Level of Preparedness and Confidence of Graduating Engineering Students to Licensure Examination in Different Learning Domains

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Abstract: -The main goal of this research is to assess the level of preparedness of graduating students in taking the board examinations in three different learning domains namely - cognitive, affective, and psycho-motor. However, this research will include the collection and collation of data from academic institutions in Central Luzon, the Philippines with engineering courses.

This study used the non-experimental quantitative design, particularly the descriptive survey. Respondents are graduating engineering students officially enrolled in different State Universities and Colleges during the 2nd semester of the school year 2021-2022. Demographic profiles of respondents were presented. Results showed that the three learning domains greatly affect the student's preparedness and confidence in taking the board examinations. The research conducted depicted a number of points that needs to be addressed to improve the level of preparedness and confidence in taking the licensure exam.

Key Words: — ***Engineering, Licensure Exam, Cognitive Domain, Affective Domain, Psycho-Motor Domain.***

I. INTRODUCTION

Engineering by definition is the application of science and mathematics to solve problems. While scientists and inventors come up with innovations, it is engineers that make these innovations applicable to the real world. In simpler terms, engineering makes the impossible possible, and engineers are the ones performing possible impossibilities. From earlier than the stone age to the first manned flight, up until today's electric cars and the future's hyperloop transport system, engineering has played the biggest part in developing the world as we see it today and how we envision it in the future.

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Along with these innovations and developments are of course drawbacks. As the world progressed, the baselines of engineering naturally progressed and became a lot more complicated than how it was back then. Back then, people in the civil and architecture field did manual drafting where all they need were drawing materials. Today the standard of drafting is by using software such as AutoCAD, Revit, Sketch-Up, and the likes. Although this approach cuts the designing and modeling phase of construction which promotes a more accurate, precise, and faster job, it is naturally more costly than buying drawing materials.

Since today's engineering is a whole lot more intricate, it's needless to say students regardless of the field, are expected to be "top-tier level" for them to basically keep up with the challenges of the field. From mathematical subjects such as trigonometry, analytic geometry, calculus, etc., up to science subjects such as chemistry, physics, etc., many students find it hard to pass them and some must even retake certain subjects just to make the cut. Take note that the mentioned subjects are mostly offered in the freshman and sophomore years of college and are apart from the major technical subjects that engineering seniors take. Then comes to the recently implemented K-12

program which affected even the tertiary level since the curricula for college majors had to undergo revisions and tweaks to fit shorter college year levels (before K-12, Eng'g was a five-year (5) course. the K-12 program shortened it to four (4) years). This means students can graduate earlier than it was before K-12, but their subjects and lessons will be more compact and fast-paced.

We also must take into consideration the effects of the COVID-19 pandemic. The pandemic has affected each and every aspect of the "then normal" way people do things. Take for example our schools which used to have face-to-face classes have opted to conduct online classes. The pandemic posed to be a great hurdle, especially for classes and subjects that require the physical presence and input of the students. Laboratory classes that greater focus more on physically interactive activities whose goal is to test and enhance the students' theoretical skills in terms of hands-on tasks, was forced to introduce virtual activities as a result of the no-contact and no face-to-face classes during the pandemic.

From the 1st year until the graduating year level of a student, it is a known fact that these students have undergone different types and kinds of hardships just to be equipped with sufficient knowledge and skills to pass the next chapter of their lives and the starting point of their professional careers, the board examination.

There are different factors as to why even though board exam takers have finished their courses and were qualified to take the exam, some of them still don't make it. The board examination results also determine the effectiveness of implemented curricula which in turn determines if an institution upholds its academic mission of producing highly qualified individuals.

Having these said, the main goal of this research is to assess the level of preparedness of graduating students in taking the board examinations, to determine the major contributing factors as to why graduating students have different levels of preparedness, and how these factors affect their chances of passing the licensure exams. Consequently, this study will take into consideration the differences in practices of the involved engineering majors. However, this research will include the collection and collation of data from different academic institutions in Region III which offer engineering as one of their programs.

II. Objectives Of The Study

The study seeks to answer the following:

What is the demographic profile of respondents in terms of?

