BIOCHEMISTRY PERFORMANCE OF NURSING STUDENTS IN A STATE UNIVERSITY IN ILOCOS REGION, PHILIPPINES

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ABSTRACT: *The study determined the BSN students' performance in the biochemistry subject for the first pandemic school year 2020-2021. Specifically, it determined the performance of the female and male BSN students along the following topics: cellular foundations, water and buffers, proteins, enzymes, vitamins and minerals, carbohydrates, lipids, metabolism, and along the cognitive skills: remembering, comprehending, applying, analyzing, and, evaluating. Mean percentage score was used to determine the performance of male and female BSN students along the topics covered and acquired skills in biochemistry.*

The significant findings were: both female and male BSN students gained 1] highest with an overall very satisfactory performance on cellular foundations while lowest with an overall poor performance on enzymes; and 2] highest with an overall very satisfactory performance on understanding skills while lowest with an overall poor performance on evaluating skills. From the above stated findings, it is highly recommended to have a follow –up research study on the other possible teaching strategies suitable in this time of pandemic that would promote better content and cognitive skills performance of BSN students in the said subject.

Keywords: Biochemistry, Performance, BSN students

1. INTRODUCTION

A great deal of knowledge in sciences particularly biology and chemistry make a good or rather the best allied medical professional in the workplace. Essential knowledge of these basic sciences which are pragmatic to professional practice brings out excellent developments to whatever field it is applied.

To an industrialized country the major backbone is the chemical process industry which includes converting raw materials into products of great commercial usage [1]. Biochemistry, as one of the fields of chemistry, has contributed immensely in the industry through the increase of growth and crop production, control and treatment of diseases, and etc. thus a lack of knowledge on this area provides no advancements in agriculture, health, nutrition, pharmacy and many others [2].

In the academe, all courses regardless of specialization must have a General Education as a basic offering (CMO No. 20, series of 2013). For the nursing program, as stated in the Program Outcomes under CMO No. 15 series of 2017, every BSN student must "apply knowledge of physical, social, natural, and health sciences in the practice of nursing". Crucial to the realization of the aforementioned program outcomes, the Commission of Higher Education enlisted Biochemistry as one of the Major Courses in the nursing curriculum.

Biochemistry is one of the most important basic disciplines in the formation of health care professionals, including nursing [3]. Furthermore, the same is expressed in a research study which states that health professionals should have a firm foundation on the human body's physiological and pathological processes in its molecular and cellular basis theoretically and practically [4]. They must be equipped with more core knowledge and skills to be able to adapt successfully to their future job environments [5].

It is further emphasized in the aforementioned study [4] that many problems arise in this offering since it required to recall earliest year. Particularly this time of the pandemic, in order to maximize the learning of nursing students on this subject, voluminous terminology, high order thinking skills, the overload of new technology/updates, and the early inclusion of biochemistry in the curricula."

It also mentioned that this discipline (Biochemistry) is commonly presented at the very beginning of the course in the nursing curricula [3]. Usually, all allied medical courses must have at least biochemistry in the curriculum, even though "this field of knowledge is one of the most difficult disciplines for students in Higher Education area [6]." Most of the students interviewed in a study [6] mentioned of anxiety and apprehension towards biochemistry since there was no basic knowledge and foundation on chemistry and biology, and comments from previous biochemistry students on the difficulty of this subject seem to add up the fear.

Moreover, this pandemic created an additional stress to majority of the students [7] as well as to the teachers due to the intense need for contemporary methods of encouraging student's engagement and participation in an online learning delivery [8]. Usually, under the previous face to face mode of instructional delivery, there were so many class disruptions not to mention the different school activities and natural calamities which could result to inability to finish deliver all the course content and competencies. With the recent occurrence of this COVID-19 pandemic, it indeed created another major disturbance to the delivery of instruction. The face-to-face setting suddenly pivoted into flexible distance learning. Online delivery remained the best choice of instructional strategy to avoid the spread of this disease. However, with the present teaching pedagogy, great challenge is also being raised to assess student's performance that is 100% cheat- proof [9]. Teachers recycled some traditional methods such as oral exams for assessment of students' learning, which proved helpful in promoting critical thinking as well as enhance social connection [9].

At present, Biochemistry in the nursing curriculum of the University of Northern Philippines is served as one of the very first major science subjects undertaken in the the researcher conducted this study to determine the BSN students' performance in the biochemistry subject for school

year 2020-2021.Specifically,it aimed to determine the performance of the female and male nursing students along the topics such as Cellular foundations, Water and Buffers, Proteins, Enzymes, Vitamins and Minerals, Carbohydrates, Lipids, Metabolism, and skills like Remembering, Comprehending, Applying, Analyzing, and, Evaluating.

