

**LABORATORY PRE-REQUISITES AND INTERNSHIP
PERFORMANCES OF PHARMACY STUDENTS**

**Sheryl C. Cagurangan, RPh; Juan Jhonny M. Cauilan, RPh;
Kristine Mae F. Gante, RPh; Eileen A. Molina, RPh, MPH;
Melisa T. Reboldera, RPh, MPH, MST**

*School of Nursing and Allied Health Sciences
scagurangan@spup.edu.ph, jjcauilan@spup.edu.ph,
kgante@spup.edu.ph, emolina@spup.edu.ph,
mreboldera@spup.edu.ph*

ABSTRACT

The purpose of this research study is to determine whether a relationship exists between the academic performance of students in pre-requisite laboratory subjects and their internship in hospital pharmacy and manufacturing setting. The quantitative research approach for this study employed a correlational design. The population of interest was the BS Pharmacy students of St. Paul University Philippines, Tuguegarao City under the following academic years: 2012-2013 (Caritas Mariae), 2013-2014 (L'archange Raphael), and 2014-2015 (St. Therese of the Child Jesus). Grading and evaluation sheets were the main sources of data. Performances were presented in percentage and Pearson Product Moment Correlation Coefficient was utilized to determine the relationships. Results show a moderate relationship ($r=0.310$, $p<0.01$) between the academic performance of students in pre-requisite subjects and internship in hospital pharmacy setting. While there is a strong positive correlation ($r=0.485$, $p=0.000$) between manufacturing internship and the prerequisite laboratory subject. In conclusion, this study found that the level of performance of BS Pharmacy Students in the pre-requisite subjects is positively associated with their performance in the field internship.

Keywords: *pharmacy, internship, manufacturing internship, hospital internship*

INTRODUCTION

Pharmacy education is a course which provides a broad spectrum of scientific training and can lead to employment in a wide range of scientific fields. The main concern of Pharmacy Education is to provide the country with pharmacists who are scientifically competent to deliver the full spectrum of pharmaceutical services required in health care delivery (CHED, 2006). Pharmacy education comprises both academic and clinical activities designed to assure that the students will acquire the necessary skills, knowledge, and attitude required for the pharmacy practice.

Pharmacy internship is a significant part of undergraduate pharmacy education worldwide. The internship is often seen as an important part of higher education and of developing professionalism among students by learning in a professional practice setting (Hammer, 2006). As stated in CHED Memorandum Order No. 3 series of 2006, a pharmacy student must have completed the number of hours for community, hospital, and manufacturing pharmacy internship as a requirement for graduation. A pharmacy student must have completed a total of nine hundred sixty (960) hours of internship, two hundred (200) hours for minor internships in the fields of community, hospital, and manufacturing pharmacy and three hundred sixty (360) hours for major pharmacy internship which can be done in any of the three areas of internship.

In order to qualify for the internship programs, students need to acquire certain competencies that will be needed to facilitate training and assure safety practices. For that purpose, students need to pass prerequisite subjects before they can be endorsed to an internship program. In a manufacturing internship, the prerequisite subjects include PHR112 – Quality Control 1 and PHR115 – Manufacturing Pharmacy. These subjects were both offered during the second semester of the third year. If students successfully pass these subjects, they can be endorsed to go for manufacturing internship in summer.

Internship contributes to students' transition between theoretical knowledge and application, introducing students to

professional practice. During laboratory classes, students should be given sufficient simulation activities that are similar to the actual practice in the pharmacy profession. These laboratory activities will enhance students' skills to prepare them for professional practice better. In a study conducted by Rheault and Shafernich-Coulson(1988) and Xiao, Wu, Lin, and Zhang (2014) regarding the relationship between academic achievement and clinical performance in a physical therapy education program, students' grades may reflect how well they will perform ultimately in the clinical setting. If grades indeed do reflect the performance in internships, then low performing students in prerequisite subjects who need assistance for skills enhancement can be identified early, and remediation can be instituted (Flores, Conteras, Tosoc, & Pring, 2016).