- Age
- Gender
- Course
- Major
- University / College

Determine the level of preparedness and confidence of Engineering students in taking the board exam in terms of the following learning domains:

- Cognitive Domain
  - Mathematics Subjects
  - Science Subjects
  - Language Subjects
  - Professional / Design Subjects
  - Comprehensive Examination
- Affective Domain
  - Study Habits and Practices
  - Academic Behavior
  - Environmental Factors
- Psycho-motor Domain
  - OJT Performance
  - School Participation

Based on findings, propose measures that will enhance the engineering program.

III. Methodology

3.1 Research Design

This study will use the non-experimental quantitative design, particularly a descriptive survey and method including a

methodological survey will be used to determine the level of preparedness and confidence of the respondents towards the coming engineering licensure examination. The researchers will also apply the methodological study concerned with the testing and evaluation of research instruments and methods.

3.2 Research Instrument

The study will use a self-made survey research instrument composed of two parts. The first part will ask about the demographic profile of the respondents. The second part will be composed of questions related to the determination of the level of preparedness and confidence in terms of three different learning domains namely: Cognitive, affective, and psychomotor domains.

3.3 Locale of the Study

This research will be conducted in State Universities and Colleges located in Region III, Central Luzon, Philippines. There is a total of 21 Public SUCs and 43 Private SUCs in Central Luzon. The researchers will focus on three (2) SUCs as research locales namely the following:

- Nueva Ecija University of Science and Technology, Cabanatuan City, Nueva Ecija
- Holy Angel University, Angeles City, Pampanga

3.4 Respondents

The respondents of the study will be graduating engineering students who are officially enrolled in region 3 State Universities and Colleges, 2nd semester school year 2021-2022. The researchers will randomly select all the graduating engineering students to be the respondents of the study.

3.5 Sampling Procedure

The researchers will conduct the study on engineering students of public and private State Universities and Colleges in Central Luzon, the Philippines. The respondents will serve to be the sample population of the study in which they will be selected using purposive sampling. The said sampling technique will be used by the researchers for they have set the following respondent's criteria: 1) student in a public or private SUCs, Central Luzon; 2) graduating engineering student; 3) shows interest in participating in the study.

3.6 Research Instrument Used

The study used a designed questionnaire that was composed of two parts. The first part asked about the demographic profile of the respondents. The second part is composed of questions related to the level of preparedness and confidence of Engineering students in taking the board exam in terms of the different learning domains and are categorized.

Scoring Guidelines:

A rubric was used to determine the respondent's perception of their level of preparedness and confidence in the board exam based on different learning domains.

A Likert Scaling was used in the survey. It is a psychometric scale which commonly used in the questionnaire.

IV. RESULTS AND DISCUSSION

Through the survey conducted, the researchers have gathered the results as follows;

4.1 Demographic Profiles

Respondents' demographic profiles were collected. The majority of the respondents aged 22 years old (50.7%), 25 years old (17.1 %), 23 years old (15.8%), and others range from 24-34 years old (16.4%). Most respondents are male (60.27%). Respondent's different engineering courses were identified such as Civil Engineering, Mechanical Engineering, Electrical Engineering, and Aeronautical Engineering

4.2 Cognitive Domain

On Academic Subjects, Language Subjects showed the greatest number of excellent grades while Comprehensive Examinations/ Mock Board Exams showed the least count of excellent grades. The majority of the respondents' Comprehensive Examinations/ Mock Board Exams academic grades are "fair". Mathematics subjects showed the most count of "passing" grades.

On the Academic Subjects, it shows that most of the respondents are doing great in their subjects. As the data shows, there is around 12.4% of students on the "passing" scale concerning the five (5) academic subjects overall. As for the study habits and practices, it is most notable that the respondents claim to have a specific style of learning. One of the respondents said that;

"I study best at night or dawn; my mind works best when my environment is quiet. My attention span isn't that good, my focus gets easily swayed by small things, that's why I prefer to study at that time. The way I study is that I write down things I need to learn, memorize or practice. I learn a lot in the form of writing." – Respondent

Another respondent said;

"*My study habit is to study a topic then try answering problems right away then later check if it's correct or see the mistake I made in the process of solving*." – Respondent

