Performance of Notre Dame of Dadiangas University - Bachelor of Science in Civil Engineering (Nddu-Bsce) Graduates in the Civil Engineers' Licensure Examination

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DOI: https://dx.doi.org/10.47772/IJRISS.2025.91100163

Received: 21 November 2025; Accepted: 28 November 2025; Published: 03 December 2025

ABSTRACT

This study evaluates the performance of Bachelor of Science in Civil Engineering (BSCE) graduates from Notre Dame of Dadiangas University (NDDU) in the Civil Engineers' Licensure Examinations conducted from November 2008 to November 2017. The primary objective is to identify the strengths and weaknesses of the graduates in specific licensure exam subjects, analyze trends in passing rates across different batches, and propose strategies to improve future performance. The study utilized secondary data from official university records, including mean board ratings, subject-specific performance, and overall pass/fail outcomes.

The findings revealed that Mathematics and Structural Design and Construction Engineering were consistently challenging subjects for NDDU graduates, while Hydraulics and Geotechnical Engineering showed stronger performance. The study also found that the mean passing percentage varied significantly between first-time takers and repeaters, with first-time takers generally performing better. However, the overall passing percentage of NDDU graduates was lower when repeaters were included, underscoring the need for improved support for these students.

Furthermore, the Analysis of Variance (ANOVA) test indicated that there was no significant difference in passing rates across different batches, suggesting that the overall performance has remained relatively stable over the years. Based on these results, the study proposes several strategies to improve performance, including strengthening review programs, revising the curriculum to incorporate more practical applications, enhancing faculty development, and providing targeted support for repeaters.

Overall, the study highlights both the successes and areas for improvement in NDDU's Civil Engineering program, offering actionable recommendations to increase passing rates and better prepare students for the licensure exams. The findings provide valuable insights for academic and administrative stakeholders seeking to improve the licensure exam outcomes of future graduates.

INTRODUCTION

The Problem and Its Setting

In an increasingly interconnected world, the education and licensure of engineers are critical to ensuring that the built environment meets the demands of safety, sustainability, and innovation. Across many countries, professional engineering licensure is enacted to safeguard public welfare, maintain technical standards, and ensure that practitioners are qualified to undertake responsibility for complex infrastructure and systems. Recent research highlights that engineering graduates must be equipped not only with technical knowledge but with global, multicultural, and interdisciplinary skills to operate within a rapidly evolving environment (Rawboon, 2020; Veroya, 2024).

At the international level, agreements such as the Washington Accord have sought to harmonize engineering degree recognition across participating countries, thereby underscoring the importance of licensure-readiness and accreditation in a global context. These agreements aim to ensure that engineering education meets a shared,

rigorous standard, thus enabling professionals to work anywhere in the world (Micor, Quimbo, Perez, & Ortega-Dela Cruz, 2023). Moreover, scholars argue that engineering education must shift from traditional content-centered approaches to outcomes-based frameworks that align with global workforce expectations (Paradise, 2022).

At the national level in the Philippines, the pathway to engineering practice includes completion of a recognized engineering degree, fulfillment of specified work or experience requirements, and successful performance on the licensure examination administered by the Professional Regulation Commission (PRC) (PRC, n.d.). The national regulatory environment emphasizes not simply the attainment of credentials but also the alignment of local engineering education programs with international quality standards. Engineering programs are increasingly evaluated on their compliance with quality assurance and accreditation systems in the Philippines (Rawboon, 2020).

At the local level, the performance of graduates from specific institutions in the licensure examination serves as a key indicator of the effectiveness of their engineering curriculum and the capacity of the institution to prepare students for professional practice. Studies on Philippine engineering education demonstrate that licensure examination performance is a meaningful proxy for curricular quality and institutional competitiveness (Micor et al., 2023). Despite advancements in engineering education, significant variances remain in licensure pass rates, subject-area weaknesses, and the extent to which graduates possess the competencies demanded by employers (Ng & Lojo, 2023).

While existing research highlights the correlation between engineering education and licensure exam performance, gaps remain in understanding how specific institutional factors, such as teaching methods, curriculum design, and support systems, directly influence the outcomes of licensure examinations at the local level. Studies have primarily focused on the general performance of graduates across different regions (Ng & Lojo, 2023; Veroya, 2024), but few have examined the detailed performance trends within individual institutions or how specific educational interventions impact licensure success. Furthermore, research has shown that while licensure exams are used as a measure of program quality, the exact areas of curriculum that need enhancement are not well-documented in the context of Philippine engineering programs (Rawboon, 2020).

Additionally, much of the available literature has addressed general engineering disciplines or has focused on national averages, leaving a gap in understanding the specific challenges faced by Civil Engineering graduates in licensure exams (Micor et al., 2023). Therefore, this study aims to address these gaps by investigating the performance of Civil Engineering graduates from Notre Dame of Dadiangas University (NDDU) in the Civil Engineers' Licensure Examination, identifying key areas of weakness, and exploring how institutional strategies can contribute to improved outcomes.

Given these gaps, this study will provide insights into the factors affecting licensure performance at the institutional level and propose targeted interventions that can enhance the quality of education and improve student outcomes in future licensure exams.

LITERATURE REVIEW

The Literature Review for this study explores previous research and theories surrounding the performance of Civil Engineering graduates in licensure examinations. The review addresses the primary areas of the study: trends in licensure exam performance, subject-specific weaknesses, institutional strategies for improving performance, and the relationship between curriculum and licensure outcomes. By examining past studies, the review identifies gaps in the existing body of knowledge and provides a framework for the current study, which aims to assess the performance of Notre Dame of Dadiangas University (NDDU) Civil Engineering graduates in licensure exams and propose strategies for improvement.

Trends in Licensure Exam Performance

Recent studies indicate that licensure exam performance is an important indicator of both the quality of educational programs and the preparedness of graduates to enter professional practice. Various studies have noted that while some institutions have consistently achieved high passing rates, others struggle to meet national

standards. For instance, in the Philippines, research shows a fluctuation in passing rates between cohorts, with the performance of repeaters often impacting the overall success of engineering programs (Micor et al., 2023).