This study aimed to determine the correlation between the laboratory pre-requisite and internship performances of pharmacy students. The researchers would like to determine whether the performance of students in prerequisite laboratory subjects will be a predictor of how well they will perform in the internship. This study is deemed beneficial to the academic community, particularly to the pharmacy instructors in enhancing their mode of delivery in teaching. The results of this study can also help the instructors of the prerequisite subjects in creating a rubric that is designed to assess and evaluate the performance of students accurately. The rubric should be aligned with the competencies found in the evaluation form for the internship. Through this study, the manufacturing internship coordinator can formulate or improve the evaluation tool for the internship. The evaluation form must contain the competencies that are specifically suited for an intern in each field of pharmacy internship. The findings of the study may provide references for pharmacy educators to identify students at risk and provide early remediation prior to the deployment in the hospital and manufacturing firm. The results of the study can also serve as a starting point for pharmacy students taking the prerequisite subjects to better prepare for their internships.

Conceptual Framework

The following paradigm guided the study.

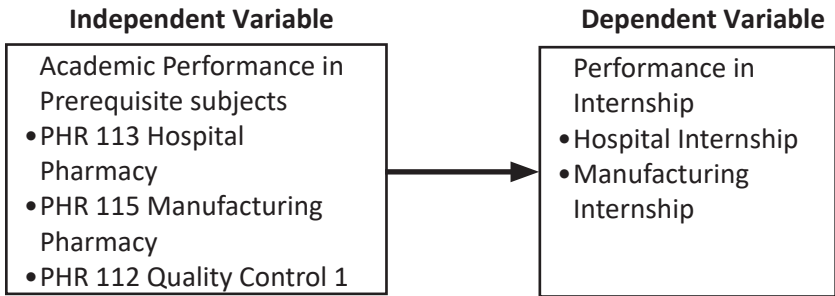


Figure 1. Conceptual paradigm of the study

As shown, the correlational study considered the academic performance of the pharmacy students in their prerequisite subjects (BS Pharmacy Curriculum, 2018) as the independent variables while their performance in their Internship as the dependent variable. The prerequisite subjects included were PHR 113 Hospital Pharmacy, PHR 115 Manufacturing Pharmacy, and PHR 112 Quality Control 1. The students’ academic performances were their grades in the three subjects which were taken from the official permanent records in the department. Their internship performances were the results of the preceptors’ assessment in the two internship areas: hospital and manufacturing internships. This study correlated these two variables in order to establish the relationship between them.

Statement of the Problem

The study aimed to determine whether a relationship existed between the academic performances of students in pre-requisite laboratory subjects and the internship in hospital and manufacturing setting.

Specifically, it sought to answer the following:

1. What is the level of academic performance of the students in their

- pre-requisite subjects?
2. What is the level of performance of the students in the following internship:
 - 2.1 Hospital, and
 - 2.2 Manufacturing ?
 3. Is there a significant relationship between the academic performance of students in pre-requisite subjects and their hospital & manufacturing internship performance?

Scope and Limitation

This study aimed to determine the correlation between the prerequisite laboratory performances and internship performances of BS Pharmacy students of St. Paul University Philippines for Academic Years 2012-2013, 2013-2014 and 2014-2015.

The levels of laboratory performances of students were based on the students' final grades in the prerequisite subjects. The final grade in the prerequisite laboratory subjects is comprised of both the grades in the lecture and laboratory. This study did not utilize the specific grade of the students in the laboratory.

The levels of performance in the manufacturing internship were based on the total grade of students in their manufacturing and hospital internship. This study did not utilize the ratings of the students in the specific competencies specified in the major internship evaluation form.

METHODOLOGY

Research Design

The quantitative approach particularly the descriptive correlation research design was utilized in the study. This was used since the study involved the collection and utilization of quantitative information to establish the relationship between the students' performance in their laboratory prerequisites and their internship in hospital and manufacturing.

Participants of the Study

The subjects of interest for this study were the BS Pharmacy students of St. Paul University Philippines, Tuguegarao City. A total of one hundred fifty-one (151) students were included in the study. These include three (3) batches of pharmacy students from Academic Year 2012-2015. The table provides a summary of the subjects under consideration.

