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Research Article

Predicting Revalidation Examination Performance of Radiologic Technology Students: A Structural Equation Modelling Approach

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ABSTRACT

One of today's major problems in higher education system is the academic failure of medical science students with apparent yearly reports of experiencing probation, insufficient medical knowledge, increase educational semester, and drop out incidences. This study aims to predict the revalidation examination score of the Radiologic Technology interns of a higher education institution in Iligan City. An exploratory research with descriptive correlation design was used to investigate the interrelationship between the predicting variables in this study. The researchers adopted the Grit-S Scale structured questionnaire that was developed by Duckworth and Quinn (2009), which was designed to measure the grit level of respondents. This tool was used to elicit the needed primary data on the currently enrolled 26 radiologic technology interns at a higher institution in Iligan City. The survey was administered online via Google form. The secondary data, which constitutes of monthly examination score, case study scores, and revalidation examination was solicited in the CRT Program Head. Census sampling was employed in this research to obtain a more satisfactory response. The study showed that the indicators in monthly examination obtained a total mean of 31.64 with an SD of 14.35. These low scores were manifested in their performance in revalidation examination, which revealed a total mean score of 52.73 with a ± 16.02 SD. On the contrary, the respondents obtained high scores in case study with overall mean score of 95.42 and an SD of ± 2.83. The overall grit level of the respondents demonstrated a moderate description. Furthermore, the findings of this study also revealed that there is a significant relationship between monthly examination and revalidation examination. The strength of correlation is direct and strong as revealed by the coefficient of 0.904. Meanwhile, there is no significant relationship between revalidation examination score and case study score (p=0.537); between revalidation examination score

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and grit level (p=0.833); between grit level and monthly examination score (p=0.831) and between grit level and case study score (p=0.071). The positive influence of monthly examination implies that respondents who scored high in the monthly examination would be predicted to score high also in the revalidation examination. These findings can help the faculty and program head in drafting policies and the improvement of academic and clinical performance of students in revalidation exam.

Keywords: *Revalidation Examination, Structural Equation Modelling, Grit, Radiologic Technology*

Background

Academic success is the key to any educational institution and the ingredient of success is preparation. When there is preparation, there should be an assessment as well. This assessment will measure the quality of the learning, especially of the courses which require clinical internship. In the field of radiology, revalidation examination is considered as comprehensive exam based on all the professional subjects and instructional activity drafted in the training program. Written and oral evaluation is given towards the end of the program to test the interns' knowledge after several months of clinical duties. The aforementioned evaluation is necessary because if the students perform well in the assessment, it implies their readiness to professional practice. Also, their efficacy equates to the quality of education that they have received in the training program.

Clinical education of Higher Education Institutions caters learning experiences that allow students to apply theoretical principles to actual practice (Zehr, 2016). However, one of today's major problem of higher education system in many countries is academic failure of students under the medical sciences (Azari et al., 2015). According to Sabel et al. (2015), many students are yearly reported to experience probation, increased educational semester, and drop out incidences. A study of Chiegwu et al. (2019) concluded that it not only necessary to focus on lecturer's knowledge on the subjects and availability of facilities but also on the method used in learning, which influence the students' performance. According to Ahmady et al. (2019), the gap in knowledge or students' insufficient medical knowledge, lack of perseverance and motivation, as well as limited use of case-based learning method prevent the growth of critical thinking in medical students.

The process of molding students through clinical internship requires a tremendous effort that will help them change personally and professionally. It is a mixture of intense physical and intellectual activities that could sometimes bring stress to the students, but nevertheless clinical internship is indeed essential for medical students. A literature review revealed that there seem to have a decline in clinical competency of student interns. The study of Alipio et al. (2018) showed that the overall evaluation of the student interns has low competence on basic radiological science modalities. In Bachelor of Science in Radiologic Technology, these modalities are being taught in major professional subjects and these are also covered in the revalidation exam. Success in these subjects require the adoption of effective approaches to familiarize students with its theory and practical application.

In Cagayan De Oro, Almajar et al. (2013) explored more on the specific RT professional subjects like Image Production and Evaluation to significantly predict both written revalidation exam in clinical education and National Radiologic Technology Licensure Examination. They added that this revalidation on some aspect contributes to passing rate of student in Radiologic Technology Licensure Examination.

Since most of the researchers' perused literature correlates internship performance with national licensure examination, in

connection to the locale of this research, this higher education institution current's school performance in RTLE has been below the national passing rate. Many authors suggested that knowing the weakness and strengths of students and graduates in certain examination including the revalidation exam may help in resolving poor performance issue. Terry et al. (2017); and Zhang & Henderson (2015) suggested that standardized examination may be used to enhance students learning and may help educators to identify students who are at risk of poor performance in clinical practice and summative examination.

