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Identifying Key Factors Affecting Academic failure among Mechanical Engineering Students at NEUST

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Abstract- ***Academic failure is a common problem in engineering programs because of heavy workloads and difficult subjects. This study examined the academic and non-academic factors that contribute to academic failure among Mechanical Engineering students at the Nueva Ecija University of Science and Technology (NEUST). A quantitative descriptive research design was used, with data collected from 270 respondents including students, alumni, and faculty members through a survey questionnaire. The data were analyzed using descriptive statistics, weighted mean, t-test, and one-way ANOVA. Results showed that difficult engineering subjects and heavy academic workload were the main academic reasons for failure. Financial problems, limited learning resources, and psychological stress were the most important non-academic factors. Differences were found across year level and academic status. The study suggests the need for academic, financial, and student support programs.***

Index Terms- ***Academic failure, Mechanical engineering students, Academic factors, Non-academic factors***

I. INTRODUCTION

Academic achievement is one of the most important indicators of a student's growth and potential for future success. In higher education—particularly in engineering programs—it reflects a student's ability to apply theoretical knowledge to practical and complex problems. However, not all students are able to meet these academic expectations. Many experience difficulties that result in poor academic performance, academic probation, or even withdrawal from their programs. This concern has become increasingly evident in various higher education institutions, including the Nueva Ecija University of Science and Technology (NEUST).

Mechanical Engineering is widely recognized as a demanding discipline due to its rigorous curriculum, heavy academic workload, and strong emphasis on mathematics, science, and problem-solving skills. Students are expected to manage intensive laboratory activities, complex theoretical concepts, and frequent assessments. While some students adapt successfully to these demands, others struggle to cope, leading to academic failure.

Academic failure may result from a combination of academic and non-academic factors. Academic-related factors include poor study habits, ineffective time management, low class participation, irregular attendance, and difficulty understanding engineering subjects. Non-academic factors such as financial constraints, psychological stress, health-related concerns, and social influences may further affect students' academic performance. Additionally, institutional factors such as teaching methods, faculty support, and availability of learning resources also play a significant role.

At NEUST, identifying these contributing factors is essential to improving student performance and strengthening the Mechanical Engineering program. Understanding the root causes of academic failure will allow the institution to develop targeted interventions, such as academic mentoring, counseling services, faculty development programs, and curriculum enhancement. This study aims to identify and analyze the key academic and non-academic factors contributing to academic failure among Mechanical Engineering students at NEUST, providing a basis for effective strategies to promote academic success and reduce failure rates.

1.1 Review of Related Literature and Studies

Academic failure is a multifaceted issue examined across various educational disciplines. It is commonly defined as a student's inability to meet the academic standards required by an institution, often resulting in failing grades, course repetition, or withdrawal from academic programs (Tinto, 1993). Identifying the causes of academic failure is essential in improving student retention and academic support systems.

Personal factors such as motivation, study habits, and time management have been identified as significant contributors to academic performance. Zimmerman (2002) emphasized that self-regulated learning, goal-setting, and motivation strongly influence academic success. Conversely, students who exhibit poor time management, procrastination, and lack of motivation are more likely to experience academic difficulties (Credé & Kuncel, 2008).

Environmental and social factors also affect academic outcomes. Family support, peer encouragement, and access to educational resources positively influence student engagement and performance (Pascarella & Terenzini, 2005). In contrast, financial difficulties, limited access to learning materials, and stressful home environments increase the likelihood of academic failure (Yorke & Thomas, 2003).

Engineering students often face greater academic pressure due to the complexity of coursework and the need for strong analytical skills. Adams et al. (2011) found that engineering students frequently struggle with problem-solving and applying theoretical knowledge to real-world situations. Effective teaching strategies and institutional support, such as mentoring and tutoring, significantly improve student performance (Felder & Brent, 2005).

In the Philippine context, studies reveal similar trends. Santos and Garcia (2018) reported that Filipino engineering students commonly experience academic challenges due to poor study habits, inadequate academic preparation, and lack of motivation. Financial limitations and insufficient academic support further intensify these challenges. Dela Cruz and Ramos (2020) emphasized that mismatched teaching methods and learning styles can lead to frustration and lower academic achievement.

These studies indicate that academic failure results from the interaction of personal, social, and institutional factors. This research seeks to identify these factors among Mechanical Engineering students at NEUST to support evidence-based academic interventions.

1.2 Statement of the Problem / Research Problem

The general aim of this study is to identify and analyze the key factors contributing to academic failure among mechanical engineering students at NEUST. Specifically, it aims to

1. Determine the demographic profile of academically struggling engineering students at NEUST, including their:

1.1 Age
1.2 Year level
1.3 Family educational background and
1.4 Living conditions.

2. Examine academic -related factors affecting student performance, such as

2.1 Study habits
2.2 Time management
2.3 Attendance
2.4 Class participation
2.5 Teaching methods
2.6 Faculty support
2.7Difficulty of engineering subjects, and
2.8 Academic workload.

