

CANDIDATE ENGINEERS: AN EVALUATION OF THEIR
LICENSURE EXAMINATION PERFORMANCE**Mervin P. Mohammed**

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Abstract

This study evaluated the performances of the candidate engineers of the College of Engineering (COE) of the Tarlac State University (TSU) in the licensure examinations. The results of the four-year licensure examinations of the graduates of the COE with specialization in the fields of civil, electrical, electronics, and mechanical engineering were covered in this study. The research methods used in the study were descriptive and analytical approaches. The subjects of the study were the TSU College of Engineering graduates with specialization in civil, electrical, electronics and mechanical engineering. They took the board examination during the same year or not more than one year from the time of their graduation. Candidates who took the board examination more than once and/or beyond one year from the date of their graduation were not included in this study. For ethical consideration, all necessary procedures in acquiring the board examination results were strictly adhered to by the researchers. Likewise, the names and board examination results of the subjects of this study were treated with utmost confidentiality to protect their interest. The total numbers of first time takers for the licensure examinations in engineering specializing in civil, electrical, electronics and mechanical engineering were 100, 106, 108, and 44 respectively. The statistical methods used in this study were the descriptive and inferential statistics. The analysis of variance was used to determine the variation among the four-year licensure examination performances of the candidate engineers in the fields of civil, electrical, electronics, and mechanical engineering. The study revealed that there was no significant difference among the four-year licensure examination performances of both the civil and mechanical engineer candidates. In contrast, the electrical and electronics engineer candidates' performances significantly differed within the evaluation period.

Keywords: Candidate Engineer, Licensure Examination Performance, Evaluation of Licensure Performance

Engineering educators of the Philippines pose a substantial concern for globalization of service. In this case there will be free flow of service among countries and therefore professional services have to be liberalized. Due to the increasing importance of human services, an appropriate move has to be done in order to stress the greater impact and promotion of engineering education for globalization. In this age of globalization, modern professionals are challenged to learn, analyze and innovate. A key to globalization is sustaining knowledge-based education through interdisciplinary ways.^[1]

The Licensure Examination for Engineers is a tool that measures and ensures the quality of engineers who would join the workforce of various manufacturing industries in the Philippines and abroad. The Professional Regulations Commission (PRC) as the duly constituted body created for this function has been consistent in its task of screening who among the graduates from all board courses will be granted the professional licenses based on the board exam results.^[2]

Professional regulation impacts the lives of the 2.4 million registered Filipino professionals from 42 various fields and the hundreds of thousands of aspiring professionals who take the licensure examinations every year. More so, PRC affects the lives of every Filipino relying on the services of the professionals.^[3]

Passing the licensure examination given by the PRC is one of the greatest achievements in one's life. This examination is intended to prove the graduates' knowledge, progress, skills and qualification in a particular profession. It needs a lot of time to study, to have self-discipline, patience and determination and these will not be possible without prayers, support and encouragement.^[4]

In an academic setting, it is the responsibility and accountability of the members in the academic system to ensure the success of their graduates.^[5] This would be accomplished through the adoption of appropriate engineering education and experience requirements as prerequisites for licensure.^[6]

The performance of the student in every institution plays a very important role in determining the quality of education, which eventually guarantees the efficiency and effectiveness in application in a chosen profession or career. It suggests a higher standard of performance of the instructional system. The performance of the student in the licensure examination reflects the institution's efficiency as well as the intellectual capacity of the student.^[7]

The present study evaluates the performance of the engineering graduates of the College of Engineering (COE) of the Tarlac State University in the licensure examination. The results of the four year licensure examinations of the graduates of the COE with specializations in the fields of civil, electrical, electronics, and mechanical engineering are covered in this study.

The present study is focused on evaluating the licensure examinations performance of the candidate engineers of the TSU College of Engineering with specializations in civil, electrical, electronics, and mechanical engineering. Specifically, the study answered the following questions.

1. What are the performances of the candidate engineers in the licensure examination in terms of: rating distribution per course? average performance per subject area? passing performance?;
2. Is there a significant variation among the performances of the candidates in the engineering licensure



examination?; 3. What plan of action is proposed to improve the performances of the candidate engineers in the licensure examinations?

Methods and Materials

The research methods used in the study were the descriptive and analytical approaches. The subjects of the study were the College of Engineering graduates with specialization in civil, electrical, electronics and mechanical engineering. The Tarlac State University graduates took the board examinations during the same year or not more than one year from the time of their graduation. Candidates who took the board examinations more than once and/or beyond one year from the date of their graduation were not included in this study. The board examination performances of the engineer candidates were acquired from the Professional Regulatory Commission (PRC) through the Dean of the College of Engineering. For ethical consideration, all necessary procedures in acquiring the board examination results were strictly adhered to by the researchers. Likewise, the names and board examination results of the subjects of this study were treated with utmost confidentiality to protect their interest.

The total numbers of first time takers of the licensure examinations in engineering specializing in civil, electrical, electronics and mechanical engineering were 100, 106, 108, and 44 respectively.

