

INSIGHTS ON THE EFFECTIVENESS OF A HYBRID LEARNING MODALITY IN A BS PHARMACY PROGRAM OF A LOCAL UNIVERSITY IN THE NATIONAL CAPITAL REGION, PHILIPPINES: A FOLLOW-UP STUDY

MARIA FAY NENETTE M. CARIAGA

Institute of Pharmacy, University of Makati, JP Rizal Extension, West Rembo,
1215 Taguig City, Philippines

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ABSTRACT

The COVID-19 situation in 2020 pushed educational institutions in the Philippines to adopt an online learning modality. Subsequently, through a phased approach, catch-up plan was implemented towards the end of the 2nd semester of the academic year (AY) 2021–2022 and limited onsite laboratory classes were likewise employed during the 1st semester of AY 2022–2023. By the 2nd semester of AY 2022–2023, hybrid learning, which consisted of 50% online and 50% onsite learning delivery mode was implemented as per the Commission of Higher Education (CHED) memorandum order 16, series of 2022. As educational institution transitioned to hybrid learning, questions on the pedagogical effectiveness were raised. This study which consisted of a mixed-method approach was performed to assess if the program learning outcomes (PLOs) of a Bachelor of Science in Pharmacy (BS Pharmacy) program in a local university in the National Capital Region, Philippines were achieved given the transition to hybrid learning modality. Quantitative data were gathered through online survey, while qualitative data were collected via the conduct of open forum and narrative essay. The quantitative findings of the study revealed significant improvements in PLO achievement under the hybrid learning from purely online learning. Qualitative findings highlighted enhanced learning experience, collaborative opportunities and practical skills development aided by the increased onsite engagements. In conclusion, the hybrid learning effectively attained the PLOs, emphasising the importance of having an onsite learning set-up. The insights from this study contributes to the advancement of pedagogical strategies in the field of pharmacy education as the world may face future challenges such as pandemics.

Keywords: BS Pharmacy program, Hybrid learning, Online learning, Onsite learning, Outcomes-based education

*Corresponding author: mariafaynnette.cariaga@umak.edu.ph

INTRODUCTION

In response to the issuance of the Philippines' Commission on Higher Education (CHED) memorandum Order 4 series of 2020, known as the "Guidelines on the Implementation of Flexible Learning, following the COVID-19 pandemic in 2020, the Bachelor of Science in Pharmacy (BS Pharmacy) program at the Institute of Pharmacy, University of Makati immediately adopted a flexible learning as the main approach of delivering education. This learner-centered approach provided flexible access to educational materials, schedules and learning assessment via a combined use of digital and traditional tools. This is a strategic move to promote resilience in education in the challenging circumstances such as pandemics. With the easing pandemic situation through time and the development of alternative pedagogical techniques, the CHED Memorandum Order 6 series of 2022 entitled "Sustaining Flexible Learning in Higher Education" was released as a guide for educational institutions towards the transition of mode of educational delivery from purely online to having a catch up plan for the most essential learning activities and assessments, to a combined face-to-face classes and online learning during the 2nd semester of the Academic Year (AY) 2021–2022 and the 1st semester of AY 2022–2023, respectively. This transition in the new normal optimises the learning outcomes while safeguarding both students and faculty members against the persisting COVID-19.

Afterwards, the CHED Memorandum Order 16 series of 2022, "Updates on Onsite Learning in Higher Education", introduced hybrid learning, mandating institutions to allot half of the contact time to onsite learning in classrooms, and other important learning spaces. Laboratory and specialised simulated sessions were prioritised for onsite learning, providing students important hands-on experiences for their future professional careers. In addition, internship courses integral to the BS Pharmacy program were mainly executed onsite at the host training establishments (HTEs). However, HTEs can integrate remote internship activities while maintaining educational rigor. The remaining half of the contact time was dedicated to online learning through Zoom, Google Meet and other related platforms.

