

Curriculum Review of the BS Pharmacy Program of a Local University in the NCR, Philippines: A Mechanism for Quality Assurance

Maria Fay Nenette M. Cariaga, University of Makati, Philippines
Justine Marie A. Ocampo, University of Makati, Philippines
Estela DV Barasi, University of Makati, Philippines

The Asian Conference on Education & International Development 2023
Official Conference Proceedings

Abstract

The Bachelor of Science in Pharmacy program at a local university in the NCR was officially approved on February 10, 2012 by virtue of the Board Resolution No. 2012-029. Curriculum enhancements were made in order to align with the thrust of the local university. On December 2021, the new PSGs for BS Pharmacy program was officially released for implementation. This study, conducted from March to April 2022, aimed to determine students' level of achievement of the PLOs; strengths, limitations, recommendations and over all impressions on the program; evolved themes based qualitative responses, serving as bases for creating an action plan. Sequential, mixed-method approach was used: review of documents, online survey (Aquino, et al., 2018) and FGDs. Through purposive and convenience sampling, thirty-six (36) Levels 3 and 4 students were administered with the instrument. FGDs with students (N=55), alumni (N=6), faculty members (N=8) and industry partners (N=4) were also conducted. Results show that students' strengths are along PLO1B (3.53, SD.136 & 3.50, SD .074), Store and dispense drugs following appropriate guidelines; and PLO5 (3.4630 SD .13436 & 3.4040 SD.13968), Provide pharmaceutical care including counseling on medicinal use, medication error and medication safety. However, they need to improve on PLO 1A (3.0574, SD.188 & 3.1289 SD .239) Identify, compound, and manufacture of drugs. Three (3) main themes were difficulty or rigor of the program, best features, and opportunities for continuous improvement. Timely curriculum review is pivotal in the quality assurance of education.

Keywords: Curriculum Review, BS Pharmacy Program, Outcomes-Based, Continuous Quality Improvement

iafor

The International Academic Forum
www.iafor.org

Introduction

In June 2012, the local university started offering Bachelor of Science in Pharmacy with its unique incorporation of the Associate of Applied Science in Pharmacy Technology, and embedded enhancements in Pharmaceutical Management, marketing, and entrepreneurship. The program followed the CMO No. 3 s of 2006 or the policies, standards, and guidelines (PSGs) for pharmacy education in the country and the outcomes-based education framework. In 2018, a provisional curriculum was adopted based on the CMO No. 8 s. 2018 which allowed HEIs to submit the final new or revised curricula aligned to the new PSGs within the first term of AY 2018-2019. On November 5, 2021, CMO No. 25 s 2021, or the new PSGs for Pharmacy program was officially released.

This research aimed to conduct a review of the existing curriculum as a basis for continuous quality improvement in preparation for the implementation of the (sample) new curriculum in the CMO 25 s. 2021 for AY 2022-2023. Through quantitative self-assessment, achievement of program learning outcomes was established by 3rd and 4th-year students during AY 2021-2022. Qualitative feedback was also gathered from the same students and alumni together with other stakeholders like faculty members and industry partners.

Methodology

Both quantitative and qualitative approaches (mixed-method, sequential) were used in this study; particularly a review of documents such as the existing and new BS Pharmacy curriculum of the local university, pertinent course plans, CHED Memorandum Order 5 s. 2021; analysis of the strengths, limitations, recommendations, and overall impression from focus group discussions; and online survey using the local university's Pharmacy program learning outcomes questionnaire (Aquino, et al., 2018). The informed consent process was properly observed. Non-random methods, purposive and convenience sampling were employed. Currently enrolled levels 3 and 4 students together with the alumni were administered with a survey questionnaire. After which, focus group discussions with students (N=55), alumni (N=6), faculty members (N=8), and industry partners (with active MOA) (N=4) were conducted through a series of virtual meetings conducted from March to April 2022 at the local university of a premiere city in the NCR. Descriptive and inferential statistics particularly mean ratings, SD and T-test were used to analyze the quantitative data. Thematic analysis was used to analyze the qualitative data.

Results and Discussion

Program Learning Outcomes Assessment by the Students

The local university's BS Pharmacy program learning outcomes questionnaire (Aquino, et al., 2018) was administered online to Level 3 and 4 students during the AY 2021-2022. Thirty-six (36) students willingly answered the said tool.

PLO 1A (Identify, compound, and manufacture of drugs following appropriate guidelines, standards, and specifications)	3 rd yr mean	4 th yr mean	Mean	SD	Desc
1. Determining biological activities of phytochemical constituents in PMPs	3.05	3.19	3.11	0.68	C

2. Applying the appropriate method of extraction and purification	3.21	3.31	3.26	0.51	C
3. Writing and naming chemical formula of pharm'l agents	3.00	3.38	3.17	0.71	C
4. Classifying inorganic and organic pharmaceutical agents based on properties and structures	3.26	3.13	3.20	0.68	C
5. Identifying the uses of organic and inorganic compounds based on structures	2.89	3.25	3.06	0.73	HC
6. Categorizing inorganic and organic substances	3.37	3.31	3.34	0.59	HC
7. Performing tests for quality and purity of representative drugs in the official monograph	3.11	3.00	3.06	0.64	C
8. Conducting qualitative methods of analysis for each of the natural products or constituents.	2.79	2.81	2.80	0.76	C
9 Interpreting the results of the different chemical, physical and biological methods of drug analysis	2.95	3.06	3.00	0.69	C
10 Formulating pharmaceutical dosage forms based on the properties, types, and incompatibilities of substances	3.11	3.13	3.11	0.72	C
11 Selecting the most appropriate pharmaceutical aid and/or, necessity, organic and inorganic compounds to be used in preparing product formulation	3.00	3.19	3.09	0.66	C
12 Selecting the most appropriate type of water and/or other appropriate solvents to be used in different compounding situations.	3.21	3.06	3.14	0.69	C
13 Synthesizing simple organic and inorganic compound products.	3.05	3.06	3.06	0.76	C
14 Application of PICS (Pharmaceutical Inspection Co-operation Scheme) Guidelines and (Good Manufacturing Practice) GMP for ASEAN Countries in industrial pharmacy practice.	2.63	2.94	2.77	0.91	C
15 Performing the actual procedure of extemporaneous compounding of TPNs and paper tablets, among others.	2.89	2.56	2.74	0.85	C
16 Manufacturing different dosage forms based on the basic pharmaceutical principles, processes, methods, and techniques.	2.89	2.88	2.89	0.96	C
17 Evaluating the most appropriate container to be used for different dosage forms and in consideration of the characteristics of drugs to be prepared	3.26	3.13	3.20	0.76	C
18 Designing the appropriate product packaging including product container, compatibility, label format and product insert	3.21	3.50	3.34	0.68	HC
19 Labelling the product properly (i.e. legible, comprehensible and complete).	3.21	3.56	3.37	0.77	HC
Grand Mean and SD	3.06	3.13	3.09		C

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74- not capable (NC)

Table 1. Overall Mean and SD for PLO1A learning outcomes

Out of the 19 learning outcomes in PLO1A, students assessed themselves as highly capable only in 4 learning outcomes, to wit: *Labelling the product properly (i.e., legible, comprehensible and complete) (3.37, 0.77)*; *categorizing inorganic and organic substances (3.34 .59)*; *designing the appropriate product packaging including product container, compatibility, label format and product insert (3.34, 0.68)*; and *identifying the uses of organic and inorganic compounds based on structures (3.06, 0.73)*. The compounding of medications is a fundamental part of pharmacy practice. Pharmacists are responsible in ensuring that dispensed products are of correct identity, pure, of proper strength and are labeled accurately and appropriately for the end user (ASHP Guidelines on Compounding Sterile Preparations, 2022).

