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Challenges and Issues Faced by Radiologic Technology Students in Radiography Simulation and Laboratory Training in a Private University in Southern Isabela

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Abstract—Radiography simulation and laboratory training play a vital role in developing the technical competencies, practical skills, and clinical readiness of Radiologic Technology students. However, students may encounter challenges and issues that affect their learning experiences and preparation for actual clinical practice. This study aimed to determine the challenges and issues faced by Radiologic Technology students during radiography simulation and laboratory training in a private university in Southern Isabela. Specifically, it examined the respondents' demographic profiles in terms of age, sex, and year level, identified the challenges and issues encountered, and determined whether significant differences existed when respondents were grouped according to their demographic characteristics. The study employed a descriptive-quantitative research design involving 104 Radiologic Technology students from the second, third, and fourth year levels through total enumeration sampling. Data were collected using a validated, researcher-adapted questionnaire consisting of demographic information, a three-point Likert-scale assessment of challenges, and a checklist of identified issues. Frequency, percentage, weighted mean, Kruskal-Wallis H test, and Mann-Whitney U test were utilized for statistical analysis, with a 0.05 level of significance. Results revealed that most respondents were 20–21 years old (49%), female (69.2%), and second-year students (55.8%). The overall weighted mean for challenges was 2.34, interpreted as "Not a Challenge," indicating that students generally experienced relatively few challenges during simulation and laboratory training. The highest-rated indicator was the potential of different training techniques to resolve practical difficulties (3.00). Regarding issues, the need for more realistic simulation scenarios involving multiple patients ranked first (38), followed by limited simulation use due to high costs (36) and lack of dedicated laboratory spaces (27). Furthermore, statistical analyses revealed no significant differences in the challenges and issues experienced by students when grouped according to age, sex, and year level (p greater than 0.05). The study concludes that although students generally perceive simulation and laboratory training positively, improvements in simulation realism, accessibility, facilities, and instructional strategies remain necessary. Strengthening these areas may enhance practical competencies, confidence, and preparedness for clinical practice.

***Index Terms*—challenges and issues, laboratory, radiologic technology, simulation, training.**

1. Introduction

Radiologic Technology plays an essential role in healthcare by providing diagnostic images that help medical professionals detect, evaluate, and monitor various diseases. The quality and accuracy of these images depend on the knowledge, technical skills, and competence of radiologic technologist in performing radiographic procedures, positioning patients, and operating imaging equipment safely and effectively [1]. To develop these competencies, Radiologic technology education incorporates simulation and laboratory training, which allow students to practice procedures and apply theoretical knowledge in a controlled learning environment before entering actual clinical settins. Through demonstrations, return demonstrations, and guided practice, students can improve their technical abilities, develop confidence, and prepare for their future professional responsibilities [2].

Despite the importance of simulation and laboratory training, Radiologic Technology students may encounter various challenges that affect their learning experiences and practical skills development. These challenges may include anxiety and stress during laboratory activities, difficulties in performing radiographic procedures, limited practice time and the need for different training techniques. McNulty et al. [3] reported that radiography students may experience anxiety and reduced confidence when applying theoretical knowledge in practical settings. Similarly, O'Connor et al. [4] highlighted concerns related to the realism of simulation scenarios, instructor feedback, and stress during the laboratory assessments. These

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findings suggest that although simulation provides valuable opportunity for learning, students may still experience difficulties that require appropriate instructional support and improve training strategies.

In radiography education, the availability of adequate facilities, equipment, instructional resources is also important in providing effective practical training. Limited access to simulation equipment, high equipment costs, inadequate laboratory space, and insufficient opportunities to practice realistic clinical scenarios may affect the quality of students' learning experiences. McGaghie et al. [5] emphasized that the use of simulation in healthcare education is one of the most significant innovations in healthcare teaching since halsted put forth the paradigm of "see one, do one, teach one". Furthermore, Hazell et al. [6] discussed the volume of simulation-based learning in preparing diagnostic radiography students for clinical practice. These findings highlight the importance of providing realistic and well-structured simulation activities that help students develop the skills necessary for actual clinical situations.

In a Private University in Southern Isabela., Radiologic Technology students undergo simulation and laboratory training as part of their academic preparation for clinical practice. However, students may experience different challenges and issues while participating in these activities. These may involve the need for more realistic simulation scenarios, the cost and availability of simulation resources, laboratory space limitations, and the anxiety associated with performing practical procedures. Students may also have different perceptions of these experiences depending on their demographic characteristics, particularly age, sex, and year level. Examining these factors is important in determining the challenges and issues commonly encountered by students and identifying whether significant differences exist among groups. Understanding these concerns may provide a basis for improving the learning environment and strengthening the connection between theoretical instruction, laboratory practice, and clinical training.

Moreover, this study supports Sustainable Development Goal (SDG) 4: Quality Education, which promotes inclusive and equitable quality education and lifelong learning opportunities for all. Effective simulation and laboratory training contribute to quality education by providing students with opportunities to develop practical competencies, critical thinking, and confidence in performing radiographic procedures. Identifying the challenges and issues experienced by Radiologic Technology students may help educational institutions evaluate their training methods, instructional support, and laboratory resources. Through these improvements, students may be provided with more effective learning opportunities that support their academic development and preparation for professional practice.

The primary objective of this study is to determine the challenges and issues faced by Radiologic Technology students in Radiography Simulation and Laboratory Training in a Private University in Southern Isabela. Specifically, the study seeks to describe the demographic profile of the respondents in terms of age, sex, and year level; identify the challenges they encounter during simulation and laboratory training; determine the issues they experience; and examine whether significant differences exist in these challenges and issues when respondents are grouped according to their demographic profiles.

A. Background of the Study

Radiologic Technology education is designed to equip students with the knowledge and skills to prepare them for a more professional approach necessary in performing diagnostic imaging safely and effectively. For Radiologic Technology students, clinical exposures are crucial to their education as they play a vital role in developing and acquiring skills that are necessary in becoming a successful radiologic technology student (Saffar, H., and et. al, 2020).

A crucial part of this learning process is allowing them to be exposed to more laboratory training that will broaden their knowledge in such procedures. These laboratory trainings include simulation trainings, allowing students to practice technical skills, understand imaging procedures, and apply the theoretical concepts in a controlled learning environment with the supervision and instruction of clinical instructors.

In terms of the current practices of simulation to teachers, learning is highly structured around instructor-led demonstrations and student return-demonstrations. Faculty members and clinical instructors utilize radiographic equipment and phantoms to guide students through real-world scenarios, observing performance firsthand to provide immediate feedback and technical corrections. This approach allows teachers to align daily laboratory exercises with both curriculum standards and professional accreditation requirements.

