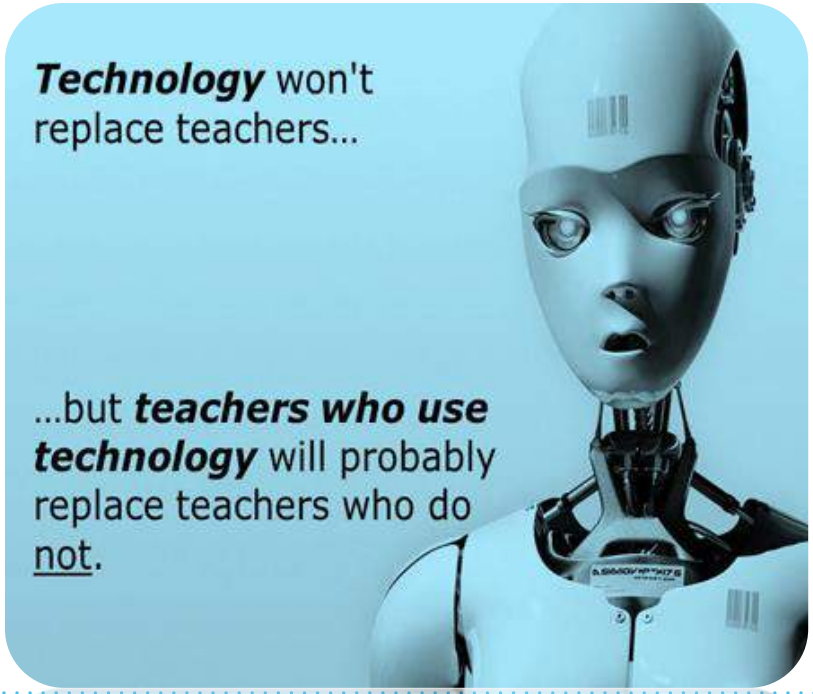
Let's get ready!



Thank you for participating!

Please provide your feedback through the 4-question survey that will appear to you at the end of the event