The learning outcomes with the lowest mean ratings came out to be the following: *Performing the actual procedure of extemporaneous compounding of TPNs and paper tablets, among others (2.74, 0.85)*, followed by the *Application of PICS (Pharmaceutical Inspection Co-operation Scheme) Guidelines and (Good Manufacturing Practice) GMP for ASEAN Countries in industrial pharmacy practice (2.77, 0.91)*, and *Manufacturing different dosage forms based on the basic pharmaceutical principles, processes, methods, and techniques (2.89, 0.96)*.

Based on the results, students need to enhance their competencies in extemporaneous compounding, bulk compounding, and the production of pharmaceutical products in accordance with GMP. These competencies are emphasized during laboratory classes and experiential pharmacy practice in Pharmaceutical Manufacturing, which, due to the pandemic, were delivered using remote online learning.

PLO 1B (Store and dispense drugs following appropriate guidelines, standards, and specifications)	3 rd yr mean	4 th yr mean	Mean	SD	desc
1. Demonstrating proper handling and storage conditions to ensure stability of the products.	3.32	3.38	3.34	0.76	HC
2. Receiving the prescriptions for drugs properly (e.g., cross-checking the name and identity of the patient on the prescription)	3.58	3.50	3.54	0.66	HC
3. Asking proper screening questions before dispensing.	3.37	3.50	3.43	0.70	HC
4. Assessing the authenticity and validity of the prescription, assessing the accuracy of information in the prescription, and not filling the violative and impossible prescriptions.	3.68	3.56	3.63	0.60	HC
5. Rechecking the original label of the product against the prescription.	3.42	3.44	3.43	0.65	HC
6. Indicating number and date on the prescription accordingly (if completely filled or partially filled).	3.63	3.63	3.63	0.49	HC
7. Issuing medicine to the patient with clear instructions and advice (e.g Proper reconstitution of powders/granules.)	3.58	3.50	3.54	0.56	HC

8. Using consistent and repeated good dispensing procedures in ensuring that errors are detected and corrected	3.63	3.50	3.57	0.56	HC
Grand Mean and SD	5.53	3.50	3.51		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74-not capable (NC)

Table 2. Overall Mean and SD for PLO1B learning outcomes

It is gleaned from the table that students assessed themselves as highly capable in all of the learning outcomes of PLO1B with the following in the top 3: *Indicating the number and date on the prescription accordingly (if completely filled or partially filled) (3.63, 0.49); Assessing the authenticity and validity of the prescription, assessing the accuracy of the information in the prescription, and not filling the violative and impossible prescriptions (3.63, 0.60); and using consistent and repeated good dispensing procedures in ensuring that errors are detected and corrected (3.57, 0.56)*. On receiving a prescription, it should be screened and validated by the pharmacist to ensure that it is for the correct patient and it complies with the requirements. Adherence to good dispensing procedures is integral in ensuring that medicines are dispensed correctly. Any error which may occur during the dispensing process should be detected and rectified before medicines are handed to the patient or caregiver (Guide to Good dispensing practice, 2016). Patient counseling being the last point of contact between the patient, pharmacist, and medication in the dispensing process is by far the most important strategy that every pharmacist must adopt in order to minimize dispensing errors. In addition, reporting errors as they occur and when they occur will help in learning from the mistakes and ultimately prevent such errors in the future (Ismail, 2020; and Aquino et. al., 2019).

PLO 2A (Practice pharmacy in accordance with existing laws, legal and regulatory standards)	3 rd yr mean	4 th yr mean	Mean	SD	Desc
1 Complying with the laws, regulations, and ethical responsibilities of pharmacists to protect and ensure the well-being of their patients.	3.53	3.44	3.49	0.66	HC
2 Continuing professional knowledge of regulatory policies and laws by keeping abreast of current regulations.	3.21	3.50	3.34	0.68	HC
3 Being involved in the planning and implementation of establishing practical, technical, ethical, and regulatory policies within the organization	3.16	3.19	3.17	0.92	C
4 Providing all necessary information regarding the Substandard and Falsified Medical Products to support applications or submission	3.05	3.19	3.11	0.87	C
5 Reporting and handling Adverse Events (AEs), Adverse Drug Reactions (ADRs), and Substandard and Falsified (SF) medical	3.05	3.50	3.26	0.89	HC

6 Evaluating Adverse Events/Adverse Drug Reactions and Salesforce (SF) reports and submission of findings to regulatory authorities	2.84	3.44	3.11	0.90	HC
7 Illuminating the role of Pharmacist in Post-marketing Surveillance and Risk management Plan	3.05	3.50	3.26	0.82	HC
8 Engaging stakeholders to participate in the reporting and managing of Adverse Effects/Adverse Drug	3.11	3.31	3.20	0.83	C
9 Handling product complaints and product integrity issues.	3.11	3.25	3.17	0.92	HC
10 Sampling randomly from drug outlets which are needed for quality testing	3.11	3.00	3.06	0.87	C
11 Recalling products from the market in accordance with organizational and regulatory policies and procedures	3.05	3.19	3.11	0.87	C
12 Communicating the recall with regulatory authorities.	2.68	3.19	2.91	0.98	C
13 Ensuring that the organizational policies and procedures implemented by the company are documented properly.	2.89	3.44	3.14	0.88	C
14 Ensuring that the manufacturing and quality controls conform consistently to the specifications documented in the registration file	2.79	3.38	3.06	0.84	C
15 Obtaining documents required to ensure compliance of business operations	3.11	3.44	3.26	0.78	C
16 Enacting the laws relevant to the pharmacy practice into day-to-day activities.	3.16	3.31	3.23	0.81	C
Grand Mean and SD	3.06	3.33	3.18		C

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74 not capable (NC)

Table 3. Overall Mean and SD for PLO2A learning outcomes

Out of the 16 learning outcomes in PLO2A, students assessed themselves as highly capable in 6 learning outcomes, top 3 is as follows: *Complying with the laws, regulations and ethical responsibilities of pharmacists to protect and ensure the well-being of their patients.* (3.49, 0.66); *Continuing professional knowledge of regulatory policies and laws by keeping abreast of current regulations.* (3.34, 0.68); *Obtaining documents required to ensure compliance with business operations* (3.26, 0.78); *Reporting and handling Adverse Events (AEs), Adverse Drug Reactions (ADRs), and Substandard and Falsified (SF) medicines* (3.26, 0.89). These indicators fall under the course, Legal Pharmacy and Ethics with Regulatory Pharmacy.

An essential part of medication therapy is to ensure that patients are receiving the intended effects of the medication they are taking and are not experiencing any undesired side effects, which are also known as adverse events. Pharmacists in a clinical setting could access patient information that allows them to monitor and report adverse events when it occurs while in the

community setting, the pharmacist may notice a potential adverse event while counseling or interacting with patients (Aquino et.al., 2019; and Viswanathan et.al., 2014).

The learning outcomes with the lowest mean ratings came out to be the following: *Communicating the recall with regulatory authorities (2.91, 0.98)*; *Ensuring that the manufacturing and quality controls conform consistently to the specifications documented in the registration file (3.06, 0.84)*; and *Sampling randomly from drug outlets which are needed for quality testing (3.06, 0.87)*. Pharmaceutical regulations are the combination of legal, administrative, and technical measures that governments take to ensure the quality, safety, and efficacy of medicines (Pharmaceuticals Regulation EU Drug Discovery and development, 2013). Students need to enhance their competence in aspects that pertain to the regulatory pharmacy in the Experiential Pharmacy Practice (EPP), preferably in the hybrid or in-person mode, as this is taken up only as one of the topics in the 4 unit-course, Pharmaceutical Manufacturing. Further, these indicators can be strengthened through in-person, onsite experiential pharmacy practice experience.