However, multiple limitations in the current situation of the learning in radtech directly hinder this process. Students frequently face a shortage of modern facilities, meaning they must train on limited and outdated radiographic equipment that lacks the realism of actual clinical setups. Furthermore, overcrowding and high student-to-instructor ratios in laboratory classes limit individual hands-on practice time and delay personalized feedback from teachers. This creates a gap between simulated training and clinical rotations, elevating student stress and performance anxiety.

Radiography simulation and laboratory training are designed to enhance the students' confidence and critical thinking abilities for their clinical preparation. Students can improve their competence in patient positioning, equipment handling, radiation safety, and accuracy of the procedures through these hands-on activities, simulation-based exposures, and guided demonstrations. These learning methods play a vital role in preparing the students for real-world clinical situations.

The effectiveness of clinical training is responsible for the competency level that would be demonstrated by the radiologic technology students [7]. Despite the highly structured design of radiology simulation laboratories, students frequently confront systemic constraints that disrupt skill acquisition and complicate the transition to clinical competency. Consequently,

the primary purpose of this study is to investigate and determine the challenges and issues faced by radiologic technology students in a simulation and laboratory-based training. By analyzing these specific procedural, environmental, and emotional hurdles, the study aims to provide a clear basis for improving laboratory infrastructure, instruction, and overall clinical readiness.

Restriction to learning may still happen to students, limited access to radiology equipment and machines or laboratories, difficulties in understanding or performing laboratory and clinical procedures, anxiety during sessions, and lack of guidance and feedback from clinical instructors. In addition, students' learning strategies and prior knowledge of the program may also affect their learning and how they perceive the knowledge acquired in performance-based training, and how they face simulation-based learning.

B. Research Questions

The study aims to determine the Challenges and Issues faced by Radiologic Technology students in Radiography Simulation and Laboratory Training in a Private University in Southern Isabela.

Specifically, the researchers sought to answer the following question:

1. What is the profile of the respondents in terms of: 1.1 Age; 1.2 Sex; and 1.3 Year level?
2. What are the challenges faced by the Radiologic Technology students in Radiography Simulation and Laboratory training?
3. What are the issues of the Radiologic Technology students in Radiography Simulation and Laboratory training?
4. Is there a significant difference between the challenges and issues faced by the Radiologic Technology students when group according to their profile variables?

C. Research Hypothesis

Ho: There are no significant differences between challenges and issues faced by Radiologic Technology students during radiography simulation and laboratory training.

D. Significance of the Study

This study is significant as it aims to explore and understand the lived challenges and issues that Radiologic Technology students are facing during radiography simulation and laboratory training at the Private University in Southern Isabela by focusing on students' personal perspectives, this study seeks to provide an in-depth understanding of the difficulties they face in acquiring practical skills, adapting to laboratory procedures, and applying theoretical knowledge in a simulated learning environment.

Radiologic Technology students. By bringing their concerns and perceptions to light, the findings of this study provide these students with a voice. Recognizing shared challenges can validate their struggles, encouraging them to evaluate their practical training and pinpoint where they need further assistance.

Faculty members and clinical instructors. This study may offer meaningful insights into how students perceive radiography simulation and laboratory training. By highlighting current teaching, supervision, and learning dynamics, these insights guide curricular improvements that are highly responsive to student needs and academic progress.

University Administration. The results of this study may serve as a basis for reviewing existing laboratory facilities, simulation resources, and instructional support systems. The quantitative findings may help inform decisions on program development and enhancements that aim to improve the effectiveness of radiography training.

Future researchers. This study may provide rich qualitative data that can be used as a foundation for further studies related to radiologic technology education, simulation-based learning, and laboratory training. It may also help in the development of future quantitative studies based on the themes identified.

E. Theoretical Background

1) Theoretical Framework

This study is based on David Kolb's Experiential Learning Theory, which highlights learning as a process where knowledge comes from transforming experiences. According to Kyei K. A. et al. [7], clinical training is a requirement for all radiography students. In radiography simulation and lab training, Radiologic Technology students gain hands-on experience by performing imaging procedures. Reflect on their performance before moving on to understand radiographic principles and corrective actions. Finally, Apply what the students learned through active experimentation in later training sessions.

However, Kyei K. A. et al. [7] note that challenges like limited equipment, technical issues, anxiety, and lack of guidance can disrupt students' progress through the experiential learning cycle. These obstacles can affect the students skill development, confidence, and overall learning outcomes. Therefore, this study looks into how these challenges influence the experiential learning process for Radiologic Technology students during radiography simulation and lab training.

2) Conceptual Framework

The study follows the Input–Process–Output (IPO) model to create its conceptual framework. The study shows how radiography simulation and laboratory training create educational outcomes and skill development paths for Radiologic Technology students in a Private University in Southern Isabela.

F. Literature Review

1) Radiography Simulation

Constantino et al. [8] conducted research through their study "A Scoping Review on the Status of Clinical Simulation in Healthcare Education in the Philippines" which assessed the qualities and research methods of Philippine studies related to clinical simulation training in healthcare education. The authors identified deficiencies in study design and methodological rigor and simulation fidelity which led them to recommend that future research should implement more effective methods and improve tool validity and create complete simulation systems

to boost healthcare education progress in the Philippines.

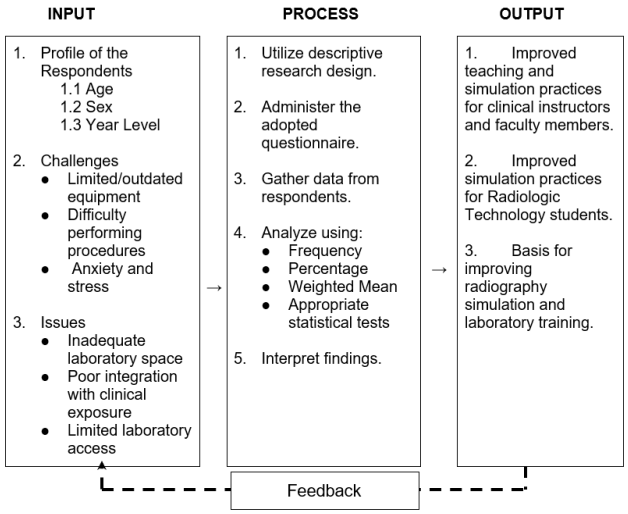


Fig. 1. Paradigm of the study.

According to O'Connor et al. [9], Simulation forms a key element of undergraduate Radiography education as it enables students to develop their clinical skills in a safe environment.

In an Article written by Vestbøstad et al. [10] titled "Research on simulation in radiography education: a scoping review protocol", Simulation has the potential to improve skills through training in a controlled environment, and simulation has a positive effect on knowledge and skills, and even patient-related outcomes. Reviews addressing the use of simulation across the different radiography specialties are lacking. Although, further knowledge on simulation in radiography education is needed to inform curriculum design and future research.