Given the importance of clinical education and the problems related to it, identifying students at risk of academic failure, especially in clinical internship and studying the factors associated with it is essential in minimizing failure rate. The previous studies mentioned mainly investigated the predictors related to students' academic performance; however, studies underscoring the predictors of revalidation examination performance in clinical education are not well understood. Hence, this research attempted to examine the relationship between various cognitive predictors such as monthly examinations scores and case-study analyses score as well as the non-cognitive grit-level predictor and its influence on students' performance in revalidation examination.

The present study aims to predict the revalidation examination score of the Radiologic Technology interns of a higher education institution in Iligan City, Philippines. The result of this study can help the faculty and program head in planning and providing the necessary actions or interventions regarding the influencing factors that affects students' performance success in revalidation exam. In addition, the present study could be of help to future researchers who would undertake subsequent study on large scale reviews involving the performance of student radiographers who have been greatly affected by this unprecedented change in this year's clinical internship program.

Statement of the Problem

This study aims to predict the revalidation examination score of the Radiologic Technology interns of a higher education institution in Iligan City, Philippines. Specifically, it seeks to answer the following questions:

1. What is the monthly examination score of the respondents?
2. What is the case study score of the respondents?
3. What is the level of grit of the respondents?
4. What is the revalidation examination score of the respondents?
5. Is there a significant relationship:
   - 5.1 between monthly examination and revalidation examination scores?
   - 5.2 between case study and revalidation examination scores?
   - 5.3 between grit level and revalidation examination score?
   - 5.4 between monthly examination score and grit level?
   - 5.5 between case study score and grit level?
6. Do monthly examination score, case study score, and grit level predict the revalidation examination score of the respondents?
7. Do monthly examination and case study scores predict the grit level of the respondents?
8. What model best predict the revalidation examination score of the respondents?

Hypothesis

The null hypotheses are formulated and were tested at 0.05 level of significance:

1. There is no significant relationship between:
   - 1.1. revalidation examination score and monthly examination score
   - 1.2. revalidation examination score and case study score
   - 1.3. revalidation examination score and grit level
   - 1.4. grit level and monthly examination score
   - 1.5. grit level and case study score
2. Monthly examination score and case study score do not significantly influence the grit level of the respondents.

Methods

Research Design

This study utilized an exploratory research design. It aimed to formulate an appropriate and functional model that can predict the revalidation examination score of the Radiologic Technology interns of a higher education institution in Iligan City, Philippines. Also, this study used the descriptive correlation design to investigate the interrelationship between the predicting variables such as monthly examination score, case study score, grit, and revalidation examination score.

Research Environment

This study was conducted at a Higher Education Institution (HEI) offering Radiologic Technology program in Iligan City. This school is a private, non-sectarian and non-political learning institution. The school complex is situated along the Rotonda of San Miguel Village, Pala-o, Iligan City which is hundred meters few away from the Iligan City Hall. The school complex comprises of six (6) major structures having a total floor area of approximately 13,570 m^2. It was founded in 1975 and was officially opened for the school year 1974-1975 with a handful of personnel just sufficient to run the institution.

Due to lockdown and exercised community quarantine which bring forth to limited movement and travel restrictions to everyone during COVID-19 pandemic, the researchers were contained to restriction protocols, thereby prompting them to conduct the study in Iligan City. Moreover, the variables under the probe of this study were based on the drafted clinical education program for this academic year 2020-2021 offered by this HEI in Iligan City. This was the main reason why this school was chosen as locale of the study by the researchers.

Participants of the Study and Sampling Procedure

The respondents of the study were the 26 bona fide Radiologic Technology Interns of batch 2020-2021 in a higher education institution in Iligan City. The chosen predictors of this current research were solely tailored on the drafted program of this particular school year. Therefore, the sample size was limited to the asserted 26 number of students. Moreover, in terms of sample size, census sampling was employed in this study. The sample size was very small; hence, it is reasonable to include the entire population to obtain a more satisfactory response.

Research Instruments Used

This study used both primary and secondary data. For the primary data, the researchers adopted the Grit-S questionnaire developed by Duckworth and Quinn (2009) which is designed to measure the perseverance level and passion for long-term goals. The secondary data constituted of the monthly examination scores and case study scores of radiologic technology students that was solicited in a higher education institution in Iligan City.

The Grit-S questionnaire consists of eight (8) items: four representing the consistency of interest (CI) subscale and four representing the perseverance of effort (PE) subscale. This questionnaire has a 5-response Likert option for each item. The PE subscale is represented by items such as “I finish whatever I begin.” are scored on a 5-point Likert scale ranging from 1 = “not at all like me” to 5 = “very much like me”. The CI subscale of the Grit-S instrument are reversed coded in order to create a consistent scoring method across all items (e.g., “very much like me” is scored 1 rather than 5, while “not like me at all” is scored 5 rather than 1, and so on). Scoring was done by adding all of the corresponding points of the chosen answers and dividing its sum by 8. The maximum possible score of this scale is 5 (extremely gritty) while 1 (not at all gritty) would be the lowest possible score. Former studies on Grit-S questionnaire reported an acceptable to good reliability Cronbach’s α values ranging from .73 to .83 (Duckworth & Quinn, 2009).

