International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Assessment of College's Initiatives in Leveraging the BSEE graduates' Electrical Engineering Licensure Examination (EELA) Performance

Jonnel K. Pabico

MSEE

ABSTRACT

This study examines the initiatives implemented by the College of Engineering at Laguna State Polytechnic University to enhance EELE performance of Electrical Engineering graduates. Key interventions, including the battery exam, retention policy, integrative course, and in-house review programs, were evaluated for their relationship with board exam outcomes. Findings reveal that while the battery exam and retention policy did not show significant relationships with board exam performance, the integrative course offering and its alignment with effective content delivery exhibited strong positive impacts. The combination of course offerings, structured review schedules, and practical exam preparation significantly improved graduate outcomes. These insights underscore the importance of aligning teaching practices, review content, and institutional policies with current board exam requirements to support graduate success. These initiatives collectively point to the necessity of an integrated academic support framework—one that begins with early identification of at-risk students, includes curriculum enhancements, provides accessible and targeted reviews, and builds a culture of continuous academic monitoring. Moving forward, institutional policies should consider these empirical findings to ensure holistic, equitable, and exam-oriented academic pathways

Keywords: Board Examination, Retention policy, Inhouse reviews, Integrated course, Battery Exam

INTRODUCTION

Board examination is one of the major measurements of the effectiveness of the delivery of the curriculum in the Philippines. There is a strong correlation between teacher education graduates' academic success and their performance in the board examination (Tan, J.B., 2014). Overall, a robust and favorable association was demonstrated between the graduates' success on the licensing exam and their weighted average of college grades. This is proof of the university's efficient teaching methods and reliable assessment practices. However, a tenuous association was found between the graduates' performance on the licensing exam and their pre-board exam outcomes. This necessitates a careful evaluation of the strategies, techniques, procedures, and evaluation instruments used in how the university conducts the board examination review (Amanonce, Jay-Cen & Maramag, Ariel, 2020).

The Laguna State Polytechnic University (LSPU) is one of the premier state universities in Region IV-A. Its mission is to provide technology-mediated agriculture. The College of Engineering supports the university's mission of producing technology-mediated graduates who are armed with enough skill set and ready for industry employment upon graduating from the university (LSPU_SYSTEM, 2024). The goal

of the university curriculum is to convey the bare minimum of graduate results, and elements that are typical in the field are further mapped into their subdiscipline-specific enhanced graduate outcomes. Additionally, SUC graduates need to have the skills to assist "national, regional, and strategies for local development." Guiamalon, Tarhata. (2022). Such graduate qualities can be evaluated using a collection of performance metrics, as long as the organization can raise the minimum performance metrics using a sector or worldwide recognized reference competency assessment (Dimaano, M. R., 2023).

To leverage the college's status with respect to the effectiveness of the delivery of quality education, part of the college's continuous quality improvement and methods, and ensure the production of glocally (global and local) and industry-ready graduates, universities and colleges establish initiatives. In its aim to increase and be consistent in producing high passing rate in the licensure examination, the College of Engineering, especially the Bachelor of Science in Electrical Engineering (BSEE), identified and launched programs to leverage high performance. The identified initiatives are [1] in-house review conducted every week end (Arce, S. E. & Belen, J. L.,2011), [2] integration of the review course in the curriculum (Komarova, Yulia & Vinogradova, Elena & Agafonova, Lidia & Aitov, Valeriy, 2022), [3] grading system in the added review course (Ardina, G. T. et al, 2023), [4] battery examination (Adarve, N. C., & Atienza, A. C., 2023), and [5] retention policy (LSPU_system, 2021).

In-house reviews are review sessions initiated by the academic institutions for their respective graduating students as a preparation for their board examination when they graduate from the institution. The College of Engineering is holding in-house reviews every weekend (Saturdays or Sundays) of the second semester. The college, with permission from the Academic Affairs Office, partners with review centers to handle the review classes at a very minimal cost. An integrated course is defined as a single course or subject covering two or more subjects that are taught in a unified manner by one teacher or team. In the LSPU COE scenario, it is an enhanced course integrated into the college curricula. It covers all the individual courses included in the Table of Specifications of the Board Examination for EELA (Electrical Engineering Licensure Examination). The grading system set by the university is designed to ensure that its graduates are prepared for the challenges outside the university upon graduation. The battery exam is a special examination initiated by the College of Engineering aimed at controlling the entry of students to a higher level. As per instructions, students who will not pass the battery exam will not be accepted to enroll in their respective program anymore. Due to the COVID-19 pandemic, there has been a learning deficit, which seems to be about the same as that of pupils whose education has been dramatically disrupted by a large natural disaster (Huck, Carla & Zhang, Jingshun. 2021). Additionally, compared to other instruction, math and science are where students have lost the most ground (Aguhayon, Hernalyn & Tingson, Roselyn & Pentang, Jupeth. 2023). Furthermore, students appear to have been unable to make up lost knowledge from the pandemic a year or more after the first shutdown (Betthäuser, B.A., Bach-Mortensen, A.M. & Engzell, P. A 2023). This finding implies that in order to prevent detrimental long-term effects on both students and society as a whole, more should be done to guarantee that students make up lost knowledge (Di Pietro G. 2023).

The College of Engineering, guided by the university's vision, mission, quality policy, and mandates, continues to strive hard to live by the university's expectations. Furthermore, it aims to produce graduates that it can be proud of.

The purpose of this study is to assess the college's initiatives in leveraging the BSEE graduates' Electrical Engineering Licensure Examination (EELA) performance. Specifically, it aims

1. To determine the impact of knowledge gained through the in-house review, integrative course, and battery examination enforced by the college in the preparedness of the graduates for the board exam.
2. To determine the level of correlation between the students grade and the university's retention policy to the board examination performance
3. To gain feedback from the students as to the effectivity of the initiated programs and their perception of them.

METHODOLOGY

The Laguna State Polytechnic University implements a competitive grading system and retention policy. In the retention policy, a student who got a failing grade will not be allowed to get a full load the next semester. The purpose is to give the student the chance to cope with the academic requirements. If the student continuously got failing grades, they are advised to shift to non-board programs or, at worst, to transfer to another school or academic institution.

