

COVID-19 Impact on Board Exams for the Department of Electronics Engineering at Don Honorio Ventura State University

Ohlan Jefferson T. Fernando¹, Rick Donald S. Manzon², Lester O. Natividad³

¹ Engineer 1, Don Honorio Ventura State University, Pampanga, Philippines

² Faculty of Graduate Studies Department, Nueva Ecija University of Science and Technology, Nueva Ecija, Philippines.

³ Faculty of Electronics Engineering Department, Don Honorio Ventura State University, Pampanga, Philippines.

ABSTRACT: The COVID-19 pandemic changed the delivery of education as many programs temporarily transitioned to remote learning. This study tends to answer the question: Did the COVID-19 pandemic and transition to virtual learning have an effect on Don Honorio Ventura State University- ECE Department's ECE Licensure Examination Passing Rate? Data was gathered through the Professional Regulation Commissions website from April 2019 to April 2023 ECE Licensure Examination. A chi square test was used to determine if there is a significant difference between the result of the said licensure examination before and after pandemic. Result suggests ($\phi^2 = 0.5877$ and $p\text{-value}=0.433$) to reject the null hypothesis therefore accepting the alternate hypothesis. The COVID-19 pandemic and the transition to online learning had a direct impact on ECE student performance on the ECE Licensure Examination.

KEYWORD: Pandemic, remote learning.

I. INTRODUCTION

Most worldwide industries were affected by the pandemic caused by a Corona Virus Disease-2019 (COVID-19) pandemic. According to the World Health Organization (WHO) (2020), The global COVID-19 pandemic caused a huge loss of life and brought massive challenges to health, food systems, and work worldwide. It's causing a lot of economic and social problems too. This challenges in the different aspect of our lives were also reflected in the academic community. Hoofman and Secord (2020) stated in their study that the COVID-19 pandemic has changed and will continue to change the mode of delivery of knowledge and skills across the education system. Many of the students might have adapted to these changes but there were learners that struggled and learned best with the traditional learning system. The gap between these students is evident among those who belong to families which could not compensate for the need for home-based learning.

In the Philippines, both public and private higher education institutions (HEIs) needed to adapt due to the current circumstances, as in-person meetings and large gatherings were prohibited. To adjust, the leading universities implemented work-from-home arrangements. Their examples were followed by all the schools across the country. They shifted to remote teaching modalities – synchronous and asynchronous. Synchronous remote learning was implemented for students with stable internet and proper smart electronic devices such as cellphones. Asynchronous

remote learning was implemented for learners who did not have reliable internet or do not have resources for accessing the internet (Simbulan, 2020).

During pandemic, some universities like the University of the Philippines (UP) system and De La Salle University (DLSU) implemented a “no fail policy” which was condemned by Department of Education (DepEd) for it was deemed to be unfair (2020). Although schools and universities had varying opinions, almost three years of online classes passed along with the COVID-19 pandemic and batches of students have graduated with their bachelor's degree.

Although a degree in college is already a good credential, there are professions which need licenses from Professional Regulation Commission (PRC) to be fully acknowledged in their fields. One of which is the course Bachelor of Science in Electronics and Communication Engineer. On April 13, 2020, the Commission on Higher Education (CHED) published a COVID-19 guideline with recommendations for mitigating, preventing, and controlling the virus's spread. The advice states that Higher Education Institutions (HEIs) must continue to "exercise their judgment in the deployment of [available] flexible learning and other alternative modes of delivery in lieu of on-campus learning, if they have the resources to do so" [2] To supplement program requirements for degree programs that include internship and clinical work, adaptable electronic and non-electronic learning methods, modules, self-directed learning activities, etc. are provided [2]. Both students and teachers will suffer as a result of this change in the way that learning is delivered.

The pandemic's restrictions and the decision to postpone the 2020 licensing exams had a significant negative impact on the Philippine labor market. 2.23 million Filipinos left the labor force between July and October 2020 [3] In addition, the labor force participation rate among people who were of working age fell to 58.7% in October 2020 [3].

