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Student's Academic Achievement Predicts Clinical Internship in Radiological Sciences

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Abstract:- Radiologic Technology Education is in a dynamic state that has evolved substantially from analog to digital radiography and from on-the-job training program to formal education which are now standard. Clinical internship in the hospital setting is crucial where experience is one of the most prime opportunities for the Rad-Tech interns.

The purpose of this study is to determine the student's academic achievement and the students internship performance in the radiological sciences of the school year 2023-2024. By utilizing an explanatory research design, the study focusing in the Rad-Tech internship performance aligned with performance indicators such as: area preparation, patient care and management, patient positioning, and image acquisition and processing.

The challenges faced by the students during internship in the radiological sciences were all challenge and interpreted as low which obtained the over-all mean p-value of 2.62. This means that the challenges were poor performance in the radiological sciences.

Based on the findings of the study, the respondents need to be guided by the Clinical Instructors and the preceptors in all radiological sciences procedures such as Ultrasound, Computed Tomography Scan, Magnetic Resonance Imaging, Nuclear Medicine, and Radiation Therapy.

Keywords:- *Academic Achievement, Internship Performance, Radiological Sciences*

I. INTRODUCTION

Along with the real-world collision, clinical internship program is where the students develop professional skills in actual clinical hospital exposures in a real situation through diagnostic and therapeutic procedures.

According to CMO No. 7, series of 2018, the clinical internship is in the fourth-year level of BS Rad-Tech to accomplish 2,112 hours for an 11 months. Relatively, there were previous studies conducted that internship performance has a positive impact, however, other studies have low internship performance but have satisfactory academic performance.

➢ *Statement of the Problem:*

This study aimed to determine the student's academic achievement and the clinical internship performance in the radiological sciences in terms of Ultrasound, Computed Tomography Scan, Magnetic Resonance Imaging, Nuclear Medicine, and Radiation Therapy of the school year 2023-2024.

- What is the student's academic achievement in the radiological sciences?
- What is the students performance in their clinical internship in the radiological sciences?
- What are the challenges faced by the students during internship in the radiological sciences?
- Is there a significant relationship between academic achievement and internship performance in the radiological sciences?
- Is there a significant difference in the student's academic achievement in the radiological sciences when data are grouped into sex and age?
- Is there a significant difference in the students clinical internship performance in the radiological sciences when data are grouped into sex and age?

➢ *Scope and Delimitation of the Study:*

The respondents of this study were limited to the BS Rad-Tech interns of the school year 2023-2024 of Brent Hospital and Colleges, Inc., located at R. T. Lim Boulevard, Zamboanga City, Philippines. The researcher employed the adapted and enhanced performance indicators taken from related studies and from the CMO No. 7, series of 2018. This purposive study was limited to 14 Rad-Tech interns out of 35 due to some of the interns have not yet completed their internship rotation in all radiological science modalities in various affiliating hospitals.

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II. RESEARCH METHODOLOGY

A. Research Design

The study used a descriptive correlational design and data mining method. Descriptive research because the gathered data is quantitative in nature that would describe sub-variables such as explanatory or predictive variables. The method is used in order to describe, record, analyze and interpret the data gathered.

Correlation is to investigate the internship performance in the radiological sciences among the Rad-Tech interns with respect to their academic perf in school. Data mining study because the researcher will cultivate or dig the academic achievement of the respondents in school.

This method is used to determine the student's academic achievement and the internship performance in the radiological sciences in different affiliating hospitals. Through their ratings, the strength and weakness of the student's skills in the clinical setting will be identified.

B. Participants of the Study

A total of 12 preceptors of both Rad-Tech Clinical Coordinators and Rad-Tech staff in the radiological departments were asked to answer the constructed clinical internship evaluation tool to rate the Rad-Tech interns.