PLO 2B (Practice pharmacy in accordance with ethical and moral standards)	3 rd yr mean	4 th yr mean	Mean	SD	Desc
1 Enacting the code of ethics for pharmacists relevant to the pharmacy practice into day-to-day activities.	3.16	3.31	3.23	0.65	C
2 Applying knowledge of personal, social, ethical and moral principles of the pharmacy practice	3.37	3.44	3.40	0.65	HC
3 Practicing what a Filipino pharmacist took oath to do in concordance with ethics and morality.	3.32	3.44	3.37	0.65	HC
4 Working ethically and effectively in the practice areas of pharmacy Engaging in lifelong learning with a passion to keep current with national and global developments in general and with pharmacy and health developments.	3.37	3.31	3.34	0.64	HC
5 Engaging in lifelong learning with a passion to keep current with national and global developments in general and with pharmacy and health developments.	3.42	3.31	3.37	0.60	HC
Grand Mean and SD	3.33	3.36	3.34		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74-not capable (NC)

Table 4. Overall Mean and SD for PLO2B learning outcomes

Students assessed themselves as capable in 1 out of 5 learning outcomes: *Enacting the code of ethics for pharmacists relevant to the pharmacy practice (3.23, 0.65)*. They assessed themselves as highly capable in the other 4 indicators, highest of which is the learning outcome: *Applying knowledge of personal, social, ethical and moral principles of the pharmacy practice (3.40, 0.65)*. Students have a firm grasp of the practice of pharmacy in accordance with ethical and moral standards. They embody the principles that form the fundamental basis of their roles and responsibilities which are based on moral obligations and virtues as specified in the Philippine Pharmacists Association Code of Ethics for Pharmacists.

These principles based on moral obligations and virtues are established to guide pharmacists in their relationship with their patients, other health professionals, and society (Aquino et. al., 2019; American Pharmacist Association, 2018; and Maitreemit et al., 2008).

PLO 3 (Collaborate and communicate effectively with other members of the HC team in safeguarding the overall health and wellness of the individuals and the community in general)	3 rd yr mean	4 th yr mean	Mean	SD	Desc
1 Actively participating in the functions and adhering to policies of the Pharmacy and Therapeutics Committee (PTC).	3.05	3.00	3.03	0.86	C
2 Applying knowledge of the roles and responsibilities of other healthcare team members to patient care	3.58	3.25	3.43	0.65	HC
3 Developing a good network and readily approaching peers, co-workers and/or superior for assistance as necessary.	3.47	3.31	3.40	0.55	HC
4 Collaborating with other members of the health care team to achieve optimal patient outcomes across the continuum of care	3.68	3.19	3.46	0.66	HC
5 Communicating effectively in counseling patients and/or the patient's caregiver about the patient's medication following the correct process	3.68	3.44	3.57	0.56	HC
6 Contributing to the development of a health vigilance system within the organization	3.11	3.38	3.23	0.88	C
7 Communicating to the regulatory authorities, any changes in the formulations, manufacturing process, testing procedure, and supplier of raw materials and other pertinent details of a registered product.	2.84	3.25	3.03	0.92	C
Grand Mean and SD	3.49	3.24	3.38		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable ©, 1.75-2.49 somewhat capable (SC), 1.00 -1.74-not capable (NC)

Table 5. Overall Mean and SD for PLO3 learning outcomes

Students rated themselves as highly capable in 4 out of 7 learning outcomes. Top 2 are as follows: Communicating effectively in counseling patients and/or the patient's caregiver about the patient's medication following the correct process (3.57, 0.56); and collaborating with other members of the health care team to achieve optimal patient outcomes across the continuum of care (3.46, 0.66). In addition to professional courses, every semester, the College conducts activities like Grand case presentation and OBE Fair where students from Pharmacy, Nursing, and Radiologic Technology collaborate to accomplish a given clinical case. An interdisciplinary healthcare approach can improve patient outcomes, healthcare processes, and levels of satisfaction. Further, effective open-ended questioning and active listening are essential skills for gathering and relaying information to patients (Aquino et. al. 2019).

The lowest mean ratings are with the following learning outcomes: Actively participating in the functions and adhering to policies of the Pharmacy and Therapeutics Committee (PTC). 3.03 0.86; Communicating to the regulatory authorities, any changes in the formulations, manufacturing process, testing procedure, and supplier of raw materials and other pertinent details of a registered product. 3.03, 0.92; Contributing to the development of a health vigilance system within the organization 3.23, 0.88. These indicators include specific roles of pharmacists that can be fully acquired by students through in-person, onsite, and supervised experiential pharmacy practice.

PLO 4 (Provide relevant drug and health-related information to patients)	3 rd yr mean	4 th yr mean	Mean	SD	Desc
1 Interpreting laboratory test and physical assessment results.	3.37	3.31	3.34	0.59	HC
2 Evaluating the patient's need to identify the amount of education and type of information needed to optimize his/her medication use	3.47	3.38	3.43	0.65	HC
3 Relating various physiologic and pathophysiologic conditions of normal and special populations to effects in pharmacokinetics of drugs	3.26	3.25	3.26	0.70	HC
4 Identifying problems arising from abnormalities in of endocrine functions	3.16	3.00	3.09	0.70	C
5 Describe risk factors for hypertension and the impact on cardiovascular diseases/conditions such as angina, arrhythmia and congestive heart failure	3.53	3.44	3.49	0.51	HC
6 Designing and documenting accurately a medication counseling plan to address the needs of individual patients and a monitoring plan towards the desired therapeutic outcomes	3.47	3.31	3.40	0.60	HC
7 Providing an appropriate drug information based on prescription to achieve the goal of treating the infectious disease.	3.42	3.31	3.37	0.73	HC
8 Providing usable information to patients/customers relating to natural products which are used as ingredients of herbal supplement	3.37	3.56	3.46	0.61	HC
9 Identifying and prioritizing patient problems and medication-related needs.	3.16	3.25	3.20	0.63	C
Grand Mean and SD	3.36	3.31	3.34		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable ©, 1.75-2.49 somewhat capable (SC), 1.00 -1.74-not capable (NC)

Table 6. Overall Mean and SD for PLO4 learning outcomes

Students rated themselves as highly capable in 7 out of 9 learning outcomes. The top 3 are as follows: Providing usable information to patients/customers relating to natural products which are used as ingredients of herbal supplements (3.46, 0.61); Describe risk factors for hypertension and the impact on cardiovascular diseases/conditions such as angina, arrhythmia

and congestive heart failure (3.49, 0.51); Evaluating the patient's need to identify the amount of education and type of information needed to optimize his/her medication use (3.43, 0.65). These indicators all relate to ensuring patient safety and education which are critical in order to complete an assessment that will appropriately address all of the patient's medication-related needs. The lowest ratings were found with the following learning outcomes: Identifying problems arising from abnormalities in of endocrine functions (3.09, 0.70), and Identifying and prioritizing patient problems and medication-related needs (3.20, 0.63). It is crucial that student pharmacists are capable of identifying and prioritizing patient problems and medication-related needs because it is ultimately the healthcare practitioner's responsibility to assure that all of the necessary information about the patient is collected and that the data is accurate. These indicators can be enhanced through pharmacotherapy courses and patient medication counseling cases (Aquino et. al., 2019; and Armor et.al., 2014).

