



Exploring the Motivational and Preparatory Experiences of BSEE Graduates Pursuing the REE Examination Amidst the COVID-19 Pandemic

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Abstract: The licensure examination for Registered Electrical Engineers (REE) is inherently rigorous and became even more challenging during the COVID-19 pandemic. The repeated postponement of examination dates heightened stress and uncertainty among examinees. Despite these setbacks, the April 2022 REE examination was held as scheduled, offering a unique opportunity to explore the lived experiences of those who succeeded under such difficult conditions. This study aimed to investigate the experiences and challenges encountered by BSEE graduates who passed the April 2022 REE, with the goal of informing institutional stakeholders and supporting future examinees. Employing a basic qualitative research design, the study utilized nonprobability sampling to select 14 participants, all of whom were successful REE passers. Data were collected through semi-structured interviews and analyzed thematically using a hermeneutic phenomenological approach. Four major themes emerged from the analysis: (1) Positive attitude and hard work – highlighting the role of perseverance and mindset; (2) Uncertainty and disappointment – reflecting emotional distress due to repeated rescheduling; (3) Career growth and family uplift – emphasizing the aspirational and motivational dimensions; and (4) Calculator use and content enhancement – identifying technical strategies that supported exam performance. The findings underscore the importance of fostering a positive and supportive learning environment, both from peers and faculty. Institutional support from the application phase through exam preparation was seen as crucial. Additionally, enhancing curricular content, integrating calculator techniques, and adopting effective teaching strategies for board exam subjects were recommended. These insights can inform policies and programs that support licensure examination candidates, and may serve as a source of motivation and guidance for students in similar fields.

Keywords: Licensure Examination, Pandemic Challenges, Licensure Examination, Exam Preparation Strategies

I. INTRODUCTION

Republic Act No. 7920 otherwise known as the New Electrical Engineering Law is an act providing for a more responsive and comprehensive regulation for the practice, licensing, and registration of electrical engineers and electricians. Pursuant to this act, the passing of the Licensure Examination for Registered Electrical Engineers (REE) is a necessity in the practice of the profession.

The objective of the BSEE program CapSU states that the graduates are expected to: (1) be professionally stable and employed in the field of electrical engineering and other related fields; (2) be competent in professional practice with innovations and technologies, and engaged in community services and continuing development program; and (3) be imbued with core values of the institution and uphold the ethical standards in the practice of electrical engineering profession. These objectives embody the activities of the program upon which producing licensed electrical engineers is a fundamental goal.

REE as it is difficult by itself, has become even more a challenging undertaking in the midst of the pandemic. The pandemic has affected everyone in the world by disrupting the way of life in the most unimaginably horrible ways. For BSEE graduates who were about to take the REE, this posed a huge halt in their life since while they are ready to pursue the most vital passage to their professional life, the pandemic happened, thereby rendering restriction to their movements in the realization of their personal plans and prospects. Thus, the experiences of the passers of the April 2022 REE is truly worth a record. Thereupon, a qualitative investigation on their experiences has become a point of interest.

There had been numerous studies conducted to investigate the nature of electrical engineering education. Likewise, there had been many studies conducted on the conditions of electrical engineering graduates pursuing the REE, but none on the challenges and experiences of REE during the pandemic, specifically in our local context.

There are, however, relevant studies that informed and provided insight on the interest of this study. First is the study by Barrot (2021) who conducted a study on the challenges of tertiary level students [5]. The findings revealed that, of the many challenges that learners had to face, the COVID-19 pandemic had the greatest threat on the quality of the learning experience and students' mental health. In terms of coping strategies employed by students to face this adversity, the most frequently used were resource management and utilization, help-seeking, technical aptitude enhancement, time management, and learning environment control. Secondly, the challenges in learning and group gatherings posed restrictions on movement and compelled everyone to abide to health protocols by Gonzales et al., (2020) & Kapasia et al., (2020) was also an invaluable review in the study. Lastly, Kondili et al., (2020) expressed that the pandemic is inflicting multiple shocks on young people especially their employment prospects.