Given the pedagogical shifts and adaptations, this study was implemented to investigate the impact of the transition to hybrid learning of educational delivery on the program learning outcomes (PLOs) among BS Pharmacy students of AY 2022–2023. This is a follow-up study conducted by Cariaga *et al.* (2023) focused on BS Pharmacy students in AY 2021–2022 who received purely online learning mode of education delivery. This study employed both quantitative metrics for the self-assessed achievement of PLOs and qualitative feedback from students, alumni, faculty members and industry partners to better understand the effectiveness of hybrid learning by assessing the average and differences in the self-assessed achievement in PLOs among students of AY 2021–2022 and AY 2022–2023. Moreover, the study conducted comparative analyses across different cohorts comparing:

- 3rd and 4th year students during the AY 2022–2023
- 3rd year students between AY 2021–2022 and AY 2022–2023
- 4th year students between AY 2021–2022 and AY 2022–2023
- 3rd year students of AY 2021–2022 with 4th year students from AY 2022–2023

This study is significant in understanding the effectiveness of hybrid learning in shaping future pedagogical strategies and policies.

METHODS

The study was conducted from July 2023 to September 2023 at the Institute of Pharmacy, University of Makati. Non-random, purposive and convenience sampling were employed in this mixed method research study. Quantitative data from the self-assessment of students in achieving PLOs (Table 1) were gathered using an online survey using the questionnaire per PLO developed by Aquino *et al.* (2019). A 4-point Likert scale was used with the following interpretation: 3.25–4.00 highly capable (HC), 2.50–3.24 capable (C), 1.75–2.49 somewhat capable (SC) and 1.00–1.74 not capable (NC). Quantitative data were complemented by qualitative inputs from students belonging to the 3rd year (n = 24) and 4th year (n = 29) levels. Additional qualitative insights were obtained from faculty members (n = 9), alumni (n = 9) and industry partners (n = 3) through narrative essays and an open forum during the periodic curriculum review meeting. Topics in the essay and open forum includes the strengths and limitations of the BS Pharmacy curriculum, and the recommendations for students to be practice-ready after graduation.

Table 1: List of PLOs assessed in the study.

| PLOs | Description |
|--------|--|
| PLO 1A | Identify, compound and manufacture of drugs following appropriate guidelines, standards and specifications |
| PLO 1B | Store and dispense drugs following appropriate guidelines, standards and specifications |
| PLO 2A | Practice pharmacy in accordance with existing laws, legal and regulatory standards |
| PLO 2B | Practice pharmacy in accordance with ethical and moral standards |
| PLO 3 | Collaborate and communicate effectively with other members of the healthcare team in safeguarding the overall health and wellness of individuals and the community in general |
| PLO 4 | Provide relevant drug and health-related information to patients |
| PLO 5 | Provide pharmaceutical care including counseling on medicinal use, medication error and adverse event prevention – medication safety |
| PLO 6 | Practice effective management and leadership skills in all given settings or practice sites |
| PLO 7 | Manage drug establishments based on sound entrepreneurial practice integrating pharmaceutical care principles |
| PLO 8 | Conduct scientific research methods and processes for the development of novel drugs which are pro-Philipino and for the improvement of existing drug products and the practice of the profession itself |
| PLO 9 | Contribute to the enhancement of overall social, mental, emotional and physical health of individuals, communities and the country as a whole |

Given that this is a follow up study, the summarised data from the AY 2021–2022 were derived from the previous study of Cariaga *et al.* (2023), and were used for comparative analyses (Table 2). To provide an overview, Table 3 summarises the learning modalities received by students of each level and AY. Descriptive and inferential statistics were used to analyse quantitative data using Microsoft Excel, and IBM SPSS Statistics 25.0 version

while figures were created using GraphPad Prism 8.0.2. The mean self-assessment ratings and standard deviations (SD) were determined with differences analysed using *t*-test with *p*-value < 0.05 indicating statistical significance. Thematic analysis aided with NVivo version 12 was used to analyse the qualitative data.

Table 2: Mean self-assessment ratings and SD of 3rd and 4th year students of AY 2021–2022 in achieving PLOs.