There were 35 Rad-Tech interns who were officially enrolled forwarded by the School Registrar to the College of Rad-Tech of Brent Hospital and Colleges, Inc., unfortunately their were only 14 Rad-Tech interns who were qualified to be rated and evaluated by the Rad-Tech Coordinators and various preceptors of affiliating centers based on their proficiencies. The researcher prepared 5 sets of performance indicators in the specific radiological science modalities.

C. Sampling Procedure

Before the conduct of this research study, the researcher sent a personal communication to the offices of the following; School Director's office, College of Rad-Tech and Heads of the Radiology Departments of various medical institutions asking permission and suggestions to allow the researcher to conduct the study in the affiliated centers of Brent Hospital and College Incorporated, Zamboanga City.

Upon approval of the communication letter and after identifying the Rad-Tech preceptors in the affiliating centers, the researcher distributed the survey questionnaires to the raters/evaluators of the 14 Rad-Tech interns. The researcher requested the assistance of the Rad-Tech Coordinators for the distribution and retrieval of the survey questionnaires.

In this light, ample time was given to the raters to evaluate to complete the survey instrument. Finally, all data were gathered, tallied and tabulated based on the given performance indicators.

D. Research Instrument

The researcher constructed and developed a survey questionnaires for the respondents to check on the clinical proficiencies of the Rad-Tech interns required in the clinical internship practice. The survey questionnaire is a form of checklist with corresponding ratings that the researcher wanted to gather.

The researcher used the instrument used by most national and local researchers to evaluate the clinical internship performance of the Rad-Tech interns in the radiological sciences. However, the researcher modified and enhanced some of the items of the performance indicators in order to conceptualize the purpose of the study.

E. Validity and Reliability of the Research Instrument

Some research experts were requested to validate the instrument used. Their suggestions and recommendations were integrated in order to augment and improve the instrument. The questionnaires validated by the research experts and after validation, the survey questionnaires were distributed to the chosen Rad-Tech respondents. Furthermore, the clinical internship evaluation tool classified the 5 radiological science modalities along with 4 performance indicators.

III. RESULTS AND DISCUSSIONS

A. Problem No. 1: What is the student's academic achievement in the radiological sciences in terms of Ultrasound, Computed Tomography Scan, Magnetic Resonance Imaging, Nuclear Medicine, and Radiation Therapy?

Table 1. Respondent's Academic Achievement in Radiological Sciences

Indicator	Mean	Verbal Description	Interpretation
1. Ultrasound	2.64	Low	Passed
Computed Tomography Scan	2.85	Low	Passed
3. Magnetic Resonance Imaging	2.68	Low	Passed
4. Nuclear Medicine	2.47	Low	Passed
5. Radiation Therapy	2.49	Low	Passed
Over-all mean	2.62	Low	Passed

Legend: 1.9-1.0 Very High, 2.25-2.0 High, 2.7-2.3 Moderate, 3.0-2.75 Low, 3.4-3.1 Very low

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Table 1 shows that the academic achievement of the students in Ultrasound is low interpreted as passed which obtained a mean of 2.64, Computed Tomography Scan is also low interpreted as passed which obtained a mean of 2.85, Magnetic Resonance Imaging is also low interpreted as passed which obtained a mean of 2.68, Nuclear Medicine is also low interpreted as passed which obtained a mean of 2.47, Radiation Therapy is also low interpreted as passed which obtained a mean of 2.49 and the over-all mean is also low interpreted as passed which obtained a mean of 2.62. This means that the student's academic achievement is poor in all radiological science subjects, therefore, the respondents need to be evaluated their knowledge and guided in all radiological science subjects undertaken to ensure proper performance in the classroom setting before promoting to the next level. Furthermore, the dean should also evaluate the faculty teaching-learning styles.

According to the study conducted by Felicen, et al., (2014) of Lyceum of the Philippines University found out that the internship performance was low training skills but have satisfactory level in academic performance. Relatively, the finding does not conform with this study.

B. Problem No. 2: What is the students performance in their clinical internship in the radiological sciences in terms of Ultrasound, Computed Tomography Scan, Magnetic Resonance Imaging, Nuclear Medicine, and Radiation Therapy?