II. RELATED LITERATURE

A. The Covid-19 Academic Challenges among Students

The whole world has been affected by the adverse implications of COVID-19, where many countries are still following the parameters of lockdown and other restrictions. These lockdowns have stopped people from travelling to other places, forcing them to stay within their homes for most of the year (Alter, 2021). This kind of forced isolation has increased the use of online technology in our daily lives. Like all other activities, traditional education has shifted from face-to-face learning to online platforms. Different schools and colleges have adopted this new pattern of online learning for students. Though online education offers continuity in learning for students, it still comes with its own set of challenges and obstacles, especially in the field of engineering that was earlier focused on hands-on learning. To add the fact that students have to deal with extra-long hours to finish the school work assigned to them, the pandemic has caused obstacles to the academic goals of the students. Some of the challenges faced by the learners include, logistical challenge, Zoom fatigue, practical learning, internships and final year projects (Alter, 2021) [2]. Logistically, it has become virtually impossible for students to go to and from school because of the limitations posed by the pandemic. Academic were done online which only exacerbated the challenges that students face everyday. The findings further revealed that the COVID-19 pandemic had the greatest impact on the quality of the learning experience and students' mental health. In terms of strategies employed by students, the most frequently used were resource management and utilization, help-seeking, technical aptitude enhancement, time management, and learning environment control (Barrot, 2021) [6].

True, it is not unusual to hear students going through stress and anxiety caused by length exposure to online learning. This is also further worsened by the limited to zero interaction of students with their peers and classmates.

Prompted by the recent boom in videoconferencing, psychological consequences of spending hours per day on these platforms have been examined by Bailenson (2021) [4]. He expressed that just as "Googling" is something akin to any web search, the term "Zooming" has become ubiquitous and a generic verb to replace videoconferencing. Virtual meetings have skyrocketed, with hundreds of millions happening daily, as social distancing protocols have kept people apart physically (Ramachandran, 2021)[17]. Bailenson (2021) concluded that spending too much time onscreen, seeing oneself in video chats, mental activity needed for video chat cause exhaustion [4]. He further added that, usual mobility of learners have been reduced causing a general sense of feeling tired.

In addition, attending so many online classes in a single day has resulted in students feeling tired and weary. All this can be attributed to zoom fatigue, where spending long hours of work in front of the computer has stopped students from attending regular engineering classes. There are even many delays and interruptions in videos and audios, which is why students get confused and need explanation more often. This kind of fatigue has made students more anxious, and they're more likely to lose interest in their studies (Alter, 2021) [2].

Coronavirus (COVID-19) disease is an emerging situation that brought challenges to all sectors, including academia and research. Undergraduate and postgraduate students in biochemistry and molecular biology have been affected significantly due to the recent laboratory closures. Experiments have been suspended for long causing extreme stress to the students. Virtual laboratory is a powerful educational tool that enables students to conduct experiments at the comfort of their home. An excellent opportunity to engage students with technology and in parallel to avoid unforeseen disruptions, as happened recently due to pandemic (Vasiliadou, 2021) [20]. Virtual laboratories cannot replace entirely the physical experiments in traditional laboratories. However, in academic settings virtual and physical laboratories can work together. Especially now during COVID-19 pandemic, students can perform the experiments online without any time limitations, receive instant feedback, familiarize with health and safety regulations, repeat the experiential activities