Simulation can also prepare learners for more complex procedures that they may not see many of or at all during their training but may see in their work environment after they graduate according to Hayes [11]. Simulation can prepare learners technically so valuable time spent at the clinical site is more appropriately used as they are more technically competent from their time in simulation and can be more useful to their colleagues in the workplace. This also allows greater opportunities for learning soft skills in the clinical environment which are harder to master in a simulation environment.

Simulation-based education has come to be recognized as a key component of radiologic technology programs. It provides students with the chance to practice radiographic positioning, equipment operation, and patient communication in a controlled and safe setting before actual exposure to the clinical environment. According to Bridge et al. [2], simulation is widely used in pre-registration medical radiation science education to enhance technical skills and confidence. The international audit carried out by the authors reveals that simulation improves psychomotor skills and helps to translate theoretical knowledge into practice. However, the study also points out the drawbacks, which include restricted access to simulation facilities, lack of equipment, and large variations in simulation implementation.

In a similar context, England et al. [12] investigated the rapidly evolving landscape of undergraduate education in radiography and emphasized the crucial role of simulation laboratories in equipping students for clinical practice. Although simulation can enhance learning outcomes, difficulties such as inadequate supervision, congested laboratory classes, and time constraints were reported. These factors may limit the scope for repeated practice, which is critical for mastering radiographic skills.

Laboratory-based training is an important aspect in developing psychomotor skills and clinical reasoning skills among students pursuing radiologic technology. McNulty et al. [3] conducted a study to explore the experiences of radiography students during clinical practice and found that students often experience anxiety, loss of confidence, and challenges in applying theoretical knowledge to practical settings. The transition from simulation laboratories to actual clinical settings can be overwhelming, especially when students feel they are not adequately prepared or may commit mistakes.

Additionally, O'Connor et al. [4] conducted a study to explore student perspectives on simulation-based learning in diagnostic radiography. The results showed that although students appreciated simulation as a learning tool, they identified several drawbacks, including the lack of realism in simulation scenarios, inadequate feedback from instructors, and stress associated with laboratory-based assessments among students. Students also reported challenges in coping with different patient conditions, which were not accurately reflected in simulation settings.

According to a study by O'Shea, J., Bolderston, A., & Bridge, P. [13], Simulation-based education is a significant aspect of teaching clinical skills in tertiary medical radiation science programmes. This allows students to experience a more realistic approach in clinical setting but in a safe and guided environment. It is a crucial educational tool especially in allied medical students. Most studies demonstrated that simulation could improve clinical competence and increase preparedness and confidence for clinical placement.

Moreover, a study by Hankin, R. A., & Jones, S. P. [14] also said that incorporating various technologies and modalities, the versatility of simulation allows educators to adapt practical experiences to meet the learner's needs while also addressing curriculum and professional accreditation requirements (Motola et al., 2013). Simulated patients can also help in developing the students' skills by providing the opportunity to replicate the complexicties of "real-life" patient interaction. Extensive evidence shows learners are satisfied with simulation experiences, with ratings independent of the simulation modality, activity, and student level (O'Donnell et al., 2014).

2) Laboratory Training

A study titled "Analysis on Laboratory Training Connotation Construction of Practical Education in University of Applied Sciences" by Jianli Tian [15], Laboratory training, namely experimental teaching, is a kind of teaching form by students under the guidance of teachers, using certain equipment and materials, through controlling the operation process of conditions, to cause some changes in experimental subject and test the acquired knowledge or newly acquired knowledge

through observing changes in these phenomena, and it is a form to improve students' operation ability and practical ability as well as a part of practical teaching.

Laboratory training is an integral part of radiologic technology education and plays a role in bridging the gap between theoretical models and practical applications. According to the World Health Organization [16], health professional education should combine simulation-based learning and laboratory-based learning to ensure that students acquire technical skills, patient safety awareness, and clinical decision-making skills before interacting with patients. In radiologic technology education, laboratory training provides students with opportunities to practice radiographic positioning, equipment operation, radiation safety, and image interpretation in a controlled environment. This setting is less risky and improves psychomotor skills and accuracy. Despite its importance, laboratory training may pose challenges, such as equipment availability, supervision, and simulation resources, which can hinder skill development and confidence. These challenges are particularly relevant in understanding the problems faced by radiologic technology students in radiography simulation and laboratory training.

Jeffries [17] also highlights that laboratory and simulation-based training are structured experiential learning approaches that aim to simulate real-world clinical settings, allowing students to apply theoretical knowledge to practice. In radiography education, laboratory training involves demonstration, return demonstration, and guided practice using radiographic equipment and phantoms. In this way, students improve critical thinking, technical skills, and teamwork skills. However, Jeffries adds that laboratory training can be effective only if well-designed instruction, qualified faculty, and adequate resources are provided. In the absence of these factors, students may develop anxiety, reduced hands-on experience, and challenges in mastering radiographic skills. These aspects form part of the larger discussion on the problems faced by radiologic technology students in simulation and laboratory training.

According to Grant [18], in the study "Simulation-based learning in medical laboratory education: A critique of the literature" simulation-based learning in medical laboratory education enables students to develop technical skills and cognitive abilities and decision-making competencies through practice in a simulation environment which protects actual clinical environments from potential hazards. The study shows that simulation implementation lacks proper assessment methods but its success depends on effective curriculum integration and multiple practice sessions and relevant scenarios and beneficial evaluation methods. The study shows that structured simulation programs enable students to achieve better competence levels and confidence growth and complete their clinical practice preparation process.

Palumbo [19], proved through his study "Clinical simulation in undergraduate medical training in the clinical simulation laboratory (LaSiC) of the Faculty of Medical Sciences, University of Buenos Aires: A different model for learning abilities and skills" that clinical simulation enables students to acquire practical skills while developing their critical thinking and decision-making abilities within a secure environment. The study also identifies challenges such as high equipment costs, specialized instructor training requirements, and limited accessibility which demonstrate the need for structured planning together with institutional support to achieve optimal learning results.

According to Bugaj and Nikendei [20] Today, skills laboratories or "skills labs", i.e. specific practical skill training facilities, are a firmly established part of medical education offering the possibility of training clinical procedures in a safe and fault-forging environment prior to real life application at bedside or in the operating room. Skills lab training follows a structured teaching concept, takes place under supervision and in consideration of methodological-didactic concepts, ideally creating an atmosphere that allows the repeated, anxiety- and risk-free practice of targeted skills.

A study conducted by Brown, A., & Smith, K. [21] defines laboratory training as a "robust assessment program" that promotes safe and quality practice for allied medical students. This procedure incorporates collecting, testing, and reporting phases of diagnostic practices.

A systematic review of the literature on the effectiveness of laboratory training in industry Buchanan [22], resulted in the following conclusions, Laboratory training is effective as a means of facilitating specifiable changes in individuals in the industrial setting, It has been used effectively in some programs of organizational development, but not in others and Behavioral scientists associated with the National Training Laboratories are actively engaged in subjecting their theories and methods to systematic analysis, and in developing strategies for organization development.