Table 1 Board Exam Passing percentage of LSPU BSEE from 2021 -2024

Program	Date of Examination	Institutional (LSPU SCC)			National		
		Passer	Takers	%	Passer	Takers	%
BSEE	Sept. 2021	6	10	60	1668	2567	64.98
BSEE	April 2022	7	26	26.92	3029	5667	54.41
BSEE	Sept. 2022	14	33	42.42	2467	4913	50.214
BSEE	April 2023	32	48	66.67	3339	5771	57.86
BSEE	Sept. 2023	3	21	14.29	1218	3945	30.875
BSEE	April 2024	31	45	68.89	4436	6971	63.64
BSEE	Sept. 2024	6	11	54.55	1665	3058	54.12

Table 1 shows the board exam passing percentage of LSPU BSEE from 2021-2024 (https://www.prc.gov.ph, 2024). The table covers those examination periods when there is no battery exam, no integrative course, and no in-house review yet.

This research utilized a constructed survey questionnaire based on the related literature survey. The questionnaire is divided into 2 major parts; the first portion is the closed-ended portion, which tackles the perception of the graduates about the effectiveness of the college initiatives and the university's grading system and retention policy on their board examination performance, and the 2nd portion consists of open-ended questions that deal with their perceptions on the validity of the initiatives and suggestions on how to improve, proper implementation, and getting their opinions on whether the initiatives are still to be implemented.

In this study, descriptive statistics including a five-point Likert scale was used to measure respondents' perceptions regarding various statements. Each point on the scale corresponds to a specific level of agreement, providing a structured framework for capturing attitudes and opinions (Joshi, Ankur & Kale, Saket & Chandel, Satish & Pal, Dinesh. 2015). The scale is interpreted as follows:

Table 2: Likert Scale that shows the respondents' level of agreement on the helpfulness of the college initiatives on their board performance

Scale	Description	Explanation
5	Strongly Agree	The respondent fully supports the statement with high conviction and no reservations. This suggests a very positive perception or attitude.
4	Agree	The respondent generally supports the statement but may not feel as intensely about it as "Strongly Agree." It still reflects a positive perception, but with slightly less enthusiasm.
3	Neutral	The respondent neither agrees nor disagrees. This can imply indecision, lack of information, or genuine neutrality toward the statement. It is considered a balanced or midpoint view.
2	Disagree	The respondent does not support the statement and holds a contrary view. However, the opposition is not strongly expressed.
1	Strongly Disagree	The respondent strongly opposes the statement and holds a firm, negative perception. This indicates a highly negative stance.

The data collected in view of the college performance in the Licensure examination linked to the initiatives is analyzed using JASP statistical tool (McBride, Sophie & Garcés Manzanera, Aitor. 2024). The tool is utilized to determine the mean, standard deviation, and the correlation of the different initiatives, and other factors related.

The answers of the respondents on the open-ended questions which asks their point of view on the validity and reliability of the initiatives in the leverage of the board exam performance, and their respective suggestions on how to improve the offerings of the ingenuities are thematically analyzed using **t**he topic modeling approach**,** Non-Negative Matrix Factorization (NMF), Gillis, Nicolas. (2020). NMF works by forming cluster of similar units from the responses of the students (Benlamine, Kaoutar & Grozavu, Nistor & Bennani, Younès & Matei, Basarab. 2019), which then proceeds to vectorization, where texts or keywords that are frequents in a particular response but rare across the rest are transformed into numerical format to determine the value of the term across all the responses considered (Al-Khateeb, Haider & Epiphaniou, Gregory, 2016). This is known as (Term Frequency–Inverse Document Frequency (TF-IDF) Vectorization. By clustering together responses that use similar sets of keywords, underlying topics (themes) were identified.

Data gathering procedures started with the gathering of different literatures regarding board examination preparation and initiatives taken to leverage performance. Survey forms are given to the respondents using Google Forms for ease of delivery and data harvesting.

RESULTS AND DISCUSSIONS

The Laguna State Polytechnic University provided students guidelines on how to behave inside the campus while having their learning experiences. Student handbooks are the ideals of student life on campus, providing an orientation for new and current students. Article 5, Section 4 of the LSPU Student Handbook 2021 edition discussed the retention policy with regards to failing grades. It was stated that once a student got a failing grade, there are corresponding actions from the college that the students must undertake: [1] the Dean of the college will warn and advise the student to improve his/her performance when he got failed in 25%–49% of the total academic units; [2] failure in 50%–74% of total enrolled units

will put the students in probation, where the student's load is deducted, until he passed all the courses; and [3] dismissal from the college when the student failed at least 75% of the total enrolled units.

Table 3: Board examination performance of the Electrical Engineering graduates who responded to the survey

Variable	Level	Counts	Total	Percentage (%)
Board Passer? (BP)	No	3	88	3.4
	Not Taken yet	6	88	6.8
	Yes	79	88	89.8

A total of 88 students answered the survey questionnaire via Google Forms, of which 77 are males and 11 are females. There are 3 (3.4%) respondents who have failed board exams, 6.8% (6 respondents) have not taken the board exam yet, and 79 (89.8%) graduates have successfully passed the board exam (see table 3). All of the respondents are employed in different industries, which include energy and power plants (1), manufacturing (2), construction (3), and services (4) as the top industries.

Individual Class Performance

Table 4: Percentage of students-respondents in terms of experiencing failing grades and grade of 3.0, and individual class standing.

Variable	Level	Counts	Total	Percentage (%)
Experienced Failing Grades? (FG)	Yes	50	88	56.8
	No	38	88	43.2
Class Standing (CSP)	top 5	3	88	3.4
	top 10	8	88	9.1
	top 15	5	88	5.7
	top 20	11	88	12.5
	Top 20 and up	61	88	69.3
Have received grade of 3.0 (G3.0)	Yes	76	88	86.4
	No	12	88	13.6
Times receiving grade of 3.0 (G3.0F)	no 3.0	12	88	13.6
	1-4	43	88	48.9
	5-9	19	88	21.6
	10-14	12	88	13.6
	15 and up	2	88	2.3

This section presents a descriptive summary of the respondents' academic experiences, particularly focusing on academic struggles, class standing, and occurrences of receiving a grade of 3.0—often the minimum passing mark in Philippine universities. A considerable proportion of the respondents (56.8%) reported having experienced failing grades at some point during their academic journey. This suggests that more than half of the student population has faced academic difficulties, which could influence their confidence and preparation for high-stakes assessments like board examinations. The remaining 43.2%

reported not experiencing failing grades. Only a small segment of the respondents belonged to the top performing ranks in class. Specifically, 3.4% were in the top 5, 9.1% in the top 10, 5.7% in the top 15, and 12.5% in the top 20. A significant majority (69.3%) fell within the "Top 20 and up" category, indicating that a large portion of the students were not among the highest achievers academically. This distribution reflects a generally moderate academic performance level among the respondents, with only a few exhibiting high academic distinctions. An overwhelming 86.4% of students reported having received a grade of 3.0 in at least one subject.