The statistical methods used in this study were the descriptive and inferential statistics. The analysis of variance was used to determine the variation among the four-year licensure examination performances of the candidate engineers in the fields of civil, electrical, electronics, and mechanical engineering. The scheffe test was used to determine which among the licensure examination performances of the candidate engineers in the fields of civil, electrical, electronics, and mechanical engineering significantly differed.

Results and Discussions

Performance of the Candidate Engineers in the Licensure Examination: The rating distribution per course, average performance per subject area, and passing performance of the TSU first time takers of the licensure examinations in engineering specializing in civil, electrical, electronics and mechanical engineering are presented in the succeeding discussions.

Rating Distribution per Course: In Table 1, the overall rating distribution per course of the candidate engineers is presented.

Section 16 of Republic Act 9292 with the short title Electronics Engineering Law of 2004 states that “to pass the licensure examination, a candidate for Electronics Engineer must obtain a passing rating of seventy percent (70%) in each subject given during the examination: Provided, however, that a candidate who obtains a passing rating in the majority of the subjects but obtains a rating in the other subject/s below seventy percent (70%) but not lower than

sixty percent (60%), shall be allowed to take one removal examination on the subject/s where he/she failed to obtain the passing rating.”

For the civil, electrical and mechanical engineering licensure examinations all candidates must obtain an average rating of seventy percent (70%) in all subject areas provided that no subject/s will fall below fifty percent (50%).

The table reveals that majority of the performances of the civil engineer candidates were below the passing mark of 70 percent. There were 45 candidates who surpassed the passing mark but only 44 candidates passed the examination. The reason for this is that one candidate had a rating below 50 percent in one of his subjects. Among the examination passers, one candidate got a passing mark of 94.55 percent.

Table 1 - Overall Rating Distribution per Course

Score Range	Civil	Electrical	Electronics	Mechanical
35 – 39	1	1	2	0
40 – 44	8	8	1	0
45 – 49	8	8	3	0
50 – 54	9	13	12	0
55 – 59	9	9	15	3
60 – 64	12	16	17	2
65 – 69	8	14	14	5
70 – 74	5	19	20	6
75 – 79	17	10	14	15
80 – 84	14	5	9	9
85 – 89	8	3	1	2
90 – 94	1	0	0	2
Total number of passers	45	37	44	34
Total number of candidates below the passing mark	55	69	64	10

There were 37 electrical engineer candidates who earned ratings above the 70 percent passing mark. Unfortunately, the candidates, passing rate stood only at 34.91 percent.

Forty-four of the electronic engineer candidates earned an overall rating of 70 percent and above. Out of the 44 candidates only 29 passed the examinations. The candidates who earned ratings below 70 percent in one or more subjects automatically earned a conditional or removal examination remark. Candidates who obtained passing ratings in the majority of the subjects but obtained ratings in the other subject/s below seventy percent (70%) but not lower than sixty percent (60%), were allowed to take one removal examination on the subject/s where the candidates failed to obtain the passing rating.

The mechanical engineer candidates got the highest number of passers among the courses in terms of percentage. Out of the 44 examination takers, 34 of the candidates earned a rating of above 70 percent. Out of the 34 candidates, two candidates earned ratings of 90.80 and 90.85 in the licensure examinations.

Overall, the mechanical engineer candidates out-performed the civil, electrical, as well as the electronics engineer candidates in terms of average passing performance.



Average Performance per Subject Area: The average performance of the candidate engineers per subject area is presented in table 2. The licensure examination for civil engineers covers the subjects mathematics, surveying and transportation engineering (subject 1); hydraulics & geotechnical engineering (subject 2); and structural engineering and construction (subject 3). For the electrical engineer licensure examination, the coverage are mathematics (subject 1), engineering sciences and allied subjects (subject 2) as well as electrical engineering professional subjects (subject 3).

Electronics engineer licensure examination covers the following subjects: mathematics (subject 1), general engineering and applied sciences (subject 2), electronics engineering (subject 3), as well as electronic system and technologies (subject 4) The coverage of the mechanical engineer licensure examination are mathematics (subject 1), machine design (subject 2), and industrial/power plant engineering (subject 3).

Table 2 - Average Performance per Subject Area

Subject	Civil	Electrical	Electronics	Mechanical
1	69.78	63.62	68.42	75.30
2	69.14	62.21	69.81	80.30
3	60.75	63.24	62.23	70.84
4	-	-	63.56	-
Overall	66.43	63.06	66.01	75.71

As presented in Table 3, the civil, electrical, as well as the electronics engineer candidates in the licensure examinations attained an average rating below the passing mark in all subject areas. Only the candidates in the mechanical engineering licensure examinations attained an average rating of 70 percent and above in all subject areas.

Overall, the candidates in mechanical engineering had the highest average performance in the licensure examinations at 75.71 percent. This was followed by the civil, electronics and electrical engineer candidates with averages of 66.43, 66.01, and 63.06 percent respectively.