According to Employment Training Panel [23], Laboratory Training is defined as handson instruction or skill acquisition under the constant and direct guidance of a qualified trainer. Laboratory training may require the use of specialized equipment or facilities. Laboratory training may be conducted in a simulated work setting, or in a productive work setting.

In a study conducted by Zhang, L., et al. [24] also defines laboratory training as an anchor for learning wherein students doesn't only learn beyond theoretical practices, but also beyond that to master their application of diagnostic skills. This involves learning analytical methods and instruments operation as the core learning stimulus.

3) Challenges Faced by Radiologic Technology Students in Radiography Simulation and Laboratory Trainings

An article titled "Challenges in teaching radiologic technology laboratory courses using home-based alternative learning modalities: The faculty members' experience" by Atencio et al. [25] revealed that participants experienced various challenges which include having unstable internet connection, difficulty familiarizing selves with the use of online platforms, limitations in resources, lack of student engagement at times, environmental distractions as well as exerting greater effort in preparation and modification of learning materials to be used for teaching. Although it focuses on teaching experience, it highlights barriers that indirectly affect students'

learning in lab/simulation settings –- such as limited resources, technology challenges, and adapting materials for practical courses.

Kyei et al. [7] "Challenges Faced by Radiography Students During Clinical Training", radiography student's experience during their clinical and simulation training were hampered by issues, such as a lack of equipment, anxiety, and insufficient guidance; these barriers to the experiential learning process limit the student's ability to build their confidence and competence levels, as well as to prepare them for their clinical practice. To improve the student's confidence, competence, and preparedness for practice, it is imperative that these issues be addressed.

A study titled "Exploration on the challenges of radiologic technology graduates during their internship in affiliated hospitals of Trinity University of Asia" by Cañete J. A et. al [26], This study revealed that interns struggle with handling pediatric patients, communication, differences between public and private hospital environments, heavy workload, lack of adequate supervision, and the gap between theory and practice. Developing coping mechanisms such as time management, multitasking, positive self-talk, and seeking support from peers and mentors help in handling difficult situations. The study highlights the need for better preparation, simulation-based learning, and enhanced mentorship to improve the internship experience and professional development for students, interns, faculty, departments, and intern coordinators in Radiologic Technology.

According to A, K. K. [7], who studied the "Challenges Faced by Radiography Students During Clinical Training", Clinical training forms part of the requirements of every radiography student. The study revealed challenges faced by radiography students such as the gap between theory and practices, inadequate exposure to certain specialized procedures and time allotted to each treatment room. The study showed that clinical training can be enhanced by providing enough equipments and clinical areas for students, also films and cassettes must be made available before the date and time of clinical training. Finally, the theory aspects of clinical training must be in tune with the practice to enhance effective learning experience by students.

According to Holmström [27], who studied the research entitled "Radiography Students' Learning of Plain X-Ray Examinations in Simulation Laboratory Exercises: An Ethnographic Research", Simulation promoted theory-practice connection, simulation guided the students to follow instructions, and simulation strengthened collaboration between students. The factors supporting and impeding learning were the same: academic studies before the simulation and learning tasks. In addition, experimentation without teacher's supervision was an impeding factor for some students.really got into how radiography students learn in plain X-ray simulation labs. The results indicated the need to pay attention to simulation pedagogy and students' academic skills.

In a study titled "Challenges Faced by Students, Instructors and Technologists during the Clinical Placement of Radiology Technology Students for clinical Practices" by Bizuayehu Nigatu Lemu [28], the study revealed that structural factors are crucial to hands-on-experience of the radiologic technology students, many of which directly translate to the challenges they face in a laboratory setting. It was also highlighted that the availability of an actual simulation trainings and lack of imaging modalities which are crucial in their trainings were cited as primary determinants of student competency.

According to a study by Abraha A., et al. [29] the goal of clinical practice is to bridge the gap between theory and practice by preparing students to apply their classroom- based knowledge and skills to real patient situations. The study revealed significant challenges faced by radiology technology students during clinical practice in the study area. These included insufficient supervision, disorganized training, inadequate equipment, and overcrowded clinical settings. To enhance students' clinical competence and future radiography skills, the curriculum and clinical training model should be revised to better integrate theory and practice.

According to Ismail et al. [30],in their study "Challenges and opportunities in the uptake of simulation in healthcare education" healthcare students face multiple obstacles during simulation-based learning because they cannot access necessary facilities and there are not enough qualified instructors and their academic requirements are too demanding and equipment prices are excessively high and they experience performance stress. The study demonstrates that educational institutions need to implement faculty development programs and modify their curricula while acquiring institutional resources to create productive educational environments which support proper simulation use in healthcare training.

Findings from Niyongombwa et al. [31], in the study "Exploring medical students' simulation learning experience in Rwanda: A qualitative study", show that students use simulation to develop their skills because it boosts their confidence yet they encounter problems which result from restricted access to simulation spaces and inadequate equipment and improper time management. The obstacles which exist restrict practice possibilities and feedback access, which results in problems for both skill development and readiness. The study requires implementation of simulation programs which need proper planning and require access to facilities and need instructors to receive organized training.

In a similar study by Addisalem et al. (2024) entitled "Practices and Challenges in implementing Chemistry Laboratory work in Secondary Schools: A Review, These challenges hinder effective teaching and learning of chemistry, impacting students' academic achievement and attitudes towards science. Despite positive perceptions towards practical work, resource constraints and other factors limit its implementation. Curriculum expectations often differ, and practical constraints often hinder hands-on learning. Effective collaboration among stakeholders, including educational authorities, policymakers, school administrators, and teachers, is important for enhancing students' learning experiences and promoting scientific literacy.

4) Issues faced by Radiologic Technology Students in Radiography Simulation and Laboratory Trainings

In Maniego-Mananghaya, P.A [32], "Clinical Learning Environment Of Radiologic Technology Students: A Cornerstone To Professional Readiness", discussed how a supportive clinical environment is necessary to prepare radiologic technology students for a career in Professional Practice. Specifically identified as having negative effects on students' confidence and readiness for a clinical experience included inadequate facilities and supervision, lack of appropriate feedback to students, and lack of adequate supervision. Many of the same issues can be found in simulating and training laboratories.

According to Choa et al. [33] in their research "The Radiology Research Situation in the Philippines: Identifying the Barriers and Limitations for Future Directions", radiology trainees in the Philippines demonstrate interest in research but they encounter challenges when trying to create high-quality research because they lack adequate time and financial support and research facilities and professional training and guidance from mentors. The medical field needs institutions to provide better support and dedicated time for researchers and established research programs in order to train skilled researchers who will enhance radiology procedures and patient treatment.