Through this study, the teachers being the prime movers of the learning process will be made aware of the topics that they are going to improve in terms of finding and using the best teaching strategy in order to improve the student's performance on such area. Moreover, school administrators will be aware of the possible trainings that would be conducted for the enhancement of the instructor. It will also give idea to the administrators for any school regulation such as trainings and seminars that could support the improvement of students' performance in the nursing college.

2. METHODS

This study used a descriptive design with a slight narrative inquiry. The descriptive design was utilized to determine the performance of BSN students along the topics covered in biochemistry with the aid of a UNP Ethics Committee - approved, pilot-tested, item-analyzed and statistically proven achievement test. After which a short narrative inquiry was conducted to validate on the results.

The population of the study were two sample classes of first year BSN students of the University of Northern Philippines for the school year 2020-2021 who have taken up the biochemistry subject. They were invited to answer the said instrument. And before the conduct, the mechanics of the study were explained to the respondents/participants and it was made clear that the activity was voluntary. They were neither coerced nor bribed to join the study. They were informed that there were no known risks in participating in the study. It was also clarified that the results of the exam would not affect their grades as it would not be included in the computation of their performances in the aforementioned subject. Furthermore, it was also elucidated that the data will be treated with utmost care and respect and data privacy policy would be observed thoroughly. It was assured that all data gathered would be utilized only for the purpose of this research. They were also enlightened of the benefits of joining the study, they could help in the discovery of the needs of biochemistry instruction and they could contribute to its improvement. Moreover, the respondents/participants were informed that the study and the results of data treatment, devoid of any of their identities, would be presented to the following professional assemblies such as any research conventions. Eventually, they were informed that it would be published in a reputable refereed journal. Soft copies of data would be deleted after the study has been published. The conduct of these activities was done during the respondents/participants' vacant time during schooldays so that no class, was affected. School supplies used for the aforementioned activities was financed personally by the researcher. The administration of examination and the conduct of the follow-up interview were not profit-gaining activities; thus, the respondents did not pay anything for these activities.

For the statistical process, frequency count, percentage and mean were used for the treatment of the data. For the pilot testing, discrimination index, difficulty index, and reliability testing were utilized to create a good reliable instrument.

3. RESULTS AND DISCUSSION

As gleaned from the table, all students got an overall satisfactory rating with a mean percentage score of 49.38% on all topics of biochemistry. Furthermore, both sexes had the highest mean percentage score along the topic cellular foundations, with an outstanding rating (81.56%) for the females while a very satisfactory rating (70.00%) for the males.

Table 1. Percentage Score Achievement of Male and Female Nursing Students

TOPICS	SEX					
	Female		Male		As a Whole	
	Mean Percentage Score	DR	Mean Percentage Score	DR	Mean Percentage Score	DR
Cellular Foundations	81.56	O	70.00	VS	78.11	VS
Water and Buffers	37.59	P	35.00	P	36.82	P
Proteins	56.74	S	46.67	S	53.73	S
Enzymes	35.46	P	33.33	P	34.83	P
Vitamins and Minerals	62.41	VS	45.00	S	57.21	S
Carbohydrates	39.01	P	31.67	P	36.82	P
Lipids	56.74	S	46.67	S	53.73	S
Metabolism	44.68	S	41.67	S	43.78	S
Overall	51.77	S	43.75	S	49.38	S

Norm:
00.00-20.00 Very Poor
20.01-40.00 Poor
40.01-60.00 Satisfactory
60.01-80.00 Very Satisfactory
80.01-100.00 Outstanding

The reason could be this, it is the very first topic encountered by the students in this subject. Moreover, it is purely conceptual and does not need computational analysis. Students also are familiarized with this topic since they had this in anatomy and physiology which is also offered together with biochemistry in the first year of the UNP nursing program. Furthermore, based from the feedbacks of the focus-group discussion, this was given in the lecture since senior high school. On the other hand, both sexes earned their lowest percentage score with a poor rating on different areas; the females acquired 35.46 % under the topic enzymes while the males obtained 31.67% in the topic carbohydrates. Also, both sexes demonstrated poor performance on the topic water and buffers with $\bar{x}$=37.59% for females and $\bar{x}$= 35% for male students. These topics concern a lot of conceptual analyses. This could be related to many other external factors such as misconceptions, lack of understanding, and poor

imagery of matter at the submicroscopic level. Feedback from the focus group discussion mentioned that questions related to these topics were hard to understand or to digest. Others mentioned that these hard topics should be given more time to cover. It is further commented that knowing the subject chemistry is a difficult one and they were doing the online learning or using online as a platform in studying, which means biochemistry gets even tougher compared before pandemic. Biochemistry gets a lot more difficult during this time of online learning.