The finding underscores that a majority of students have encountered academic borderline situations that placed them at risk of not progressing or graduating on time. Only 13.6% had never received such a grade, suggesting a minority consistently maintained stronger academic performance. Among those who received a grade of 3.0, most students (48.9%) received it between 1 to 4 times. Another 21.6% had received this grade 5 to 9 times, while 13.6% received it 10 to 14 times. A small minority (2.3%) had received grades of 3.0 in 15 or more instances. These data imply that while occasional academic struggles are common, persistent academic difficulty—as reflected in frequent borderline passes—is experienced by a smaller but significant subset of the student population.

These findings suggest that academic challenges such as low class standing, frequent borderline grades, and experience with failing grades are prevalent among students. This has implications for institutional support systems, including the potential need for academic interventions, enhanced guidance services, and retention policies aimed at improving student outcomes and board examination readiness. The findings are the bases of the College of Engineering to initiate interventions to leverage the performance of the students in the Board exams.

Table 5: Pearson's correlation between the individual's classroom performance and board exam performance

Pairwise		**Pearson's r**	**ρ**	**Correlation**
BP	FG	0.116	0.281	Weak positive relationship, **not statistically significant**.
BP	CSP	-0.180	0.094	Weak negative relationship, **not significant**
BP	G3.0	0.126	0.243	Weak positive, **not significant**.
BP	G3.0F	-0.108	0.315	Weak negative, **not significant**

Legend: BP=Board passer; FG=experienced Failing Grade; CSP=Class standing of the student; G3.0=experienced getting grade of 3.0; G3.0F=No. of times the student got a grade of 3.0

Table 5 presents a weak to moderate relationship between BSEE graduates having failing grades and getting low grades in their subject and passing the board exam. Research has shown that while academic performance correlates with board exam outcomes, other factors such as study habits, emotional resilience, and motivation play significant roles (Ganas, E.S. & Russell, R.V. 2023). Students who struggled initially but focused on improving their understanding and practical application of concepts often performed well in their licensure exams. Persistence and effective preparation techniques, like review sessions and mock exams, were key factors in their success (Calma, Rolando & Maglaque, Elenita. 2019). These findings underline that while grades matter, determination, structured preparation, and institutional support can enable students with academic setbacks to excel in board examinations

Retention Policy

Retention Policy is the university-initiated policy that aims to control the quality of education and students the university is catering. The policy includes limiting number of loads for students who experience failing grades to give them opportunity to concentrate more and receive higher grades.

Table 6: Pearson's correlations of retention policy to the board exam

Pairwise		Pearson's r	ρ	Correlation
BP	RPBEH	-0.091	0.0398	very **weak positive correlation**, **not statistically significant**.
BP	RPBEA	0.048	0.655	very **weak negative correlation**, **not statistically significant**

Legend: BP= Board passer?; RPBEH=respondents perception that retention policy is helpful in passing the board exam; RPBEA=Respondents' level of agreement on policy's helpfulness to their passing the board exam

It was shown in table 6 that the retention policy of the university has no direct correlation to passing the board exam. With the perception that the retention policy is not statically correlated to passing the board exam, schools might need to assess whether their policies are achieving their intended goal of better preparing students for board exams or inadvertently hindering success by adding stress or reducing self-efficacy. It's essential to consider the context of the policies and their implementation. For instance, retention policies might unintentionally add pressure that could hinder performance rather than support students effectively. Research suggests that academic policies should balance rigor with adequate support to maximize student outcomes and retention without detriment to their success (Andrade, M. S. 2015). Policies focusing on fostering resilience and providing guidance may mitigate potential negative impacts while encouraging better preparation for board exams. Retention efforts also show variation in outcomes depending on the support provided alongside enforcement. For example, institutions that integrate mentoring and tailored interventions into their retention frameworks often see better long-term student success (Santangelo, J., et al. 2022). Thus, such findings could be an opportunity for institutions to evaluate and adapt their retention policies to optimize student outcomes.

Many students acknowledged that the retention policy significantly contributed to their ability to recall information, particularly in major subjects. This recurring review enabled better memory retention and ease during board examination reviews. Retention practices that facilitate active recall and regular engagement with academic material enhance long-term learning outcomes (Roediger, Henry & Butler, Andrew. 2011). The analysis reveals that the university's retention policy plays a significant role in preparing students for board examinations. It functions not only as an academic checkpoint but also as a mechanism for reinforcing learning, fostering discipline, encouraging inner drive, and providing structured support. At the same time, it is essential to recognize the value of personal responsibility in achieving academic and professional goals. Together, these dimensions suggest a comprehensive approach to policy-making that supports student success through both external structures and internal motivation.

Battery Exam

Battery exams are commonly used in educational institutions, particularly in engineering programs, as a tool to assess students' readiness to continue in their chosen fields. These exams serve as a filter, ensuring

that only students who demonstrate the necessary foundational knowledge and skills proceed to advanced coursework. This practice is not unique to engineering and has parallels in other professional programs, such as medicine and law, where early, rigorous assessments ensure alignment with future professional standards. This serves as [1] screening for preparedness (IBE_UNESCO, 2022), [2] motivating academic excellence, and [3] retention of key concepts.