A study by Ng and Lojo (2023) further elaborates on the challenges faced by graduates of engineering programs, highlighting that despite technological advancements and curriculum reforms, certain cohorts continue to underperform, suggesting a need for more targeted educational strategies. Additionally, recent analyses by Veroya (2024) demonstrated that while licensure examinations offer a standardized measure of competency, they do not always reflect the effectiveness of specific teaching methods, suggesting that localized research is crucial to understanding performance trends.

Subject-Specific Weaknesses

Subject-specific weaknesses have been a common issue for Civil Engineering graduates in licensure exams. Performance gaps are particularly noticeable in areas such as Mathematics, Structural Design, and Geotechnical Engineering. For example, studies have identified that many engineering graduates, particularly in the Philippines, perform poorly in subjects that require higher-order problem-solving skills, such as Structural Design (Rawboon, 2020). This has been attributed to gaps in practical knowledge, insufficient training in real-world application, and inadequate instructional materials (Micor et al., 2023).

Furthermore, Hydraulics and Geotechnical Engineering, which are critical areas of civil engineering, have also been reported as weak points for graduates in various national studies (Ng & Lojo, 2023). In some cases, performance is impacted by outdated curricula that fail to incorporate the latest industry practices (Rawboon, 2020). A recent study by Paradise (2022) also emphasized the importance of hands-on learning experiences to reinforce theoretical knowledge and bridge these gaps.

Institutional Strategies for Improving Performance

Institutional strategies are critical for improving licensure exam performance, particularly in institutions with lower passing rates. Effective interventions, such as faculty development programs, targeted review sessions, and improvements in curriculum design, have been shown to positively influence student outcomes in licensure exams. Micor et al. (2023) highlighted the effectiveness of curriculum reforms and faculty training in improving student performance, noting that programs that incorporate practical assessments and industry-based projects yield better results in licensure exams.

Rawboon (2020) proposed that creating a structured support system for students, such as mentoring programs, counseling services, and peer-assisted learning opportunities, could help address the academic and emotional challenges that students face leading up to the exams. Similarly, Ng and Lojo (2023) found that institutions that introduced intensive pre-board review programs saw a marked improvement in licensure exam results, underscoring the importance of timely and focused review sessions.

Relationship Between Curriculum and Licensure Outcomes

The relationship between curriculum design and licensure exam performance is well-documented in the literature. Outcome-based education (OBE) frameworks, which focus on measuring student competencies rather than simply course completion, have been identified as effective in preparing students for licensure exams. According to Veroya (2024), engineering programs that align their curricula with licensure exam content and integrate experiential learning experiences produce graduates who are better equipped for professional practice.

Moreover, research suggests that curriculum updates, especially those that incorporate emerging technologies and practices in civil engineering, contribute significantly to improved student performance in licensure exams. A study by Paradise (2022) demonstrated that institutions that continually update their teaching materials to reflect the latest engineering developments show higher pass rates in licensure exams.

Conclusion of Literature Review

The existing literature indicates that licensure exam performance is influenced by various factors, including curriculum design, subject-specific knowledge gaps, and institutional strategies. While national trends provide

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue XI November 2025

an overall picture of engineering education, localized research focused on individual institutions, such as this study on NDDU's Civil Engineering program, is crucial for identifying specific weaknesses and implementing effective improvements. The current study seeks to fill this gap by evaluating the performance of NDDU graduates in the Civil Engineers' Licensure Examination and proposing targeted strategies to enhance exam outcomes.

Conceptual Framework

The conceptual framework for this study is designed to explore and determine the factors influencing the performance of Bachelor of Science in Civil Engineering (BSCE) graduates from Notre Dame of Dadiangas University (NDDU) in the Civil Engineers' Licensure Examinations conducted from November 2008 to November 2017. The framework focuses on key areas, including the graduates' performance in various licensure exam subjects, the institution's mean passing percentage, batch comparisons over time, and the potential strategies to improve future passing rates.

The first variable, Graduate Performance in Board Subjects, investigates the strengths and weaknesses of graduates in the specific subjects tested in the licensure examination. This helps identify which subjects the students excel in and which ones they struggle with. Identifying these areas of weakness, such as Structural Design, Mathematics, or Geotechnical Engineering, allows the institution to implement targeted interventions and support programs to strengthen students' competencies in these areas.

The second variable, Mean Passing Percentage, reflects the overall success rate of NDDU graduates in the Civil Engineers' Licensure Examinations from 2008 to 2017. By analyzing the passing rates of graduates, this variable provides an overall view of the effectiveness of the curriculum and support systems in preparing students for the licensure exam. It also serves as a benchmark to assess NDDU's performance compared to other institutions.

The third variable, Batch Comparison in Passing Rates, examines if there is a significant difference in the passing rates between different graduating batches. This analysis seeks to identify whether any cohorts performed better or worse in the licensure exams due to changes in curriculum, teaching methods, faculty, or external factors. A statistical comparison of passing rates between batches will help to assess the impact of such variables on exam outcomes.

Finally, the Institutional Strategies and Policies for Improving Performance are examined. This variable explores the policies and strategies that NDDU can implement to increase the licensure exam passing rates. Such strategies might include review programs, faculty development initiatives, curriculum reforms, and additional mentorship or peer support systems. These interventions are aimed at improving students' preparedness for the licensure exams and addressing weaknesses identified in the first three variables.

The Licensure Exam Performance is the dependent variable, representing the ultimate outcome of the study. It will be assessed through pass rates, subject-specific performance, and overall success in the Civil Engineers' Licensure Examination. The study aims to determine how these factors—subject-specific weaknesses, passing percentage, batch comparisons, and institutional strategies—affect licensure exam performance and propose actionable recommendations for improving future outcomes.