and generate data for their assessment. Also, they are engaged with technology and prepare more productively for their physical laboratories (Mehall, 2022)[14]. Virtual experiments can be conducted into groups permitting social interaction and collaboration among the students (Cavinato et al., 2021) [7]. Important aspects in social distancing that enable communication and reduce feelings of isolation and loneliness. Apart from education, online simulators are frequently used for research purposes (Dai & Ke, 2022)[8]. Students in experimental disciplines like biochemistry and molecular biology are heavily affected by the recent social distancing regulations. However, virtual laboratories can provide a powerful solution in tertiary education for undergraduates and postgraduates (doctoral students) during COVID-19 pandemic. Undergraduate students can progress to their studies without any disruptions since important experiments can be conducted online at home. Whereas doctoral researchers can possibly investigate the effect of virtual laboratories in biochemistry/molecular biology during pandemics and emerging situations. Furthermore, post-doctoral scholars and doctoral students can gain teaching experience in virtual education by helping academic staff (Vasiliadou, 2020)[20]. Moreover, internships and final year projects have been severely affected as graduating students battle the challenges of Covid-19. The final year students are told to submit projects and internship files to complete their degree program. But with online learning, students have become more distressed as they're not able to meet their teachers and discuss their projects with them. As a result, seeking solutions for their problems have become difficult. Internships are a rite of passage for many teens and young adults having their first proper taste of working life, but the coronavirus pandemic has led to the ending of on-site work experience and created other challenges (Vasiliduo, 2020) [20].

B. Learner's Choice and Pursuit of Engineering

Learners' choice pertaining to the direction of their academic undertaking has been a discussion and has attracted attention since the turn of the twentieth century. Access and equity as provided by the government is a perspective that has affected it. These concerns emerged from studies with focus on the learners' background characteristics, academic and career goals, and experiences corresponded with one's perception of attending college and the opportunities it afforded them. The examination of these variables helped explain factors that contributed to an individual's decision to enroll in college (Fagan, 2019).

Additionally, in a study by Andrews (2020), student attrition in engineering education has long been a critical concern, prompting studies that move beyond traditional indicators of academic performance. In addressing this issue, the *Engineering Futures Project* adopted an action research approach to intervene in a faculty where attrition rates were notably twice the university average. The initiative involved the development of an algorithm designed to identify students at risk of academic non-progression. These students were subsequently offered personalized support and mentoring from members of the project team (Engineering Futures Project, n.d.).

In addition, a student's choice to pursue a career in engineering is a longitudinal decision influenced by a multi-faceted web of often interrelated factors. In a study by Abe et al. (2020), it was revealed that in light of persistent shortages in Science, Technology, Engineering, and Mathematics (STEM) skills, South African educators and stakeholders have shown increasing interest in understanding the factors that influence students' career decision-making in these fields. While prior research has acknowledged the influence of family, educators, peers, and personal interests, there is a notable scarcity of qualitative studies examining how these factors interact in the South African context. A recent study addressed this gap by investigating the perceptions of STEM majors across all academic levels—from first to fourth year—at a South African university. Utilizing a hermeneutic phenomenological approach to traditional content analysis, the researchers explored 203 student responses to a semi-structured questionnaire. To ensure quality and rigour, the study employed peer interrogation, modified member verification, compact description, code-recode tactics, and assessment trails. Three core themes emerged from the analysis: interpersonal influences, intrapersonal factors, and career outcomes expectancy. These findings suggest that STEM students' career decision-making processes are more multifaceted than previously reported. The study offers critical insights that could inform more responsive policies and targeted interventions to address STEM skills shortages within the region.

III. METHODOLOGY

A. Research Method

Qualitative research design was applied in this research. The researcher investigated on the experiences of registered electrical engineers passers during the pandemic. Qualitative research is a type of research that gathers, collects, interprets or analyzes non-numeric data. The interpretation and analyses are valuable to a qualitative study for seeks to it reveal the meanings the subject or the phenomenon under study. Moreover, a qualitative research helps one to comprehend the way of things through an investigation of one subject, a case, a target sample, or a target population. Meanings can be reached through investigation on attributes, behaviors, actions, interactions, perceptions, beliefs, and outlook. Moreover, this type of research results to an output that is descriptive, narrative, or textual which the researcher then interprets with rigorous, thorough, and systematic method of transcribing, coding, and analyses of trends and themes (Hardesty et al, 2019). In qualitative research, meanings are constructed by human beings as they engage with the world they are

interpreting. Similarly, basic qualitative study uncovers the participants' interpretation of their experiences of a particular phenomenon, how they construct the world, and what meaning the participants attribute to their experiences (Merriam & Tisdell, 2016).