Admana, et. al [34] took a similar approach and examined how well lab activities worked for second-year radiologic technology students during home-based learning. While lab activities still played a role in student learning, the study didn't shy away from the problems. Students had limited access to real radiographic equipment, fewer chances to actually practice, and often found it hard to apply what they'd learned in real clinical scenarios. Without in-person lab sessions or realistic simulations, students struggled to master radiographic positioning, handle equipment properly, and perform procedures accurately. Even with alternative lab activities in place, the research showed that students weren't fully ready for clinical work. The takeaway? There's a real need to tackle the obstacles in simulation and lab training if we want radiologic technology students to be truly prepared.

An article wrote by Hazell et al. [6] entitled "Simulation based learning to facilitate clinical readiness in diagnostic radiography", Simulation was introduced as a learning modality that can imitate clinical procedures in a safer and more effective manner compared to conventional learning. This is particularly important in situations where clinical placements are not readily available. The issue of clinical sites being overwhelmed due to a lack of staff and equipment, as well as workload constraints, is a challenge that may affect the quality of the learning process.

According to French, R., et al. [35] who wrote a systhematic review about "Educating radiography students via simulation-based learning in preparation for clinical placement work integrated learning (WIL): A scoping review of student perspectives", sifted through a stack of studies, asking how students feel about simulation-based learning in radiography. Their findings sounded familiar. Simulations offer fresh ways to practice, but students still struggle when they leave the lab and step into real clinical work. Many didn't feel ready or confident with actual patients. The review hit on a bigger issue, too. Simulation doesn't pay off if it's not fully baked into the curriculum or lined up with real clinical skills. It's not just about having the tech or the activities, it's about how everything fits together.

Moreover, Chau et al. [36] looked at the literature on "Simulation-based education for medical radiation students" and found plenty of obstacles. Some were technical outdated equipment, not enough realism, missing feedback. Others came down to how schools actually use simulation. When activities didn't connect to the curriculum, students checked out and didn't learn much. Good technology isn't enough. Students need strong instruction and steady support to really benefit from simulation.

In a review wrote by McGaghie et al. [5] titled "A critical review of simulation-based medical education research", students are allowed to perform clinical tasks within a safe and monitored setting through simulation-based education; however, simulation training may be less effective if students are provided with insufficient resources, inadequate faculty oversight of student progress, and a lack of integration of simulation with clinical placements.

Meanwhile, in a study titled "Problems encountered during clinical internship by the radiologic technology interns of De La Salle Medical and Health Sciences Institute" by Aguilar, P., et al. [37], It was revealed that there are respondents who had encountered problems during their clinical internships particularly on unavailability of imaging and therapeutic machines, equipment, and accessories, lack of mental support, lack of feedback from training officers regarding their clinical performance of the interns and the results of their assessments, outdated hospital equipment and accessories, and lack of provision in intern holding area. Despite the challenges of face-to-face learning, the participants expressed appreciation for this instructional method. They realized that they learn better with this set up, which effectively contributes to the appreciation of their program.

Edin et al. [38] used a qualitative research method to study the challenges which medical radiology technology students and instructors encountered during their clinical practice at Hawassa University in Ethiopia. The study identified four major themes which impacted clinical experience because of department-related factors and clinical learning environment and supervision issues and poor pedagogical approaches. The main obstacles which confronted the team included insufficient supervisory support and disorganized educational programs and insufficient training materials and overly populated clinical environments. The authors established that curriculum and clinical training model changes together with structured supervision and necessary equipment and controlled patient assignment systems will improve students ability to connect theoretical knowledge with practical work while developing their clinical skills.

An article titled Simulation based teaching in interventional radiology training: is it effective? by Patel and Dennick [39], results demonstrate the relevance of simulated training to

current education models in improving trainee competence; however, this is limited to the simulated environment as there is a lack of literature investigating its predictive validity and the effect on patient outcomes. Simulation is thus currently only deemed useful as an adjunct to current training models with the potential to play an influential role in the future of the interventional radiology training curriculum.

2. Methods

This section discuss contains the method that was used by the researchers in conducting this study. It incorporated the research design, site, and participants, research instrument, data gathering procedure, data analysis, and ethical consideration. This chapter shows how the researchers came to the necessary data for this study, and how this study will be analyzed, interpreted, and presented in the easiest way possible.

A. Research Design

This study, the researchers used a Descriptive-Quantitative approach. The design is appropriate since the study aims to explore and gain an in-depth understanding about challenges and issues faced by Radiologic Technology students in Radiography Simulation and Laboratory Training in a Private University in Southern Isabela based on the direct insights and perspectives of the participants.

Quantitative research, as defined by John W. Creswell [40], is a form of research that uses numerical data collected and analyzed in order to elucidate phenomena by studying the difference among variables, as well as describing trends in a specific population. Descriptive quantitative research, as a form of quantitative research, aims to describe specific phenomena without manipulating any variables. This form of research is usually employed in studies that aim to understand specific phenomena in an educational setting.

B. Study Site and Participants

The study was conducted at the Private University in Southern Isabela. An institution that offers a Bachelor of Science in Radiologic Technology, being the most suitable location in conducting the study as it offers a program with the highest concentration of the target respondents. This locale is chosen aside from having the highest number of target respondents, its accessibility and the cooperation of its authorities and respondents will ensure that the data gathering can be conducted efficiently.

Table 1
Distribution of participants by year level

Year level	Population
2nd year	58
3rd year	27
4th year	19
Total	**104**

Since the study was conducted at Private University in Southern Isabela. the respondents of this research are Undergraduate Radiologic Technology students enrolled in Year 2, Year 3 and Year 4, those with foundational knowledge and who are beginning clinical skills training for patients in a Private University in Southern Isabela.

A total of 104 students (n = 104) will be the respondents for this study via total enumeration from the Radiologic Technology Department in a Private University in Southern Isabela.

The use of total enumeration was used to determine the respondents of this study was made to represent the whole group. This was done to ensure the balance of responses that represent the perspective of students across different levels of laboratory training. However, respondents with limited exposure to the research topic were excluded from the study, as they had not yet acquired the background necessary to address the questions.

The participants of this study will consist of Radiologic Technology students in a Private University in Southern Isabela, who are directly involved in radiography simulation and laboratory training. The study will use a total enumeration sampling technique, to ensure equal representation of Radiologic Technology students across different year levels, in order to improve the accuracy and generalizability of the findings.

C. Research Instrument

To gather information, the researchers will use a three-part questionnaire. The first part is about the Profile of Respondents containing the Age, Sex, and Year Level of the respondent. The second part is the 3-point likert-scale questionnaire type all about the challenges faced by Radiologic Technology students containing 20 statements which the researchers adapted and modified some of the statements from a study called “The Challenges Experienced by Nursing Students in Clinical Learning Environment and their suggestions” by Akyüz E, Ergöl Ş. (2022). And lastly, the third part is the checklist all about the issues faced by Radiologic Technology containing 10 statements which the researchers also adapted and modified some of the statements from a study called “Challenges Faced by Radiography Students During Clinical Training” by Kyei K. A., et al. [7].