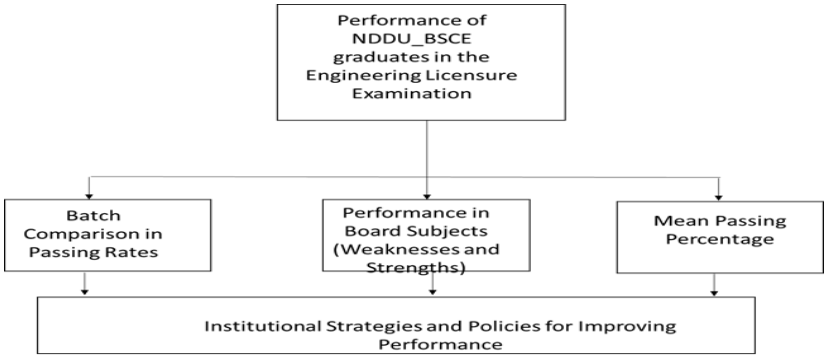

Figure 1. Conceptual Framework

Statement of the Problem

This study aims to assess the performance of Bachelor of Science in Civil Engineering (BSCE) graduates from Notre Dame of Dadiangas University (NDDU) in the Civil Engineers' Licensure Examinations conducted between November 2008 and November 2017. By evaluating various factors contributing to licensure success, the study seeks to provide a comprehensive understanding of the strengths and weaknesses of NDDU graduates and identify strategies for improving licensure outcomes. Specifically, this research aims to determine the following:

1. The board subjects in which the graduates demonstrated general strengths or weaknesses on their first attempt at the licensure examination;
2. The mean passing percentage per subject per batch of NDDU graduates in CE Licensure Examinations.
3. The mean passing percentage of NDDU graduates in the Civil Engineers' Licensure Examinations over the studied period;
4. Whether there is a significant difference in the passing rates of NDDU graduates across different graduation batches;
5. The policies and strategies that could be implemented to increase the passing rate of future graduates.

This investigation will not only evaluate the historical performance of NDDU graduates but also propose actionable recommendations for improving future licensure exam outcomes.

Scope and Delimitations

This study focuses on evaluating the performance of Bachelor of Science in Civil Engineering (BSCE) graduates from Notre Dame of Dadiangas University (NDDU) in the Civil Engineers' Licensure Examinations conducted from November 2008 to November 2017. The primary objective of the study is to assess the factors influencing the licensure exam performance of NDDU graduates, including subject-specific strengths and weaknesses, overall passing percentages, variations in passing rates across different graduation batches, and potential strategies for improving licensure outcomes. Specifically, the study aims to analyze the graduates' performance in board subjects, calculate the mean passing percentage over the period, examine any significant differences in passing rates between different batches, and propose policies and strategies to increase future passing rates. The study will rely on secondary data obtained from official records of NDDU graduates who participated in the licensure exams during the defined period, with an emphasis on academic factors, institutional strategies, and exam outcomes.

The delimitations of the study include several constraints that define its boundaries. First, the research is limited to graduates of NDDU and focuses exclusively on their performance in the Civil Engineers' Licensure Examinations from 2008 to 2017, excluding graduates from other years or institutions. Additionally, the study examines only board exam subjects and does not address other assessments or performance indicators outside of the licensure exams. Although the study will consider performance differences between graduate cohorts, it will not delve into individual student factors, such as personal study habits, work experience, or participation in external review programs, which may also influence exam outcomes. Furthermore, the study will not explore qualitative aspects such as feedback from students or faculty on curriculum design or teaching methods, as it is based on aggregate performance data. Lastly, the study's scope is confined to the licensure exam performance of NDDU graduates, excluding other professional certifications or related academic assessments.

These delimitations help ensure that the study remains focused on the key research questions while acknowledging the boundaries of the investigation in terms of time, scope, and institutional context.

Significance of the Study

This study is significant to various stakeholders who have a direct or indirect interest in the performance of Bachelor of Science in Civil Engineering (BSCE) graduates from Notre Dame of Dadiangas University (NDDU)

in the Civil Engineers' Licensure Examinations. The findings of this research will provide insights that could benefit the university, students, faculty, policymakers, and the broader community. The significance of this study is outlined below, starting from the most immediate stakeholders to those indirectly affected.

1. NDDU Civil Engineering Graduates

The study directly benefits NDDU Civil Engineering graduates, as it provides a comprehensive evaluation of their performance in licensure exams. By identifying strengths and weaknesses in board subjects, the study offers valuable feedback that can guide future cohorts and assist them in preparing more effectively for the licensure exams.

2. Future NDDU Civil Engineering Students

For prospective students, this research can highlight areas of improvement in the Civil Engineering program at NDDU. Understanding which subjects present challenges will help students focus their efforts and improve their performance in future licensure exams, thereby increasing their chances of success.

3. Faculty Members of the Civil Engineering Program

Faculty members will benefit from the findings by gaining insights into the areas where students are struggling the most. This feedback can inform faculty teaching strategies, allowing them to adjust their approach, improve course content, and provide additional support in areas where students exhibit consistent weaknesses.

4. NDDU Administration

The university administration plays a key role in curriculum design and student support services. The study's findings will provide NDDU's administration with data to inform decisions on possible curriculum reforms, faculty training, and the implementation of support mechanisms to improve licensure exam performance.

5. Curriculum Development and Accreditation Bodies

Accreditation bodies and curriculum developers can use the results of this study to assess the effectiveness of the Civil Engineering program at NDDU. The research highlights the alignment of the current curriculum with licensure exam requirements and provides valuable input for refining the curriculum to meet the needs of the licensure exam and industry standards.

6. Policymakers and Educational Authorities

Policymakers in education can use the findings to better understand the trends in licensure exam performance and the effectiveness of institutional support programs. This study could inform national educational policies on licensure exam preparation, especially in technical and engineering programs, leading to initiatives that improve overall pass rates nationwide.

7. Engineering Employers and Industry Stakeholders

Engineering firms and industry stakeholders will find this study valuable as it highlights the preparedness of NDDU graduates for professional practice. The findings can help employers understand the skill gaps that may exist in graduates, guiding them in shaping hiring practices and training programs for new engineers entering the workforce.

8. Parents and Families of Students

For the families of current and future NDDU Civil Engineering students, this research provides insights into the strengths and weaknesses of the program, allowing them to support their children more effectively in their academic and professional journeys. The results of the study can reassure parents about the university's efforts to improve licensure exam performance.

9. Local Government and Regional Stakeholders

The local government and regional development agencies may benefit from the study's insights, particularly if they focus on improving local educational standards or boosting professional development in the engineering sector. By supporting initiatives that increase licensure exam pass rates, they can help foster a more competent and competitive workforce.