This research is created to assess the validity of the assertions presented in existing literature for the Don Honorio Ventura State University's ECE Department. This evaluation is conducted through the analysis of data concerning the performance of licensure examinations among different batches. Specifically, the examination data from the April 2019, October 2019, and October 2021 cohorts will be scrutinized to represent the pre-pandemic era. Conversely, the post-pandemic phase will be depicted through the examination data from the April 2022, October 2022, and April 2023 cohorts. This meticulous analysis aims to determine if the patterns observed in the existing literature hold true within the context of the DHVSU-ECE Department, highlighting any potential impact of the pandemic on licensure examination outcomes.

The study aims to determine the impact of COVID-19 on board exams for the Department of Electronics Engineering at Don Honorio Ventura State University. More specifically to:

1. Compute for the chi-square value and p-value from the given set of data;
2. Compare and differentiate the results from pre-pandemic and post-pandemic exam takers and;
3. Associate the COVID-19 pandemic to the results of the 2022 and 2023 ECE board exam takers from DHVSU.

This research delves into the examination performance trends within the ECE Department of Don Honorio Ventura State University (DHVSU). The study focuses on evaluating the potential impact of the pandemic on licensure examination results. The data encompassed in this investigation are drawn from multiple examination batches, including April 2019, October 2019, October 2021 (pre-pandemic), as well as April 2022, October 2022, and April 2023 (post-pandemic). By examining the patterns in examination outcomes during these specified periods, the study seeks to ascertain if the observations documented in existing literature hold true for the DHVSU-ECE Department.

II. RELATED STUDIES

The COVID-19 Pandemic

The WHO declared COVID-19 as a global pandemic on March 11, 2020. This virus has not only had social impacts on public health worldwide but has also significantly affected economies. Decreases in income, rising unemployment rates, and disruptions in transportation, services, and industries are some of the key challenges posed by this ongoing pandemic. Many governments initially underestimated the risks of

COVID-19, leading to unfortunate consequences in their countries. Given that the pandemic is expected to persist, it's crucial to take preventive measures to stop the spread of the infection, safeguard lives, and protect economic stability (Mishra et al, 2020).

Haleem et al. (2020) highlighted that the impact of COVID-19 has swiftly influenced our everyday routines, businesses, and disrupted global trade and travel. Swift identification of the disease in its early stages is crucial to curbing its rapid transmission between individuals. Most countries have slowed down their manufacturing processes. The repercussions of this disease extend to various sectors, including pharmaceuticals, solar power, tourism, and the electronics industry. The virus has widespread effects on both individuals' daily lives and the global economy. Currently, the effects of COVID-19 on daily life are broad and hold significant consequences, categorized into healthcare, economic, and social aspects.

Effect of COVID-19 in Education

The closure of schools in Europe because of COVID-19 has caused major disturbances in education. Early signs from wealthier countries in the region show that the pandemic is causing learning setbacks and inequality. To counteract these lasting negative consequences, countries like Ukraine and other less prosperous middle-income nations, which are expected to be even more affected, must introduce programs to help students catch up, safeguard education funding, and get ready for future challenges by improving education systems (Donnelly et al, 2021).

Hoofman and Secord (2020) stated in their study that the COVID-19 pandemic has changed and will continue to change the mode of delivery of knowledge and skills across the education system. Many of the students might have adapted to these changes but there were learners that struggled and learned best with the traditional learning system. The gap between these students is evident among those who belong to families which could not compensate for the need for home-based learning.

The Philippines' Education during Pandemic

Castro (2022) gathered documents which revolve around the various impacts of the COVID-19 pandemic on education in the Philippines in his study. The information underscores a significant influence of the pandemic on the country's education sector. Due to school closures, the Philippines had to resort to distance learning. However, it's evident that studying from home hampers effective learning for Filipino students. While distance learning aims to curb COVID-19 infections for safety, its drawbacks and broader consequences outweigh the convenience. It's also inferior compared to in-person learning. Students who lack access to online resources are particularly affected by at-home schooling, worsening their existing disadvantages. This situation could lead to a