Data Gathering Procedure

This research used both primary and secondary data. For secondary data collection, a request letter was forwarded to the program head of College of Radiologic Technology in order to access the needed secondary data which constitutes of monthly examination scores and case-study scores of radiologic technology

student interns of the academic year 2020-2021. Afterward, the Program Head notified the Clinical Instructors who handle the internship program to grant permission to researchers to have a copy of the requested file.

For the primary data collection, the researchers administered an online Grit survey via Google form. The survey included the letter of consent and Grit-S questionnaire. It was sent to each respondent's official school email addresses also referred to as "imcccrt Gmails". As instructed in the questionnaire, the research participants were asked to answer the questions as honestly as possible. Because all of the items in the questionnaire were set as required questions, there were no missing data within all the submitted survey.

All of the data including the secondary data requested from the College of Radiologic Technology office through grant access by the Program Head were retrieved online. The collected data were prepared, tabulated and analyzed using the provided statistical tools under the guide of statistician.

Ethical Considerations

The researchers valued the respondents' participation by prioritizing their welfare and respecting their will not to disclose any information that they do not like to share. An informed consent stating the nature and purpose of the study was attached into the survey questionnaire. It was written to seek their voluntary participation and serve as an assurance that their refusal would not involve penalty or loss of benefits to which they were entitled.

Most importantly, in compliance of the ethics committee of this institution, the researchers ensured that the procured interns' reported scores were kept confidential and that it was used for research purpose only. Specific code was assigned per respondents to ensure their anonymity and privacy concerns. The data that were withdrawn from through online were encrypted with password so that only the researchers have access on it. The name of the school was not mentioned in this paper and also, all of the data both the primary and secondary data were dealt in accordance to research protocols and will be discarded accordingly after the research is done. This study was approved by the Iligan Medical Center College Institutional Ethics Review Committee with approval No. 202-101-002.

Data Analysis

Mean. This was used to determine the level of monthly examination scores, case study scores and grit level of Radiologic Technology interns.

Pearson product moment correlation. This was used to determine the interrelationships between monthly examination scores, case analysis scores, grit scores, and revalidation examination performance of the respondents.

Stepwise Multiple Linear Regression. This was used to determine the significant predictors of revalidation examination.

Structural Equation Modeling maximum likelihood (ML). This was used to determine the best fit model of revalidation examination. In evaluating the goodness of fit of the models, the following indices were used: CMN/DF, Goodness of Fit index (GFI), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA).

Results and Discussion

I. Monthly Examination Scores of Radiologic Technology Interns

Table 1 shows the mean with standard deviation (SD) of the monthly examination scores of the respondents. There were six monthly examination areas that were included in the analysis. These were Patient Care and Management and Human Anatomy and Physiology; Professional Ethics, Jurisprudence and Administration; Radiologic Physics, Equipment and Maintenance; Radiation Biology and Protection; Image Production and Evaluation; and Quality Assurance and Quality Control.

The total mean ± SD of monthly examination scores of the respondents was 31.64 ± 14.35. The respondents exhibited the highest monthly examination score mean ± SD in Radiologic Physics, Equipment and Maintenance at 42.42 ± 19.89, followed by Radiation Biology and Protection, Professional Ethics, Jurisprudence and Administration, Image Production and Evaluation, and Patient Care and Management and Human Anatomy and

Physiology, at 34.65 ± 24.90, 34.19 ± 11.53, 27.88 ± 18.34, and 26.92 ± 8.59, respectively. Meanwhile, the respondents demonstrated the lowest monthly examination score mean ± SD in Quality Assurance and Quality Control at 23.77 ± 17.61. This finding implies that the overall monthly examination score of the respondents is low which is also evident on their acquired scores in the six monthly examination areas. However, the calculated standard deviation value appears to be a little high which means that individual respondents has varied performance in the examination (i.e., some scored well in the examination while others scored very low).

Table 1. The Mean with Standard Deviation (SD) of the Monthly Examination Scores of the Respondents (n = 26)

Monthly Examination Areas	Mean	SD
1. Patient Care and Management and Human Anatomy and Physiology	26.92	8.59
2. Professional Ethics, Jurisprudence and Administration	34.19	11.53
3. Radiologic Physics, Equipment and Maintenance	42.42	19.89
4. Radiation Biology and Protection	34.65	24.90
5. Image Production and Evaluation	27.88	18.34
6. Quality Assurance and Quality Control	23.77	17.61
Total	31.64	14.35

II. Case Study Scores of Radiologic Technology Interns

Table 2 shows the mean with SD of the case study scores of the respondents. As shown, the overall case study scores mean ± SD was 95.42 ± 2.83. This means that majority of the respondents scored high in the case-study analysis.

Table 2. The Mean with Standard Deviation (SD) of the Case Study Scores of the Respondents (n=26).