10. The Broader Society and Community

Finally, society as a whole benefits from a higher standard of engineering education and professional practice. As NDDU graduates perform better in licensure exams and become more qualified professionals, their contributions to infrastructure development, public safety, and technological advancements will have a direct positive impact on the community and the nation as a whole.

In conclusion, the findings of this study are essential to a wide range of stakeholders, from current students to national educational bodies, and will provide actionable recommendations to improve licensure exam performance, enhance educational programs, and strengthen the overall professional development of future engineers.

METHODOLOGY

The methodology for this study is designed to assess the performance of Bachelor of Science in Civil Engineering (BSCE) graduates from Notre Dame of Dadiangas University (NDDU) in the Civil Engineers' Licensure Examinations. This section outlines the research design, participants, data collection methods, data analysis techniques, and ethical considerations that will guide the study. The methodology is developed to answer the research questions concerning the performance of NDDU graduates, including subject-specific weaknesses, overall passing percentages, batch comparisons, and strategies for improving licensure success.

Research Design

This study adopts a descriptive research design, which aims to describe the licensure exam performance of NDDU graduates across multiple years. The research will use quantitative methods to analyze the performance data of students who took the Civil Engineers' Licensure Examinations. The study will specifically focus on the first-time takers of the licensure examination from NDDU within the period of November 2008 to November 2017. Descriptive statistics will be employed to summarize the overall licensure performance, while comparative analysis will be used to assess differences in passing rates between different batches. Additionally, this research aims to identify trends and relationships between subject-specific weaknesses and overall licensure success.

Selection of Respondents

The respondents for this study will consist of BS Civil Engineering graduates from Notre Dame of Dadiangas University (NDDU) who participated in the Civil Engineers' Licensure Examinations between November 2008 and November 2017. The study will specifically focus on graduates who took the licensure exam for the first time within this period, ensuring that the data reflects the initial exam performance of NDDU graduates. Only those who graduated with a Bachelor of Science in Civil Engineering from NDDU and took the licensure exam for the first time during the study timeframe will be included in the sample.

Graduates who did not take the licensure exam or those who took the exam multiple times (repeaters) will be excluded from the study. Additionally, respondents whose licensure exam data, including subject-specific scores or overall exam results, are incomplete or unavailable in NDDU's official records will also be excluded.

This study will employ a total enumeration sampling technique, meaning all eligible graduates who meet the inclusion criteria will be included in the analysis. As the study utilizes secondary data from NDDU's official records, there is no need for random sampling. The sample size will include all first-time licensure exam takers from the specified period, and the number of respondents will depend on the available data in NDDU's records.

By focusing on first-time takers and utilizing existing licensure exam data, the study ensures that the results provide a comprehensive and accurate analysis of the performance of NDDU Civil Engineering graduates in their licensure exams.

Research Instruments

The research instruments for this study are primarily based on secondary data and document analysis, which will be used to assess the performance of BS Civil Engineering graduates from Notre Dame of Dadiangas University (NDDU) in the Civil Engineers' Licensure Examinations conducted between November 2008 and November 2017. These instruments will help address the study's objectives, which include identifying graduates' strengths and weaknesses in board subjects, calculating the mean passing percentage, analyzing batch differences in passing rates, and proposing policies and strategies for improving licensure exam outcomes.

The primary research instrument will be secondary data collected from official records maintained by NDDU. These records will provide essential information about each graduate, such as their name, graduation year, subject-specific scores, and their overall performance in the licensure exam (i.e., pass or fail). This data will also include subject-specific performance that identifies areas where graduates were strong or weak, such as Structural Design, Mathematics, or Geotechnical Engineering. These performance indicators are crucial for understanding the challenges students face and where improvements can be made.

In addition to the primary data, document analysis will be used to examine institutional policy documents and curriculum guidelines related to licensure exam preparation. This will include reviewing any review programs, faculty development initiatives, and strategies that have been implemented by NDDU to improve student success in the licensure exam. The document analysis will provide insights into whether institutional strategies have been aligned with the licensure exam requirements and if they have been effective in addressing the weaknesses identified in the graduates' performance.

To analyze the data, the study will employ statistical analysis tools. Descriptive statistics will be used to summarize the overall licensure exam performance of NDDU graduates, including calculating the mean passing percentage and evaluating subject-specific performance. One-Way Analysis of Variance (ANOVA) will be applied to determine if there are any significant differences in passing rates between different graduating batches. This will help assess whether institutional factors, such as changes in curriculum or faculty involvement, have had an impact on licensure exam outcomes. Correlation analysis will also be used to explore the relationship between subject-specific weaknesses and overall licensure success, helping to identify if certain areas of weakness consistently correlate with a higher likelihood of failing the exam.

Overall, the combination of secondary data, document analysis, and statistical analysis will provide a robust methodology for evaluating the performance of NDDU graduates in the licensure examinations. These instruments will help the study address the research questions and offer actionable recommendations for improving licensure exam performance at NDDU.

Data Gathering Procedure

The data gathering procedure for this study will be systematic and organized to ensure the accurate collection of relevant data regarding the performance of BS Civil Engineering graduates from Notre Dame of Dadiangas University (NDDU) in the Civil Engineers' Licensure Examinations between November 2008 and November 2017. The process will involve obtaining secondary data from official university records, analyzing licensure exam results, reviewing relevant documents, and applying statistical methods to assess and interpret the data. The steps of

Data Analysis

The data analysis for this study will involve a systematic approach to interpreting the collected data and addressing the research questions related to the performance of BS Civil Engineering graduates from Notre Dame of Dadiangas University (NDDU) in the Civil Engineers' Licensure Examinations between November

2008 and November 2017. The analysis will focus on evaluating subject-specific weaknesses, calculating the mean passing percentage, analyzing the differences in passing rates across different batches, and identifying policies and strategies for improving licensure exam outcomes.

To begin with, descriptive statistics will be used to summarize the data and provide a clear overview of the licensure exam performance. The mean passing percentage will be calculated to determine the overall success rate of NDDU graduates in the licensure exams over the study period. This will give insight into the general performance of the graduates. Additionally, subject-specific performance will be analyzed to identify areas where students are performing well and areas where they are struggling. By calculating the average scores in each subject, such as Structural Design, Mathematics, and Geotechnical Engineering, the study will highlight strengths and weaknesses, enabling the identification of subjects that need targeted interventions.