Table 1

Distribution of the Subjects Grouped According to Batches

Academic Year	Frequency	Percent
AY 2014–2015 (St. Therese of the Child Jesus)	64	42.38
AY 2013 – 2014 (L’archange Raphael)	49	32.45
AY 2012 – 2013 (Caritas Mariae)	38	25.17
Total	151	100.00

Instruments of the Study

There were two sets of data that were gathered in the study, namely, the students’ prerequisite laboratory and their internship performance.

These performances were obtained from the existing documents in the office. Prior to the conduct of the documentary analysis, the researchers asked permission from the Dean of School of Nursing and Allied Health Sciences to access the data. Performances in the prerequisite subjects and internships were obtained from grading and evaluation sheets, respectively.

The researchers used the grading sheets submitted by the respective instructors for the evaluation of the level of performance of the students in the prerequisite subjects. The Evaluation forms for Minor Internship were utilized by the researchers to measure the level of performances of the students in hospital and manufacturing internships. The said instrument is a standard performance evaluation tool of the BS Pharmacy students in their minor internships. The

student interns were evaluated by the preceptor pharmacist in the partner internship institution.

Data Gathering Procedure

The researchers asked permission from the Dean of the School of Nursing and Allied Health Sciences to access the data of the students from Academic Year 2012-2015. Specifically, the grades in Hospital Pharmacy, PHR112 Quality Control 1, PHR115 Manufacturing Pharmacy, and the Student Evaluation Sheet for Minor Hospital and Manufacturing Internship were collated. The data were kept confidential by secluding the name of the students and using a unique alphabetical code to represent each student instead.

Data Analysis

All data were encoded, tallied and interpreted using different statistical tools. Weighted mean was used to assess the level of performance of students in the prerequisite subjects, PHR113 Hospital Pharmacy, PHR112 Quality Control 1 and PHR115 Manufacturing Pharmacy, as well as the level of performance of students in hospital and manufacturing internship per academic year. Pearson-Product Moment Correlation (Pearson-r) was used to test the significant relationship between the prerequisite laboratory and internship performances. To further analyze the result, the data were treated using SPSS software with 0.05 alpha level.

RESULTS AND DISCUSSION

Table 2

Level of Performance of the Students in Prerequisite Subjects for their Internship

School Year	Characteristics	PHR113 Hospital Pharmacy	PHR 115- Manufacturing Pharmacy	PHR 112- Quality Control 1
AY 2014-2015	Minimum	88	80	75
	Maximum	95	91	93
	Mean	91.47	86.03	84.73
	Standard Deviation	1.59	1.77	3.90
AY 2013-2014	Minimum	88	78	74
	Maximum	99	93	90
	Mean	96.10	87.41	82.49
	Standard Deviation	4.43	2.72	3.86
AY 2012-2013	Minimum	98	85	81
	Maximum	98	91	91
	Mean	98	87.84	86.58
	Standard Deviation	0.00	1.71	2.38

The table above shows the level of performance of students in the prerequisite subjects, PHR115 – Manufacturing Pharmacy and PHR112 – Quality Control 1, and manufacturing internship for the inclusive years AY 2012-2013 to 2014-2015.

In PHR113 - Hospital Pharmacy performance, the mean grade of the batch of students for AY 2014-2015 is 91.47. The highest rating obtained is 95, and the lowest grade is 88. The mean score of students in the pre-requisite subject, PHR115 – Manufacturing Pharmacy, is 86.03, in which the student with the highest grade got 91, and the lowest mark is 80. For PHR112 – Quality Control 1, the mean score of students is 84.73, with the highest and the lowest mark as 93 and 75, respectively.

For the batch of students for AY 2013-2014, their mean grade in PHR113 Hospital Pharmacy is 96.10. The highest rating obtained is 99, and the lowest grade is 88. The mean score of students in the pre-requisite subject, PHR115 – Manufacturing Pharmacy, is 87.41, in which the highest grade is 93, and the lowest mark is 78. For PHR112 – Quality Control 1, the mean score of the students is 82.49, with the highest and the lowest mark as 90 and 74, respectively.