The research instrument that used in this study is a 3-point Likert-scale questionnaire (1 = Disagree, 2 = Undecided, 3 = Agree) and a checklist to assess the challenges and issues faced by Radiologic Technology students during simulation and laboratory training, ensuring simplicity and ease of response while facilitating statistical analysis.

The data used in the questionnaire are checked using validity and reliability analysis. Internal reliability measures the extent to which a test or questionnaire is homogenous. Cronbach’s alpha will be used to measure internal reliability. The value that is greater than 0.7 will be considered acceptable (Gray, 2017).

To ensure the validity of a quantitative study, the research instrument must measure what it intends to measure (Gray, 2017). Validity analysis is performed using the Pearson product-moment correlation coefficient. If the questions violate the validity or reliability test, the question item is replaced or dropped.

The questionnaires were subjected to content validation by

three (3) Registered Radiologic Technologists who served as validators. The validators evaluated the questionnaires based on the relevance, clarity, appropriateness, and alignment of the items with the objectives of the study. This validation process was conducted to establish the content validity and ensure that the research instruments adequately measured the intended variables of the study. The questionnaires obtained an overall content validation score of 2.77, which was interpreted as valid based on the established validation criteria. Therefore, the validated questionnaires were appropriate for the study to the identified respondents of the study.

D. Data Gathering Procedure

The researchers first prepared the research proposal, including the research objectives, methodology, and survey questionnaire. The research instrument was adapted and modified from related literature and was subsequently reviewed and validated by experts to ensure its accuracy, clarity, and relevance to the objectives of the study. Necessary revisions were made based on the recommendations of the validators before the final version of the questionnaire was prepared.

After the research instrument was validated, the researchers sought permission from the University, particularly from the concerned offices and the Department of Radiologic Technology, to conduct the study among the identified respondents. Upon receiving approval, the researchers coordinated with the respondents regarding the schedule and distribution of the questionnaires. The purpose of the study was explained to the respondents, and they were informed that their participation was voluntary. They were also assured that the information they provided would be treated with confidentiality and used solely for academic and research purposes.

The validated survey questionnaires were then distributed to the identified respondents. Sufficient time was given for the respondents to answer the questionnaire carefully and honestly. After the allotted time, the researchers collected the accomplished questionnaires and checked each one for completeness to ensure that all necessary responses were provided. Any incomplete or improperly answered questionnaires were verified whenever possible to maintain the quality of the collected data.

After retrieving the completed questionnaires, the researchers compiled, organized, coded, and tabulated the data for analysis. The collected data were then analyzed using the appropriate statistical tools based on the objectives of the study. Finally, the results were interpreted and presented in tables, followed by corresponding discussions, conclusions and recommendation.

E. Data Analysis

In analyzing the data, the researchers will employ descriptive statistical methods. Frequency and percentage distributions will be used to describe the demographic profile of the respondents in terms of age, sex, and year level. Weighted mean will be used to determine the level of challenges and issues faced by Radiologic Technology students during simulation and laboratory training. The computed mean scores and correlation results will be interpreted using a three-point scale consisting of Agree, Undecided, and Disagree.

In Addition, to determine the difference among the variables. The Kruskal-Wallis H test was used to determine significant differences between the challenges and issues faced by the Radiologic Technology students when grouped according to their age and year level. A Mann-Whitney U test was also conducted to compare these variables when grouped according to sex. Both inferential statistical analyses were tested at a 0.05 level of significance, and decisions to accept or reject the null hypotheses were based on the computed p-values.

Table 2
Data table and ranges

Scale	Range	Descriptive interpretation	Interpretation
1	1.00–1.66	Disagree	Challenge
2	1.67–2.33	Undecided	Uncertain
3	2.34–3.00	Agree	Not a challenge

F. Ethical Considerations

This study will adhere to strict ethical standards to ensure the rights, dignity, and welfare of all participants are protected. As this study aims to explore the challenges and issues faced by Radiologic Technology students during radiography simulation and laboratory training.

The following principles will guide the conduct of this study:

1. Voluntary Participation. The researchers informed the respondents that participation was optional and included only those who willingly agreed to participate.
2. Informed Consent. Prior to data collection, participants will be fully informed about the purpose, scope, and procedures of the study.
3. Confidentiality and Anonymity. Participants' identities will be strictly confidential.
4. Non-Maleficence (Do No Harm). The study will be conducted in a manner that avoids any physical, emotional or psychological harm to participants.
5. Beneficence (Maximizing Benefits). The study aims to benefit participants and the academic community.
6. Right to Withdraw. Participants can withdraw from the study at any stage without explanation or penalty.
7. Responsible Use of Data. Collected data will be used solely for academic and research purposes.
8. Researcher Responsibility. The researchers will maintain professional conduct throughout the study.

3. Results and Discussions

This section presents the results, discussion, and the personal insights that the researchers have gathered through the process of conducting and collecting experiences and of the respondents about the study on Challenges and Issues faced by Radiologic Technology students in Radiography Simulation and Laboratory Trainings in a Private University in Southern Isabela.

A. Summary of Respondents' Demographic Profile

Table 3
Distribution of the respondents according to their demographic profile

Variable	Category	Frequency (f)	Percentage
Age	18–19 years old	29	27.9%
	20–21 years old	51	49%
	22–23 years old	20	19.2%
	24 years old and above	4	3.8%
Sex	Female	72	69.2%
	Male	32	30.8%
Year level	2nd year	58	55.8%
	3rd year	27	26%
	4th year	19	18.3%

The study involved a total of 104 Radiologic Technology students. The majority of the respondents belonged to the 20–21 years old age group, with 49% of the total population. In terms of sex, female respondents comprised the larger proportion of the sample with 69.2%. Most of the participants were enrolled in the 2nd year level with 55.8%.

The findings indicate that most of the respondents were 20–21 years old, reflecting the typical age range of Radiologic Technology students in higher year levels. The majority of the participants were female and enrolled in the second year, suggesting that the study primarily represents the perspectives of female second-year Radiologic Technology students. According to Mazaheri [41], Radiologic Technology programs generally attract young adult learners, particularly those in the early stages of their professional education. Similarly, a study on allied health students reported that the majority of the respondents, or 77.5%, were female, suggesting that allied health courses may be more commonly pursued by women.

B. Challenges Experienced by the Students

The findings revealed varying levels of challenges faced by the respondents during radiography simulation and laboratory training. The computed overall mean was 2.34, indicates that the respondents agreed with the statements.

Among the indicators, Statement 15 obtained the highest mean score of 3.00, followed by Statements 2 mean scores of 2.98. Statement 9 obtained the lowest mean score of 1.58, followed by Statement 8 with 1.63.