| PLOs | Self-assessment Rating (Mean ± SD) | | Mean ratings of students per PLO | Description |
|---|------------------------------------|-------------------------------|----------------------------------|-------------|
| | 3 rd Year Students | 4 th Year Students | | |
| PLO 1A | 3.05 (0.18) | 3.12 (0.23) | 3.09 (0.05) | C |
| PLO 1B | 3.52 (0.13) | 3.50 (0.07) | 3.51 (0.02) | HC |
| PLO 2A | 3.05 (0.19) | 3.32 (0.14) | 3.19 (0.19) | C |
| PLO 2B | 3.32 (0.10) | 3.36 (0.07) | 3.35 (0.02) | HC |
| PLO 3 | 3.42 (0.28) | 3.26 (0.15) | 3.35 (0.12) | HC |
| PLO 4 | 3.37 (0.14) | 3.33 (0.15) | 3.36 (0.03) | HC |
| PLO 5 | 3.46 (0.13) | 3.40 (0.13) | 3.43 (0.04) | HC |
| PLO 6 | 3.19 (0.30) | 3.33 (0.23) | 3.27 (0.10) | HC |
| PLO 7 | 3.35 (0.11) | 3.29 (0.18) | 3.32 (0.04) | HC |
| PLO 8 | 3.25 (0.10) | 3.49 (0.08) | 3.37 (0.17) | HC |
| PLO 9 | 3.31 (0.04) | 3.39 (0.06) | 3.36 (0.05) | HC |
| Mean ratings across all PLOs per year level | 3.30 (0.15) | 3.35 (0.10) | 3.33 (0.04) | HC |

Table 3: Learning modalities received by BS Pharmacy students.

| BS Pharmacy Students | Learning Modalities | |
|---|---|-----------------|
| | Lecture and Laboratory Classes | Internship |
| 3 rd year students of AY 2021–2022 | Onsite learning for 1 year (pre-pandemic time), and online learning for 2 years (pandemic time) | Online learning |
| 4 th year students of AY 2021–2022 | Onsite learning for 2 years (pre-pandemic time), and online learning for 1 year with 1 semester of catch-up plan (pandemic time) | Online learning |
| 3 rd year students of AY 2022–2023 | Online learning for 2 years (pre-pandemic time), and hybrid learning for 1 year, online with onsite laboratory classes, and with catch-up plan (pandemic time) | Online learning |
| 4 th year students of AY 2022–2023 | Onsite learning for 1 year (pre-pandemic time), online learning for 2 years, and hybrid learning for 1 year, with online with onsite laboratory classes (pandemic time) | Hybrid learning |

Note: The 3rd year students in AY 2021–2022 constituted the same cohort of pharmacy students who progressed to the 4th year level in AY 2022–2023.

RESULTS

The results of the self-assessment ratings in achieving PLOs between 3rd and 4th year BS Pharmacy students of AY 2022–2023 is summarised in Table 4 using the questionnaire of Aquino *et al.* (2019) (see Appendix). Students from this AY were highly capable of achieving all PLOs, with the highest seen in PLO 2B describing the practice of pharmacy in accordance with ethical and moral standards. Students from this AY were also highly capable in achieving PLO 1A and PLO 2B, in which students from the previous AY 2021–2022 were only described to be capable. The mean self-assessment ratings for each PLOs were significantly higher for students belonging to AY 2022–2023 than in AY 2021–2022 (Figure 1A). For the AY 2022–2023, 3rd year and 4th year students showed no significant differences on the mean self-assessment ratings across all PLOs. (Figure 1B). However, comparing the cohorts of different AYs, we were able to identify that students from AY 2022–2023 were generally better in attaining PLOs. The 3rd year students from AY 2022–2023 had a rating that was significantly higher in the mean self-assessment ratings in achieving all PLOs, as compared to the 3rd year students from AY 2021–2022 (Figure 1C). Similarly, significantly higher ratings were also observed among 4th year students from AY 2022–2023 than 4th year students from AY 2021–2022 (Figure 1D). Lastly, significant improvements in the mean self-assessment ratings in achieving all PLOs were observed in the same cohort over time, when the ratings of students on 3rd year level during the AY 2021–2022 were compared to the ratings of the similar students when they reached the 4th year level in AY 2022–2023 (Figure 1E).

Table 4: Mean self-assessment ratings and SD of 3rd and 4th year students of AY 2022–2023 in achieving PLOs.