The PHR113-Hospital Pharmacy performance of the students for the AY 2012-2013 batch got the mean score of 98. The mean score of students in the pre-requisite subject, PHR115 – Manufacturing Pharmacy, is 87.84, in which the student with the highest grade got 91, and the lowest mark is 85. For PHR112 – Quality Control 1, the mean score of students is 86.58, with the highest and lowest mark as 91 and 81, respectively.

It can further be deduced from the table that in terms of the three subjects, in all three batches the highest grade is observed in their Hospital Pharmacy (PHR113) as compared to the other prerequisite subjects (PHR 115 and PHR 112). In addition, in terms of their grades in PHR 113 and PHR 115, of the three batches, batch 2012-2013 has the highest mean grade, followed by the batch 2013-2014. Batch 2014-2015 got the lowest mean grade.

For their PHR 112 grades, batch 2012-2013 consistently got the highest mean, followed by batch 2014-2015, and batch 2014-2015 got the lowest mean.

Table 3

Level of the Performance of Students in Their Hospital Internship and Manufacturing Internship

Academic Year	Characteristics	Hospital Internship	Manufacturing Internship
AY 2014-2015	Minimum	80	79
	Maximum	94	90
	Mean	87.67	84.32
	Standard Deviation	2.97	2.39
	Minimum	87	82
AY 2013-2014	Maximum	95.66	92
	Mean	90.11	85.80
	Standard Deviation	2.65	1.71
	Minimum	80.04	81
	Maximum	95	89
AY 2012-2013	Mean	89.79	85.73
	Standard Deviation	3.24	1.44

For the batch 2014-2015, in terms of their hospital internship performance, the mean score of students is 87.67. The highest rating obtained is 94, and the lowest score is 80. The mean score of students in the manufacturing internship, is 84.32, in which the student with the highest score is 90 while the lowest rating is 79.

For the hospital internship performance of students for AY 2013-2014, the mean rating is 90.11. The highest rating obtained is 95.66, and the lowest score is 87.40. The mean score of students in the manufacturing internship, is 85.80, in which the highest rating is 92 and the lowest rating is 82.

For the batch 2012-2013, the mean score of the students in their hospital internship is 89.79. The highest rating obtained is 95, and the

lowest score is 80. The mean score of students in the manufacturing internship, is 85.73, in which the student with the highest score got 89, and the lowest rating is 81.

As a whole, the 2013-2014 batch got the highest mean score in both components of internship (hospital and manufacturing internship pharmacy), followed by batch 2012-2013. Batch 2014-2015 got the lowest mean score for the two subjects.

For the three batches, the students' scores in their Hospital Internship are greater than their scores in Manufacturing Internship.

Table 4
Correlation Analysis on the Academic Performance of Students in Quality Control 1 and Manufacturing Pharmacy with their Manufacturing Internship

Independent Variable	Statistical Results	Dependent Variable	
		PHR 112 Quality Control	PHR 115 Manufacturing Pharmacy
Manufacturing Internship	Computed r value	0.006	0.485
	Probability value	0.94	0.00
	Interpretation	Not significant	Significant

Note. Correlation is significant at 0.05 level (2-tailed)

The table above shows the relationship between the manufacturing internship and the prerequisite subjects PHR112 Quality Control 1 and PHR115-Manufacturing Pharmacy. The computed r-value between manufacturing internship and the prerequisite subject PHR112 Quality Control 1 is 0.006, which signifies no correlation. The computed p-value is 0.94 which is greater than the level of significance of 0.05; therefore, the null hypothesis is accepted. This implies that there is no significant correlation between the level of performances in PHR112 Quality Control 1 and manufacturing internship.

The correlational treatment on the relationship between the

manufacturing internship and the prerequisite subject PHR115 Manufacturing Pharmacy yielded a computed r value between manufacturing internship and manufacturing pharmacy (PHR115) of 0.49, which signifies a strong positive correlation. The computed p-value is 0.00, which is less than the level of significance of 0.05; therefore, the null hypothesis is rejected. This implies that there is a statistically significant positive correlation between the level of performances in PHR115 Manufacturing Pharmacy and manufacturing internship.