Table 2. Respondents Internship Performance in Radiological Sciences

Indicator	Mean	Verbal Description	Interpretation
1. Ultrasound	2.64	Low	Passed
2. Computed Tomography Scan	2.85	Low	Passed
3. Magnetic Resonance Imaging	2.68	Low	Passed
4. Nuclear Medicine	2.47	Low	Passed
5. Radiation Therapy	2.49	Low	Passed
Over-all mean	2.62	Low	Passed

Legend: 1.9-1.0 Very High, 2.25-2.0 High, 2.7-2.4 Moderate, 3.0-2.75 Low, 3.4-3.1 Very low

Table 2 presents the respondents internship performance in the radiological sciences such as Ultrasound, Computed Tomography Scan, Magnetic Resonance Imaging, Nuclear Medicine, and Radiation Therapy. This shows that the internship performance in all radiological science modalities are low, interpreted as passed and the over-all mean is also low and interpreted as passed which obtained a mean value of 2.62 the same with academic achievement. This indicates that the students internship performance and the student's academic achievement were almost have identical results. This means that the respondents need to be guided in all tasks and procedures performed to ensure proper operating correct parameters in the radiological sciences.

This finding does not conform with the study conducted by Felizarte (2013) stated that the clinical competencies in Radiation Therapy is high. It implies that student can perform the procedures under supervision of preceptors. However, the competency base evaluation tool is essential in the monitoring of students weakness and strength as well as the assessment of student progress. It easily identifies which skills need to be develop and enhance. Relatively, this study implied that Radiation Therapy obtained high performance, however, the other radiological science modalities obtained low performance.

C. Problem No. 3: What are the challenges faced by the students during internship in the radiological sciences in terms of Ultrasound, Computed Tomography Scan, Magnetic Resonance Imaging, Nuclear Medicine, and Radiation Therapy?

Table 3. Challenges Faced by the Students During Internship

Indicator	Mean	Verbal Description	Interpretation
A. Ultrasound:	2.64	Challenge	Low
***1. Area Preparation*:** Lack of expertise in identifying materials for the procedures.			
2. Patient Care & Management: Inability to give clear instruction for patient preparation.			
3. Patient Positioning: Incompetent to position body part			
4. Image Acquisition/Processing: Unable to operate correct image parameters for image acquisition.			
B. Computed Tomography Scan:	2.85	Challenge	Low
1. Area Preparation: Lack of expertise in identifying the procedures.			

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2. Patient Care & Management: Incompetent in identifying patient preparation			
3. Patient Positioning: Incompetent to position body part			
4. Image Acquisition/Processing: Unable to operate correct image parameters for image acquisition.			
C. Magnetic Resonance Imaging	2.68	Challenge	Low
1. Area Preparation: Lack of ability to keep things in place and patient's safety.			
2. Patient Care & Management: Lack of skill to identify patient preparation.			
3. Patient Positioning: Inability to perform procedures according to protocols.			
4. Image Acquisition Processing: Unable to operate correct image parameters for image acquisition.			
D. Nuclear Medicine:	2.47	Challenge	Low
1. Area Preparation: Lack of skill to prepare materials for the procedure			
2. Patient Care & Management: Inability to ensure patient preparation and to establish rapport & empathy.			
3. Patient Positioning: Inability to perform procedures according to protocols.			
4. Image Acquisition/Processing: Inability to operate correct para- meters for image acquisition.			
E. Radiation Therapy:	2.49	Challenge	Low
1. Area Preparation: Lack of skill to prepare materials needed for the procedure.			
2. Patient Care & Management: Lack of skill to ensure patient preparation & to establish rapport and empathy.			
3. Patient Positioning: Lack of skill to perform the pro-cedures according to protocols.			
4. Image Acquisition/Processing: Inability to operate and ensure if the equipment is ready.			
Over-all mean	2.62	Challenge	Low

Legend: 1.0-1.74 Not at all Challenge, 1.75-2.24 Less Challenge, 2.25-3.24 Challenge, 3.25-4.0 Highly Challenge