PLO 5 (Provide pharmaceutical care including counseling on medicinal use, medication error, and adverse event prevention – medication safety)	3 rd yr mean	4 th yr mean	Mean	SD	Desc.
1. Identifying relevant drug interactions based on pharmacokinetic principles.	3.58	3.44	3.51	0.61	HC
2. Probing what the doctor has told him/her about the drug that has been prescribed.	3.47	3.56	3.51	0.56	HC
3. Asking proper relevant screening questions before dispensing.	3.53	3.56	3.54	0.61	HC
4. Providing non-drug related counseling (e.g health and wellness maintenance) before dispensing	3.53	3.50	3.51	0.61	HC
5. Preventing relevant drug interactions based on pharmacokinetic principles	3.68	3.50	3.60	0.50	HC
6. Resolving relevant drug interactions based on pharmacokinetic principles	3.42	3.25	3.34	0.59	HC
7. Proposing drug delivery system and routes of administration suitable for individualized therapeutic objectives (including economic considerations)	3.37	3.25	3.31	0.63	HC
8 Evaluating the medication regimen of the patient.	3.63	3.56	3.60	0.55	HC
9 Addressing medication-related problems	3.63	3.50	3.57	0.61	HC
10 Suggesting modifications in dosing and dosage regimens, when necessary, in normal and special populations and using data from Therapeutic Drug Monitoring (TDM).	3.42	3.44	3.43	0.61	HC
11 Designing dosing regimens in standard and special populations including those with altered physiologic states and economic considerations.	3.37	3.13	3.26	0.78	HC
12. Developing/initiating therapeutic plans	3.58	3.38	3.49	0.61	HC
13. Evaluating drug therapy for appropriateness, effectiveness, safety, adherence, and affordability	3.42	3.50	3.46	0.61	HC

14 Evaluating the evidence-based treatment plan for patients with renal disorders based on race, concomitant disease, drug adverse effects & drug interactions	3.42	3.38	3.40	0.50	HC
15 Evaluating the treatment plan for patients with GI disorder based on the etiology of ulcer & motility disorders	3.47	3.13	3.31	0.63	HC
16 Evaluating the treatment plan for patients with auto-immune disorders, dermatologic and hematologic disorders.	3.26	3.25	3.26	0.70	HC
17 Evaluating the treatment plan for patients with hypertension based on race, concomitant disease, drug adverse effects, & drug interactions	3.53	3.44	3.49	0.61	HC
18 Following up and monitoring the outcomes of therapeutic plans.	3.47	3.44	3.46	0.66	HC
19 Strictly follow a proper system of arrangement of drugs and supplies.	3.37	3.31	3.34	0.76	HC
20 Identifying and tagging high alert medicines (HAM) and sound alike, look alike ones (SALADs).	3.11	3.56	3.31	0.90	HC
Grand Mean and SD	3.46	3.40	3.44		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74-not capable (NC)

Table 7. Overall Mean and SD for PLO5 learning outcomes

Students rated themselves as highly capable along all the 20 learning outcomes of PLO5, with the following as top 3: Preventing relevant drug interactions based on pharmacokinetic principles (3.60, 0.5); Evaluating the medication regimen of the patient. (3.60, 0.55); Addressing medication-related problems (3.57, 0.61). These indicators fall under Dispensing 1 (Dispensing process, reading and interpreting the prescription and other medicine orders) and Dispensing 2 (Medication-Related Problems, Medication Safety, Medication Counselling, and Other Pharmacy Services) which are the most utilized courses across Pharmacy practice and are appropriate as it is aligned with the fundamental role of the pharmacists (Ongpoy, et. al., 2019).

PLO 6 (Practice effective management and leadership skills in all given settings or practice sites)	3 rd yr mean	4 th yr mean	Mean	SD	Desc
1 Assigning priorities to task in accordance with goals and objectives to manage efficiently time and other resources.	3.32	3.44	3.37	0.69	HC
2 Properly doing the role of pharmacist in purchasing and inventory management.	3.21	3.31	3.26	0.70	HC
3 Implementing changes to improve own practice or incorporating learning into practice.	3.21	3.25	3.23	0.60	C
4 Performing the functions of as deemed necessary (e.g planning, leading, organizing and controlling).	3.16	3.31	3.23	0.69	C

5 Applying the appropriate and suitable management approaches. (eg. Management by objectives (MBO), Management by Exemption (MBE), Management by Culture (MBC)	2.32	2.75	2.51	1.01	C
6 Solving conflicts using appropriate resolution management strategies suitable for the situation.	3.16	3.31	3.23	0.73	C
7 Identifying, respecting corporate hierarchies and observing proper channel of communication.	3.26	3.25	3.26	0.70	HC
8 Promoting strong team relationships in practice setting.	3.47	3.56	3.51	0.66	HC
9 Understanding training needs and development.	3.42	3.63	3.51	0.56	HC
10 Conducting performance evaluation by using relevant tools.	3.32	3.50	3.40	0.55	HC
11 Levelling expectation by solving, judging and managing a situation in a given setting or practice area.	3.32	3.38	3.34	0.64	HC
Grand Mean and SD	3.20	3.34	3.26		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74- not capable (NC)

Table 8. Overall Mean and SD for PLO6 learning outcomes

Students rated themselves as Highly Capable in 7 out of 11 learning outcomes. The top 3 is as follows: Promoting strong team relationships in the practice setting. (3.51, 0.66) Understanding training needs and development. (3.51, 0.56), Conducting performance evaluation by using relevant tools. (3.40, 0.55). The collaboration among health care professionals is one of the values that is strengthened in the College, activities are done such as Grand Case Presentation and Skills Fair which involve the student pharmacists, student nurses, and student radiologic technologists working together as a team to solve a patient case (Aquino et al., 2019). Moreover, the study by Maitreemit et. al. (2008) suggested that leadership, human relation skills, respect for authority, moral sense, emotion control, creative thinking, patience, and responsibility, among others, are the important attributes regarding pharmacists' character traits.

The lowest ratings were found with the following learning outcomes: Applying the appropriate and suitable management approaches. (e.g., Management by objectives (MBO), Management by Exemption (MBE), Management by Culture (MBC) (2.51, 1.01); Implementing changes to improve own practice or incorporating learning into practice. (3.23, 0.6); Performing the functions of as deemed necessary (e.g., planning, leading, organizing, and controlling). (3.23, 0.69); Solving conflicts using appropriate resolution management strategies suitable for the situation. (3.23, 0.73). The results may be attributed to the very few references available on management and administration based in the Philippine setting. It is important that the Center further strengthens these indicators because they are one of the critical processes in the healthcare delivery system. Furthermore, these functions are essential and must be evident in the managerial role of a pharmacist in the management of human resources, financial resources, marketing, inventory, information resources, and space management of the pharmacy (Aquino et. al., 2019; and Kelsch and Werremeyer, 2011).

PLO 7 (Manage drug establishments based on sound entrepreneurial practice integrating pharmaceutical care principles)	3 rd yr mean	4 th yr mean	Mean	SD	Desc
1 Performing opportunity assessment with deep understanding of environment and its opportunities	3.32	3.31	3.31	0.58	HC
2 Following the concepts of entrepreneurship as a spirit frame by understanding dilemmas of an entrepreneur.	3.26	2.94	3.11	0.76	C
3 Performing the concepts of a complete entrepreneur by understanding holistic attributes of an entrepreneur and the necessities of being creative and innovative.	3.32	3.19	3.26	0.74	HC
4 Performing the competence of a successful entrepreneur by understanding the concepts of self-mastery, situational mastery and enterprise mastery.	3.21	3.13	3.17	0.66	C
5 Applying SWOT (Strength, Weaknesses, Opportunities and Threats) analysis in concordance with Porter's analysis.	3.63	3.38	3.51	0.61	HC
6 Performing benchmarking by understanding item/store improvement, basic factors, and creating position articulations	3.37	3.19	3.29	0.71	HC
7 Performing the integration of all entrepreneurial marketing concepts by demonstrating competence in business appraisal.	3.32	3.19	3.26	0.70	HC
8 Utilizing relevant and innovative concepts of entrepreneurship.	3.26	3.38	3.31	0.63	HC
9 Performing the habits (e.g. disciplined, open-minded, confident among others) of successful entrepreneurs.	3.47	3.56	3.51	0.61	HC
10 Applying the working knowledge of the principles of entrepreneurship to analysis and problem solving	3.32	3.44	3.37	0.69	HC
11 Applying concepts of business plan by understanding the concepts and importance of pharmaceutical business plan.	3.37	3.50	3.43	0.65	HC
12 Performing contents of the summary and business description and drafting a business plan.	3.47	3.56	3.51	0.61	HC
13 Applying concepts of Pharmaceutical Industry Analysis by reviewing Porter's Analysis and PESTE (Political, Economic, Social, Technological and Ecological) Analysis	3.42	3.00	3.23	0.88	C
14 Utilizing pharmaceutical entrepreneurship concepts on a broader context.	3.11	3.25	3.17	0.79	C
15 Conducting financial analysis to guide allocation and use of organizational resources.	3.05	3.25	3.14	0.81	C
16 Performing financial analysis of different aspects of the business.	3.05	3.25	3.14	0.77	C
17 Creating a viable business plan (SMARTER) that will increase the pharmaceutical ventures chances of success	3.11	3.31	3.20	0.76	C