Passing Performance: In Table 3, the passing performance of the candidates in the engineering licensure examinations is presented. There were 100, 106, 108 and 44 candidates who took the civil, electrical, electronics and mechanical engineering licensure examinations, respectively, in the last four years.

Table 3 - Passing Performance of the Candidates

	Civil	Electrical	Electronics	Mechanical
Number of Candidates	100	106	108	44
Passed	44	37	29	34
Passing Rate	44.00	34.91	26.85	77.27
Average National Passing Rate	38.95	43.12	27.05	62.68

The average passing rate of the civil and mechanical engineer candidates was above the average national passing rate. Both the electrical and electronics engineer candidates had average passing rates below the average national passing percentage.

Difference among the Performances of the Candidates in the Licensure Examination: In Table 4, the results of the analysis of variance on the four-year licensure examination performances of the candidate engineers is presented.

Table 4 - Analysis of Variance on the Performances of the Candidate Engineers

Course	Computed F - value	Critical F-Value	Decision
Civil	0.77200	2.69939	Accept Ho
Electrical	11.56988	2.693721	Reject Ho
Electronics	6.122244	2.691979	Reject Ho
Mechanical	2.117476	2.838745	Accept Ho

The results revealed that the performances of the civil engineer candidates did not significantly differ in terms of their examination results in the last four years of the licensure examinations. This means that there was cohesiveness of the knowledge by the candidates who took the licensure examinations. Unfortunately, the average rating of 66.43 of the civil engineer candidates is below the passing mark which indicates that they performed poorly in all the four years of licensure examinations.

For both the electrical and electronics engineering licensure examinations, the results revealed that the performances of the candidates significantly differed during the four years of licensure examinations. The difference can be attributed to the decline in performance of the candidates in some licensure examinations.

The performance comparison among the licensure examination results of the mechanical engineer candidates revealed that there is no significant difference among their performances in the four year period. This means that the performances of the mechanical engineer candidates were comparable per examination year.

Proposed Plan of Action: In Table 5, the proposed plan of actions to improve the performance of the candidate engineers in the licensure examination is presented.

Table 5 - Proposed Plan of Action

Strategy	Brief Description
1. Curriculum review on the engineering courses	The dean, chairpersons, and faculty members of the different departments of the college may review to improve the curriculum on a regular basis and they ensure that the quality of instruction is on the rise.
2. Review of the college retention policy	The dean, chairpersons, and faculty members may establish a retention policy that includes the recruitment of quality students into the engineering department and the continuous attempt to improve the quality of those already enrolled in the department through quality instruction by the faculty.
3. Practice or mock board examination for graduating students	The department chairs, with the approval of the college dean, may encourage the faculty members to administer a practice or mock board examination to graduating students. This can be used by the students as basis on their possible performance in the actual board examination.
4. Coaching on how to pass the licensure examination	The department chairs, with the approval of the college dean, may encourage the faculty members to administer relevant coaching sessions after the administration of the practice or mock board examination to graduating students.
5. Conduct of bench marking in high performing schools	The dean, chairpersons, and faculty members may conduct bench marking activities in high performing schools in the licensure examination for them to replicate the identified best practices.



The proposed strategies to improve the performance of the candidate engineers in the licensure examination are as follows: review of the curriculum; review of the college retention policy; practice or mock board examination for graduating students; coaching on how to pass the licensure examination; and conduct of bench marking in high performing schools.

The evaluation of student performance has two primary purposes: 1) summative, to measure student progress or achievement, and 2) formative, to provide feedback to students to help them learn. For instructor, it is easy to place emphasis on the first goal, since one of his most visible jobs is to assign grades that become part of the permanent record. The second goal, however – providing feedback for the purpose of helping students improve – is often the more important one for the success of students, as well as for the success of the teacher.^[8]

According to Singh (2010), evaluating factors such as academic competence, test competence, strategic studying, time management, and test anxieties are very important in evaluating academic success. Specifically, test competence and academic competence are important factors associated with academic performance. Focusing efforts to understand these factors further would be helpful for students in enhancing their academic performances. Efficient counseling services regarding study techniques along with stress management programs could assist students in achieving better academic performance.^[9]

The effectiveness of a curriculum is measured using the results of the licensure examination. Schools usually develop remedial measures to increase the number of passers.^[10]

Learning outcomes must be observable, achievable, and measurable. Determining how successful learning outcomes are achieved is a challenging task. It requires continuous assessment and professional judgment from all program constituents.^[11]

Conclusions

Based on the findings of this study, the following conclusions are reached.

The mechanical engineer candidates out-performed the civil, electrical, as well as the electronics engineer candidates in terms of their average passing performance; The candidates in the mechanical engineering licensure examination had the highest average performance with a 75.71 rating; Overall, the civil and mechanical engineer candidates performed above the average national passing rate. On the other hand, both the electrical and electronics engineer candidates had average passing rates but below the average national passing percentage; There is no significant difference among the four-year licensure examination performances of both the civil and mechanical engineer candidates. In contrast, the electrical and electronics engineer candidates' performances significantly differed within the evaluation period.

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