Table 3 shows that the challenges faced by the students during internship in Ultrasound is a challenge interpreted as low which obtained a mean of 2.64, Computed Tomography Scan is also a challenge interpreted as low which obtained a mean of 2.85, Magnetic Resonance Imaging is also a challenge interpreted as low which obtained a mean of 2.68, Nuclear Medicine is also a challenge interpreted as low which obtained a mean of 2.47, Radiation Therapy is also a challenge interpreted as low which obtained a mean of 2.49 and the over-all mean is also a challenge interpreted as low which obtained a mean of 2.62. This means that the challenges faced by the respondent during Internship is low, where students are poor performance in the radiological science modalities during clinical internship. Therefore, the posited hypothesis that there is no significant relationship between student's academic achievement in the radiological sciences and the clinical internship performance is rejected since there is a statistically significant difference among the variables tested. In addition, this means that the respondents need to be guided in all tasks and procedures to be performed.

According to the study of Felizarte (2013) which stated that the students can perform tasks and procedures but need guidance, students had limited skills because most of the affiliation centers they don't allow the students to prepare, most often students only observe in the area.

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D. Problem No. 4: Is there a significant relationship between academic achievement and internship performance in the radiological sciences?

Table 4. Significant Relationship between Student's Academic Achievement and Internship

Variables		R-value	P-value	Decision	Interpretation
X	Y				
Academic Achievement	Ultrasound	.166	.571	Accept	Not significant
	CT- Scan	.292	.311	Accept	Not significant
	MRI	.487	.007	Accept	Not significant
	Nuclear Med	.411	.145	Accept	Not significant
	Radiotherapy	.346	.226	Accept	Not significant

Legend: X variable represents academic achievement and Y variable represents radiolo-gical sciences

Table 4 presents the relationship between academic achievement and internship performance. Data revealed that the relationship between the academic achievement and the internship performance does exist as shown in the table which obtained p-value=.571 (Ultrasound), p-value=.311 (Computed Tomography Scan), p-value=.007 (Magnetic Resonance Imaging), p-value =.145 (Nuclear Medicine) and p-value=.226 (Radiation Therapy), all these are greater than the alpha of 0.05, level of significance. Therefore, the posited hypothesis that there is a significant relationship between the student's academic achievement and the internship performance is accepted since there is no statistically significant correlation among the variables tested.

This implies that academic achievement has no bearing on the clinical internship of the students. This further indicates that other factors may play a more significant role in determining the success and efficacy of clinical internship. Such factors could include interpersonal skills, practical experience, adaptability, and the ability to apply theoretical knowledge in real-world scenarios. This perspective challenges the traditional emphasis on academic performance as the primary measure of a student's potential in clinical settings. Moreover, this indicates that a holistic approach, considering both academic and non-academic qualities, may be more effective in selecting and training students for clinical internship.

According to the study conducted by Adonis, et al. (2020) that the learning preferences positively affect the clinical competencies of the radiologic interns. In relation, the study conducted by Florentino et al. (2019) further described that the clinical competence due to the lack of workforce and equipment in both the institutions and the hospitals; the academe is left fighting in producing competent needed staff of the medical field. According to the study conducted by Alipio (2020) that in the Philippines, low academic adjustment of college students result to poor academic achievement.

According to the study conducted by Sajja Jayashree and SN Manjunatha of India (2019) that Indian Medical Graduate should acquire core competencies during the training period. In addition, study conducted by Safabakhsh (2022) stated that one of the most important pieces of training students learn in the clinical course is practical learning skills, a necessity of the medical profession in performing clinical procedures.

E. Problem No. 5: Is there a significant difference in the student's academic achievement in the radiological sciences when data are grouped into sex and age?