Next, comparative analysis will be conducted to determine if there is a significant difference in the passing rates between different batches of graduates. The study will use One-Way Analysis of Variance (ANOVA) to assess if passing rates vary significantly between different cohorts. ANOVA will allow the study to identify whether changes in curriculum, faculty, or teaching methods across years have had an impact on licensure exam performance. If significant differences are found, post-hoc tests will be performed to pinpoint the specific batches that have differing performance levels.

In addition to quantitative data analysis, the study will include a review of institutional policies and strategies aimed at improving licensure exam performance. Document analysis will be conducted to evaluate the effectiveness of past and current review programs, curriculum updates, and faculty development initiatives at NDDU. This will provide insight into whether the existing strategies are aligned with best practices for licensure exam preparation and where improvements may be needed.

Finally, the results of the data analysis will be interpreted to address the research questions. The study will focus on identifying trends and patterns in graduates' performance, understanding the key factors contributing to licensure exam success or failure, and proposing recommendations for improving future licensure outcomes. By interpreting the findings, the study will provide actionable insights that can help NDDU improve its licensure exam preparation programs, support mechanisms for students, and overall academic performance in future cohorts.

In conclusion, the data analysis will combine descriptive statistics, comparative analysis, correlation analysis, and document analysis to thoroughly evaluate the performance of NDDU Civil Engineering graduates in the Civil Engineers' Licensure Examinations. This multi-faceted approach will allow for a comprehensive understanding of the factors influencing licensure exam success and help propose effective strategies to improve performance moving forward.

Ethical Considerations

Ethical considerations are crucial to ensuring the integrity, transparency, and respect for participants' rights throughout the study. This research involves the analysis of secondary data from the Civil Engineers' Licensure Examinations taken by BS Civil Engineering graduates from Notre Dame of Dadiangas University (NDDU). Several ethical guidelines will be adhered to in this study to maintain privacy, confidentiality, and objectivity.

First, confidentiality will be maintained at all times. Personal information of graduates, such as their names and any other identifiable data, will be kept confidential. The data used in the study will be de-identified to ensure that individual students cannot be traced. Only aggregate data will be analyzed and reported, ensuring that the identities of graduates are not disclosed. Data will be shared with relevant academic staff or external reviewers in compliance with privacy standards, and access will be limited to those directly involved in the research process.

While the study relies on secondary data, informed consent will be sought from the university to access the records, in accordance with NDDU's guidelines on the use of institutional data. If any new primary data is collected (such as surveys or interviews with faculty), participants will be fully informed about the purpose of

the study, how their data will be used, and their right to withdraw at any point without penalty. This ensures that ethical standards are maintained throughout the data collection process.

The study will also prioritize transparency and integrity in all aspects. The methodology, data collection process, and analysis techniques will be clearly outlined, and the findings will be reported honestly and without manipulation. The researcher will ensure that all sources, including institutional records, are properly cited, and that all data interpretations are rooted in the evidence collected. The goal is to maintain objectivity and provide a clear, accurate picture of licensure exam performance without bias.

In terms of non-bias and objectivity, the study will avoid any personal or institutional biases. All data will be analyzed impartially, with the results presented based solely on the data obtained. The researcher will use statistical methods to ensure that the analysis is as objective as possible, refraining from subjective interpretations or assumptions. The goal is to provide an unbiased evaluation of NDDU's licensure exam performance.

Given that this study relies on secondary data, it is essential to ensure its ethical use. The researcher will adhere to NDDU's guidelines regarding the access and use of student records. All data will be securely stored and accessed only by the researcher. The data will be used solely for the purposes of this study, ensuring that it is not misused or disclosed without proper consent.

Throughout the study, the researcher will maintain accountability by documenting all aspects of the research process. Any changes to the methodology or ethical procedures will be noted and justified to ensure that the research is conducted in a responsible and transparent manner. The study will be carried out in full compliance with NDDU's ethical standards, and necessary approvals will be obtained before accessing any student data.

Lastly, the study will respect all institutional policies related to the use of student records. The researcher will ensure that all required permissions are obtained from NDDU, and if faculty or administrative staff participate in the study, their involvement will be voluntary, and their roles will be clearly defined to prevent conflicts of interest.

By adhering to these ethical considerations, the study aims to ensure confidentiality, integrity, and fairness throughout the research process. This approach will help build trust among participants, stakeholders, and the academic community, ensuring that the findings are credible and can be used to improve the licensure exam performance of NDDU's Civil Engineering graduates.

RESULTS AND DISCUSSIONS

The Results and Discussion section presents an analysis of the data collected regarding the performance of NDDU BS Civil Engineering graduates in the Civil Engineers' Licensure Examinations. The study evaluates several key aspects, including the graduates' strengths and weaknesses in specific board subjects, the overall passing percentages, the comparison of passing rates across different batches, and the effectiveness of institutional policies and strategies. The findings are based on the analysis of licensure exam results from 2008 to 2017, with additional insights drawn from historical performance trends and the examination of potential factors influencing student success. This section provides a comprehensive discussion of the results, linking them to existing literature and offering recommendations for improving licensure exam outcomes. Each aspect of the analysis is explored in detail to provide a clearer understanding of the factors affecting performance and to propose actionable strategies for enhancing future graduates' success in the licensure exams.

Statement of the Problem 1:

The board subjects the graduates were generally weak or strong at in their first take.

Table 1. Mean Rating of Takers per Board Subject Areas

Board Subjects	No. of Takers (n)	Mean Rating	Minimum Rating	Maximum Rating
Mathematics & Surveying	92	71.57	11	91

Hydraulics and Geotechnical Eng'g	92	78.67	17	98
Structural Design & Construction Eng'g	92	68.95	24	90

The results in Table 1, which show the mean ratings of NDDU graduates in different board subjects, provide key insights into the areas where students excelled and where they faced difficulties in their first attempt at the Civil Engineers' Licensure Examinations. The analysis reveals that Hydraulics and Geotechnical Engineering were the subjects where graduates performed the best, with a mean rating of 78.67%, while Structural Design and Construction Engineering presented the most challenges, with a mean rating of 68.95%. Mathematics and Surveying had a mean rating of 71.57%, indicating a moderate level of difficulty.