Case Study Scores	Mean	SD
1. Overall Case Study Scores	95.42	2.83

III. Level of Grit of Radiologic Technology Interns

Table 3 shows the mean with SD of the level of grit among the respondents. There were eight items used to measure the construct of grit. The overall mean ± SD of this variable was 3.29 0.46 with a description of moderate. The item 'I finish whatever I begin' obtained the highest mean ± SD of 4.00 ± 0.85 with a description of high. The item 'I am diligent' got a mean ± SD of 3.65 ± 0.69 with a description of high. The item 'I am a hard worker' exhibited a mean SD of 3.58 ± 0.95 with a description of high.

Meanwhile, the item 'I often set a goal but later choose to pursue a different one' obtained a mean ± SD of 3.23 ± 0.91 with a description of moderate. The item 'I have been obsessed with a certain idea or project for a short time but later lost interest' got a mean ± SD of 3.19 ± 0.80 with a description of moderate. The item 'Setbacks don't discourage me' demonstrated a mean ± SD of 3.08 ± 1.06 with a description of moderate. The item 'I have difficulty maintaining my focus on projects that take more than a few months to complete' obtained a mean ± SD of 2.81 ± 1.06 with a description of moderate. Finally, the item 'New ideas and projects sometimes distract me from previous ones' got the lowest mean ± SD of 2.77 ± 0.65 with a descriptive equivalent of moderate.

As revealed by the result, the overall grit level of respondents was found to be in moderate description which suggest that they are moderately gritty. In relation to the study of Miller et. al., (2018), they suggested that grit is a better predictor of student proficiency and clinical knowledge and by knowing the grit score of medical students, it may predict their score in the forthcoming examination.

Table 3. The Mean with Standard Deviation (SD) and Description of the Level of Grit of the Respondents (n = 26)

Items	Mean	SD	Description [a]
1. New ideas and projects sometimes distract me from previous ones. *	2.77	0.65	Moderate
2. Setbacks don't discourage me.	3.08	1.06	Moderate
3. I have been obsessed with a certain idea or project for a short time but later lost interest. *	3.19	0.80	Moderate
4. I am a hard worker.	3.58	0.95	High
5. I often set a goal but later choose to pursue a different one. *	3.23	0.91	Moderate
6. I have difficulty maintaining my focus on projects that take more than a few months to complete. *	2.81	1.06	Moderate
7. I finish whatever I begin.	4.00	0.85	High
8. I am diligent.	3.65	0.69	High
Grand Mean	3.29	0.46	Moderate

Legend: 4.20-5.00 = Very High; 3.40 4.19 = High; 2.60-3.39 = Moderate; 1.80-2.59 = Low; 1.00-1.79 = Very Low

Note: *=Reverse scoring

IV. Revalidation Examination Scores of Radiologic Technology Interns

Table 4 shows the mean with SD of the revalidation examination scores of the respondents. As shown, there were three revalidation examination areas. These were Oral, Practical, and Written. The total mean ± SD of revalidation examination scores of the respondents was 52.73 ± 16.02. The respondents scored the highest in oral revalidation examination as manifested by a mean ± SD of 63.88 ± 18.14. They obtained a mean ± SD of 55.62 ± 17.09. On the other hand, they obtained the lowest score in written revalidation examination as manifested by a mean ± SD of 38.69 ± 20.35.

The overall revalidation examination scores of the respondents were found to be 52.73 with an SD of 16.02. The passing rate for each examination areas is 75 out of 100 total items. With the yielded mean score of 52.73, this indicates that majority of the respondents failed in the given examination. Moreover, the (16.02) SD value which is low implies that most of the scores were close to the mean score and that there was less variance among the respondents score in the revalida exam.

Table 4. The Mean with Standard Deviation (SD) of the Revalidation Examination Scores of the Respondents (n = 26)

Revalidation Examination Areas	Mean	SD
1. Oral	63.88	18.14
2. Practical	55.62	17.09
3. Written	38.69	20.35
Total	52.73	16.02

V. Significant Relationship Among the Variables Used in the Study

Table 5 presents the r-value with p-value and interpretation of the test of significant relationship among variables used in the study. Five correlations were individually analyzed. First, the correlation between monthly examination and revalidation examination scores obtained an r-value of 0.904 that is significant ($p<0.001$). Second, the correlation between case study and revalidation examination scores yielded an r-value of 0.127 that is not significant ($p=0.537$). Third, the correlation between grit level and revalidation examination

scores demonstrated an r-value of -0.043 that is not significant (p=0.833). Fourth, the correlation between monthly examination scores and grit level showed an r-value of -0.044 that is not significant (p=0.831). Finally, the correlation between case study scores and grit level obtained an r-value of 0.359 that is not significant (p=0.071). Based on the results, Hypothesis 1.1 was rejected while Hypotheses 1.2, 1.3, 1.4, and 1.5 were accepted.