Table 5. Significant Difference in the Student's Academic Achievement in the Radiological Sciences When Data are Grouped into Sex

Variable	Sex	Mean	Pv	Tv	Interpretation
Academic Achievement	Male	2.42	.033	-2.41	Significant
	Female	2.71			

0.05 Level of Significance

Table 5 presents that the significant difference in the student's academic achievement in the radiological sciences does exist in terms of sex which obtained p-value of .033 greater than alpha of 0.05, level of significance. Therefore, the posited hypothesis that there is a significance difference in the student's academic achievement in the radiological sciences when grouped according to sex is rejected since there is a statistically significant difference among the variables tested. This means that the female students have higher academic achievement in the radiological sciences than male students because the Bachelor of Science in Rad-Tech program is a science related field where female students have higher academic performance, they attend classes more regularly, sit at their desks more frequently, and get evaluated consistently higher than male students. Therefore, the null hypothesis is not accepted.

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According to the study conducted by Jackman and Morrain-Webb (2019) that the gender differences in academic performance have engaged the attention of scholars for some time now. In addition, the study conducted by Ullah and Ullah (2019) that males in the past have had a higher overall academic performance than females. Further, the study conducted by Workman and Heyder (2020) which results challenge the notion that males perform better in science and math subjects than females. The study conducted by Adeyemi et al. (2019) explains that the academic performance of male and female students depending on the subculture of the group.

Table 6. Significant Difference in the Student's Academic Achievement in the Radiological Sciences When Data Grouped into Age

Variable	Age	Mean	Pv	Tv	Interpretation
Academic Achievement	19-23	2.55	.053	-2.14	Significant
	24 above	2.28			

0.05 Level of Significance

Table 6 presents that the significant difference in the student's academic achievement in the radiological sciences does exist in terms of age which obtained p-value of .053 greater than alpha of 0.05, level of significance. Therefore, the posited hypothesis that there is no significance difference in the student's academic achievement in the radiological sciences when grouped according to age is rejected since there is a statistically significant difference among the variables tested. This means that regardless of age, students can achieve higher academic achievement because it is not that younger age are able to remember more than older people. It takes sometimes, longer to absorb, process, and remember new information. The natural loss of brain receptors and neurons that occurs with aging may also make it harder to concentrate. Therefore, the null hypothesis is not accepted.

According to the study conducted by Yavuz (2019) that students starting at an older age scored higher on the TIMSS 2015 math and science tests. The study conducted by Landerso et al. (2020) that school starting age may be endogenous and is likely to correlate with student and family characteristics, parental preferences, and child maturity. Also previous research conducted by Lubotsky and Kaestner (2016) has shown that students who enter school at an older age score higher on in-school tests.

F. Problem No. 6: Is there a significant difference in the students clinical internship performance in the radiological sciences when data are grouped into sex and age?

Table 7. Significant Difference in the Students Clinical Internship Performance in Radiological Sciences When Grouped According to Sex

Variable	Sex	Mean	Pv	Tv	Interpretation
Clinical Performance	Male	2.42	.033	-2.41	Significant
	Female	2.71			

0.05 Level of Significance

Table 7 presents that the significant difference in the students clinical internship in the radiological sciences does exist in terms of sex which obtained p-value of .033 greater than alpha of 0.05, level of significance. Therefore, the posited hypothesis that there is no significance difference in the students clinical internship in the radiological sciences when grouped according to sex is rejected since there is a statistically significant difference among the variables tested. This indicates that female students performed better in the clinical internship than male students because female students are always listening to the instruction given by their supervisors, attentive to the procedures to be demonstrated in the actual setting and interested to the examinations undertaken. In relation, female students outperforming male students in almost all disciplines at various levels of the educational ladder. Therefore, the null hypothesis is not accepted.

According to the study conducted by Jackman and Morrain-Webb (2019) that the gender differences in academic performance have engaged the attention of scholars for some time now. Also the study conducted by Ullah and Ullah (2019) that males in the past have had a higher overall academic performance than females. Moreover, the study conducted by Workman and Heyder (2020) which results challenge the notion that males perform better in science and maths subjects than females.