The strong performance in Hydraulics and Geotechnical Engineering suggests that students excelled in applied engineering concepts related to water systems and soil mechanics. These subjects often involve real-world problem solving, which may have aligned with the practical training and educational experiences of NDDU students. Geotechnical Engineering, in particular, has been identified as an area where students can often perform well due to its practical nature (Ng & Lojo, 2023).

On the other hand, Structural Design and Construction Engineering exhibited the weakest performance, with a mean rating of 68.95%. This result highlights a persistent difficulty for students in this area. Structural Design is a subject that requires a deep understanding of dynamic systems, nonlinear analysis, and complex problem-solving, which are often seen as challenging for engineering students (Paradise, 2022). The complexity and abstract nature of these topics require students to apply foundational engineering principles in advanced ways, which can contribute to the lower scores observed.

Mathematics and Surveying, with a mean rating of 71.57%, showed moderate difficulty for NDDU graduates. Mathematics is foundational in engineering, but it remains one of the most challenging areas for students across many engineering disciplines. Recent studies have shown that struggles with mathematics are common in engineering education, due to the advanced problem-solving skills required (Veroya, 2024). Surveying, while practical, requires precise calculations and application of theoretical knowledge to fieldwork, which can also contribute to performance variability.

In conclusion, the results indicate that Hydraulics and Geotechnical Engineering were strengths for NDDU graduates, while Structural Design and Mathematics were areas of weakness. The findings underscore the need for targeted interventions, such as focused review sessions in Mathematics and Structural Design, practical exposure through enhanced On-the-Job Training (OJT), and the incorporation of advanced problem-solving techniques and real-world scenarios in the curriculum. Addressing these weaknesses will help improve the licensure exam outcomes for future cohorts of NDDU graduates.

Statement of the Problem 2:

The mean passing percentage per subject per batch of NDDU graduates in CE Licensure Examinations.

The analysis of the mean passing percentage for NDDU graduates in the Civil Engineers' Licensure Examinations from November 2008 to November 2017 revealed significant variations in performance across different years and subjects. Each batch highlighted trends in how graduates performed in specific subjects, with some subjects consistently showing stronger performance and others indicating persistent weaknesses.

For Batch 2008, the weakest performance was observed in Mathematics and Surveying, with a mean board rating of 67.62%, followed by Hydraulics and Geotechnical Engineering at 69.50%. The highest mean rating was recorded in Structural Design and Construction Engineering at 72.69%. This indicated that while students performed better in applied subjects like Structural Design, Mathematics remained a challenging area, suggesting the need for more intensive mathematical preparation. The performance in Structural Design and Construction Engineering, although higher than other subjects, highlighted the complexity of these topics, as described by

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue XI November 2025

Carson (2014), who explained that these areas involve dynamic, nonlinear systems that are challenging for students to grasp. Similar results were noted in Racadio et al. (2009), where many BSCE graduates showed poor performance in areas like Mathematics, Surveying, and Construction Engineering.

In Batch 2009, there was a shift in the weakest subject, with Structural Design and Construction Engineering having the lowest mean rating of 66.57%, followed by Mathematics and Surveying at 69.43%. However, Hydraulics and Geotechnical Engineering stood out as the strongest subject, with a mean rating of 80.86%. This again pointed to the challenges students face in complex design subjects, which require high-level analytical skills. The findings were consistent with the previous batch, suggesting that subjects like Structural Design remain difficult despite improvements in other areas.

There were no board takers for Batch 2010.

For Batch 2011, Structural Design and Construction Engineering emerged as the weakest subject, with a significantly low mean rating of 54.67%, followed by Mathematics and Surveying at 71.78%, and Hydraulics and Geotechnical Engineering at 72.33%. This was the lowest performance in Structural Design across all batches, which further emphasized the need for more application-based learning and reinforcement of theoretical concepts. The results again mirrored findings from Racadio et al. (2009), highlighting the continued struggle of graduates in design and mathematical subjects.

There were no board takers for Batch 2012.

For Batch 2013, the performance showed a marked improvement. The graduates of this batch had the best performance in Hydraulics and Geotechnical Engineering, with a mean rating of 81.60%, followed by Mathematics and Surveying at 77.87% and Structural Design and Construction Engineering at 74.13%. This batch demonstrated an overall better performance compared to previous years, suggesting that students in this cohort may have benefitted from enhanced review programs or improved teaching strategies. The results deviated from the trend observed in earlier batches, where Structural Design and Construction had been weaker subjects, indicating that performance can vary across different cohorts regardless of subject difficulty.

In Batch 2014, the performance was again weaker in Structural Design and Construction Engineering (mean rating of 66.53%) and Mathematics and Surveying (mean rating of 67.53%), while Hydraulics and Geotechnical Engineering showed a stronger performance (mean rating of 75.67%). These results mirrored previous trends, reinforcing the idea that Mathematics and Structural Design were consistently challenging subjects, while students excelled in Hydraulics and Geotechnical Engineering.

Batch 2015 showed an improvement compared to Batch 2014, with the weakest performance in Structural Design and Construction Engineering at 74.80%, followed by Mathematics and Surveying at 78.40%, and Hydraulics and Geotechnical Engineering with the highest mean rating of 80.60%. The results suggested that while improvement was evident, Structural Design and Construction Engineering still posed challenges for students, necessitating further emphasis on practical application in these subjects.

For Batch 2016, Structural Design and Construction Engineering remained the weakest subject with a mean rating of 69.17%, followed by Mathematics and Surveying at 75.08%. The strongest subject was Hydraulics and Geotechnical Engineering, with a mean rating of 90.00%. The consistently higher performance in Hydraulics and Geotechnical Engineering demonstrated that students had a better grasp of applied engineering concepts in these areas compared to theoretical and design-focused subjects.

Finally, Batch 2017 had similar performance results to Batch 2014, with the weakest performance in Structural Design and Construction Engineering (mean rating of 69.85%) and Mathematics and Surveying (mean rating of 69.62%). The strongest subject was again Hydraulics and Geotechnical Engineering, with a mean rating of 82.08%. These results indicated that while there was some improvement in Hydraulics and Geotechnical Engineering, the core subjects of Mathematics and Structural Design continued to present challenges for NDDU graduates.