Table 5

Correlation analysis on the students' academic performance and their in PHR113 Performance

Independent Variable	Statistical Results	Dependent Variable
		Hospital Internship (PHR 111)
Hospital Internship	Computed r value	0.31
	Probability value	0.00
	Interpretation	Significant

The table above shows the relationship between the hospital internship and the prerequisite subject PHR113 - Hospital Pharmacy. The computed r-value between manufacturing internship and PHR 113 is .310, which signifies a moderate positive correlation. The computed p-value is .000, which is less than the level of significance of 0.01; therefore the null hypothesis is rejected. This implies that there is a statistically significant positive correlation between the level of performances in the pre-requisite subject, PHR113 Hospital Pharmacy and hospital internship. This result does not support the findings of Barnett, Tang, Hill, Kuperberg, and Knapp (2010) which stated that there is no significant difference in academic or clinical performance between those students with prior pharmacy experience and those without.

CONCLUSION

The researchers conclude that the grades of the students in the prerequisite subject, Quality Control 1, does not affect their level of performance in manufacturing internship. On the otherhand, students who performed well in Manufacturing Pharmacy also performed well in their manufacturing internship. The skills acquired by the students in the laboratory for Manufacturing Pharmacy were highly utilized in different affiliated manufacturing firms where they were deployed. Moreover, this study found that the level of performance of BS Pharmacy Students in the pre-requisite subject, Hospital Pharmacy, is also positively associated with their performance in the internship field.

RECOMMENDATIONS

Based on the findings and conclusion drawn, the following recommendations are offered:

BS Pharmacy curriculum may be maintained, sustained, enriched, and continuously evaluated and upgraded to be excellent and highly competitive.

The Pharmacy Internship Program may be designed in a way that motivates students to perform better in their professional subjects and internships.

Future researchers may widen the scope of the study by determining the correlation between students' performances in prerequisite laboratory subjects and manufacturing internship for five (5) academic years.

Future researchers may correlate the laboratory performance of students with the specific performance indicators in the evaluation form.

The dean and associate dean may consider revising the internship evaluation form to measure the performance of the students with a uniform set of standards, especially the contents and grading system.

The Pharmacy Department of the School of Nursing and Allied Health Sciences of St. Paul University Philippines may further enhance the curriculum and existing activities in the Dynamic Instructional Plan (DIP) in preparation for the deployment of interns to different manufacturing firms.

Faculty handling Pharmacy subjects may consider refining the course syllabus by providing industry exposure, trainings, and seminars, and workshops to both the instructors and students.

The University may upgrade the quality of facilities for manufacturing pharmacy to continuously enhance students' knowledge and skills in preparation for both their internship and future employment.

Future researchers may include other pharmacy subjects (non-laboratory) which are relevant to the internship. They may also consider other factors or variables to confirm the results of this study.

References

Commission on Higher Education. (2006). CHED Memorandum Order 3, series of 2006. Retrieved from <https://ched.gov.ph/cmo-3-s.2006>

Coulson, E., & Rheault, W. (1988, March). Relationship between academic achievement and clinical performance in a physical therapy education program. *PubMed. Phys Ther.* 68(3), 378-80. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/3279441>

Flores, M., Conteras M., Tosoc, R., & Pring, A. (2016, July). Correlation between the laboratory performance and the internship performance of physical therapy students in one private university in the Philippines. *Asia Pacific Journal of Education, Arts and Sciences*, 3(3).

Hammer, D. (2006). Civility and professionalism. In B. Berger

(ed.). *Promoting Civility in Pharmacy Education* (pp.71–91). Binghamton, NY: Pharmaceutical Products Press.

Xiao, H., Wu, W., Lin, Y., & Zhang, X. (2014). Relationship of academic courses and clinical internships to performance on the National Qualified Examination for Registered Professional Nurses (NQEX-RPN). *International Journal of Nursing Sciences I*, 400-404.

Mar, E., Barnett, M. J., Tang, T., Sasaki-Hill, D., Kuperberg, J. R., & Knapp, K. (2010). Impact of previous pharmacy work experience on pharmacy school academic performance. *American journal of pharmaceutical education*, 74(3), 42.

BS pharmacy curriculum. (2018). Tuguegarao City, Cagayan: St. Paul University Philippines.