Table 8. Significant Difference in the Students Clinical Internship Performance in the Radiological Sciences When Data Grouped into Age

Variable	Age	Mean	Pv	Tv	Interpretation
Clinical Performance	19-23	2.55	.053	-2.14	Significant
	24 above	2.28			

0.05 Level of Significance

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Table 8 presents that the significant difference in the students clinical internship performance in the radiological sciences does exist in terms of age which obtained p-value of .053 greater than alpha of 0.05, level of significance. Therefore, the posited hypothesis that there is no significance difference in the students clinical internship in the radiological sciences when grouped according to age is rejected since there is a statistically significant difference among the variables tested. This means that regardless of age, students can achieve higher clinical internship performance because it is not that younger people are able to perform the radiological science procedures more than older people. Therefore, the null hypothesis is not accepted.

According to the study conducted by Yavuz (2019) that students starting at an older age scored higher on the TIMSS 2015 math and science tests. In addition, the study conducted by Landerso et al. (2020) that school starting age may be endogenous and is likely to correlate with student and family characteristics, parental preferences, and child maturity. Also previous research conducted by Lubotsky and Kaestner (2016) has shown that students who enter school at an older age score higher on in-school tests.

IV. CONCLUSIONS

Based on the findings of the study, the researcher drawn the following conclusions accordingly: (1). The majority of the respondents were female and all respondents had rotated in the radiological science modalities of the affiliated hospitals. (2). The respondents need to be guided by the Clinical Instructors/Coordinators and the preceptors in all radiological sciences procedures such as Ultrasound, Computed Tomography Scan, Magnetic Resonance Imaging, Nuclear Medicine, and Radiation Therapy with the following performance indicators: Area Preparation, Patient Care and Management, Patient Positioning and Image Acquisition and Processing. (3). There is a significant difference in the clinical internship performance of the respondents when data are grouped according to sex and age.

RECOMMENDATIONS

In this section, based on the findings of the study and conclusions, the several recommendations could be made to enhance the academic and performance of the Rad-Tech interns in the radiological sciences:

- *Learning Strategies*

The academic instructors should work together with the Department Head to develop and enhance the study strategies tailored their individual learning styles, strengths, weakness and other pertaining thereto.

- *Intervention Programs*

The academic achievement was reported very low, the college should come up with an intervention programs to enhance the students learning styles and improve their study habits. This includes effective workshops, study techniques, time management, stress reduction which are necessary to their success.

- *Effective Teaching Strategies*

The Faculty members and the Clinical Instructors of the College of Rad-Tech should be trained in the following radiological sciences modalities to employ technical know how, teaching strategies which encourage active engagement, critical thinking and self-directed learning among the Rad-Tech students.

- *Hospital Administrators*

The Hospital Administrators and the Training Officers shall provide the radiology departments an effective training programs, supervisory, hands-on and other applicable policies and guidelines pertaining to the Rad-Tech internship competencies. Through effective training programs, the administration should assign competent Radiologic Technology Staff, well trained with extremely technical skills, knowledgeable and above all skilled professionals to guide the the Rad-Tech interns affiliated at their medical institutions.

- *Radiology Department Staff*

The Rad-Tech staff of the departments shall teach and guide the Rad-Tech interns base from the appropriate knowledge, principles with the precise skills in performing any imaging procedures in the radiological science modalities. They should take time to join seminars related to the profession for the awareness of the recent practices in the area of specialization. Produce strategic proposal that will improve the clinical internship program and develop plans for the internship training of the students.

- *Rad-Tech Interns*

The Rad-Tech interns must be obliged in training in order to improve the competence, the eagerness to learn, and follow the guidelines, protocols within the radiology departments. Interns should be able to pursue the training and be prepared with the significant competencies in the workplace in various affiliating hospitals.

- *Clinical Internship Evaluation Tool*

The clinical internship evaluation tools must be revisited and enhanced along with the standard tools and adapted from the CMO No. 18 series of 2006 and CMO No. 7 series of 2018 for further learning improvement of the Rad-Tech students.

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