Development of Corrective and Progressive Mechanics for Non-Performing Engineering Student: Input for Collaborative Action Research

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Abstract- This collaborative action research was conducted in response to the call of the university officials to develop corrective and progressive mechanics to address the issues relating to nonperforming engineering students with the goal of expanding and accelerating knowledge acquisition. The study was conducted on Quezon City University's main campus. Participants were engineering students and faculty members who collaborated during the intervention program with the strict supervision of university officials, including the college dean of engineering, the area chairpersons, and strict monitoring of the research management office. This research was participated by 68 respondents during the initial phase and 77 respondents during the intervention program. The subjects involved were science, technology, engineering, and mathematics. The study further employed binary coding techniques to comply with data privacy law and ethical research standards. Moreover, the study used categorizing, describing, analyzing, and interpreting techniques for qualitative data analysis.

Index Terms- Non-Performing Students, Learning Process, Learning Capacity

I. INTRODUCTION

The evolution of many factors associated with non-performing students is an ongoing thrust in the Philippine educational system, particularly in the engineering program and its allied courses. These factors are predominantly observed in engineering students at Quezon City University. This condition is not a novelty in the historical narrative of Quezon City University, as records in the past showed that the population of QCU was historically affected by a seemingly academic crisis in the quality of education across the board. During the initial inquiry of this research, records showed that 16.40% of non-performing students in science belonged to dropout students, while the other 7.5% were failed students. Moreover, records showed that 11.94% are from failed students, while the other 14.92% are from dropouts in mathematics. The economic collapse of most students is self-revealing in their inability to perform many educational activities in online learning. Moreover, the advent of the COVID-19 virus has put additional stress on the burdens of non-performing students for various reasons, such as the sudden outbreak of unemployment among parents supporting the financial and material resources required in the online learning process of the students. Now that the education sector is shifting to face-to-face and hybrid learning modalities, many hypothetical but apparent reasons will affect the learning process. These are the compelling reasons for conducting this research.

II. METHODOLOGY

By nature and intent, this action research employed Descriptive-Qualitative Technique. According to Cruz (2010), Descriptive-Qualitative is applied to describe the condition of the existing phenomenon and practices, while according to Paler & Calmorin (2005), Descriptive-Qualitative is applied to asses ongoing trends and cultural practices. In this study, the researchers evaluated the non-performing condition and practices of irregular engineering students by identifying the number of dropouts and the number of failures and eventually categorized, described, and analyzing before the students were subjected to the intervention program. The intervention program was a collaborative and reactive action that required the participation of students who were irregular and currently enrolled in Science, Technology, Engineering, and Mathematics (STEM) subjects. This activity needed collaboration from subject teachers who served as collaborators and the watch keeper during the intervention program for (1. prerequisite recall and review of its importance, (2. discussion for the importance of goals and learning objectives (3. review in concept mapping and sequencing, (4.) Application of Learning techniques such as application of GPS, Multisim, Benchwork, Function Generator, and other electronic tools and test equipment, and (5. review in analyzing and comprehending mathematical worded problems.

III. RESULTS AND DISCUSSION

Now it is the time to articulate the research work with ideas gathered in above steps by adopting any of below suitable approaches:
This action research was conducted in response to the call of the university officials to develop corrective and progressive mechanics to address the issues relating to non-performing engineering students with the end goal of expanding and accelerating knowledge acquisition. The study was conducted on Quezon City University's main campus. Participants are engineering students and faculty members who collaborated during the intervention program with the strict supervision of university officials, including the College Dean of Engineering, the Area Chairpersons, and rigorous monitoring of the research management office. This research was participated by 68 respondents during the initial phase and 77 respondents during the final stage of an intervention program. The subjects involved were Science, Technology, Engineering, and Mathematics. The study further employed binary coding techniques to comply with data privacy law and ethical research standards. Moreover, the study used categorizing, describing, analyzing, and interpreting techniques for qualitative data analysis. Respondents were second-year level engineering students who took Science, Technology, Engineering, and Mathematics subjects during the second semester of the school year 2021-2022 and the current semester of SY 2022-2023. The factors involved were limited to the five (5) variables, which are difficulty in recalling and applying the prerequisite subjects, difficulty in understanding the learning goals and objectives, including attainability, difficulty in constructing and outlining the concept mapping of topics, difficulty to use learning apps and advanced educational technology, and difficulty to solve and analyze the worded problem.

IV. CONCLUSION AND RECOMMENDATIONS

Based on the findings, the following conclusions are now summarized. A student who elected to be officially dropped or unofficially dropped does not necessarily mean to be a nonperforming student. In fact, upon examining their records during the previous semesters, some of them were average or above average, respectively. Therefore, there must be a compelling reason why a student who chose to be officially dropped or unofficially dropped maybe experience a problem that forced them to fall into the subject. Some of these factors include students were not prepared academically, unhappy with the college, having a discouraging environment, picking the wrong course, and having conflicts with work and family problems, respectively. School administrators may consciously prioritize programs that would address the dropout crisis aiming to decrease the proportion of the main reasons for dropping out. In a parallel analysis related to this study, it was imperative to create a program development for nonperforming students, particularly the dropout and the failed students in their respective courses.

Findings of this study showed that difficulty in recalling and applying prerequisite subjects, difficulty in outlining and constructing concept mapping of topics, and difficulty in solving and analyzing worded problems in mathematics were factors associated with the learning process of engineering students. If this was the ongoing trend in engineering, students fell short of being responsible for themselves, particularly in reviewing the prerequisite subjects where they were found to be weak; students also fell short in reviewing the outlining and concept mapping of their issues. They also needed to improve in reviewing problem-solving and analysis. Findings also revealed that students' electronics engineering and industrial engineering learning process and learning capacity were associated with their appreciation of sciences and mathematics subjects. However, identifying cases and matching them with principles and mathematical procedures or algorithms were not significantly related to their attitudes towards sciences and mathematics subjects. All problem-solving skills, namely identifying cases, describing cases, matching patients with principles, rate of doing problem-solving and mathematical procedures or algorithms, were significantly associated with the learning process and learning capacity of students in sciences and mathematics subjects.

Based on the formulated courses of action, the study selected COA no.3, which is to develop corrective and progressive mechanics for nonperforming students that will allow the expansion of knowledge through collaborative students centered learning program and accelerate the acquisition of knowledge and skills through innovative and developmental students training program.

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