B. Participants of the Study

The study was conducted in the Electrical Engineering Department of College of Engineering, Architecture and Technology of Capiz State University Main Campus during AY 2021-2022. The fourteen (14) participants were selected by the researcher as the subject of the study because they are in possession of the experiences of the registered electrical engineering licensure examination during the pandemic based on an inclusion and exclusion criteria.

TABLE 1 INCLUSION AND EXCLUSION CRITERIA IN SELECTING PARTICIPANTS

Inclusion	Exclusion
Male or female and has graduated the BSEE Program of Capiz State University Main Campus	Has not graduated the BSEE Program of Capiz State University Main Campus
Must be a Filipino Student	Non-Filipino Student
Passed the April 2022 Registered Electrical Engineering Licensure Examination (REE)	Not a passer of April 2022 Registered Electrical Engineering Licensure Examination (REE)

C. Research Instrument

This qualitative study utilized open-ended interview questions consisting of descriptive, narrative evaluative and non-directive questions. The data gathered from the open-ended interview questions provided the primary source of data for the study. The data gathered appeared in a spreadsheet immediately after the participants have responded. Bansal (2020) stated that, for collecting primary data in the current conditions of COVID 19 pandemic, when we cannot connect respondents personally, google form spreadsheet with pie chart representation is the best option.

D. Data Gathering Procedure

The researcher first determined the purpose of the study and the reason why there is a necessity to conduct the study. The researcher then formulated the questions based on the statement of the problem. The questions were validated by a language expert. To gather the information or data, the researcher administered the questionnaire online through Google form. Bansal (2021) stated that, for collecting primary data in the current conditions of COVID 19 pandemic, when we cannot connect respondents personally, google form spreadsheet with pie chart representation is the best option.

E. Data Analysis Procedure

This study employed a phenomenological qualitative research design to explore the experiences of CapSU Main graduates in their journey to becoming registered electrical engineers in 2020. Given the nature of qualitative inquiry, the study remained flexible and responsive to the research setting, data collection, and analysis process to which online data gathering was conducted due to the limitations posed by the pandemic. In line with Tesch's (2013) framework, thematic analysis was applied to identify key patterns and insights. The study maintained ethical considerations by obtaining informed consent, ensuring confidentiality, and prioritizing participant well-being throughout the research process. By employing a participant-centered approach, this study captured the depth of the participants' experiences in their journey to becoming registered electrical engineers.

F. Research Questions

The research questions were designed to guide the study in the exploration of the experiences of 14 REE passers in the REE held last April 2022. These questions provided a foundation for gaining a detailed understanding of how the participants made sense of their experiences in taking the REE during the pandemic:

1. What personal values are essential for overcoming the challenges encountered in completing a Bachelor of Science in Electrical Engineering (BSEE)?
2. How do BSEE graduates describe their experiences in preparing to take the Registered Electrical Engineer (REE) examination during the COVID-19 pandemic?
3. What factors influence BSEE graduates to pursue the REE examination despite the challenges posed by the pandemic?
4. What strategies or preparatory paths do BSEE graduates undertake to increase their likelihood of passing the REE examination?

G. Participants

The recommended sample size for qualitative studies can vary based on the research design and approach. Nonprobability sampling is the method of choice for qualitative research (Merriam & Tisdell, 2016). Vehovar & Steinmetz (2016) purported that researchers have emphasized that nonprobability sampling method is logical for discovering what occurs, the implication of what occurs, and the relationship linking these occurrences. Patton (2017) declared that participants are included based on expected reasonable coverage of phenomenon given on the purpose of this study. Further, Merriam & Tisdell (2016) posited that the participants are called for their experience and competence in the topic at hand. Selection of the participants must be based on a selection criteria (Patino & Ferreira, 2018). In this case, all 14 participants are BSEE graduates of CapSU Main who pursued and successfully passed the REE held last April 2022.