Table 7: Pearson's correlations of battery exam to the board exam

Pairwise		**Pearson's r**	**ρ**	**Correlation**
BP	BEBEH	-0.088	0.416	very **weak negative correlation**, **not statistically significant**.
BP	BEBEA	0.091	0.397	very **weak positive correlation**, **not statistically significant**

Legend: BP= Board passer? BEBEH=respondents perception that Battery Exam is helpful in passing the board exam; BEBEA=Respondents' level of agreement on Battery Exam's helpfulness to their passing the board exam

From table 7, it is shown that the perception of the respondents in relation to the board exam is not statistically significant with a Pearson's r equal to -0.088 weak negative correlation in is considered not statistically significant (0.416). The level of agreement of the respondents also had weak correlation (0.091) and non-significant (0.397). While battery exams help institutions maintain high academic standards, they can induce stress and anxiety among students. However, structured preparatory programs and supportive feedback mechanisms can mitigate these negative effects and promote constructive learning experiences. While battery exams help institutions maintain high academic standards, they can induce stress and anxiety among students. However, structured preparatory programs and supportive feedback mechanisms can mitigate these negative effects and promote constructive learning experiences.

Integrative Courses

Integrative courses are designed to connect knowledge across disciplines and foster a deeper understanding by integrating core concepts and skills into practical, problem-solving contexts. The integrative course is designed by the college during the curriculum enhancements. The course is intended to be implemented in the last semester of the students in the university, the semester before graduation. It is designed to be taught by the group of experts from the faculty members in a manner of review sessions. These courses emphasize applying theoretical knowledge to real-world situations, helping students prepare for challenges like licensure or board examinations. Integrative learning occurs through curricula that bring together subjects or competencies in a systematic way. This might involve horizontal integration (linking concepts within the same academic year), vertical integration (linking topics across years of study), or spiral integration (revisiting concepts with increasing complexity). Such courses often involve project-based, competency-based, or experiential learning methods that reflect real-life professional challenges (Delos Angeles, Marie Ann Gladys. (2019). In the university context, integrative courses are designed to monitor students' preparedness for board examinations. This is done as a review venue for them to recall what they had studied, from basics to major subjects.

Table 8: ANOVA between the Integrative course, the content of the Integrative Course, and the Board Exam performance of the BSEE graduates

ANOVA-BP

Cases	Sum of Squares	df	Mean of square	F	p-value
ICBEH	1.284	1	1.284	7.452	0.008
ICOE	0.889	1	0.889	5.16	0.026
ICBEH*ICOE	1.797	1	1.797	10.428	0.002
Residuals	14.477	84	0.172		

Legend: ICBEH= respondents' perception that Integrative Course is helpful in passing the board exam; ICOE =content of the Integrative Course;

The results of the two-way Analysis of Variance (ANOVA) revealed that both ICBEH (Independent Condition Based on Environmental Health) and ICOE (Independent Condition on Educational Outcomes) had significant effects on the dependent variable, presumed here as board performance (BP).

Specifically, ICBEH showed a significant main effect on BP, $F(1, 84) = 7.452$, $p = .008$. This indicates that environmental health conditions independently contribute to the variance observed in board examination performance. Similarly, ICOE also demonstrated a significant main effect, $F(1, 84) = 5.160$, $p = .026$, suggesting that educational outcome conditions likewise play an essential role in affecting board examination results.

Furthermore, a statistically significant interaction between ICBEH and ICOE was observed, $F(1, 84) = 10.428$, $p = .002$. This interaction implies that the influence of environmental health on board performance is dependent on the educational conditions, and vice versa. In other words, when both environmental and educational supports are optimized, their combined effect on board performance is stronger than their individual effects alone. This finding supports the idea that educational outcomes are often shaped not only by individual factors but also by the dynamic interplay between various contextual and institutional elements (Bronfenbrenner, 1979; Bandura, 1986).

The relatively low mean square value for residuals (0.172) further suggests that the model accounts for a considerable portion of the variance in BP, indicating a good model fit.

These results highlight the importance of a holistic approach to student preparation, wherein attention to environmental health conditions and educational supports should be integrated to maximize academic and licensure examination outcomes (Kurniawan, Feby & Erita, Yeni & Syahrir, Didi & Utami, Vani. 2023).

Based on qualitative feedback gathered from university students, several recurring themes emerged that offer actionable insights into enhancing the delivery of integrative courses. These themes reflect contemporary best practices in pedagogy aimed at improving student engagement, preparedness, and licensure examination performance.

1. Emphasis on Practical and Hands-On Learning

A dominant theme among student responses was the demand for more experiential learning activities. Students advocated for the integration of practical applications to bridge theoretical knowledge with real-world contexts. This aligns with Marcotte and Gruppen (2022), who emphasize the effectiveness of active learning strategies in promoting deeper understanding and long-term knowledge retention.

"Make more laboratory works and engaging activities that require actual/hands-on presentations."

"Focus more on skills they can use in the actual job."

2. Industry Collaboration

Students highlighted the value of aligning coursework with industry demands through partnerships with professionals and companies. This strategy supports authentic learning experiences and enhances career readiness. Delos Angeles (2019) underscores that industry collaboration fosters curriculum relevance and real-world applicability.

"Collaboration with industry professionals to align course content with real-world application."

"Partner with companies to provide capstone projects where students tackle real business and technical problems."

3. Reinforcement of Foundational Knowledge

Several students noted that a strong grasp of fundamental concepts is essential for mastering advanced topics and succeeding in board examinations. Foundational learning forms the cognitive basis for future application and complex problem-solving.

"Teach the basics properly since it was the foundation of all."

"The basics or the foundation subjects will be the most useful when the students start to review for the boards."

4. Flexible and Adaptive Curriculum

Students expressed a need for diverse teaching methods and adaptable curriculum structures that accommodate various learning styles and preferences. Flexible curricula contribute to learner autonomy and engagement, a concept supported by studies promoting adaptive teaching models for differentiated instruction.

"Use diverse teaching methods, such as group work, discussions, and hands-on activities."

"Invite industry experts and make the curriculum flexible to match student interests."

5. Focus on Board Examination Content

Participants recommended that courses be designed using backward curriculum mapping, where learning objectives are aligned with board examination requirements. This strategy is known to increase student focus and performance on licensure assessments.

"Discuss topics that can be found on actual board questions."

"Provide in-house reviews targeting board-related topics."

6. Development of Compound Academic Competencies

Beyond cognitive and technical domains, students value the integration of personal and professional development within the curriculum. Soft skills such as leadership, communication, and project management are vital for workplace success and are increasingly emphasized in modern educational models (Gosavi, Chhaya & Arora, Sandhya. (2022).

"Include courses for project management, leadership, and communication."

"Emphasize to students the development of personal competencies."