In conclusion, the results of the mean passing percentages and subject-specific performance revealed consistent challenges for NDDU graduates in subjects such as Mathematics and Structural Design and Construction Engineering. While some cohorts showed improvement in certain subjects, the overall trends suggest a need for continued focus on enhancing understanding and application in these difficult areas. Addressing these weaknesses, particularly in Mathematics and Structural Design, may lead to better licensure exam outcomes for future NDDU graduates.

Statement of the Problem 4:

The mean passing percentage of NDDU in CE Licensure Examinations.

The analysis of the mean passing percentage for NDDU graduates in the Civil Engineers' Licensure Examinations from November 2008 to November 2017 showed that the overall passing percentage varied significantly across the years. The passing rates for first-time takers were higher than for repeaters, but when the percentage of repeaters was included, the overall passing percentage dropped.

In May 2012, NDDU achieved a remarkable 100% passing rate for first-time takers, which later dropped to 75% when repeaters were included. However, the May 2013 board exam marked a low point with a 0% passing rate for repeaters, indicating the challenges that repeat takers face in passing the licensure exams.

Over the 10-year period, the mean passing percentage for NDDU was 40.55%, which is relatively higher than the national average. It should be noted that NDDU's passing percentage for first-time takers was generally above the national passing percentage, indicating that while the performance of first-time takers is relatively strong, repeaters face considerable difficulty.

The results of this study suggest that although NDDU's licensure exam passing rate is above the national average for first-time takers, there is a significant gap in performance when repeaters are considered. The consistently lower passing rates for repeaters indicate a need for additional support systems to help these students improve their chances of passing the licensure exam. This finding also underscores the importance of reinforcing learning and providing more focused preparation for repeaters to enhance their chances of success.

In conclusion, the overall passing percentage for NDDU's Civil Engineering graduates in the licensure exams has shown variability across different years. While the passing rate for first-time takers has been relatively strong, the performance of repeaters remains an area of concern. Addressing this gap through targeted support and intervention strategies could help improve NDDU's overall licensure exam performance.

Statement of the Problem 5:

Is there a significant difference in NDDU passing rates between batches?

The analysis to determine whether there is a significant difference in NDDU passing rates between batches was conducted using Analysis of Variance (ANOVA). The results of the ANOVA test indicated that there is no significant difference in passing rates across the different graduating batches (sig = 0.173).

This result suggests that the performance of graduates in the licensure examination, as measured by their mean board ratings, was relatively consistent across all batches. Despite the fluctuations in passing rates observed in the raw data, the differences in the mean board ratings between batches were not statistically significant. This means that any variations in performance between batches can be considered as incidental, and not due to any substantial underlying differences in the cohorts' preparedness or ability.

The lack of significant differences implies that NDDU's overall approach to preparing students for the Civil Engineers' Licensure Examination has remained consistent over the years, with similar outcomes for each graduating batch. If there were differences in performance, they were minor and did not significantly affect the overall licensure exam results. These findings suggest that factors like curriculum, faculty involvement, or review programs may not have had a large impact on improving or varying performance between batches, or that the differences in passing rates were due to factors unrelated to institutional preparation.

In conclusion, the ANOVA test results indicate that the performance of NDDU graduates in the licensure examination has been relatively consistent across the years. This highlights the need for a deeper analysis of other factors that could be influencing licensure outcomes, such as the effectiveness of review programs, changes in the examination format, or the overall preparedness of students, in order to make meaningful improvements for future cohorts.

Statement of the Problem 6:

The policies and strategies that could be implemented to increase passing rate.

Based on the results of the study, several policies and strategies can be implemented to help increase the passing rate of NDDU BS Civil Engineering graduates in the Civil Engineers' Licensure Examinations. The analysis revealed that certain subjects, particularly Structural Design and Construction Engineering, Mathematics and Surveying, and Hydraulics and Geotechnical Engineering, showed consistent patterns of student performance, with Mathematics and Structural Design emerging as key areas of difficulty. Furthermore, the study indicated variations in passing rates between different batches, with some cohorts performing better than others. These findings highlight the need for targeted interventions to improve overall performance.

1. Enhanced Review Programs and Post-Graduation Support One key strategy to improve passing rates is to ensure that students are fully prepared for the licensure exams. Graduates should be encouraged to take formal review sessions immediately after graduation, ensuring that they are fully prepared before sitting for the licensure exam. Given the weak performance in subjects like Mathematics, which is a common area of struggle, additional math-focused review programs should be developed to strengthen students' analytical and problem-solving abilities. This could include offering supplemental workshops, problem-solving sessions, and mock exams tailored to difficult subjects.

2. Curriculum Enhancement and Real-World Applications The study found that certain subjects, like Structural Design and Construction Engineering, consistently presented challenges due to their complex, dynamic, and nonlinear nature. As Carson (2014) explained, these subjects often require advanced understanding of multi-dimensional analysis. To address this, faculty should revise their syllabi to include more practical applications and recent industry developments. Incorporating simulation exercises that mimic real-life scenarios in Structural Design, Construction Engineering, and Geotechnical Engineering will allow students to gain hands-on experience. Additionally, industry experts should be invited as guest speakers or to conduct workshops to bridge the gap between theory and practice.

3. Stronger Integration of On-the-Job Training (OJT) The findings suggest that many students struggle to apply classroom knowledge to real-world problems, especially in more complex subjects like Structural Design. A more robust integration of OJT is crucial to ensuring that students can apply theoretical knowledge in practical settings. The OJT program should be designed to complement classroom instruction, with an emphasis on building real-world engineering skills, particularly in areas where students show consistent weaknesses.

4. Early Intervention Through Admission and Retention Policies The study highlighted that students' early performance in subjects like Mathematics could predict their ability to succeed in the licensure exams. Therefore, implementing stricter admission criteria based on performance in core subjects, such as Mathematics, could help ensure that only students with a strong foundation in these areas enter the program. Additionally, a retention policy that includes periodic assessments to identify struggling students early can help provide targeted support before they reach the licensure exam stage.