The findings reveal that the respondents generally agreed that they experienced relatively few challenges during radiography simulation and laboratory training, as indicated by the overall mean of 2.34. Statement 15 obtained the highest mean score of 3.00, making it the most frequently encountered challenge, followed by Statement 2 with a mean of 2.98. Conversely, Statement 9 recorded the lowest mean of 1.58, followed by Statement 8 with 1.63, indicating that these challenges were least experienced by the respondents. Overall, the results suggest that although the respondents encountered challenges throughout their simulation and laboratory training, the frequency and extent of these experiences differed across the various aspects of their training. The results are supported by studies showing that Radiologic Technology students encounter different types and levels of challenges during simulation and laboratory training. Holmström [27] found that while simulation laboratory exercises helped radiography students connect theory with practice, some students experienced difficulty when performing activities without teacher supervision, showing that challenges can vary depending on the learning task and level of guidance. This is supported by Nguyen [42], that Radiologic Technology training requires substantial hands-on practice and that students may face concerns related to radiation safety, technical procedures, and limited access to training resources.

Table 4
Challenges faced by the radiologic technology students in radiography simulation and laboratory training

Statement	Mean	Descriptive interpretation	Interpretation
1. I think the physical conditions of the skills laboratory are not suitable for skills practice.	1.68	Undecided	Uncertain
2. I have a clinical Instructor with in any practice in the Laboratory.	2.98	Agree	Not a challenge
3. I think the skills training I received is not enough for clinical practice.	1.95	Undecided	Uncertain
4. I think that technological developments should be integrated into our practical training.	2.76	Agree	Not a challenge
5. Having Clinical Instructors with us during clinical practice makes us more courageous in practice.	2.89	Agree	Not a challenge
6. I often learn in the Simulation Laboratory through trial and error.	2.84	Agree	Not a challenge
7. I think the instructor does not support the students when there is a problem in the Laboratory Training.	2.11	Undecided	Uncertain
8. I think I couldn't get the opportunities to develop skills in Laboratory practice.	1.63	Disagree	A challenge
9. I think the instructor does not have clinical skills to provide my clinical development.	1.58	Disagree	A challenge
10. The fact that Instructors spend more time with us in the Simulation Laboratory increases my skills during Simulation and Laboratory Training.	2.94	Agree	Not a challenge
11. I think our total duration of Laboratory practice experience for each course is very short.	2.51	Agree	Not a challenge
12. Clinical Instructors give the student the opportunity to practice.	2.90	Agree	Not a challenge
13. I think the Simulation environment is far below my expectations to improve my practice skills.	1.79	Undecided	Uncertain
14. I think that different training techniques should be tried for better clinical practice difficult.	2.88	Agree	Not a challenge
15. Challenges in practice can be resolved by using different training techniques.	3.00	Agree	Not a challenge
16. I think I couldn't improve my skills because the materials I need to use in the Laboratory are inadequate.	1.98	Undecided	Uncertain
17. I think our Instructors doesn't care about us.	1.86	Undecided	Uncertain
18. I feel I have no importance/place in the Laboratory Training.	1.67	Undecided	Uncertain
19. I think the instructor treats students hard in the Laboratory Training.	1.97	Undecided	Uncertain
20. I get anxious and stressed before going into Laboratory Training.	2.95	Agree	Not a challenge
Overall mean	**2.34**	**Agree**	**Not a challenge**

C. Issues of the Students in Radiography Simulation and Laboratory Training

Table 5
Issues faced by the radiologic technology students in radiography simulation and laboratory training

Issue	Frequency	Rank
Need to develop more realistic scenarios including multiple patients	38	1
Limited use due to high cost	36	2
Lack of dedicated spaces	27	3
Lack of consumable supplies	21	4
Difficulty in understanding and operating the equipment	17	5
Lack of classroom sizes	13	6
Outdated simulation technology	10	7
Difficulty in implementation	10	7
Safe learning environment	10	7
Lack of support staff	9	8

The results showed that several issues were encountered by the respondents during simulation and laboratory training. Issue 7 ranked first with a frequency of 38, indicating that it was the most commonly identified issue among the respondents. Issue 5 ranked second with a frequency of 36, while Issue 4 ranked third with a frequency of 27. On the other hand, Issue 10 obtained the lowest frequency of 9, making it the least identified issue among the respondents.

The findings emphasize the respondents' interest in more realistic simulation scenarios, particularly those involving multiple patients (38), suggesting an opportunity to enrich their learning experiences and further strengthen their preparedness for actual clinical practice. This was followed by the limited use of simulation due to high cost (36) and the lack of dedicated spaces (27). In contrast, the lack of support staff (9) was the least reported issue, suggesting that it was not a major concern among the respondents. Since higher-year students have greater exposure to clinical settings, they may better recognize the importance of simulation activities that reflect real clinical situations. In contrast, lower-year students, such as second-year students, may have identified the need for more realistic simulation scenarios particularly those involving multiple patients as the most common issue because of their limited clinical exposure. Realistic scenarios allow students to practice prioritization, patient communication, equipment handling, radiation protection, and decision-making in situations that closely resemble actual radiologic practice. This finding is supported by Park et al. [43], who emphasized that simulation scenarios should reflect current clinical environments to promote student engagement and meaningful learning.

D. Differences of Challenges and Issues According to the Students

1) Age

The Kruskal-Wallis H Test was used to determine whether there were any statistically significant Differences in the Respondents' challenges and Issues Faced by the Radiologic Technology Students in Radiography Simulation and Laboratory Training when grouped according to the Age.

For challenges, the obtained p-value was 0.111, while for issues, the computed p-value was 0.391. Both values were greater than the 0.05 level of significance. The results indicated no significant Differences in the Respondents' challenges and Issues Faced by the Radiologic Technology Students in Radiography Simulation and Laboratory Training when grouped according to the Age, since p-values were greater than 0.05 significance level. Thus, the null hypothesis must be accepted at a 0.05 significance level.

Table 6
Differences in the respondents' challenges and issues according to age

Age	N	Mean rank	H test	df	p-value
Challenge					
18–19 years old	29	59.91	6.003	3	0.111
20–21 years old	51	54.12			
22–23 years old	20	40.43			
24 years old and above	4	38.50			
Issues					
18–19 years old	29	49.59	3.005	3	0.391
20–21 years old	51	57.13			
22–23 years old	20	45.30			
24 years old and above	4	50.63			

The results show that there was no significant difference in the challenges and issues encountered by the respondents when grouped according to age. For challenges, respondents aged 18–19 years obtained the highest mean rank, while those 24 years old and above had the lowest. Similarly, for issues, the 20–21 years old group had the highest mean rank, whereas the 22–23 years old group had the lowest. However, the computed p-values for both challenges (0.111) and issues (0.391) were greater than the 0.05 level of significance, indicating that age did not significantly influence the respondents' perceptions of the challenges and issues encountered during radiography simulation and laboratory training.The results indicated no significant Differences in the Respondents' challenges and Issues Faced by the Radiologic Technology Students in Radiography Simulation and Laboratory Training when grouped according to the Age, since p-values were greater than 0.05 significance level. Thus, the null hypothesis must be accepted at a 0.05 significance level.