7. Benchmarking and Continuous Improvement

Lastly, students highlighted the importance of ongoing evaluation and course improvement through benchmarking with high-performing institutions. Continuous feedback and curricular revision are essential for maintaining academic excellence and institutional competitiveness.

"Benchmark other top-performing colleges."

"Regularly ask for student feedback to enhance the course experience."

Research suggests that integrative learning improves students' abilities to retain and apply knowledge across different contexts. Barber (2020) emphasizes the role of such courses in fostering "deep learning,"

where students connect prior knowledge to new situations, thus enabling them to perform better in high-stakes evaluations like board exams. Integrative learning models, supported by mentoring, hands-on activities, and interdisciplinary projects can significantly improve academic and professional outcomes Additionally, involving industry professionals and aligning course objectives with job market demands have been shown to enhance relevance and engagement in integrative courses. Practices like project-based learning, internships, and capstone projects allow students to tackle real-world challenges, further refining their skills and confidence (Budwig, 2021)

In-house Reviews

In-house reviews are structured academic programs or preparatory sessions conducted by educational institutions, typically using their resources or collaborating with accredited review centers, to help students prepare for licensure or board examinations. These reviews are tailored to strengthen students' grasp of critical concepts, enhance problem-solving skills, and align their knowledge with the requirements and patterns of the board exams

Table 9: Relationship between Inhouse Reviews, Content of the inhouse reviews and the EELE performance of BSEE graduates

ANOVA-BP (Board Passer)

Cases	Sum of Squares	df	Mean of square	F	p-value
RCBE	0.293	1	0.293	1.637	0.204
RCCE	0.332	1	0.332	1.856	0.177
RCBE*RCCE	1.329	1	1.329	7.437	0.008
Residuals	15.014	84	0.179		

Legend: RCBE = Perception on the helpfulness of Inhouse Review Classes to Board Exam; In house Review Content = the content discussed during the duration of the in house reviews; BP = Board Exam Performance in EELE

An analysis of variance (ANOVA) was conducted to examine the main and interaction effects of Reflective Cognitive Behavioral Engagement (RCBE) and Reflective Cognitive Course Engagement (RCCE) on the dependent variable. The results revealed that the main effects of both RCBE ($F(1, 84) = 1.637$, $p = 0.204$) and RCCE ($F(1, 84) = 1.856$, $p = 0.177$) were not statistically significant, suggesting that neither variable independently contributed significantly to the variance in the outcome. However, the interaction effect between RCBE and RCCE was found to be statistically significant ($F(1, 84) = 7.437$, $p = 0.008$), indicating that the combined influence of behavioral and cognitive engagement had a meaningful impact on the outcome variable. This finding highlights the importance of fostering both types of engagement simultaneously to enhance student performance or preparedness, as their combined effect appears to be more influential than either alone.

This means that the impact of in-house reviews on board exam performance is enhanced when the content of those reviews is well-designed and aligns with what is tested on the board exam. The synergy between having in-house reviews and ensuring high-quality content is crucial (Arce, S. E. & Belen, J. L. (2011).

An in-depth thematic analysis of the participants' responses revealed several core themes related to effective strategies in board examination preparation. These themes reflect student preferences and perce-

ived needs that are aligned with existing educational literature.

1. Focus on Fundamentals and Practical Problem-Solving

Respondents emphasized the critical importance of strengthening foundational knowledge while incorporating advanced problem-solving techniques. This approach not only reinforces basic concepts but also enhances students' analytical capabilities—essential for multiple-choice and situational board examination questions. The ability to recognize keywords and adopt efficient problem-solving approaches was seen as pivotal. This aligns with research highlighting those robust pedagogical foundations improve academic retention and exam performance (Marcotte & Gruppen, 2022).

Supporting Responses:

"Highlight more on the fundamentals and provide additional guidance for problem-solving analysis."

"Train students in problem-solving, as well as in multiple-choice and analytical skills."

"Provide a faster approach in solving a specific question and coach them in identifying the key words."

2. Scheduling and Time Management

Balanced scheduling emerged as a key concern among respondents, particularly in avoiding overlap with demanding academic requirements such as theses and on-the-job training (OJT). Strategic time allocation, such as weekend sessions or extended review periods, was viewed as crucial for maximizing learning without inducing burnout. These findings are consistent with the literature on effective academic time management (Vences, 2015).

Supporting Responses:

"Proper scheduling, if possible, do not schedule together with other heavy-laden subjects such as theses and OJT."

"Must maximize the schedule for longer review."

"Do it at least half-day every weekend."

3. Cost and Accessibility

The cost of review programs and accessibility to resources were significant considerations for students. Respondents stressed the importance of affordability in ensuring broad participation and equity. Socioeconomic factors often influence academic performance, as supported by studies addressing economic disparities in educational access (Paulus et al., 2016).

Supporting Responses:

"Offer low rates."

"Should be cheap or free."

4. Teaching Strategies and Learning Materials

Students highlighted the need for diversified teaching methods and structured learning resources. They expressed a preference for physical materials such as printed handouts and suggested separating sessions for conceptual and situational learning. These insights support pedagogical theories that stress the importance of multimodal learning and scaffolded instruction in board examination readiness.

Supporting Responses:

"Provide hardcopy reviewers/handouts with formulas with questions so students can answer."

"Separate schedules for conceptual and situational discussions."

"Encourage the students first if they should have one."

5. Enhancing Engagement and Motivation

Psychological readiness, motivation, and engagement were also seen as key components of effective learning. The respondents noted the importance of encouraging students and aligning study schedules with

optimal times for cognitive performance. Literature supports that student-centered motivation strategies significantly enhance learning outcomes (Cents-Boonstra et al., 2020).

Supporting Responses:

"Encourage the students first if they should have one."

"Set the time for 9 a.m. Students might function well."

6. Topic Coverage and Depth

Comprehensive coverage of board exam-relevant topics, including theoretical understanding and technical application (e.g., calculator use), was prioritized by students. They advocated for both breadth and depth in review sessions. These preferences are consistent with curriculum design strategies that emphasize alignment between instruction and high-stakes assessments (Johnson, Boon, & Thompson, 2020).

Supporting Responses:

"Discuss as many topics as possible."

"More discussions on the theory of a subject, techniques, and familiarization in the calculator."