5. Utilizing Data for Continuous Improvement The study shows that the performance of different batches varies, which suggests that factors such as teaching methods, faculty development, and student preparation can impact licensure exam outcomes. It is recommended that NDDU regularly collect and analyze licensure exam data to identify trends and patterns in student performance. By utilizing this data, the university can implement targeted curriculum revisions, faculty development programs, and student support initiatives aimed at addressing the areas where students most frequently struggle. A tracer study

could be conducted to follow up on the success of alumni, using their insights to refine future educational strategies.

6. Targeted Preparation for Repeaters The study found that repeaters were a significant factor in lowering the overall passing percentage, with a 0% passing rate for repeaters in some years. To improve the performance of repeat takers, NDDU should introduce specialized remediation programs and pre-board review sessions focused on the areas where repeaters tend to struggle. These programs should be personalized and offer extra support in weak subjects like Mathematics and Structural Design, with opportunities for individualized tutoring and practice exams. Offering peer mentoring where repeaters can receive support from alumni who passed the exam on their first attempt can also be beneficial.

7. Strengthening Alumni Networks and Mentorship Programs To help build motivation and provide career guidance, NDDU should foster stronger connections with alumni who have successfully passed the licensure exam. These alumni can serve as mentors and resource speakers for current students, providing them with valuable insights into what helped them succeed in the licensure exam. Alumni could also be involved in review programs, giving students practical advice and offering encouragement.

In conclusion, based on the findings of this study, a multi-faceted approach involving enhanced review programs, curriculum improvements, better OJT integration, targeted support for repeaters, and stronger admission and retention policies could significantly improve NDDU's licensure exam performance. By addressing these areas, NDDU can ensure that future cohorts are better prepared to succeed in the Civil Engineers' Licensure Examinations, ultimately raising the institution's passing rates and contributing to the development of competent and highly skilled engineers.

CONCLUSION BASED ON THE RESULTS OF THE STUDY

The findings of this study reveal important insights into the performance of NDDU BS Civil Engineering graduates in the Civil Engineers' Licensure Examinations over the period from 2008 to 2017. The results highlight both strengths and areas of improvement in the licensure exam performance of the graduates. Notably, while Hydraulics and Geotechnical Engineering were consistently strong subjects for NDDU graduates, other subjects like Mathematics, Structural Design, and Construction Engineering presented significant challenges, as evidenced by the consistently low performance in these areas.

Despite these challenges, the study revealed that the mean passing percentage for first-time takers was relatively higher compared to repeaters, indicating that NDDU's academic preparation for initial exam takers is effective. However, the performance of repeaters significantly lowered the overall passing rate, underscoring the need for additional support systems for students who do not pass on their first attempt. Furthermore, the analysis showed that there was no significant difference in the passing rates between graduating batches, suggesting that institutional changes over the years may not have had a major impact on improving licensure exam outcomes.

The study also pointed to several areas where institutional strategies could be refined, including enhancing the effectiveness of review programs, improving faculty training, and reinforcing the practical application of theoretical knowledge. Additionally, the need for stronger support mechanisms for repeat takers and struggling students was highlighted, along with the importance of refining admission policies to ensure that students are adequately prepared for the rigors of the licensure exams.

RECOMMENDATION BASED ON THE RESULTS OF THE STUDY

Based on the findings of this study, several recommendations can be made to improve NDDU's passing rates in the Civil Engineers' Licensure Examinations and to better prepare future graduates for success:

1. Strengthen Review Programs for Graduates:

The study showed that Mathematics and Structural Design were consistently challenging subjects for graduates. It is recommended that NDDU enhance its review programs by incorporating subject-specific review sessions

for areas like Mathematics, Structural Design, and Construction Engineering. These review sessions should include simulation exercises, mock exams, and targeted problem-solving activities to build students' confidence and skills in these subjects.

2. Curriculum Enhancement and Practical Application:

To improve performance in challenging subjects, the curriculum should be revised to include more practical applications of theoretical knowledge. On-the-Job Training (OJT) programs should be better integrated into the curriculum to ensure that students gain hands-on experience in real-world engineering problems, particularly in Structural Design and Construction Engineering, where graduates showed consistent weaknesses.

3. Comprehensive Support for Repeaters:

The study indicated that the performance of repeat takers significantly lowered NDDU's overall passing percentage. To address this, it is recommended that specialized remediation programs be introduced for repeaters. These programs should include personalized tutoring, extra review sessions, and practice exams designed to target weak areas. Peer mentoring from successful alumni could also be incorporated to provide additional support for repeat students.

4. Stronger Admissions and Retention Policies:

The study suggests that the admission criteria could be strengthened to ensure that students with a solid foundation in key subjects like Mathematics are admitted to the program. NDDU could implement selective admission based on entrance exam performance, particularly in core subjects. Additionally, a retention policy should be put in place to identify and provide support for students who are struggling academically before they reach the licensure exam stage.

5. Increased Faculty Development and Industry Collaboration:

It is essential for faculty members to stay updated on the latest trends, technologies, and methodologies in the field of Civil Engineering. Professors should attend regular training seminars and workshops to improve their teaching methods and ensure that the curriculum is aligned with industry standards. Additionally, industry experts and alumni should be invited as guest lecturers to provide students with a more practical understanding of engineering challenges and solutions.

6. Improvement of Marketing Strategies for Program Enrollment:

To increase the number of students enrolled in the Civil Engineering program, NDDU should enhance its marketing efforts by showcasing successful alumni and offering incentives to students interested in pursuing a career in Civil Engineering. Engaging alumni networks to speak at recruitment events could inspire and attract more students to the program.

7. Data-Driven Decision Making:

NDDU should implement a systematic data collection and analysis process to continuously track the performance of students in licensure exams. Regular tracer studies should be conducted to track the performance of graduates, identify trends, and refine the curriculum and support programs based on actual outcomes. This data-driven approach will help the institution make informed decisions regarding program improvements and better support students' needs.

By implementing these recommendations, NDDU can significantly improve the licensure exam performance of its future Civil Engineering graduates. These strategies will help strengthen the academic preparation of students, enhance practical skills through real-world applications, and provide better support to those who need it most. Ultimately, these changes will contribute to improving the overall passing rates and the long-term success of NDDU's Civil Engineering program.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue XI November 2025

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