18 Illustrating and discussing the pharmaceutical healthcare industry and the health care business in the Philippines	3.26	3.44	3.34	0.80	HC
19 Identifying the core pharmaceutical marketing concepts.	3.21	3.31	3.26	0.78	HC
20 Applying pharmaceutical marketing strategy in building customer relationships by strategic planning, marketing process and marketing effort	3.21	3.31	3.26	0.89	HC
21 Performing pharmaceutical marketing in both traditional and non-traditional way.	3.16	3.38	3.26	0.85	HC
Grand Mean and SD	3.28	3.30	3.29		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74-not capable (NC)

Table 9. Overall Mean and SD for PLO7 learning outcomes

Students rated themselves as highly capable in 14 out of 21 learning outcomes, top 3 is as follows: Applying SWOT (Strength, Weaknesses, Opportunities, and Threats) analysis in concordance with Porter's analysis. (3.51, 0.61); Performing the habits (e.g., disciplined, open-minded, confident among others) of successful entrepreneurs. (3.51, 0.61); Performing contents of the summary and business description and drafting a business plan. (3.51, 0.61). The local university incorporated enhancements along Pharmacy Administration, Marketing, and Entrepreneurship in order to balance with Pharmaceutical Sciences and Pharmaceutical Care competencies. This PLO shows that pharmacy students at the university are already excelling in integrating administration, marketing, and entrepreneurial practice with pharmaceutical care (Aquino, et. al., 2019).

The lowest ratings are found along the following: Following the concepts of entrepreneurship as a spirit frame by understanding the dilemmas of an entrepreneur (3.11, 0.76); Performing the competence of a successful entrepreneur by understanding the concepts of self-mastery, situational mastery, and enterprise mastery (3.17, 0.66); Conducting financial analysis to guide allocation and use of organizational resources (3.14, 0.81); Performing a financial analysis of different aspects of the business (3.14, 0.77). These indicators must be strengthened in the instructional delivery given that marketing and entrepreneurship are among the keys to the development of a range of health services in the community and hospital sectors. It is important to note, however, that pharmacy students can only fully acquire and develop such competencies when they are already exposed to the actual setting.

PLO 8 (Conduct scientific research methods and processes for the development of noble drugs which are pro-Filipino and for the improvement of existing drug products and the practice of the profession itself)	3 rd yr mean	4 th yr mean	Mean	SD	Desc.
1 Understanding the importance of research in the different fields of practice of pharmacy.	3.21	3.56	3.37	0.84	HC
2 Demonstrating competence in research, technical writing and data analysis in the workplace.	3.16	3.38	3.26	0.85	HC
3 Writing the different parts of a research manuscript.	3.32	3.44	3.37	0.81	HC
4 Conducting research in accordance with existing protocols related to pharmaceutical sciences, education, and practice.	3.11	3.56	3.31	0.87	HC

5 Integrating relevant information from literature and studies or devising methodologies operationally.	3.26	3.44	3.34	0.76	HC
6 Critiquing contents of a published research manuscript based on established criteria.	3.21	3.50	3.34	0.84	HC
7 Presenting and defending the said research paper to a technical panel	3.47	3.63	3.54	0.82	HC
8 Disseminating the results of the said research at a level appropriate to the level of capacity of the audience	3.26	3.44	3.34	0.76	HC
Grand Mean and SD	3.25	3.49	3.36		HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74-not capable (NC)

Table 10. Overall Mean and SD for PLO8 learning outcomes

As gleaned from the table, students rated themselves as highly capable along all the learning outcomes of PLO8, with the top 3 as follows: Presenting and defending the said research paper to a technical panel (3.54, 0.82), Understanding the importance of research in the different fields of practice of pharmacy. (3.37, 0.84); Writing the different parts of a research manuscript. (3.37, 0.81). Pharmacy students obtain a deeper understanding of why research is important by conducting researches and presenting and defending these researches to technical panels in Pharmacy Research Methods with Pharmaceutical Statistics, and Pharmacy Research and Thesis Writing. Further, pharmacy students were taught at the onset how to do research as part of their task assessments in courses such as Pharmaceutical Botany with Taxonomy, Pharmaceutical Pharmacognosy and Plant Chemistry, Pharmaceutical Inorganic Chemistry, Drug Delivery Systems, Pharmaceutical Microbiology, and Parasitology, among others. According to Deal et. al. (2016), regardless of the practice setting, it is imperative that pharmacists be able to participate in generating new knowledge or use the ever-expanding body of literature and studies to guide patient care, and by adopting and establishing an evidence-based practice.

PLO 9 (Contribute to the enhancement of overall social, mental, emotional, and physical health of individuals, communities, and the country as a whole)	3 rd yr mean	4 th yr mean	Mean	SD	Desc
1 Understanding and contributing to existing policies, laws, interventions and programs that address public health issues	3.26	3.31	3.29	0.75	HC
2 Appreciating the roles of pharmacists in a collaborative health care setting in addressing public health issues.	3.32	3.44	3.37	0.73	HC
3 Applying concepts, methods, strategies, interventions addressing Public Health issues and concerns.	3.32	3.44	3.37	0.73	HC
4 Providing appropriate pharmaceutical care services to the patient and the community (e.g., patient counseling, medication review and medication reconciliation, among others).	3.37	3.38	3.37	0.73	HC

5 Lobbying and working for overall health and wellness sustainability, cultural adaptability and poverty alleviation in the community and country as a whole.

Grand Mean and SD	3.32	3.39	3.35	HC
-------------------	------	------	------	----

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74-not capable (NC)

Table 11. Overall Mean and SD for PLO9 learning outcomes

Students rated themselves as highly capable in all of the learning outcomes of PLO 9, with the top 3 as follows: Appreciating the roles of pharmacists in a collaborative health care setting in addressing public health issues. Applying concepts, methods, strategies, and interventions addressing Public Health issues and concerns, and providing appropriate pharmaceutical care services to the patient and the community (e.g., patient counseling, medication review, and medication reconciliation, (3.37, 0.73). The course, Public Health Pharmacy introduces the students to community health that includes both private and public efforts of individuals, groups, and organizations to promote, protect, and preserve the health of those in the community. Community pharmacists work closely with the public and would be expected to highly value the care of primary health and drug use plans of the community (Maitreemit et.al., 2008).