wider education gap, risking their prospects and causing negative effects on a larger scale, including social and economic decline for the country. Between March 2020 and September 2021, UNICEF observed that 131 million students from 11 countries, including Bangladesh and the Philippines, had been attempting remote learning for around three-quarters of their regular school time. In the Philippines, face-to-face classes were mostly suspended, and the education department introduced a mix of remote learning options, including online platforms, educational TV, radio, and printed modules. According to a report from the department in March 2021, 99% of public school students passed the first academic quarter of the previous year. However, various surveys suggest that students are facing disadvantages in this setup. The Movement for Safe, Equitable, Quality and Relevant Education found that over 86% of 1,299 students surveyed learned less through the education department's take-home modules. Similar trends were observed with online learning and a combination of online and physical materials, where 66% and 74% of respondents respectively reported learning less (De Guzman, 2021). On April 13, 2020, the Commission on Higher Education (CHED) issued guidelines concerning COVID-19, suggesting ways to prevent and control the virus. The guidelines recommend that Higher Education Institutions (HEIs) should decide whether to shift from on-campus to flexible learning based on their resources. Additionally, alternative methods like electronic and non-electronic learning tools are introduced for programs with internship and clinical components. Both students and teachers are expected to face challenges due to this shift in learning approach. The pandemic's limitations, including the postponement of the 2020 licensing exams, had a notable negative impact on the Philippine job market. Between July and October 2020, approximately 2.23 million Filipinos exited the labor force. Moreover, the labor force participation rate for those of working age dropped to 58.7% in October 2020.

Post-Pandemic Effect COVID-19

Changes in the mode of delivery have impacted even the professional accreditation examinations such as what the Accreditation Council for Occupational Therapy Education (ACOTE) stated in the year 2022. Starting in March 2020, Occupational Therapy (OT) students all over the country had to deal with school closures and a shift to online learning due to social distancing rules. These changes, which initially started in cities, quickly spread across the entire nation because of the global outbreak. On March 5th, schools in Washington State closed, and this trend continued rapidly. By March 12th, 16 states had closed schools statewide. Around March 16th, more than half of all students in the U.S. were no longer attending classes in person. On March 25th, all public schools in the United States closed their physical campuses for the rest of the academic year. Recent research has shown that COVID-19 has negatively affected individual students'

academic performance. Preparedness plays a crucial role in the achievement of exam takers in their licensure exams and therefore needs proper attention. Former students, now exam takers, must be well-prepared in terms of financial, mental, environmental, and academic aspects, which require thorough groundwork. As revealed by this research, most students at Partido State University viewed their level of preparedness as inadequate in terms of finances, mental state, academics, and the environment (Pardiñas, 2023). Arponen et al. (2022) concluded that among the 22 courses taught remotely during the pandemic in the University of Helsinki, there was a noteworthy difference ($p < .05$) in awarded grades for 16 of them (73%) when compared to the grades from the two previous years. Fluctuations in exam grades were present even before remote teaching started, but they became more frequent afterward. Throughout the pandemic, grade changes were almost equally divided between lower grades (26%) and higher grades (36%), suggesting various factors possibly unrelated to remote teaching could be at play. These findings were derived by comparing the examination performance data from 2018 and 2019 with the data from 2020.

III. CONCEPTUAL FRAMEWORK

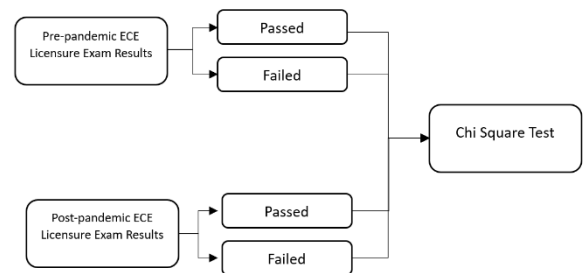


Fig 1. Research Model, by the author, 2022

The researcher gathered data on ECE licensure exam results for both pre-pandemic and post-pandemic periods. Each student's outcome was categorized as "Passed" or "Failed" for both time periods.

The collected data were organized into four categories based on the root boxes and branches, indicating the number of students who passed and failed in each period.

The data from all four categories were used as input for the chi-square test. This test analyzed whether there is a significant difference between the expected and observed frequencies of passed and failed outcomes in the two time periods. If the p-value from the chi-square test is below a certain significance level (often set at 0.05), it suggests that there is a significant association between the time periods and the licensure exam outcomes.

IV. RESEARCH METHODOLOGY

Time and Place of Study

The study was conducted from June 2023 to August 2023 in Nueva Ecija University of Science and Technology (CWXQ+8M5, Cabanatuan City, 3100 Nueva Ecija). The board examination performance data were collected from DHVSU – ECE Department.