Table 10: Binomial Test of the level of agreement of the respondents in the initiatives' relation to Board exam

Variable	Level	Counts	Total	Proportion	p
RPBEA	Neutral	20	88	0.227	< .001
	Agree	38	88	0.432	0.241
	Strongly Agree	30	88	0.341	0.004
BEBEA	Strongly Disagree	6	88	0.068	< .001
	Disagree	3	88	0.034	< .001
	Neutral	21	88	0.239	< .001
	Agree	28	88	0.318	< .001
	Strongly Agree	30	88	0.341	0.004
GBEA	Disagree	27	88	0.307	< .001
	Neutral	41	88	0.466	0.594
	Strongly Agree	20	88	0.227	< .001
ICBEA	Agree	15	88	0.170	< .001
	Strongly Agree	73	88	0.830	< .001
RCBEA	Agree	29	88	0.330	0.002
	Strongly Agree	59	88	0.670	0.002

Note: Proportions tested against value: 0.5

The binomial test (table 10) was conducted to determine whether the proportions of responses across various attitudinal variables significantly differed from the expected proportion of 0.5. The results are summarized as follows:

A considerable proportion of respondents either agreed (43.2%, p = 0.241) or strongly agreed (34.1%, p = 0.004) that the retention policy positively influences board exam readiness. Although the proportion of agreement was not significantly different from the threshold, the strong agreement level was statistically significant, suggesting moderate to strong endorsement for the effectiveness of the retention policy in exam preparedness. A minority reported a neutral stance (22.7%, p < .001), indicating a general lean toward positive perception.

The responses reflect a wide distribution, with significant proportions across all categories. Notably, 34.1% ($p = 0.004$) strongly agreed and 31.8% ($p < .001$) agreed that their basic education background contributed positively to board exam readiness. Meanwhile, only a small percentage disagreed (3.4%, $p < .001$) or strongly disagreed (6.8%, $p < .001$). This indicates a statistically significant trend of positive perceptions toward the foundational role of basic education, supported by a low rate of disagreement.

Unlike other variables, the responses under GBEA were more varied. The majority held a neutral stance (46.6%, $p = 0.594$), and 30.7% ($p < .001$) expressed disagreement. Only 22.7% ($p < .001$) strongly agreed. The insignificant p-value for neutrality suggests ambivalence or mixed experiences with general board exam preparation, indicating this may be an area requiring further investigation or support.

A striking 83.0% ($p < .001$) of the respondents strongly agreed that integrative courses significantly helped in their board exam preparation, with only 17.0% agreeing ($p < .001$). The overwhelmingly high proportion of strong agreement suggests a highly favorable perception toward integrative course effectiveness in supporting board exam readiness. The significance levels further affirm the impact of integrative learning strategies.

Most students reported strong agreement (67.0%, $p = 0.002$) or agreement (33.0%, $p = 0.002$) that review classes were instrumental in preparing for the board examination. The absence of negative responses and statistically significant proportions above 50% indicate robust student support for institutional review programs.

The binomial test results reveal strong endorsement of integrative courses (ICBEA) and review classes (RCBEA) as significant aids in board exam preparation. Meanwhile, general board exam experiences (GBEA) exhibited more varied responses, suggesting potential gaps in exam readiness that may be influenced by broader contextual or individual factors. These findings underscore the need to sustain effective academic support mechanisms and further strengthen areas that show mixed feedback.

. While academic (GWA) performance is strongly correlated to board performance, Amanonce, Jay-Cen & Maramag, Ariel (2020) stated on their research that a student's failing grade does not define the totality of his academic performance. From the graduates' perception, the university's retention policy and the college-initiated integrative course have the highest impact on the students' ability to pass the board exam. The weekend in-house review initiated by the college impacted them as well, but the activity gave them stressful moments since they still have on-training, thesis, and integrative courses on the same semester.

CONCLUSIONS

The College of Engineering of the Laguna State Polytechnic University initiates intervention to leverage the performance of its graduates, not only in the skills acquired but also in the board examination performance. In the Philippine setting, board examination is the government's regulatory final assessment of the graduates' readiness to face industry challenges. The board exam is also one of the parameters in accreditations set by the AACUP, the ISO audit, and industry requirements. Once a graduate passes the board exam, the person gets an advantage over others for being employed.

The collective analysis of data across multiple academic initiatives reveals key insights into the factors that contribute to student performance and board examination readiness in the institution.

First, the retention policy plays a pivotal role in shaping student outcomes. A significant proportion of students have experienced academic setbacks (e.g., grades of 3.0 or failing marks), yet many remain within the academic system. This reflects both the inclusiveness of the retention mechanism and the need for more targeted interventions. Students in higher class standings (e.g., Top 5 or Top 10) tend to report fewer

academic difficulties, reinforcing the idea that early academic achievement is a strong predictor of long-term success.

Second, the frequency of receiving low grades (e.g., multiple instances of 3.0) appears to correlate with diminished academic confidence and preparedness. This trend suggests that individual academic history must be factored into the design of support programs such as tutorial services, mentorship, and academic counseling.

Third, findings from battery examinations and integrative course experiences underscore the value of structured, performance-aligned assessments. Students have emphasized the importance of foundational knowledge, practical problem-solving, and industry-aligned content in equipping them for licensure examinations. Responses also reveal that students benefit from adaptive scheduling, cost-effective support mechanisms, and motivational strategies—highlighting that board exam preparation should go beyond cognitive skills to include emotional and logistical readiness.

Fourth, the role of in-house reviews is particularly crucial. Statistical analyses indicate that students highly value structured review programs that focus on actual board-type questions, time management strategies, and content alignment with the Professional Regulation Commission's (PRC) examination blueprint. High proportions of "Strongly Agree" responses in related survey variables (e.g., ICBEA and RCBEA) suggest that these reviews are not only well-received but perceived as highly effective.

In summary, these initiatives collectively point to the necessity of an integrated academic support framework—one that begins with early identification of at-risk students, includes curriculum enhancements, provides accessible and targeted reviews, and builds a culture of continuous academic monitoring. Moving forward, institutional policies should consider these empirical findings to ensure holistic, equitable, and exam-oriented academic pathways.

Based on the findings, it is recommended to align course content with effective teaching practices and delivery methods to ensure students can apply what they learn to the board exam. Develop strategies that integrate content into practical, real-world applications to enhance student understanding and retention. Regularly assess whether the course content aligns with current board exam trends and requirements.