Significant difference in the mean self-assessment levels of Level 3 and Level 4 students along the PLOs

	3 rd year		4 th year		Grand Mean & SD		Desc
	Mean	SD	Mean	SD			
PLO 1A	3.0574	.18782	3.1289	.23900	3.09	0.05	C
PLO 1B	3.5262	.13585	3.5012	.07415	3.51	0.02	HC
PLO 2A	3.0562	.19462	3.3294	.14879	3.19	0.19	C
PLO 2B	3.3280	.10035	3.3620	.07120	3.35	0.02	HC
PLO 3	3.4283	.28138	3.2617	.15613	3.35	0.12	HC
PLO 4	3.3790	.14594	3.3310	.15609	3.36	0.03	HC
PLO 5	3.4630	.13436	3.4040	.13968	3.43	0.04	HC
PLO 6	3.1973	.30754	3.3355	.23162	3.27	0.10	HC
PLO 7	3.3500	.11533	3.2918	.18280	3.32	0.04	HC
PLO 8	3.2500	.10981	3.4938	.08366	3.37	0.17	HC
PLO 9	3.3175	.04500	3.3925	.06185	3.36	0.05	HC
Grand Mean & SD	3.30	0.15	3.35	0.10	3.33	0.04	HC

Legend: 3.25-4.00 highly capable (HC), 2.50-3.24 capable (C), 1.75-2.49 somewhat capable (SC), 1.00 -1.74-not capable (NC)

Table 12. Summary of grand mean and SD of the PLOs

A T-test was conducted to determine if a significant difference exists between the two (2) year levels of students along their mean self – assessment ratings:

	Mean		T	P-Value	Interpretation
	3 rd	4 th			
PLO 1A	3.0574	3.1289	-1.54	.141	NS
PLO 1B	3.5262	3.5012	.764	.470	NS
PLO 2A	3.0562	3.3294	-4.680	.000	Sig
PLO 2B	3.3280	3.3620	-.669	.540	NS
PLO 3	3.3443	3.2600	.690	.516	NS
PLO 4	3.3790	3.3310	1.368	.204	NS
PLO 5	3.4630	3.4040	1.636	.118	NS
PLO 6	3.1973	3.3355	-3.957	.003	Sig
PLO 7	3.2810	3.2986	-.429	.673	NS
PLO 8	3.2500	3.4938	-6.185	.000	Sig
PLO 9	3.3175	3.3925	-2.754	.071	NS

Table 13. T-test results

Based on the results, Level 4 students are significantly superior than Level 3 students based on their self-assessment of the following learning outcomes: Practice pharmacy in accordance with existing laws, legal and regulatory standards); Practice effective management and leadership skills in all given settings or practice sites; and Conduct scientific research methods and processes for the development of noble drugs which are pro-Filipino and for the improvement of existing drug products and the practice of the profession itself. This is primarily because level 4 students have already undergone experiential pharmacy practice in the five areas, to wit: community, hospital, institutional, industrial, public health & regulatory. Experiential learning is a very important component of pharmacy education as it gives the students the opportunity to practice and apply what they have learned, be able to interact with their peers and other health care professionals, and be exposed to actual cases or scenarios that evoke higher-order thinking skills. Internship plays an essential part in the pharmacy education program. The integration of formal and informal learning activities during an internship, including raising awareness of incidental learning, is important to further support students' learning of the professional practice of pharmacy (Wallman, 2010).

Strengths, Limitations, Overall Impression and Recommendations of Stakeholders

The table below shows the qualitative inputs of the students, faculty, alumni, and industry partners. Students and faculty members were asked the guide questions: *What are the strengths of the BS Pharmacy curriculum? What are the limitations of the BS Pharmacy curriculum? What is your overall impression of the BS Pharmacy curriculum? What recommendations can you suggest to enhance the BS Pharmacy curriculum?* while the alumni and industry partners' insights on the competencies that graduates must possess to become practice-ready and thus, employable, were sought in addition to their recommendations for the improvement of the curriculum.

STAKEHOLDERS	STRENGTHS	LIMITATIONS	OVERALL IMPRESSION	RECOMMENDATIONS
STUDENTS	There is always something new to learn; organized, accurate, advanced, interconnected and outcomes-based. Contains collaborative activities; Comprehensive, holistic and flexible.; practice/Field readiness; Teachers are passionate and handle the course very well.; Students are pushed to study more.; Resilient and innovative; More job opportunities and diverse career selection; Pre-requisite courses are in place; proper placement of internships	Bulky; laboratory application and immersions in actual premises (Pandemic-driven); Per level “standing” is rigorous; OBE should not be applied in all courses; Small number of units allocated for some courses e.g., Health Technology Assessment and Social and Administrative Pharmacy, Curriculum may not be recognized in other countries. Some require 5 years	Challenging yet effective; Worth it after 3rd year; Opens spectrum of possibilities in the future; Unique and Dynamic; Brings out best in each student; Makes students resilient; Satisfied with learnings; Very tiring; Good especially if you will pursue medicine; Helps in the achievement of goal; Enhancement of PHAD courses is good; Helps students to become knowledgeable and good decision makers	Activity-time ratio for assessment task; Exclude some topics that are not necessary; Larger time allocation for some courses; More effective pharmacy teachers; There should be a study group headed by higher level students; Include immunization topics; Outside school immersions, i.e., FDA visits Minor pharmacy subjects/gen ed courses should be discussed briefly; More laboratory work and hands-on activities; Additional course: Human Physio 2;
FACULTY	Holistic approach to prepare the students for entry level practice, ladder, Enhancement courses: PHAD; Catered towards the practice side of the profession	Co-requisites and Pre-requisites should be aligned; Virtual classroom isn't a good avenue for students to learn chemistry, especially on lab works/techniques; Really	Should be revisited from time to time to assess whether it is still suitable to current situation; Challenging; Exceptional due to that fact that there were additional embedded courses; BS	Continuous consultation with stakeholders including government agencies. Benchmarking, Work closely with the healthcare industry practitioners/employers; Pharmacists to have focused

		packed with many courses (both major and minor); Bulky.	Pharmacy Curriculum in the local university is competent, as evidenced by its consistent very satisfactory passing rate; Overall, it is good	track. Re-alignment of some of the courses in the curriculum; Provision for adding laboratory units for Clinical Pharmacy; Comprehensive exams at the end of every semester/year; Curricular mapping (to show a continuity in the lessons and avoid redundancy).
--	--	---	--	--

Table 14. Qualitative responses of stakeholders: students and faculty members

STAKEHOLDERS	Employable competencies/skills they think graduates should possess in order to become practice-ready	RECOMMENDATIONS
ALUMNI AND INDUSTRY PARTNERS	Technical and soft skills; Decision-making skills; Critical thinking skills; Pharmaceutical industry system knowledge, People smart, communication skills verbal and written, resilience and negotiation; Perseverance and the enthusiasm to learn; Leadership roles and research-oriented (statistics); Competency and Skills in Drug Therapy Management, Health Technology Assessment and Evidence-based Practice	Specialized topics; Immunization; add people-skill task for students; Career talks from the alumni, Brainstorming sessions to improve specific issues in Philippine pharmacy practice, research analysis and interpretation competence enhancement; To have PharmD course or Clinical Pharmacy. Enhancing Pharmacotherapy Subjects with applications of Drug Therapy Assessment; Evidence-based practice and HTA

Table 15. Qualitative responses of stakeholders: Alumni and industry partners

The University of Sydney Careers Centre (2022) specifies that employability skills refer to a set of transferable skills and key personal attributes highly valued by employers and essential for effective performance in the workplace. Compared with technical competence, they are generic in nature, rather than job-specific, and are common to all work roles and workplaces across all industry types. Examples are teamwork, communication, planning and organizing,

problem-solving, among others. Personal attributes that contribute to overall employability include commitment, adaptability, honesty and integrity, reliability, ability to deal with pressure, motivation, and cultural fit with the employing organization. The pharmacy program curriculum must be able to cultivate in its students these employability skills also often referred to as soft skills, in order to prepare them for the challenges and dynamics of pharmacy practice.

According to the International Pharmaceutical Federation Global Framework (2014), education has been a strong driver of change in practice, but sometimes it could be disconnected from the needs and realities of practice. Quality assurance systems that proactively engage with practice, education, and regulation can also be drivers for quality advancement in education. It is important to ensure that at no stage do any of the “gaps” among the three (education, practice, and regulation) get too wide, because this leads to an overt disconnect, creating tensions, dissatisfaction, or frustration. If, for example, pharmacy educators have a vision for pharmacy practice and education and implement a model that is not supported by practitioners and/or regulators, graduates may become disillusioned if the practice or regulatory environment does not allow them to practice in the manner conveyed by the academic program. It is therefore imperative that inputs of the stakeholders such as the industry sector be considered in curriculum enhancement activities of schools.