4.3 Affective Domain

In the Study Habits and Practices, 77.55 % of the respondents admittedly "always" submit assignments and projects on or before the deadline. 65.10 % "often" allot an ample amount of time to study within the day. 54.42 % "often" participate in recitations. 55.47% "always" go to school early or on time. 47.97% "often" listen attentively to classroom discussions. 47.94% "always" ask for help to understand obscure lessons. 51.70% "seldom" raise questions during the discussion. 43.84% "always" jot down notes during class. 51.02% "always" show interest and motivation towards major subjects. 45.64% "always" prioritize working on projects than going out with friends. 51.37% "often" have a specific learning style that positively affects their academic performance.

In the Academic Behavior category, most of the students prefer to always work with a team rather than alone. 55% of the overall respondent say that they can often maintain high levels of interest in their studies, while 25% always maintain a high level of interest. 62% also believe that they are a well-disciplined student.

The environmental factors; financial capability, family support, study area, resources such as books and the internet, and of course the pandemic have majorly affected the majority. A respondent said that what affects him/her the most from taking the board examination was their financial capability. During the pandemic, the real Gross Domestic Product (GDP) of the Philippines contracted by 9.6% a year per year in 2020. The government expects a strong recovery before the end of 2021 when enough vaccines have been rolled out against COVID-19. However, the economic recovery plan and growth targets at the end of the year are put in doubt with the first quarter of 2021 growth rate of GDP at -4.2%. This being said, many families were affected during the pandemic. Many lost their jobs and source of income and this has contributed as one of the primary concerns of students instead of being focused on their academic performance.

4.4 Psycho-Motor Domain

Based on the respondents' OJT Performance, on average, the students have a "Very Good" rating. The elements of working in a company that was characterized in the questionnaire as criteria in determining their level of preparedness and confidence showed that there is constant progress and development in the respondent's personal characteristics, attitude, competencies, job performance, and adherence to company policies. And lastly, their school participation has shown a great number of respondents leaning towards being moderately active in participating in academic activities rather than in other types of activities.

"*I am not into activities; I only participate when I am required to do so. When it comes to voting, I keep exercising my rights as a student*." - Respondent

V. CONCLUSION

The level of preparedness and confidence of engineering major graduating students are greatly affected based on the three learning domains. In the Cognitive Domain, the respondents' intellectual capability was shown to be "Fair" on average. There were factors such as their study habits and preferences that had major effects on their performances. Take, for example, one of the respondents who prefer to study at night when everything is quiet and there are fewer distractions.

For the Affective Domain, factors such as family support play a big part in the students' confidence in taking the Licensure Exam. Many studies show that parental support does not end even when the child goes to college (Edelman, 2013; Ratelle, Larose, Guay & Sene´cal; 2005; Savage, 2009; Winegard, 2010). Cheng, Ickes, and Verhofstadt, 2012 suggest that parental support influences better academic achievement, and helps students undergo personal and social development. Besides, parental `involvement plays a role in students' well-being and translates into the students' ability to develop critical thinking useful for academic achievement at the college level (Román, Cuestas & Fenollar, 2008).

In the Psycho-Motor Domain, the students' On-the-job training was definitely beneficial in applying the skills and knowledge they earned at school to better fine-tune and get them ready for the field. 62% of the respondents being actively participative in academic activities and only participating in other activities when required shows that the level of confidence of students outside of academic bounds is a little on the lower side when it comes to leadership and participation which are important elements that concern the overall emotional intelligence of a person.

Therefore, the research conducted depicted a number of points that needs to be addressed to improve the level of preparedness and confidence of graduating students in taking the Licensure Exam. First, the board examination is a nationwide examination

with a fixed schedule which is obviously during the day. Studying at night may prove to be not helpful since the brain is conditioned to work best during the night. Second, Emotional support from either family or peers proved to be beneficial in uplifting the state of mind of a person. Thus, lack of it otherwise proves to be a loss on the part of the students. Lastly, leadership skills have long been a criterion in developing one's character which affects everything around that person. Lack of leadership skills also means that the person tends to be indecisive which hinders or facilitates goal execution, job satisfaction, and overall effectiveness.

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