Table 5. The R-value with P-value and Interpretation of the Test of Significant Relationship Among Variables Used in the Study

Variables	r-value	p-value	Interpretation
1. Monthly Examination and Revalidation Examination Scores	0.904	<0.001	Significant
2. Case Study and Revalidation Examination Scores	0.127	0.537	Not Significant
3. Grit Level and Revalidation Examination Scores	-0.043	0.833	Not Significant
4. Monthly Examination Scores and Grit Level	-0.044	0.831	Not Significant
5. Case Study Scores and Grit Level	0.359	0.071	Not Significant

The results revealed that there is a significant relationship between monthly examination and revalidation examination scores. The strength of correlation between the two variables is strong. The relationship is direct as revealed by the coefficient of 0.904. This means that as the monthly examination score increases, the revalidation examination score of the respondents also increases. Conversely, as the monthly examination score decreases, the revalidation examination score of the respondents also decreases. This finding supported the study claimed by Terry et al. (2017) and Zhang & Henderson (2015) stating that standardized examination could be used to enhance student learning and performance in summative examination. As Confirmed by the present finding, the strong and direct relationship between monthly examination and revalida examination scores may help the faculty educators and College Program head in improving students' performance in revalidation examination therefore minimizing failure rate in the said exam could be made possible.

On the other hand, this study also showed that the relationships between case study and revalidation examination scores, between grit level and revalidation examination scores, between monthly examination scores and grit level, and between case study scores and grit level, all yielded an insignificant r-value. This means that these variables are not statistically related from each other.

VI. Significant Predictors of Revalidation Examination Scores of Radiologic Technology Interns

Table 6 presents the unstandardized coefficients with p-value and interpretation of the significant predictors of revalidation examination scores of the respondents. As shown, the monthly examination scores exerted a positive influence on revalidation examination scores as manifested by its unstandardized β coefficient of 1.010, which is significant (p<0.001). The case study scores, and level of grit exerted a negative influence on revalidation examination scores as manifested by its unstandardized β coefficients of -0.024 and -0.070, respectively. Their influence was not statistically significant with p-values of 0.966 and 0.984, respectively. It can also be noted that the R-square value of the regression was 0.818, suggesting that 81.8% of the variation in revalidation examination scores can be predicted by monthly examination scores, case study scores, and level of grit. Finally, the regression model was statistically significant with p-value of <0.001.

Table 6. The Unstandardized Coefficients with P-value and Interpretation of the Significant Predictors of Revalidation Examination Scores of the Respondents

Variables	Unstandardized Coefficients		Interpretation
	β	p-value	
1. Constant	23.298	0.645	Not Significant
2. Monthly Examination Scores	1.010	<0.001	Significant
3. Case Study Scores	-0.024	0.966	Not Significant
4. Level of Grit	-0.070	0.984	Not Significant

Dependent variable: Revalidation Examination Scores, Multiple Regression Model Summary: R: 0.905, R-square: 0.818, Adjusted R square: 0.793. The model is significant at p<0.001.

Based on the unstandardized β coefficient of the significant predictor, it can be inferred that for every unit increase in the monthly examination score of the respondent, there is a corresponding increase of revalidation examination score by 1.010. This implies that the respondents who scored high in the monthly examination score would be predicted to score high also in the revalidation examination. Higher scores in the monthly examination are associated with higher scores in revalidation examination while lower scores in the monthly examination are associated with higher scores in revalidation examination.

VII. Significant Predictors of Level of Grit of Radiologic Technology Interns

Table 7 presents the unstandardized coefficients with p-value and interpretation of the significant predictors of level of grit of the respondents. As shown, the monthly examination scores exerted a negative influence on the level of grit as manifested by its unstandardized β coefficient of -0.003, which is not significant (p=0.619). The case study scores of the respondents also exerted a positive influence on the level of grit as manifested by its unstandardized β coefficient of 0.061, which is not significant (p=0.069).

It can be noted that the R-square value of the regression was 0.139, suggesting that only 13.9% of the variation in grit level of the respondents can be predicted by monthly examination scores and case study scores. However, this regression model was not statistically significant with p-value of 0.180.

Several authors mentioned in the review of related literature believe that Grit significantly predicts student performance. Specifically, Miller et. al. (2018) pointed out that student with higher grit score tends to score high in examination. Contradictory with their findings, the present study failed to accord with this claim. The overall grit score of the respondents of this study was seen to be moderately gritty (refer to Table 3), therefore, the researchers argue that the students did not persevere or work hard enough to pass the examinations. Findings in Table 3 may somehow explain why monthly examination exerted a negative influence on Grit level and case study score exerted positive influence on Grit level of the respondents.

Table 7. The Unstandardized Coefficients with P-value and Interpretation of the Significant

Variables	Unstandardized Coefficients		Interpretation
	β	p-value	
1. Constant	-2.436	0.429	Not Significant
2. Monthly Examination Scores	-0.003	0.619	Not Significant
3. Case Study Scores	0.061	0.069	Not Significant

Dependent variable: Level of Grit, Multiple Regression Model Summary: R: 0.372, R-square: 0.139, Adjusted R square: 0.064. The model is not significant at p=0.180.