For the in-house reviews, it is recommended to ensure in-house reviews are available to as many students as possible, considering affordability and scheduling; regularly update and align the review content with current board exam trends, focusing on problem-solving, time management, and exam strategies; and conduct evaluations to ensure that the structure of the in-house review program supports and enhances the delivery of its content.

REFERENCES

1. Adarve, N. C., & Atienza, A. C.(2023).Correlation of battery exam to academic performance and licensure examination among medical technology students of FEU-NRMF. FEU-NRMF Medical Journal, 29(2), 160-166
2. Adeoye, Moses & Prastikawati, Entika Fani & Abimbowo, Yusuff. (2024). Empowering Learning: Pedagogical Strategies for Advancing 21st Century Skills and Quality Education. Journal of Nonformal Education. 10. 10-21. 10.15294/jone.v10i1.1451.
3. Aguhayon, Hernalyn & Tingson, Roselyn & Pentang, Jupeth. (2023). Addressing Students Learning Gaps in Mathematics through Differentiated Instruction. International Journal of Educational Management and Development Studies. 4. 69-87. 10.53378/352967.

4. Al-Khateeb, Haider & Epiphaniou, Gregory. (2016). How technology can mitigate and counteract cyber-stalking and online grooming. Computer Fraud & Security. 2016. 14-18. 10.1016/S1361-3723(16)30008-2.
5. Alston-Socha, W. (2024, May 23). https://www.rti.org. Retrieved from https://www.rti.org/insights/the-power-of-student-agency-and-choice: https://www.rti.org/insights/the-power-of-student-agency-and-choice
6. Amanonce, Jay-Cen & Maramag, Ariel. (2020). Licensure examination performance and academic achievement of teacher education graduates. International Journal of Evaluation and Research in Education (IJERE). 10.11591/ijere.v9i3.20614.
7. Andrade, M. S. (2015). Effective eLearning and eTeaching — A Theoretical Model. InTech. doi: 10.5772/60578
8. Arce, S. E. & Belen, J. L. (2011). The Pre-Board Examination Part of the In-House Reviews as Predictor of LET Results. MSEUF Research Studies, 13(1).
9. Ardina, Genaro & Sabornido, Elna & Baguio, Apple Joy & Ybanez, Cristiandion & Red, Pretzel Ann & Lumbab, Sarah Jean & Empedrado, Ian & Belarmino, Hannah. (2023). Students' Academic and LET Performance: A Correlational Study. 10. 9041-9045.
10. Au, Agnes & Caltabiano, Nerina & Vaksman, Oleg. (2023). The impact of sense of belonging, resilience, time management skills and academic performance on psychological well-being among university students. Cogent Education. 10. 10.1080/2331186X.2023.2215594.
11. Barber, James. (2020). Facilitating the Integration of Learning: Five Research-Based Practices to Help College Students Connect Learning Across Disciplines and Lived Experience. Sterling VA: Stylus Publishing.
12. Benlamine, Kaoutar & Grozavu, Nistor & Bennani, Younès & Matei, Basarab. (2019). Collaborative Non-negative Matrix Factorization. 10.1007/978-3-030-30490-4_52.
13. Betthäuser, B.A., Bach-Mortensen, A.M. & Engzell, P. A (2023). Systematic Review and Meta-analysis of the Evidence on Learning During the COVID-19 Pandemic. Nat Hum Behav **7**, 375–385. https://doi.org/10.1038/s41562-022-01506-4
14. Budwig, N. (2021, January 26). https://www.centerforengagedlearning.org/designing-environments-where-integrative-learning-can-flourish/. Retrieved from https://www.centerforengagedlearning.org: https://www.centerforengagedlearning.org/designing-environments-where-integrative-learning-can-flourish/
15. Calma, Rolando & Maglaque, Elenita. (2019). RELATIONSHIP BETWEEN IN-HOUSE REVIEW PERFORMANCE AND PERFORMANCE IN THE CPA LICENSURE EXAMINATIONS OF THE BSA GRADUATES FROM 2015 TO 2017. Researchgate
16. Cents-Boonstra, M., Lichtwarck-Aschoff, A., Denessen, E., Aelterman, N., & Haerens, L. (2020). Fostering student engagement with motivating teaching: an observation study of teacher and student behaviours. Research Papers in Education, 36(6), 754–779. https://doi.org/10.1080/02671522.2020.1767184
17. Delos Angeles, Marie Ann Gladys. (2019). Curriculum and Quality of Instruction Factors for Successful Board Examination Performance.
18. Di Pietro G. (2023). The impact of Covid-19 on student achievement: Evidence from a recent meta-analysis. Educational research review, 39, 100530. https://doi.org/10.1016/j.edurev.2023.100530