| PLOs | Self-assessment Rating (Mean ± SD) | | | Description |
|---|------------------------------------|-------------------------------|----------------------------------|-------------|
| | 3 rd Year Students | 4 th Year Students | Mean ratings of students per PLO | |
| PLO 1A | 3.31 (0.27) | 3.41 (0.20) | 3.36 (0.07) | HC |
| PLO 1B | 3.81 (0.06) | 3.78 (0.07) | 3.80 (0.02) | HC |
| PLO 2A | 3.44 (0.25) | 3.43 (0.24) | 3.44 (0.01) | HC |
| PLO 2B | 3.84 (0.06) | 3.83 (0.03) | 3.84 (0.01) | HC |
| PLO 3 | 3.71 (0.17) | 3.73 (0.12) | 3.72 (0.01) | HC |
| PLO 4 | 3.69 (0.17) | 3.64 (0.16) | 3.67 (0.04) | HC |
| PLO 5 | 3.72 (0.14) | 3.72 (0.10) | 3.72 (0.00) | HC |
| PLO 6 | 3.58 (0.17) | 3.71 (0.20) | 3.65 (0.09) | HC |
| PLO 7 | 3.57 (0.12) | 3.68 (0.07) | 3.63 (0.08) | HC |
| PLO 8 | 3.81 (0.05) | 3.79 (0.08) | 3.80 (0.01) | HC |
| PLO 9 | 3.81 (0.08) | 3.80 (0.07) | 3.81 (0.01) | HC |
| Mean ratings across all PLOs per year level | 3.66 (0.17) | 3.68 (0.14) | 3.67 (0.15) | HC |

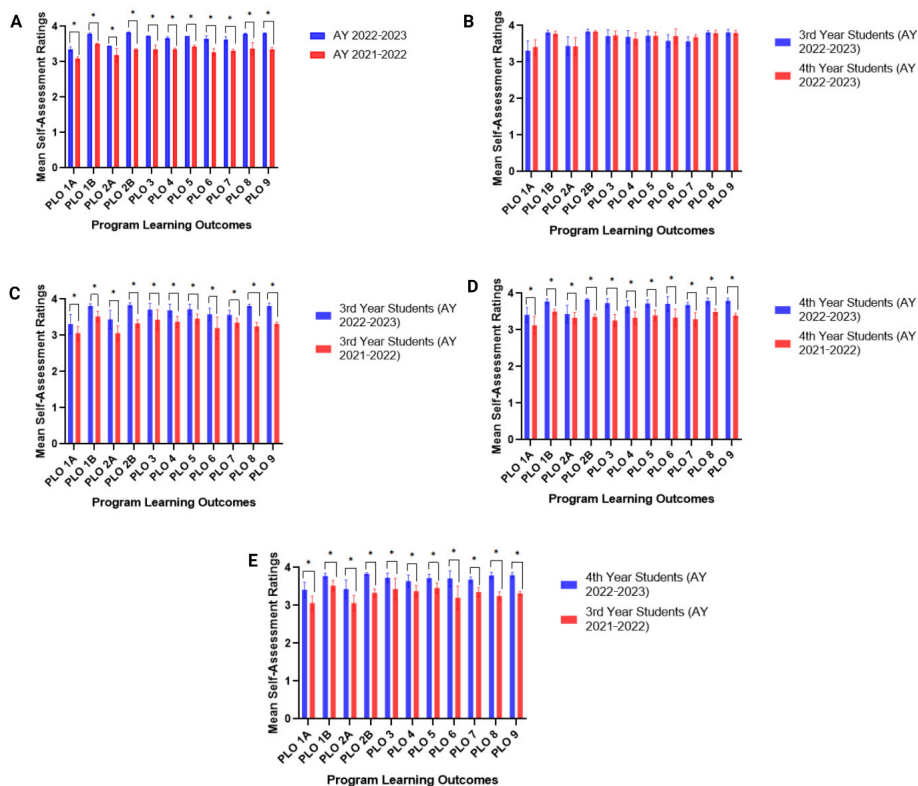


Figure 1: Mean self-assessment ratings of BS Pharmacy students in achieving PLOs. * indicates statistically significant differences at p -value < 0.05.

Qualitative inputs of the students and faculty members with the generated themes were obtained. The strengths and limitations are summarised in Table 5 and Table 6, respectively. Based on both quantitative and qualitative findings, gaps in five PLOs were identified. To improve the ratings in achieving these five PLOs, action plans were also made and are summarised in Table 7. Moreover, insights from industry partners and alumni indicated that certain skills are needed in order for graduate students to be ready in the professional world. These skills include critical thinking, and soft skills.