VIII. Best Fit Model of Revalidation Examination Scores of Radiologic Technology Interns

A series of hypothesized models based on the literature review were presented to as solution to the final problem. As shown in Table 8, short codes were used to represent the variables used in the model. The indicators for Monthly Examination Scores (Monthly) are Patient Care and Management and Human Anatomy and Physiology Professional Ethics (M1), Jurisprudence and Administration (M2), Radiologic Physics, Equipment and Maintenance (M3), Radiation Biology and Protection (M4), Image Production and Evaluation (M5), and Quality Assurance and Quality Control (M6).

The variable Level of Grit (Grit) was indicated by eight items in Table 3 (G1, G2, G3, G4, G5, G6, G7, G8). Case study scores were indicated by 'C'. Finally, the variable Revalidation Examination Scores (Revalida) was indicated by Oral (R1), Practical (R2), and Written (R3).

Table 8. Variable Codes and Names Used in the Model

Variable	Code	Name
1. Monthly Examination Scores (Monthly)	M1	Patient Care and Management and Human Anatomy and Physiology
	M2	Professional Ethics, Jurisprudence and Administration
	M3	Radiologic Physics, Equipment and Maintenance
	M4	Radiation Biology and Protection
	M5	Image Production and Evaluation
	M6	Quality Assurance and Quality Control
2. Level of Grit (Grit)	G1	Item 1 in Table 3
	G2	Item 2 in Table 3
	G3	Item 3 in Table 3
	G4	Item 4 in Table 3
	G5	Item 5 in Table 3
	G6	Item 6 in Table 3
	G7	Item 7 in Table 3
	G8	Item 8 in Table 3
3. Case Study Scores (C)		
4. Revalidation Examination Scores (Revalida)	R1	Oral
	R2	Practical
	R3	Written

Hypothesized Model 1. Revalidation examination scores can be influenced directly by monthly examination scores, level of grit, and case study scores, and indirectly by monthly examination scores and case study scores via level of grit (Figure 1).

Table 9 shows the notes for Hypothesized Model 1. The chi-square value of 275.982 with 131 degrees of freedom is significant at the .05 level: its p-value is less than 0.001. This finding suggests that model does not fit the data acceptably in the population from which the study drew its sample.

Table 10 shows the estimates among paths shown in Hypothesized Model 1. The paths and the corresponding estimate of the variables were analyzed as follows: ME exerted a negative influence on Grit (β=-0.037); Case exerted a positive influence on Grit (β=0.097); ME exerted a positive influence on Rev (β=3.518); Grit exerted a positive influence on Rev (β=7.474); Case exerted a negative influence on Rev (β=-0.741). ME and Rev exerted a positive influence on all its indicators. It can be noted that only the influence of Case on Grit, as well as the influence of ME on Rev, is statistically significant.

To further corroborate the results in Table 9, Table 11 shows the goodness of fit measures. It can be observed in the results that the model

fit values were not in the allowable range of the different fit indices as shown by (CMIN/DF > 3.0, CMIN P < 0.05), (NFI, TLI, CFI, and GFI < .95), and RMSEA > 0.08 with a PCLOSE < 0.05. This would imply that the model does not fit the data.

Table 9. Notes for Hypothesized Model 1

1. Number of distinct sample moments	171
2. Number of distinct parameters to be estimated:	40
3. Degrees of freedom (171 - 40)	131
4. Chi-square	275.982
5. Degrees of freedom	131
6. Probability level	<0.001

Table 10. Estimates in Hypothesized Model 1

Path			Estimate	S.E.	C.R.	P	Label
Grit	<---	ME	-.037	.022	-1.668	.095	NS
Grit	<---	Case	.097	.038	2.580	.010	S
Rev	<---	ME	3.518	1.069	3.291	.001	S
Rev	<---	Grit	7.474	4.586	1.630	.103	NS
Rev	<---	Case	-.741	.665	-1.114	.265	NS
M1	<---	ME	1.000				
M2	<---	ME	1.577	.529	2.982	.003	S
M3	<---	ME	3.227	.962	3.356	***	S
M4	<---	ME	4.462	1.249	3.572	***	S
M5	<---	ME	2.916	.880	3.312	***	S
M6	<---	ME	2.757	.841	3.277	.001	S
R3	<---	Rev	1.000				
R2	<---	Rev	.757	.181	4.174	***	S
R1	<---	Rev	.912	.184	4.966	***	S
G8	<---	Grit	1.000				
G7	<---	Grit	1.129	.349	3.234	.001	S
G6	<---	Grit	.437	.436	1.003	.316	NS
G5	<---	Grit	-.136	.374	-.363	.717	NS
G4	<---	Grit	1.553	.410	3.785	***	S
G3	<---	Grit	.124	.330	.374	.708	NS
G2	<---	Grit	.467	.435	1.075	.282	NS
G1	<---	Grit	.261	.268	.971	.332	NS