H. Procedures

A letter was sent to each participant asking their permission to be a respondent for the study. Further, the participants were assured that the study is conducted ethically by protecting the anonymity of their identity and confidentiality of shared information. An interview schedule was drafted by the researcher which was previously tried under pilot interview based on the framework for crafting interviews by Majid (2017). Due to the health and safety protocols against Covid, the interview was done through a Google form that participants would answer and send back to the researcher.

I. Data Collection

Data gathered from the open-ended interview questions consisting of descriptive, narrative evaluative and non-directive questions were the primary source of data for the study and eventually appeared in a spreadsheet. Bansal (2021) stated that, for collecting primary data in the current conditions of COVID 19 pandemic, when we cannot connect respondents personally, google form spreadsheet with pie chart representation is the best option.

IV. RESULTS AND DISCUSSION

A. Personal values essential for overcoming the challenges encountered in completing a Bachelor of Science in Electrical Engineering (BSEE)

Positive Attitude and hardwork is the emerging theme for Ways and methods the participants have employed to overcome the challenges they face in the pursuit of graduating as a BSEE major. It was found out in this study that most of the participants had imbibed positive attitude and a sense of hardwork to overcome challenges they face in the pursuit of graduating as a BSEE major. When the participants are asked about the ways and methods they have employed to overcome the challenges they face in the pursuit of graduating as a BSEE major, most of them said that mustering positive attitude and being hardworking helped them endure the difficulties.

“I think for me it's about perseverance and hard work. It was really challenging because I'm an irregular student. During the second semester, I really had to manage my time as I have extra subjects to tackle. Just one failed subject and I will not graduate on time. Despite of those challenges, I realized that experiencing these hardships made me focus more on what I lack and the growth of my mindset.” –P6

“Hardwork and be positive always kahit na mahirap dapat positive lang itatak mo sa isipan mo na kaya mo. And ang mahalaga sa lahat ay yung connection mo kay Lord hnd dapat mawawala yung panalangin mo.” – P14

“The major challenge I faced during my final year in college was having not enough resources to accomplish my task especially laptop. It maybe funny but I overcome this challenge by making sure that I partnered with the person who has such resources.” – P8

B. Description of the participants' in preparing to take the Registered Electrical Engineer (REE) examination during the COVID-19 pandemic

Having feelings of uncertainty and disappointment is the emerging theme for Description of the participants' experiences as a BSEE graduate pursuing to apply in the REE during the pandemic. The findings of the study revealed that most of the participants had negative emotional feelings towards their experiences. When asked to describe their experiences as a BSEE graduate pursuing to apply in the REE during the pandemic, most of the participants expressed having feelings of uncertainty and disappointment.

“Graduation meant becoming an adult, finding a job, or going to review center to pursue our license. As a pandemic graduate, it's really difficult to make a choice whether to just find a job for the meantime or to enroll to review center to start my review. On September 2021, we're supposed to take the exam. I did not apply because I think my review was not enough. Luckily by the end of the year, I enrolled to online review... But as days passed by, It turned out to be difficult to stay motivated, especially for classes that are pre-recorded and don't have any face-to-face interaction. .” – P6

“I have already a job with a starting salary rate. I was hesitant to resign from my work but after almost a month of multi-tasking, working and studying at the same time, I finally made the decision to resign and focus myself to studying and review. It was hard at first for I'm kinda adjusting myself to the pacing of studying again for it had been almost 2 years since I graduated and stop my habit of actually studying lessons in classroom like manner. It was also kinda psychologically challenging for me because there would be times that it would come into my mind that these days I should have been working and contributing something to pay the bills for my family.” – P8

“Para sakin parang roller coaster kasi hirap mag desesyon kung mag rereview kaba or mag hanap nang trabaho kasi baka ma cancel namn yung Board exam.” – P14

C. Factors influencing BSEE graduates to pursue the REE examination despite the challenges posed by the pandemic

The desire for expanding Career opportunities and emancipating the family is the emerging theme for Factors influencing the participants to pursue application for REE. Findings of the study revealed that most of the participants look forward to better days despite the pandemic. When asked to identify the factors that influence them to pursue REE, most of the participants expressed that expanding their career opportunities and emancipating the family are the factors that motivated them to pursue REE in the pandemic.