Table 5: Identified strengths of the BS Pharmacy curriculum.

| Qualitative responses | | Generated Themes |
|--|---|--|
| Students | Faculty Members | |
| Courses are flexible, evolving, adapts to changes and updated. | Courses are practical, relevant and comprehensiveness. | Courses (foundational courses, ladderised courses, managerial courses) |
| Ladderised curriculum. | Ladderised courses. | |
| Advanced and complicated topics are easy to understand. | Focused on the practice side of the program. | |
| Topics are focused in preparing students to be competent in their field of choice, some courses are specialised. | | |
| Curriculum is more patient centered. | Tackles all the foundational courses. | Foundation (strong foundational courses) |
| Strong foundation on pharmacology, medicinal chemistry and pharmacognosy. | Add-ons of administrative and managerial courses. | |
| Promotes research and innovation. | Subjects contribute to developing well-rounded Pharmacy graduate. | |
| Interprofessional education activities are available. | | |

Table 6: Identified limitations of the BS Pharmacy curriculum.

| Qualitative responses | | Generated Themes |
|--|--|---|
| Students | Faculty Members | |
| Improvement on delivery of some courses should focus also on disease management. | Does not encompass the new trends or fields in pharmacy such as pharmacovigilance. | Courses (chemistry courses, course specifications, laboratory courses, minor courses) |
| Experimentation is needed for laboratory courses. | Some courses could be better learned and understood if the students have practical experience. | |
| Deeper understanding in chemistry courses due to lack of laboratory because of the pandemic. | | |
| There is a high number of units per semester. | Too many courses in the BS Pharmacy curriculum (compressed, overwhelming, some topics are missed). | Contact hours (insufficient contact hours, limited contact hours) |
| Insufficient contact hours for some courses, and limited contact hours in the laboratory. | | |
| Arrangement of courses is challenging, as some courses require broad training such as specialised course on vaccination. | Seems exclusively focused on developing community pharmacists. | Laboratory (laboratory manuals, laboratory reagents) |
| | Some laboratory manuals need to be revised. | |
| | Limited laboratory reagents and equipment. | |

Table 7: Plan of action to the gaps identified based on the integrated quantitative and qualitative findings.

| PLOs | Quantitative Data (Based on low mean ratings) | Qualitative (Based on generated themes) | Identified gaps | Plan of action |
|--|--|--|---|--|
| PLO 1A (Identify, compound and manufacture of drugs following appropriate guidelines, standards and specifications). | <p>Conducting qualitative methods of analysis for each of the natural products or constituents.</p> <p>Performing tests for quality and purity of representative drugs in the official monograph.</p> <p>Applying the appropriate method of extraction and purification.</p> <p>Performing the actual procedure of extemporaneous compounding.</p> <p>Applications of Pharmaceutical Inspection Co-operation Scheme Guidelines and Good Manufacturing Practices in industrial pharmacy practice.</p> <p>Manufacturing different dosage forms based on the basic pharmaceutical principles.</p> | <p>Limitation in laboratory reagents, review and updating of course specifications and laboratory manuals.</p> <p>Lack off/ insufficient contact hours for some laboratory courses; chemistry courses.</p> <p>Compressed, including too many minor courses, too many activities and topics are missed.</p> | <p>Competencies in chemistry, extemporaneous compounding and manufacture of drugs.</p> | <p>Revisit the course plan of relevant courses (chemistry, pharmaceutical calculations, laboratory courses).</p> <p>Research undertakings to include topics on pharmaceutical sciences, drug discovery, and development.</p> |
| PLO 2A (Practice pharmacy in accordance with existing laws, legal and regulatory standards). | <p>Communicating recall with regulatory authorities.</p> <p>Ensuring that the manufacturing and quality control conforms consistently to the specifications documented in the registration file.</p> <p>Sampling randomly from drug outlets which are needed for quality testing.</p> | <p>Training and specialisation on topics like regulatory pharmacy.</p> <p>Lack of hands on and practical experience.</p> | <p>Competencies in the practice of pharmacy in the industry (manufacturing and regulatory).</p> | <p>Revisit course plan of relevant courses.</p> <p>Further understanding the competencies needed and opportunities in regulatory pharmacy.</p> <p>Industrial pharmacy internship should be on-site.</p> |

(continued on next page)