Note: S=significant at p<0.05; NS=not significant at p<0.05

Table 11. Goodness of Fit Measures of Hypothesized Model 1

Index	Criterion	Model Fit Value
1. CMIN/DF	< 3.00	2.107
2. CMIN P	> 0.05	0.000
3. NFI	> 0.95	0.430
4. TLI	> 0.95	0.488
5. CFI	> 0.95	0.562
6. GFI	> 0.95	0.584
7. RMSEA	< 0.08	0.210
8. PCLOSE	> 0.05	0.000

Hypothesized Model 2. Revalidation examination scores can be influenced directly by monthly examination scores (Figure 2). This hypothesis was based on the results of the study shown in Tables 5 and 6 which were corroborated by the findings in Table 9, demonstrating that monthly examinations scores would significantly predict the revalidation examination scores of the respondent.

Table 12 shows the notes for Hypothesized Model 2. The chi-square value of 24.474 with 21 degrees of freedom is significant at the .05 level: its p-value is 0.112. This finding suggests that model fits the data acceptably in the population from which the study drew its sample.

Table 13 shows the estimates among paths shown in Hypothesized Model 2. The paths and the corresponding estimate of the variables were analyzed as follows: ME exerted a positive influence on Revalidation (β=1.120); ME exerted a positive influence on all its indicators; and Revalidation exerted a positive influence on all its indicators. All paths in Hypothesized Model 2 were statistically significant.

To further corroborate the results in Table 12, Table 14 shows the goodness of fit measures. It can be observed in the results that all model fit values have successfully met the criteria set by each index (CMIN/DF < 3.0, CMIN P > 0.05), (NFI, TLI, CFI, and GFI > .95), and RMSEA < 0.08 with a PCLOSE > 0.05. This would mean that the model fits well with the data.

Table 12. Notes for Hypothesized Model 2

1. Number of distinct sample moments	45
2. Number of distinct parameters to be estimated:	24
3. Degrees of freedom (171 - 40)	21
4. Chi-square	24.474
5. Degrees of freedom	21
6. Probability level	0.112

Table 13. Estimates in Hypothesized Model 2

Path			Estimate	S.E.	C.R.	P	Label
Rev	<---	ME	1.120	.147	7.637	***	S
M5	<---	ME	1.000				S
M4	<---	ME	1.568	.194	8.096	***	S
M3	<---	ME	1.189	.159	7.481	***	S
M2	<---	ME	.623	.102	6.093	***	S
M1	<---	ME	.351	.073	4.829	***	S
M6	<---	ME	1.053	.113	9.352	***	S
R1	<---	Rev	1.000				S
R2	<---	Rev	.913	.075	12.236	***	S
R3	<---	Rev	1.012	.164	6.153	***	S

Note: S=significant at p<0.05; NS=not significant at p<0.05.

Table 14. Goodness of Fit Measures of Hypothesized Model 2

Index	Criterion	Model Fit Value
1. CMIN/DF	< 3.00	3.231
2. CMIN P	> 0.05	0.067
3. NFI	> 0.95	0.961
4. TLI	> 0.95	0.971
5. CFI	> 0.95	0.956
6. GFI	> 0.95	0.981
7. RMSEA	< 0.08	0.010
8. PCLOSE	> 0.05	0.056

Conclusion

Based on the findings of the study, the following conclusions are drawn:

1. The total mean of indicators in monthly examination obtained 31.64 with an SD of 14.35. The respondents scored the highest in Radiologic Physics, Equipment and Maintenance and they obtained the lowest score in Quality Assurance and Quality Control.
2. Majority of the respondents scored high in case study.
3. The overall mean grit level of the respondents demonstrated a descriptive equivalent of moderate which means that they are moderately gritty.
4. The overall revalidation examination scores of the respondents is low.
5. There is a significant relationship and strong correlation between monthly examination and revalidation examination. Meanwhile, there is no significant relationship between revalidation examination score and case study score; between revalidation examination score and grit level; between grit level and monthly examination score; and between grit level and case study score.
6. The significant predictor monthly examination score positively influence the revalidation examination score. On the other hand, the case study scores and level of grit exerted a negative influence on revalidation examination score.
7. The monthly examination scores exerted a negative influence on the level of grit whereas the case study predictor exerted a positive influence on the level of grit.
8. The null hypothesis that states, "There is no significant relationship between monthly examination and revalidation examination score" was rejected. The best fit model of revalidation examination score of Radiologic Technology interns is Hypothesized Model 2 which states that revalidation examination can be directly influenced by monthly examination score.