“It is hard to look for a job if you don't have license or credibility”- P2

“The major reason why I pursued applying to take REE is that I know there would be many opportunities I can find if I have that REE license with me. Job opportunities in our field is so little for those who doesn't have the license and so I made the decision to focus in pursuing it.” – P8

“My parents and for my future. Sometimes it pressured me bcos as I get older I often think about my future and the Job I want to work.” – P10

D. Strategies or preparatory paths do BSEE graduates undertake to increase their likelihood of passing the REE examination

Integrating of Calculator Techniques and improving the teaching-learning content of board exam subjects is the emerging theme for suggestions that will enable future REE aspirants to pass the board exam. The findings of the study revealed that students must be adept at using techniques as well as equipped with adequate content in the board exam subjects. When asked what suggestions they can share to enable future REE to pass the board exam, they expressed that integration of Calculator techniques in the curricular content.

“I think the professors should focus more on the basic principles and fundamentals of each subjects as it will become the foundation during review for the board examination.” – P5

“Caltechs and techniques for REE board exam for graduating class during their vacant time in school and actual workshops and trainings related to BSEE” – P14

“One of the reasons why we are having troubles during board exams is that we don't have Calculator Technique. Second, is to provide more laboratory experiences, exposures and lessons to the students, which we lack of during our times. Finally, is to continue supporting the students even after graduating, like during the review phase. It is really beneficial if the takers of the board exam feel like they're still being guided by the university.” – P8

On the whole, the findings of the study conform to the study conducted by Barrot (2021) among tertiary level students which revealed that, of the many challenges that learners had to face, the COVID-19 pandemic had the greatest threat on the quality of the learning experience and students' mental health. Secondly, the findings of the study also supported the study by Gonzales and Kapisa (2020) expressing that the pandemic has caused challenges in learning and group gatherings that posed restrictions on movement and compelled everyone to abide to health protocols. Along that,

line, it also agrees with Ryder (2020) who expressed that the pandemic is inflicting multiple shocks on young people especially their employment prospects. Furthermore, the result of the study relates to theory of Social Cognitive Theory (SCT) by Albert Bandura who postulates that human behavior, in this case, pursuing REE in the pandemic is determined by 3 factors: personal, environmental, and behavioral factors.

V. CONCLUSIONS AND RECOMMENDATIONS

In conclusion, four themes emerged from the result of the thematic analysis from the problem statements. In the first problem statement which sought to determine the personal values essential for overcoming the challenges encountered in completing a Bachelor of Science in Electrical Engineering (BSEE), the findings revealed the theme positive attitude and hardwork. In the second problem statement which sought to describe the participants' in preparing to take the Registered Electrical Engineer (REE) examination during the COVID-19 pandemic, findings revealed that participants experience uncertainty and disappointment. Moreover, in the the problem statement which sought to determine the factors influencing BSEE graduates to pursue the REE examination despite the challenges posed by the pandemic, the findings revealed that the participants have an intense desire for career growth and family uplift. Finally, in the fourth problem statement which sought to determine the strategies of preparatory paths BSEE graduates need to undertake to increase the likelihood of passing the REE Board examination, findings revealed the integration of calculator techniques and improving the teaching-learning of content.

In the same manner, the findings of the study conform to the study conducted by Barrot (2021) among tertiary level students which revealed that, of the many challenges that learners had to face, the COVID-19 pandemic had the greatest threat on the quality of the learning experience and students' mental health. Secondly, the findings of the study also supported the study by Gonzales and Kapisa (2020) expressing that the pandemic has caused challenges in learning and group gatherings posed by restrictions on movement and compelled everyone to abide to health protocols. Along that line, it also agrees with Ryder (2020) who expressed that the pandemic is inflicting multiple shocks on young people especially their employment prospects.