Thematic analysis of the stakeholders’ qualitative responses

Overall, three (3) main themes were evident:

Rigor

The difficulty of professional courses in the curriculum was encountered. This was made prominent by the following: Year level fulfillment of requirements “level standing”; OBE implementation in “highly cognitive” courses; lack of contact hours for some courses; system of co-requisites and pre-requisites, “bulky”, activity-time ratio for assessment tasks.

According to Mintrom (2014), a culture of excellence is an organizational context encouraging behaviors that, when deployed, continuously improve task performance. Systematically orienting students towards the pursuit of excellence produces cultures of excellence resulting to short-term and long-term gains for them. Rigorous application of evidence-based, continuous improvement in pedagogical practice cultivates excellence, eventually producing social and economic progress when they populate the workplace. Excellence in pharmacy practice must start in cultivating excellence in education. Rigor is necessary in order to foster agility that is needed in the very dynamic pharmacy practice. There is a need however, to prevent or lessen the controllable factors that can further contribute to its difficulty, for example, overwhelming student tasks and requirements given a low contact hour for a course.

Best features

Organized and accurate; Interconnected.; Outcomes-based. Laddered. Advanced Collaborative; self-directed. Comprehensive, holistic and flexible.; Practice/Field readiness; Passionate and dedicated teachers.; Resilient and innovative. Diverse career opportunities; Internships properly placed, Enhancement courses: PHAD; great curriculum in academics.

CMO 25 s. 2021 states that the outcome-based program (on a minimum), is at least a four (4)-year degree program with a total of 169 credit units, equivalent to 4,515 hours. The program offers a good mix of general education courses, which have relevant applications in the profession of pharmacy, and professional courses, that will help prepare the graduates in acquiring competencies necessary in the workplace. Foundation courses in pharmaceutical chemistry, pharmaceuticals, and the life sciences enhance the understanding of pharmaceutical product development and their applications in pharmacy practice. It also includes experiential pharmacy practice programs in the 4th year that involve assigning students to different CHED-accredited affiliation establishments covering a minimum of 1,200 hours. The intern/student, during the course of the EPP experience, will be exposed to a variety of opportunities in practice areas preparing them for the different roles expected of them upon graduation. Being the local university of a premiere city, it has infused enhancements in pharmaceutical administration, management, marketing, and entrepreneurship in addition to having an associate degree after the second year. The same CMO also mentions that HEIs are allowed to design curricula suited to their own contexts and missions provided they can demonstrate that the same leads to the attainment of the required minimum set of outcomes, albeit by a different route. The best features of the BS pharmacy curriculum of the local university are anchored on the salient features of the program as mentioned in the said CMO. In addition, enhancements done were considered significant in the same manner as mentors' passion and commitment.

Continuous Improvement

Specialized topics like immunization; More practical applications of theories to actual practice settings; Add people-skill tasks for students to make them more well-rounded.; Career talks from the alumni on different fields of practice; Brainstorming sessions aiming to improve specific issues in Philippine pharmacy practice, involving all year levels; reinforcement of statistics, evidence-based practice, and pharmaceutical sciences research topics; additional year/s of study to cater to specialization like PharmD/ Clinical Pharmacy program.

As emphasized in CMO 25 s. 2021, the curriculum should be designed in accordance with the needs-based professional education model of the International Pharmaceutical Federation (FIP) (published in the 2012 FIP Global Pharmacy Workforce Report) with consideration of the needs of professional practice and the Filipino society, the scope of the practice of pharmacy as stipulated in Section 4, Article 1 of the Philippine Pharmacy Act (RA 10918), the Philippine Qualifications Framework (PQF), the Philippine Practice Standards for Pharmacists (PhilPSP) and other international professional competency standards. There are also mandated topics for integration in the relevant professional courses in the curriculum such as Patient Safety and quality risk management, good pharmacy practices, leadership and management, and interprofessional education, Counterfeit Medicines and SSFFC (Substandard, Spurious, falsely labeled, Falsified and Counterfeit medical products), Pharmaceutical Promotion & Ethics, Philippine Practice Standards for Pharmacists (PhilPSP) and Pharmaceutical Supply Chain Management. The local university will continuously work for the improvement of its BS Pharmacy program using this as a guidepost.

Program Learning Outcomes (PLOs)	Quantitative	Qualitative	Identified gaps and Plan of action
<p>PLO 1A (Identify, compound, and manufacture of drugs following appropriate guidelines, standards and specifications)</p>	<p>Extemporaneous compounding of TPNs and paper tablets, among others. (2.74, 0.85),</p> <p>PICS Guidelines and GMP for ASEAN Countries in industrial pharmacy practice (2.77, 0.91),</p> <p>Manufacturing different dosage forms based on the basic pharmaceutical principles, processes, methods, and techniques (2.89, 0.96).</p>	<p>Limitation in laboratory applications and immersions/ internships in actual premises (Pandemic-driven)</p> <p>Difficulty in professional courses amplified by lack of</p>	<p>Competencies along extemporaneous compounding and manufacture of drugs:</p> <p>Revisit course plan of relevant courses</p> <p>Revisit allotment of units for possibility of enhancement</p> <p>Hyflex/Hybrid mode -laboratory courses</p> <p>Research topics to cover pharmaceutical sciences, drug discovery and development</p>
<p>PLO 2A (Practice pharmacy in accordance with existing laws, legal and regulatory standards)</p>	<p>Communicating the recall with regulatory authorities (2.91, 0.98);</p> <p>Manufacturing and quality controls conform consistently to the specifications in the registration file (3.06, 0.84);</p> <p>Sampling randomly from drug outlets which are needed for quality testing (3.06, 0.87).</p>	<p>contact hours for some courses; “bulky”, activity-time ratio for assessment tasks</p>	<p>Competencies along practice of pharmacy in the industry (manufacturing and regulatory):</p> <p>Revisit course plan of relevant courses</p> <p>Revisit allotment of units</p> <p>Hyflex/ Hybrid mode -laboratory courses and industrial pharmacy internship</p>

<p>PLO 3 (Collaborate and communicate effectively with other members of the HC team in safeguarding the overall health and wellness of the individuals and the community in general)</p>	<p>Participating in the functions and adhering to policies of the Pharmacy and Therapeutics Committee (PTC). 3.03 0.86;</p> <p>Communicating to regulatory authorities, changes in the formulations, manufacturing process, and other pertinent details of a registered product. 3.03, 0.92;</p> <p>Contributing to the development of a health vigilance system within the organization 3.23, 0.88.</p>	<p>Limitation in laboratory application and actual immersions in actual premises (Pandemic-driven)</p> <p>Difficulty in professional courses amplified by lack of contact hours for some courses; “bulky”, activity-time ratio for assessment tasks</p>	<p>Competencies on communication and interprofessional collaboration (hospital and industry):</p> <p>Revisit course plan of relevant courses</p> <p>Revisit allotment of units Hyflex/ Hybrid mode -laboratory courses, hospital and industrial pharmacy internship</p>
<p>PLO 4 (Provide relevant drug and health related information to patients)</p>	<p>Identifying problems arising from abnormalities in endocrine functions (3.09, 0.70)</p> <p>Identifying and prioritizing patient problems and medication-related needs. (3.20, 0.63)</p>	<p>Difficulty in professional courses (Example: Pharmacology Clinical Pharmacy) amplified by lack in contact hours for some courses; “bulky”, activity-time ratio for assessment tasks</p>	<p>Competencies on pharmaceutical care (medication therapy management):</p> <p>Revisit course plan of relevant courses</p> <p>Revisit allotment of units Hyflex/ Hybrid mode -laboratory courses and hospital pharmacy internship</p>
<p>PLO 6 (Practice effective management and leadership skills in all given settings or practice sites)</p>	<p>Applying management approaches (2.51, 1.01);</p> <p>Implementing changes to improve own practice (3.23, 0.6);</p> <p>Performing the management functions as deemed necessary (3.23, 0.69);</p> <p>Solving conflicts</p>		

	using appropriate strategies. (3.23, 0.73).	Difficulty in professional courses (Example: Marketing and Entrepreneurship 2) amplified by lack in contact hours for some courses; “bulky”, activity-time ratio for assessment tasks	Competencies on Pharmacy management and entrepreneurship: Revisit course plan of relevant courses Revisit allotment of units Hyflex/ Hybrid mode -laboratory courses and industrial pharmacy internship
PLO 7 (Manage drug establishments based on sound entrepreneurial practice integrating pharmaceutical care principles)	Entrepreneurship as a spirit frame (3.11, 0.76); Concepts of self-mastery, situational mastery and enterprise mastery (3.17, 0.66); Financial analysis to guide allocation and use of organizational resources (3.14, 0.81); Financial analysis of different aspects of the business (3.14, 0.77).		