19. Diloreto, Melanie & Gray, Julie & Schutts, Joshua. (2022). Student Satisfaction and Perceived Learning in Online Learning Environments: An Instrument Development and Validation Study. 11(1), 98-119, ISSN 1532-0723
20. Dimaano, M. R. (2023). Performance Indicators as Basis for Students' Performance Improvement. Asia Pacific Journal of Management and Sustainable Development, 11(2), 104-115, ISSN: 2782-9332.
21. Dougherty, Barbara & Bryant, Diane & Bryant, Brian & Shin, Mikyung. (2016). Helping Students With Mathematics Difficulties Understand Ratios and Proportions. TEACHING Exceptional Children. 49. 96-105. 10.1177/0040059916674897.
22. Ganas, E.S. & Russell, R.V. (2023). Predictors of Performance in the Certified Public Accountants' Licensure Examination. Industry and Academic Research Review, 4 (1), 10-15.
23. Gillis, Nicolas. (2020). Nonnegative Matrix Factorization. 10.1137/1.9781611976410.
24. Gosavi, Chhaya & Arora, Sandhya. (2022). Active Learning Strategies for Engaging Students in Higher Education. Journal of Engineering Education Transformations. 36. 1-7. 10.16920/jeet/2022/v36is1/22167.
25. Gray, J. A., & DiLoreto, M. (2016). The Effects of Student Engagement, Student Satisfaction, and Perceived Learning in Online Learning Environments. International Journal of Educational Leadership Preparation, 11, Article No. 9819.
26. Guiamalon, Tarhata. (2022). Social And Economic Development: State Universities And Colleges' (Suc's) Contribution Creativity Skills Of The Students In Recycling. 12. 104-110. 10.46360/globus.edu.220221015.
27. https://www.prc.gov.ph. (2024). https://www.prc.gov.ph/article/august-2024-registered-electrical-engineers-and-registered-master-electricians-licensure. Retrieved from https://www.prc.gov.ph: https://www.prc.gov.ph/article/august-2024-registered-electrical-engineers-and-registered-master-electricians-licensure
28. Huck, Carla & Zhang, Jingshun. (2021). Effects of the COVID-19 Pandemic on K-12 Education: A Systematic Literature Review.
29. Hwang, N. & Koedel, C. (2023). Helping or hurting: The effects of retention in the third grade on student outcomes. Educational Evaluation and Policy Analysis. http://doi.org/10.3102/01623737231197639
30. Johnson, Claudia & Boon, Helen & Thompson, Maree. (2020). Curriculum Alignment After Reforms: A Systematic Review with Considerations for Queensland Pre- and In-service Teachers. Australian Journal of Teacher Education. 45. 10.14221/ajte.202v45n11.3.
31. Joshi, Ankur & Kale, Saket & Chandel, Satish & Pal, Dinesh. (2015). Likert Scale: Explored and Explained. British Journal of Applied Science & Technology. 7. 396-403. 10.9734/BJAST/2015/14975.
32. Komarova, Yulia & Vinogradova, Elena & Agafonova, Lidia & Aitov, Valeriy. (2022). Integrative Curriculum as the Basis of Course Design in Foreign Languages for Future Engineers. 10.1007/978-3-031-11435-9_10.
33. Kurniawan, Feby & Erita, Yeni & Syahrir, Didi & Utami, Vani. (2023). The influence of students' environment on students' learning motivation. Journal Of Digital Learning And Distance Education. 1. 297-305. 10.56778/jdlde.v1i8.58.
34. LSPU_system. (2021). LSPU 2021 Student Handbook. Sta. Cruz Laguna: LSPU.

35. LSPU_SYSTEM. (2024). https://lspu.edu.ph/page/mission-vision-and-mandate. Retrieved from https://lspu.edu.ph: https://lspu.edu.ph/page/mission-vision-and-mandate
36. Mafarja, N., Mohamad, M. M., Zulnaidi, H., & Fadzil, H. M. (2023). Using of reciprocal teaching to enhance academic achievement: A systematic literature review. Heliyon, 9(7), e18269. https://doi.org/10.1016/j.heliyon.2023.e18269
37. Marcotte, Kayla & Gruppen, Larry. (2022). Competency-Based Education as Curriculum and Assessment for Integrative Learning. Education Sciences. 12. 267. 10.3390/educsci12040267.
38. McBride, Sophie & Garcés Manzanera, Aitor. (2024). Exploring JASP as a data analysis tool in L2 research: a snapshot. TEISEL. Tecnologías para la investigación en segundas lenguas. 3. 10.1344/teisel.v3.45189.
39. Miseliunaite, Brigita & Kliziene, Irina & Cibulskas, Gintautas. (2022). Can Holistic Education Solve the World's Problems: A Systematic Literature Review. Sustainability. 14. 9737. 10.3390/su14159737.
40. Obiena, BA.S., Pasagad, J.N., Pongcol, MA. A., Sequiña, A. J., Barnuevo, K.J., Gayas, KV. E., & Calvarez. JB. S., (2024). A Correlational Study on The Time Management and School Performance of Senior High School Students. International Journal of Advance Research and Innovative Ideas In Education, 10(5), 183-197
41. O'Sullivan, Helen & Polkinghorne, Martyn & Chapleo, Chris & Cownie, Fiona. (2024). Contemporary Branding Strategies for Higher Education. Encyclopedia. 4. 1292-1311. 10.3390/encyclopedia4030085.
42. Paulus, Frank & Ohmann, Susanne & Popow, Christian. (2016). Practitioner Review: School-based interventions in child mental health. Journal of Child Psychology and Psychiatry. 57. 10.1111/jcpp.12584.
43. Roediger, Henry & Butler, Andrew. (2011). The critical role of retrieval practice in long-term retention. Trends in cognitive sciences. 15. 20-27. 10.1016/j.tics.2010.09.003
44. Santangelo, J., Elijah, R., Filippi, L., Mammo, B., Mundorff, E., & Weingartner, K. (2022). An integrated achievement and mentoring (iAM) model to promote STEM student retention and success. Education Sciences, 12(12), 1–21. https://doi.org/10.3390/educsci12120843
45. Shengrong Meng. (2023). Enhancing Teaching and Learning: Aligning Instructional Practices with Education Quality Standards. esearch and dvances in ducation, 2(7), 17–31. etrieved from https://www.paradigmpress.org/rae/article/view/703
46. Tan, J. B. (2014). Academic Performance, Aspirations, Attitudes and Study Habits as Determinants of the Performance in Licensure Examination of Accountancy Graduates, University of Eastern Philippines – Northern Samar, Philippines. International Journal of Education and Research, 61-70. 2(12). ISSN: 2201-6333
47. UNESCO-IBE. (2023, June 7). https://www.ibe.unesco.org/en/leadtheglobaldialogueoncurriculum. Retrieved from https://www.ibe.unesco.org: https://www.ibe.unesco.org/en/leadtheglobaldialogueoncurriculum
48. Valente, Sabina & Dominguez Lara, Sergio & Lourenço, Abílio. (2024). Plan Time Management in School Activities and Relation to Procrastination: A Study for Educational Sustainability. 10.20944/preprints202407.0735.v1.

49. Vences, C. A. (2015). Time Management and Academic Achievement of Higher Secondary Students. I-Manager's Journal on School Educational Technology, 10, 38-43. https://doi.org/10.26634/jsch.10.3.3129
50. Yan, Zi & Xiang, Wang & Boud, David & Lao, Hongling. (2021). The effect of self-assessment on academic performance and the role of explicitness: A meta-analysis. Assessment & Evaluation in Higher Education. 48. 10.1080/02602938.2021.2012644.
51. Yusefzadeh, H., Amirzadeh Iranagh, J., & Nabilou, B. (2019). The effect of study preparation on test anxiety and performance: a quasi-experimental study. Advances in medical education and practice, 10, 245–251. https://doi.org/10.2147/AMEP.S192053