Furthermore, the result of the study relates to theory of Social Cognitive Theory (SCT) by Albert Bandura who postulates that human behavior, in this case, pursuing REE in the pandemic is determined by 3 factors: personal, environmental, and behavioral factors. With this the study was lead to the following recommendations, namely: 1) that the program should foster a positive learning environment between and among graduates and faculty to promote inspiration and encouragement to BSEE graduates during their pursuit of REE; 2) that the support of the institution is vital from the application process to the examination day therefore both financial and moral support will boost the morale the BSEE graduates in their pursuit of passing the REE; 3) that enhancing content knowledge, integrate Calculator Techniques and using effective teaching strategies for board exam subjects will benefit the BSEE graduates in their pursuit of passing the REE and increase their likelihood of passing the licensure examination.

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REFERENCES

- [1]. Abe, E. N. & Chikoko, V. (2020). Exploring the factors that influence the career decision of STEM students at a university in South Africa. *International Journal of STEM Education*, 7, 1-14.
- [2]. Alter, A. (2021). The Pandemic Becomes Part Of the Plot. *The New York Times*, C1-L
- [3]. Andrews, J., Clark, R., & Phull, S. (2020). Attrition, mental health and student support in engineering education: the Engineering Futures Project. *Widening Participation and Lifelong Learning*, 22(3), 8-29.
- [4]. Bailenson, J. N. (2021). Nonverbal overload: A theoretical argument for the causes of Zoom fatigue.

- [5]. Bansal, P., Grewatsch, S., & Sharma, G. (2021). How COVID-19 informs business sustainability research: It's time for a systems perspective. *Journal of Management Studies*, 58(2), 602-606.
- [6]. Barrot, J. S., Llenares, I. I., & Del Rosario, L. S. (2021). Students' online learning challenges during the pandemic and how they cope with them: The case of the Philippines. *Education and information technologies*, 26(6), 7321-7338.
- [7]. Cavinato, A. G., Hunter, R. A., Ott, L. S., & Robinson, J. K. (2021). Promoting student interaction, engagement, and success in an online environment.
- [8]. Dai, C. P., & Ke, F. (2022). Educational applications of artificial intelligence in simulation-based learning: A systematic mapping review. *Computers and Education: Artificial Intelligence*, 3, 100087.
- [9]. Fagan, L. O. (2023). Understanding Involvement and Integration Factors for International College Student Persistence (Doctoral dissertation, Seton Hall University).
- [10]. Gonzales, J. R., & Paglingayen, M. A. C. (2022). Lived Experiences of Filipino Student-Mothers in Night Shift Undergraduate Classes. *ASEAN Multidisciplinary Research Journal*, 10, 157-171.
- [11]. Hardesty, J. L., Haselschwerdt, M. L., & Crossman, K. A. (2019). Qualitative research on interpersonal violence: Guidance for early career scholars. *Journal of interpersonal violence*, 34(23-24), 4794-4816.
- [12]. Kapasia, N., Paul, P., Roy, A., Saha, J., Zaveri, A., Mallick, R., ... & Chouhan, P. (2020). Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. *Children and youth services review*, 116, 105194.
- [13]. Kondili, L. A., Marcellusi, A., Ryder, S., & Craxì, A. (2020). Will the COVID-19 pandemic affect HCV disease burden?. *Digestive and Liver Disease*, 52(9), 947.
- [14]. Mehall, S. (2022). Comparing in-class scenario-based learning to scenario-based eLearning through an interactive, self-paced case study. *Journal of Education for Business*, 97(5), 305-311.
- [15]. Patino, C. M., & Ferreira, J. C. (2018). Inclusion and exclusion criteria in research studies: definitions and why they matter. *Jornal Brasileiro de Pneumologia*, 44, 84-84.
- [16]. Patton, M. Q. (2017). *Principles-focused evaluation: The guide*. Guilford Publications.
- [17]. Ramachandran, V. (2021, February). Stanford researchers identify four causes for 'Zoom fatigue' and their simplexes.
- [18]. Republic Act No. 7079. (1995). An Act Providing for a more Responsive and Comprehensive Regulation for the Practice, Licensing, and Registration of Electrical Engineers and Electricians. Retrieved from https://www.prc.gov.ph/uploaded/documents/prbelec_amended.pdf.
- [19]. Tisdell, E. J., Merriam, S. B., & Stuckey-Peyrot, H. L. (2016). *Qualitative research: A guide to design and implementation*. John Wiley & Sons.
- [20]. Vasiliadou, R. (2020). Virtual laboratories during coronavirus (COVID-19) pandemic. *Biochemistry and Molecular Biology Education*, 48(5), 482-483.
- [21]. Vehovar, V., Toepoel, V., & Steinmetz, S. (2016). Non-probability sampling. *The Sage handbook of survey methods*, 1(2016), 329-345.