Table 7 Continued

| PLOs | Quantitative Data (Based on low mean ratings) | Qualitative (Based on generated themes) | Identified gaps | Plan of action |
|---|---|--|--|--|
| PLO 3 (Collaborate and communicate effectively with other members of the healthcare team in safeguarding the overall health and wellness of the individuals and the community in general) | Actively participating in the functions and adhering to policies of the Pharmacy and Therapeutics Committee. Communicating to the regulatory authorities, any changes in the formulations, manufacturing process, testing procedure and supplier of raw materials and other pertinent details of registered products. Contributing to the development of a health vigilance system within the organisation. | Lack of constructive alignment in relevant modules, expected learning outcomes, teaching-learning activities and assessment. | Competencies in communication and interprofessional collaboration (hospital and industry). | Revisit the course plan of relevant courses Full onsite learning mode for both hospital and industrial pharmacy internship. |
| PLO 4 (Provide relevant drug and health-related information to patients). | Identifying problems arising from abnormalities in endocrine functions. Identifying and prioritising patient problems and medication-related needs. Interpreting laboratory test and physical assessment results. | Training and specialisation on topics like immunisation and clinical pharmacy. | Competencies in pharmaceutical care (medication therapy management). | Revisit the course plan of relevant courses. Patient-centered communication, skills-based training (further emphasis on skills along immunisation, pathophysiology and disease management, pharmacovigilance). Full onsite learning mode and strengthen affiliation with a hospital with clinical pharmacy services. |
| PLO 6 (Practice effective management and leadership skills in all given settings or practice sites). | Applying the appropriate and suitable management approaches. Implementing changes to improve own practice or incorporating learning into practice. Solving conflicts using appropriate resolution management strategies suitable for the situation. | Redundant topics/courses with those taken in administration courses. | Competencies in pharmacy administration, management and entrepreneurship. | Revisit course plan and strengthen the emphasis on leadership and management in internship program. Full onsite learning mode for internship courses. |

DISCUSSION

The implementation of hybrid learning at the Institute of Pharmacy, University of Makati during the height of the COVID-19 pandemic incorporated an onsite mode of learning while ensuring both the students and faculty members' safety. In the present study, students of AY 2022–2023 who experienced transition from purely online to hybrid mode of learning were found to be highly capable of achieving all eleven of the BS Pharmacy program's PLOs in general as compared to the students of AY 2021–2022 coming from an online learning setting during the time of pandemic, who were highly capable of achieving only nine PLOs. The results were evident looking at each year level. The 3rd year and 4th year students from AY 2022–2023 assessed their capability in achieving PLOs higher than the 3rd year and 4th year students from AY 2021–2022. Looking at the same cohorts of student that experienced purely online mode (3rd year of AY 2021–2022) which eventually transitioned to hybrid mode (4th year of AY 2022–2023), self-assessment ratings increased. All these differences can be attributed to the social aspect of education that the hybrid learning offers. The presence of activities encouraging onsite interactions creates an environment wherein knowledge development occurs. The social interaction among students and professors is important in pharmacy education since several courses have laboratory component, wherein hands-on training is essential. Moreover, pharmacy education is partly patient-centered, thus direct practical experience in courses such as patient counseling is needed to develop the necessary skills to be a professional. Hybrid learning was also found to be effective in teaching specific courses in the pharmacy course such as clinical research (Athira *et al.* 2021), pharmacoconomics (Frederick *et al.* 2023) and clinical virology (Goffard *et al.* 2019) among others. Similar study but on different health-related courses such as dentistry (Yousry and Azab 2022), nursing (Moradimokhles and Hwang 2020) and medicine (Ulhaq *et al.* 2023) also found that hybrid learning is more satisfying than purely online learning. Since the hybrid learning implemented was composed of 50% online learning and 50% onsite learning, the advantages of both pedagogical strategies are present. These benefits include but are not limited to flexible learning with improvement in student engagement and self-regulated learning (Finlay *et al.* 2022).

From the previous study of Cariaga *et al.* (2023), students from AY 2021–2022 were identified to be capable of achieving PLO 1A and PLO 2A. The PLO 1A which is about the identification, compounding and manufacturing of drugs following appropriate guidelines, standards and specifications covers the analysis of natural products and constituents, test for quality and purity of drugs in the official monograph, extraction and purification of chemical compounds, synthesise simple organic and inorganic compounds and manufacture of different dosage forms. These competencies are emphasised during laboratory classes and experiential pharmacy practice, which due to the pandemic were delivered online. As for the PLO 2A which is about the pharmacy practice in accordance with existing laws, legal and regulatory standards covers sampling randomly from drug outlets needed for quality testing, communicating recall with regulatory authorities and recalling products from the market in accordance with organisational and regulatory policies. Aspects that pertain to regulatory pharmacy are better introduced in an onsite mode of delivery to provide a better understanding on the flow of recalls on products outside specifications. With the return of onsite learning in the hybrid learning mode of AY 2022–2023, improvement in

the self-assessed ratings led students to be highly capable in achieving PLO 1A and PLO 2A were observed as expected.