Table 16. Integration of quantitative and qualitative findings: Identified gaps and plan of action

Based on FIP Global Framework (2014), institutions that offer pharmacy education – universities, schools, or colleges should play a key role in assuring the quality of education. Both students and academic staff members’ assessments, evaluation, and improvement of the curriculum, implementing innovations, involving preceptors in the academic program, development of students’ competency lists, and implementation of contemporary teaching methodologies are some of the essential components of the quality assurance process. Students’ feedback can also influence the quality, but cannot provide the full scope of required perspectives. Hence, integrating the inputs of other stakeholders like faculty members, alumni, and industry partners is very integral. The above table of integrated inputs clearly shows the areas that need to be improved through the indicated plan of action. It is note-taking to say, however, that the pandemic has affected the delivery of pharmacy education thus the need for recovery interventions mainly through the adoption of the hybrid to full face-to-face modality, especially for laboratory and supervised experiential pharmacy practice courses.

Conclusion and Recommendation

Periodic or timely curriculum review is pivotal in the quality assurance of education (ensuring “fitness for purpose”); direction setting, curricular changes, and enhancements should be strongly built on sound process and meaning-making of available data. More extensive studies must be done to cover alumni (2019 to 2021) and employers. It is recommended that the plan of action be implemented in the enhancement of the new curriculum for the BS Pharmacy program for the academic year 2022-2023.

Acknowledgement

The researchers sincerely express gratitude to the contributors of this research, the stakeholders of the Center – students, alumni, faculty members, and industry partners for generously taking time and effort to participate actively in this worthwhile endeavor. The highest praise and gratitude go to God Almighty, who is the main reason for all that we do.

References

- Aquino, et al., (2019). Program Learning Outcomes of BS Pharmacy at a Local University in the NCR. *COAHS Book of Abstracts*. Volume 6. ISSN:2507-8631.
- Armor, B.L., Bulkley, C.F., Truong, T., and Carter, S.M. (2014). Assessing Student Pharmacists' Ability to Identify Drug-Related Problems in Patients Within a Patient-Centered Medical Home. *Am J Pharm Educ*. 2014 Feb 12; 78(1): 6. doi: 10.5688/ajpe7816. PMID: 24558274
- ASHP Guidelines on Compounding Sterile Preparations <https://www.ashp.org/-/media/assets/policy-guidelines/docs/guidelines/compounding-sterile-preparations.ashx>, Retrieved on Nov 28, 2022
- Commission on Higher Education (2006). CMO No. 03 Series of 2006. Policies, Standards, and Guidelines for Pharmacy Education. Available at: <https://ched.gov.ph/wp-content/uploads/2017/10/CMO-No.03-s2006.pdf>
- Commission on Higher Education (2018). CMO No. 8 Series of. 2018 Extension Period in the Submission of new or revised curricula of HEIs for AY 2018-2019. <https://chedo1.com/wp-content/uploads/2019/06/CMO-No.-8-series-of-2018-Extension-Period-in-the-Submission-of-New-or-Revised-Curricula-of-HEIs-for-AY-2018-2019.pdf>
- Commission on Higher Education (2021). *CMO No. 25 series of 2021 – Policies, Standards, and Guidelines for the Bachelor of Science in Pharmacy Program*. <https://ched.gov.ph>. <https://ched.gov.ph/wp-content/uploads/CMO-No-25-series-2021-PSG-for-BS-Pharmacy.pdf>
- Deal, E.N., Stranges, P.M., Maxwell, W.D., Bacci, J., Ashjian, E.J., DeRemer, D.L., Kane-Gill, S.L., Norgard, N.B., Dombrowski, L., and Parker, R.B. (2016). The Importance of Research and Scholarly Activity in Pharmacy Training. *American College of Clinical Pharmacy. Pharmacotherapy*. 2016 Dec;36(12):e200-e205. doi:10.1002/phar.1864. Epub 2016 Nov 25. PMID: 27885711, DOI:10.1002/phar.1864
- Guide to Good dispensing practice* 2016 1st edition <https://www.pharmacy.gov.my/v2/sites/default/files/document-upload/gdsp-2016-final.pdf>. Retrieved on Nov 28, 2022.
- Ismail, K. (2020). Role of Pharmacist in Controlling Medication Errors. Retrieved from <https://www.expertmdcat.com/role-of-pharmacist-in-controlling-medication-errors/> on November 29, 2022.
- Kelsch, Michael and Werremeyer, Amy (2011). Poster Project to Emphasize Public Health in the Pharmacy Curriculum. *American Journal of Pharmaceutical Education*, 2011; 75 (1) 2.

- Maitreemit, P., Pongcharoensuk, P., Kapol, N., Armstrong, E.P. (2008). Pharmacist Perceptions of New Competency Standards. *Pharmacy Practice* 2008 Jul-Sep;6(3):113-120.
- Mintrom, M. (2014). Creating Cultures of Excellence. Strategies and outcomes, Cogent Education. Retrieved from <https://www.tandfonline.com/doi/full/10.1080/2331186X.2014.934084> on November 29, 2022.
- Ongpoy, R.C. Jr., David, P.P., Capistrano, N.B., Obliosca-Ongpoy, J., and Francisco, F.M. (2019). Revisiting the Philippine BS Pharmacy Curriculum After 13 Years: A Survey on Pharmacist Practitioners for The Upcoming Curriculum Revision. *European Journal of Education Studies*, Volume 6, Issue 4.
- Pharmaceuticals Regulation EU Set of Pharmaceutical Regulations, *Directives and Guidelines from Drug Discovery and Development* 2nd edition (2013). <https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/pharmaceuticals-regulation> . Retrieved on Nov 28, 2022.
- Quality Assurance of Pharmacy Education: the FIP Global Framework* 2nd Edition (2014) International Pharmaceutical Federation (FIP). https://www.fip.org/files/fip/PharmacyEducation/Quality_Assurance/QA_Framework_2nd_Edition_online_version.pdf. Retrieved on December 4, 2022.
- The University of Sydney Careers Centre. *Employability Skills*. Retrieved from <https://www.sydney.edu.au/careers/students/career-advice-and-development/employability-skills.html> on December 4, 2022.
- Viswanathan, M., Kahwati, L.VC., Golin, C.E., Blalock, S., Coker-Schwimmer, E., Posey, R., and Lohr, K.N. (2014). *Medication Therapy Management Interventions in Outpatient Settings. Comparative Effectiveness Reviews*, No. 138. Agency for Healthcare Research and Quality (US); 2014 Nov. Report No.: 14(15)-EHC037-EF.
- Wallman, A. (2010). *Pharmacy Internship. Student's Learning in a Professional Practice Setting*. Acta Universitatis Upsaliensis. Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Pharmacy 120. 95pp. Uppsala. ISBN 978-91-554-7725-7.

Contact email: mariafaynnette.cariaga@umak.edu.ph