APPENDIX

A Survey on the REE April 2022 Passers (Responses)										
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A1	F	G	H	I	J	K	L	M	N	
1	number	1. Describe your experience	2. What ways and methods	3. Describe your experience	4. What factors influence	5. What suggestions would you like to share	that would help in the improvement of the BSEE program?			
2	0	I had graduated before the	The reason why I overcame	Striving to apply during the	It is hard to look for a job sometimes	teach the student on how to solve a solving problem on a direct substitution using a direct formula to a given				
3	7	When the pandemic started	Entered Electrical Engineering	During pandemic the REE	I worked for PEE almost	Teach the student using Caltech				
4	8	A lot of requirements must	Just like every other day. I	study for 15 hours a day	Because I can't find work	Experience is required. More real world problems should be taught in college.				
5	569	COVID-19 has really changed	I think for me it's about preparing	Graduation meant becoming	My family. They pushed me	I think the professors should focus more on the basic principles and fundamentals of each subject as it will become the				
6			"Research of the unfamiliar "Continuous practice of skills "Making notes and bank		"to become REE is my dream "the encouragement of classmates					
9		Was doubtful because of		It is hard knowing that we	"the encouragement of classmates	"conduct a review wherein they tackle the items/problems that are in the REE board examination				
7	5	It was horrific because we	I always try to do good even	To be honest it wasn't all	All I can say is that my mind	I can't think of anything, but I do feel like the BSEE program needs a lot of improvement in general.				
8				The major reason why I						
5		It was both frustrating and	I made sure that during	When the time I came to	take REE is that I know that	First, is to change/add something with the current curriculum of the program. One of the reasons why we are having trouble				
9		I feel disappointed because	I'm bad at math but group	I experience breakdown of	Pressure, Family and We	Have a Caltech session for the students and make them master the basic principles esp. the EE subjects and Mathematics				
10	6	Enjoyable and Exciting	Group study with my classmates	It's very difficult for us	My parents and for my future	The most important and very requirements for students in Engineering I will suggest for the Subject for Calculus Tech which				
11	727	Alhamdulillah, I was able	We are faced of a lot of challenges	That was an experience	Well, I have my own family	I have a lot of suggestion to be honest and if given a chance I would love to not only just to share my knowledge, but also				
12	6	The experience during	Study hard, focus on the	the experience was not	The factors that influence	Maybe if possible teach the students how to use the calculator technique because this is one of the important during board				
13	6	Challenging	Prayer and hardwork	None	My dream	None				
14	6	Ang hirap kasi na delay	Hardwork and be positive	Para sa kinang pang-roller	My family and My dream	None				
15	3	My experience as a BSEE	I don't really remember	Study harder and let God	Time and my wish to be	Caltechs and techniques for REE board exam for graduating class during their vacant time in school and actual works				
16		experience	ways and methods	pursuing REE in the past	factors	suggestions				
17										
18										