Research Design

In the current research study, the statistical tool used was the chi-square test, a statistical method utilized to discern the potential influence of the pandemic on the performance of the ECE Licensure Examination within the ECE Department of Don Honorio Ventura State University. This statistical analysis facilitated the examination of quantitative data, aiding in the determination of whether there existed a notable impact attributed to the pandemic on the examination outcomes. This research aimed to comprehensively examine if there exists significant difference between the pre-pandemic and post-pandemic board examination performance for DHVSU – ECE Department.

Hypotheses

Null Hypothesis

Ho: There is no significant difference in pre-pandemic and post pandemic board examination performance for DHVSU - ECE Department.

Alternative Hypothesis

Ha: There is a significant difference in pre-pandemic and post pandemic board examination performance for Don Honorio Ventura State University- College of Engineering and Architecture.

Data Collection

The researcher gathered information regarding the ECE Licensure Exam. Results for the April 2019, October 2019, and October 2021 Ece Licensure Examination are pre-pandemic, whereas those for the April 2022, October 2022, and April 2023 exams are post-pandemic.

Statistical Analysis

The research utilized the chi-square test to determine whether there exists a significant difference in the licensure examination performance of the DHVSU (Don Honorio Ventura State University) Electronics and Communication Engineering (ECE) department between the pre-pandemic and post-pandemic periods.

The chi-square test is a statistical method used to assess the association or independence between categorical variables. In this context, it will help us analyze whether there is a significant relationship between two categorical variables: the time periods (pre-pandemic and post-pandemic) and the licensure examination performance (likely categorized as pass or fail).

V. RESULTS AND DISCUSSION

In the following section, the results of the investigation into the potential ramifications of the COVID-19 pandemic on the licensure examination performance within the Electronics and Communication Engineering (ECE) department at Don Honorio Ventura State University (DHVSU) are presented. The primary objective of the study was to determine whether a statistically significant distinction exists in the performance outcomes during the periods prior to and following the pandemic's onset. To address this, an in-depth analysis utilizing the chi-square test was conducted, enabling exploration of potential associations between the respective time frames and the pass-fail outcomes witnessed in the licensure examination.

Table 1. ECE Licensure Examination Takers

Category	Passed	Failed
Pre-Pandemic	137	49
Post -Pandemic	119	51

The tabulated data in Table 1 outlines the outcomes of the ECE licensure examination for the indicated time periods. In the pre-pandemic era, 137 individuals passed the examination, while 49 did not. Following the pandemic, 119 individuals passed, and 51 individuals did not.

Table 2. Chi Square Test

Degrees of Freedom	1
Chi Square	0.5877
p-value	0.443306

Table 2 shows the chi square test results conducted for table 1. The test shows a chi square of 0.5877 with a p-value of .443306 for a degree of freedom of 1. This suggests that we should reject the null hypothesis and accept the alternative hypothesis.

These findings resonate with the broader implications of the COVID-19 pandemic on education, as discussed in the literature. The abrupt shift to remote learning and the closure of schools due to the pandemic have raised concerns about learning setbacks and inequalities (Donnelly et al., 2021). The adaptability of students to the new learning environment has varied, with some facing difficulties and struggling to adjust, especially those who thrived under traditional learning settings (Hoofman & Secord, 2020). This adaptation challenge is reflected in the presented data, where changes in examination performance might correlate with the shifts in learning modalities prompted by the pandemic.

Furthermore, the impact of the pandemic extends beyond learning environments to preparedness and readiness for examinations. The research conducted by Pardiñas (2023) indicates that students' perception of preparedness encompassing financial, mental, academic, and

environmental aspects was lacking. Such perceived unpreparedness might reflect in the observed changes in examination results, potentially influenced by the uncertainties introduced by the pandemic.

V. CONCLUSION AND RECOMMENDATION

The chi-square test of independence was used to analyze the current study. The researchers found out that there is a significant difference in the board exam performance of DHVSU -ECE licensure examination takers before and after pandemic. This shows that the COVID-19 pandemic and transition virtual learning influence Don Honorio Ventura State University- ECE Department's ECE Licensure Examination Passing Rate.

For future researchers exploring the effects of events like the COVID-19 pandemic on education, consider longer studies to understand how pandemic impacts evolve over time. Assess how well students are prepared for remote learning, including their resources and mental well-being. Study how remote learning affects disadvantaged students differently and find ways to bridge gaps in access. Compare online, hybrid, and in-person learning to see what works best for various student groups.

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