The results show that there was no significant difference in the challenges and issues encountered by the respondents when grouped according to age. For challenges, respondents aged 18–19 years obtained the highest mean rank, while those 24 years old and above had the lowest. Similarly, for issues, the 20–21 years old group had the highest mean rank, whereas the 22–23 years old group had the lowest. However, the computed p-values for both challenges (0.111) and issues (0.391) were greater than the 0.05 level of significance, indicating that age did not significantly influence the respondents' perceptions of the challenges and issues encountered during radiography simulation and laboratory training. This finding is supported by Calma [44], who found no significant relationship between age and students' perceptions of virtual simulation, suggesting that age alone may not strongly influence students' experiences and challenges in simulation-based learning.

2) Sex

Table 7
Differences in the respondents' challenges and issues according to sex

Category	Sex	N	Mean rank	U	p-value
Challenges	Female	72	52.62	1143.500	0.952
	Male	32	52.23		
Issues	Female	72	55.44	940.500	0.111
	Male	32	45.89		

A Mann-Whitney U Test was conducted to compare the Differences in the Respondents' challenges and Issues Faced by the Radiologic Technology Students in Radiography Simulation and Laboratory Training when grouped according to their Sex. The test result revealed no significant difference between male and female responses/assessments regarding Challenges and Issues Faced by the Radiologic Technology Students in Radiography Simulation and Laboratory Training, since the p-value was greater than the 0.05 significance level. Thus, the null hypothesis must be accepted at a 0.05 significance level. The p-value for challenges was 0.952, while the p-value for issues was 0.111, both of which exceeded the 0.05 significance level. This finding is supported by Gutiérrez-Puertas et al. [45], who found no significant differences in students' satisfaction with simulated learning environments across gender, indicating that male and female students may experience similar challenges and issues during simulation and laboratory training.

3) Year Level

Table 8
Differences in the respondents' challenges and issues according to year level

Year level	N	Mean rank	H test	df	p-value
Challenges					
2nd year	58	57.75	6.250	2	0.058
3rd year	27	51.46			
4th year	19	50.95			
Issues					
2nd year	58	57.82	5.611	2	0.060
3rd year	27	49.19			
4th year	19	40.97			

The Kruskal-Wallis H Test was used to determine whether there were any statistically significant Differences in the Respondents' challenges and Issues Faced by the Radiologic Technology Students in Radiography Simulation and Laboratory Training when grouped according to the year level. The results indicated no significant Differences in the Respondents' challenges and Issues Faced by the Radiologic Technology Students in Radiography Simulation and Laboratory Training when grouped according to the year level, since p-values were greater than 0.05 significance level. Thus, the null hypothesis must be accepted at a 0.05 significance level. For challenges, the computed p-value was 0.058, while for issues, the p-value was 0.060. Both values were greater than the 0.05 level of significance.

The results indicate that there was no significant difference in the challenges and issues encountered by the respondents when grouped according to year level. Although second-year students obtained the highest mean ranks for both challenges and issues, the computed p-values for challenges (0.058) and issues (0.060) were greater than the 0.05 level of significance. This indicates that year level did not significantly influence the respondents' perceptions of the challenges and issues encountered during radiography simulation and laboratory training. This suggests that Radiologic Technology students, regardless of whether they are in their second, third, or fourth year, experience similar challenges and issues during radiography simulation and laboratory training.

4. Discussion

A. Conclusion

The study aimed to determine the challenges and issues experienced by Radiologic Technology students during radiography simulation and laboratory training in a Private University in Southern Isabela. It focused on understanding the difficulties students encounter while practicing radiographic procedures, developing their practical skills, and preparing for actual clinical practice.

The researchers used a quantitative descriptive research design and gathered data from 104 Radiologic Technology students through a structured questionnaire. The respondents came from the second, third, and fourth year levels. The questionnaire focused on their demographic profiles, challenges, and issues encountered during radiography simulation and laboratory training.

The results showed that most of the respondents were 20–21 years old, female, and second-year students. The findings also revealed that students experienced relatively few challenges during simulation and laboratory training, with an overall mean of 2.34, interpreted as "Not a Challenge." The statement about solving difficulties in practical training through different training techniques received the highest mean of 3.00. This was followed by the importance of having clinical instructors present during laboratory activities, which obtained a mean of 2.98. These results show that students recognize the importance of trying different learning methods and receiving proper guidance from their instructors to improve their practical skills.

In terms of the issues encountered, the need for realistic simulation scenarios involving multiple patients ranked first, with a frequency of 38. This was followed by the limited use of simulation due to high costs, with a frequency of 36. These findings show that students need more realistic activities that are similar to actual hospital situations. They also experience concerns related to the availability of facilities, equipment, and other resources needed for their training. Since higher-year students have greater exposure to clinical settings, they may better recognize the importance of simulation activities that reflect real clinical situations. In contrast, lower-year students, such as second-year students, may have identified the need for more realistic simulation scenarios particularly those involving multiple patients as the most common issue because of their limited clinical exposure.

The study also found that there were no significant differences in the challenges and issues experienced by the respondents when grouped according to age, sex, and year level. All computed p-values were greater than the 0.05 level of significance. This means that the respondents experienced

similar challenges and issues regardless of their age, sex, or year level.

Overall, the findings show that radiography simulation and laboratory training play an important role in helping students develop their practical skills and prepare for clinical practice. However, there are few challenges and issues that need attention, particularly the need for different training techniques, more continuous simulation activities and better to laboratory resources. Improving these areas may help students become more confident and prepared when performing radiographic procedures in actual clinical settings.

B. Recommendations

Based on the findings of the study, the following recommendations are proposed:

The University administration may enhance the radiography simulation and laboratory facilities by providing updated radiographic equipment, adequate laboratory materials, and dedicated learning spaces to strengthen students' practical training.

Clinical Instructors may continue providing effective supervision, guidance, and constructive feedback during simulation and laboratory activities to further develop students' confidence and practical skills.

The Radiologic Technology Department may incorporate continuous simulation scenarios, including multiple-patient cases, to better prepare students for actual clinical practice.

The Institution may explore strategies to maximize the use of simulation resources and address the limited use of simulation due to high costs, ensuring that students have sufficient opportunities for hands-on learning.

Future researchers may conduct similar studies involving larger samples and multiple institutions or use qualitative and mixed-method research designs to gain a broader understanding of the challenges and issues encountered by Radiologic Technology students during simulation and laboratory training.

Future studies may evaluate the effectiveness of realistic simulation scenarios in improving Radiologic Technology students' clinical competence, confidence, and readiness for clinical internships and future professional practice.

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