Recommendation

With the findings and conclusion derived from the data of this study, the following are hereby recommended by the researchers:

1. School Administration. In accordance to significant variables revealed in the study, since monthly examination strongly and directly predicts the revalidation examination, it is recommended that the program head, faculty and clinical instructors should consider this variable in drafting policies related on improving the academic performance of Radiologic Technology interns as well as in the enhancement of internship training program. Planning and providing the necessary actions or interventions regarding the positive influence exerted by monthly examination could minimize the failure rate of students. Comprehensive review enhancement program is therefore recommended by the researchers. Continuance of the implemented weekly review sessions supported by a more intellectually challenging examination based on the identified indicators of monthly examination could contribute to the increase of grand total mean which will imply high result on revalidation. It is also better if the 3rd year students, who are the incoming interns, will be included in the enhancement program in order to prepare them in advance.
2. Radiologic Technology Interns. Since the overall performance of Radiologic technology interns is low with special emphasis on written revalidation examination area, student interns of this batch should reflect on this result and inculcate the idea of improving their knowledge and skills both in theory and professional practice as this may predict their future performance in RTLE.
3. Researchers. The findings of this study provide insights into the influencing factors of revalidation examination. The results can be used as secondary data for future related research. However, since this study is new and novel, corroboration with other study findings specific to Radiologic Technology is not possible. To verify the result obtained in hypothesized model 1, further research is required to establish an affirmative correlation between Case-Study Analysis, Grit Level, and Revalidation Examination. Since the sample size is limited only to 26 BS-RT interns, the researchers recommend to increase the sample size by conducting a

subsequent study including other RT schools in Iligan City. Other possible predictors like mentoring or teacher-related factors, student-related factors, emotional factors as well as environmental factor and availability of facility needed in practical education could be associated with the revalidation examination performance of students.

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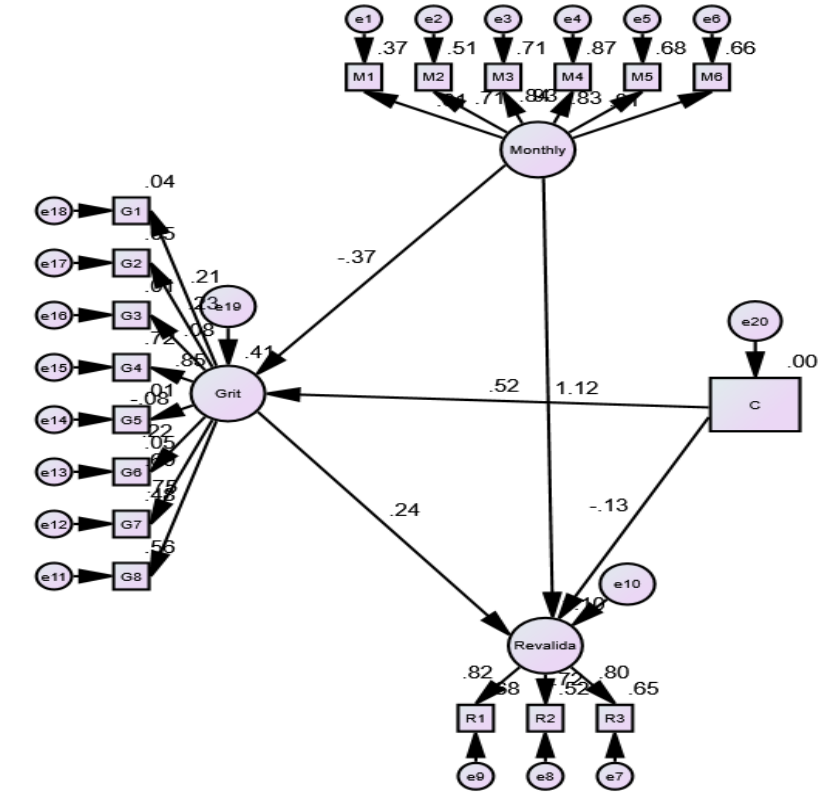

Figure 1. Hypothesized Model 1

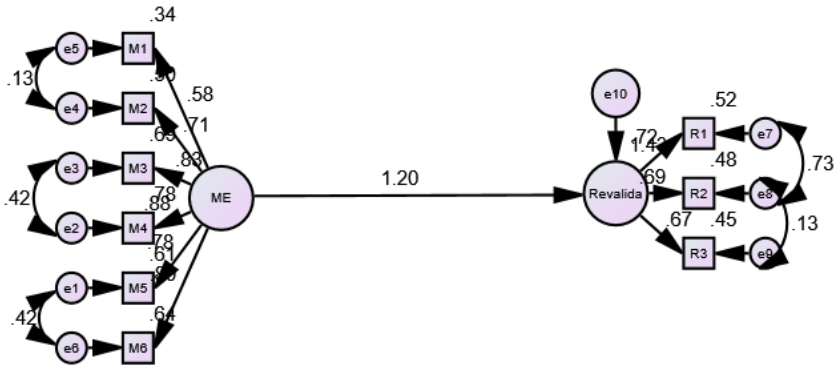

Figure 2. Hypothesized Model 2