Based on the qualitative assessment, courses and foundation were the main themes that represented the delivery of the BS Pharmacy program in AY 2022–2023. Students and faculty members considered having strong foundational (pharmacology, medicinal chemistry, pharmacognosy, pharmaceutical care and patient counseling) and managerial courses (pharmaceutical administration) together with having a ladderised approach of the curriculum, its adaptiveness, flexibility, practicality and relevance as strengths. The program offered a good mix of general education courses, which have relevant applications in the profession of pharmacy and professional courses, that will help prepare graduates in acquiring competencies necessary in the workplace. Foundation courses in pharmaceutical chemistry, pharmaceuticals and the life sciences enhanced the understanding of pharmaceutical development and their application in pharmacy practice. The program also included an internship or experiential pharmacy practice program exposing students to a variety of opportunities in practice areas preparing them for the different roles expected of them upon graduation. Additionally, three main themes, namely, courses, contact hours and laboratory, came out as limitation of the BS Pharmacy program in AY 2022–2023. Under courses, students and faculty members perceive the lack of a deeper understanding of chemistry courses; constructive alignment in the modules' expected learning outcomes, teaching-learning activities and assessment; training and specialisation on topics like immunisation, clinical and regulatory pharmacy; and lack of hands-on practical experience as restriction in achieving PLOs. Under contact hours, students and faculty members perceive that the curriculum is compressed because there are many professional courses and at the same time too many general education courses; in addition, there are too many activities that further lessen the contact hours in the delivery of important courses resulting to missed topics. Finally, under laboratory, students and faculty members alike, perceive that laboratory manuals are not updated, and laboratory reagents are limited and sometimes expired restricting the attainment of PLOs.

Five PLOs of the BS Pharmacy program that had a low rating in the self-assessment tool with gaps that needs to be addressed were noted. According to the Federation Internationale Pharmaceutique 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 the required perspectives. Hence, integrating the inputs of other stakeholders like students and faculty members are integral. The action plans that build upon the strengths and limitations identified by the stakeholders are necessary to be implemented to improve the attainment of PLO 1A, PLO 2A, PLO 3, PLO 4 and PLO 6. These revolves mainly on revisiting course plans of relevant course to keep an updated teaching module and conduct onsite laboratory activities and internship to simulate the actual setup of a pharmacy professional.

The insights of industry and alumni were also analysed revealing skills as the main theme with regards to students being professional-ready after graduation. For a pharmacy graduate to be employable, critical thinking and soft skills are necessary to be acquired and developed. According to Persky *et al.* (2019), critical thinking is one of the most desired skills of a pharmacy graduate because pharmacists need to think for themselves, inquire on claims, use good judgement, make decisions in managing and resolving patient's

medication problems and assess treatment outcomes. While soft skills, which are highly valued by employers are defined as interpersonal capabilities which include communication, creativity, problem-solving, stress management and emotional intelligence, among others (Lamri and Lubart 2023). The pharmacy program must be able to inculcate these soft skills to its students in order to prepare them for the challenges and dynamics of the pharmacy profession.

CONCLUSION

The study demonstrated that hybrid learning modality was more effective than purely online approach, as students reported higher self-assessed capabilities across all PLOs under the hybrid setup. Strengths of the program included well-constructed courses and foundational knowledge that prepared students for professional roles. However, limitations were noted in course alignment, contact hours and laboratory resources, highlighting the need for improvements in teaching strategies, curriculum structure and hands-on experiences. Moreover, critical thinking and soft skills were identified as essentials for professional readiness. Lastly, the following action plans are recommended to improve specific PLOs: revisiting course plans, and enhancing competencies in pharmaceutical sciences, including chemistry, compounding, manufacturing and research (PLO 1A); bolstering legal and regulatory pharmacy skills through industry internships (PLO 2A); strengthening inter-professional collaboration in hospital and industry settings (PLO 3); advancing patient-centered communication skills in collaboration with institutions with clinical pharmacy services with a focus on immunisation, disease management and pharmacovigilance (PLO 4); and fostering leadership management, and entrepreneurship competencies through industry partnerships (PLO 6). Implementing these action plans is crucial for the continuous improvement of the BS Pharmacy program and to effectively achieve all PLOs.

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