The findings are supported by results of the study of Linenberger, K. J., & Bretz, S. L. that students displayed misconceptions as to the interactions of enzyme and substrate, clueless ideas about the active site and incomplete understanding on the enzymes' stereospecificity [10]. One of the findings is in conjunction with the results of a study that lack of knowledge of the topic lead to students' incorrect answers to the test on carbohydrates [11]. Research also mentioned that even with conventional classroom discussions, students still encountered misconceptions and difficulties such as in writing balanced chemical equations of ions dissolved in water [12].

Table 2. Percentage Score Achievement of the Female and Male Nursing Students along Skills

SKILLS	SEX					
	Female		Male		As a Whole	
	Mean Percentage Score	DR	Mean Percentage Score	DR	Mean Percentage Score	DR
Remembering	61.12	VS	52.27	S	58.48	S
Comprehending	68.09	VS	63.33	VS	66.67	VS
Applying	34.04	P	11.67	VP	27.36	P
Analyzing	41.70	S	42.00	S	41.79	S
Evaluating	27.66	P	20.00	VP	25.37	P
Overall	51.77	S	43.75	S	49.38	S

Norm:
00.00-20.00 Very Poor
20.01-40.00 Poor
40.01-60.00 Satisfactory
60.01-80.00 Very Satisfactory
80.01-100.00 Outstanding

The Table 2 presented the cognitive domain achievement of the nursing students along biochemistry. As gathered from the table, all students got an overall satisfactory rating with a mean percentage score of 49.38% on all cognitive skills for biochemistry. Both sexes demonstrated a very satisfactory comprehension skill on all the topics of biochemistry with a mean score of 68.09% for the female and 63.33 % for the male students. This could be due to the ability of the students to recognize some connections between the answer and the questions like clues so they were able to get the exam correctly, as lifted from their feedback in the focus group discussion.

Consequently, students obtained a weak skill on application with the male students presented a mean score of 11.67% while the female students had a 34.04%; and on evaluation where the females exhibited a mean score of 27.66% while the males had 20.00% respectively. Feedback from the focus-group discussion mentioned that some test questions were confusing. Furthermore, a comment was noted that they had a difficulty in analyzing the questions and believed that before they analyzed, they should have memorized, however, due to tons of daily online lessons and assignments given during this pandemic, they failed to memorize. From the results of their focus group discussion, students experienced difficulty in digesting higher order thinking skills questions. They rely more on memorization as a form of recall and could not proceed to higher thinking analysis if not being able to memorize first. It was manageable for them to respond to tests that require understanding or comprehension since the task is to recall and interpret concepts only.

This finding could be related somehow to a study that higher order thinking skill lessons should be incorporated if students were to obtain and attain such skills [13]. This is also supported by the study of Pardo that low achievement could be due to their lack of cognitive skills and poor mathematical or computational ability as some topics are mathematically - related [14]. Although distance learning was successfully implemented, research said that heavy workload, fatigue of students and not so high-quality interaction between teachers and students were observed to affect performance [15].

Due to this pandemic, BSN students as lifted from their comments in the focus-group discussion experienced a lot of difficulties particularly with online instruction as proven from the statements where students complain of the internet connection, that online class is hard, and some presented topics were also hard to grasp. Moreover, further details of the topic were needed in order to understand the topic itself thus there must be more time for discussions per topic or more time to read and research the topic for them to understand better. Students also wanted for enough time for processing of learning before introducing new topics. These responses of the students which could be all rooted to too little interaction between students and teachers, inability to express immediately any complaints or sentiments to the instructors and lack of enough time for processing learning during the pandemic.

Thus, traditional classroom learning still provides the venue for the development of higher order thinking skills of the students as there is an opportunity to deliberate, discuss and debate things and includes a plus factor for practical learning [16].

Definitely, knowing the difficulties as Cayabyab had mentioned, would allow instructors and even administrators how to address these difficulties and be able to help on how the students will be prevented from experiencing these in the near future [17].

4. CONCLUSIONS AND RECOMMENDATIONS

The female BSN students obtained an outstanding content performance rating while the males achieved a very satisfactory content performance rating for the topic cellular foundations. Consequently, both sexes earned their lowest performance with a poor rating on the topic enzymes for the females and on the topic carbohydrates for the males. On

cognitive skills performance, both sexes demonstrated a very satisfactory comprehension skill on all the topics of biochemistry. However, both BSN students obtained poorly on application skills and evaluation skills.

Based on the conclusions of the study, it is recommended to try or combine other teaching strategies fit for flexible distance learning for the subject biochemistry for the nursing program to see if it is helpful and sufficient. It is further recommended to do another follow up study on this to standardize the results and findings on the student's difficulties in biochemistry.

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