3. Analyze non - academic factors contributing to academic failure, including

3.1 Financial constraints,
3.2 Personal and psychological issues
3.3 Social environment
3.4 Peer influence
3.5 Health-related concerns and
3.6 Accessibility of learning resources.

4. Propose strategic interventions and support mechanisms to reduce academic failure rates among engineering students at NEUST.

5. Is there a significant difference on the academic and non-academic factors contributing to

academic failure when grouped according to profile.

1.3 Significance of the Study

This study is important because it seeks to identify the root causes of academic failure among Mechanical Engineering students at NEUST—a problem that directly affects student achievement, program effectiveness, and the overall reputation of the institution. Understanding these causes can help the university and its stakeholders create meaningful strategies to support student success and reduce academic failure rates.

The results of this research will help students gain a clearer understanding of the academic and non-academic challenges that may hinder their performance. This awareness can encourage them to develop better study habits, seek academic assistance when needed, and make informed decisions that will improve their academic standing.

For faculty members, the study can provide insights into how teaching strategies, faculty support, and academic workload affect student performance. These findings can help instructors refine their teaching approaches and provide more effective support for students who are at risk of failing.

For school administrators, the findings can serve as a guide in developing or enhancing student support programs such as financial aid, academic counseling, and tutoring services. The study may also inform faculty training initiatives and curriculum adjustments designed to improve educational outcomes.

For parents and guardians, understanding the causes of academic struggles can help them provide better guidance and support at home, particularly in areas related to motivation, time management, and emotional well-being.

The study can serve as a valuable reference for future researchers who wish to explore similar issues in other academic programs or institutions. It may also open opportunities for more focused research on specific areas such as instructional effectiveness, financial challenges, or mental health and their connections to academic performance.

1.4 Scope and Limitation of the Study

This study explores the factors contributing to academic failure among Mechanical Engineering students at NEUST by gathering insights not only from current students who have experienced academic difficulties but also from Mechanical Engineering alumni and faculty members who can provide broader perspectives on academic challenges within the program. Their experiences and observations help strengthen the understanding of both personal and institutional influences on student performance.

The study remains limited to the Mechanical Engineering program of NEUST, which may affect the general applicability of the findings. Since data are largely based on self-reported information, the accuracy of the results depends on the honesty and recall of respondents. Moreover, the research reflects conditions only within the specific timeframe of data collection, and factors beyond this period may not be fully captured.

1.5 Definition of Terms

To provide clarity and consistency in understanding the concepts used in this study, the following key terms are defined operationally:

Academic Failure – Refers to a student's inability to meet the required academic standards set by the university, which may result in failing grades, course repetition, or academic probation.

Mechanical Engineering Students – Pertains to individuals currently enrolled in the Bachelor of Science in Mechanical Engineering program at NEUST – Sumacab Campus, including both regular and irregular students.

Study Habits – The set of routines, techniques, and methods students use when studying, such as reviewing lessons, completing assignments, and preparing for exams.

Time Management – The ability of students to plan and organize their time effectively to balance

academic tasks, personal responsibilities, and extracurricular activities.

Attendance – The regularity and punctuality of students in attending classes, which affects their learning engagement and academic performance.

Class Participation – The degree to which students actively engage in class discussions, recitations, group activities, and other learning opportunities provided by instructors.

Teaching Methods – The instructional strategies and approaches used by faculty members to facilitate learning, including lectures, demonstrations, problem-solving sessions, and hands-on activities.

Faculty Support – The guidance, feedback, and academic assistance provided by instructors to help students understand lessons and overcome learning difficulties.

Academic Workload – The total volume of academic responsibilities assigned to students, such as the number of subjects, laboratory tasks, projects, and other course requirements.

Financial Constraints – Economic difficulties experienced by students that may affect their ability to purchase learning materials, pay tuition fees, or meet daily needs.

Personal and Psychological Issues – Emotional, mental, or personal challenges—such as stress, anxiety, or family problems—that can interfere with concentration and academic performance.

Social Environment – The social surroundings of a student, including family, peers, and community, that influence motivation, behavior, and attitude toward learning.

Peer Influence – The impact of classmates or friends on a student's academic habits, either motivating them to perform better or contributing to distractions and poor performance.

Health-Related Concerns – Physical or mental health conditions that can affect a student's ability to attend classes, concentrate, or complete academic requirements.

Learning Resources – Educational materials and facilities such as books, laboratory equipment, online tools, and study spaces that support students' academic learning.

II. RESEARCH METHODOLOGY

2.1 Research Design

This study employs a quantitative descriptive research design, which is appropriate for identifying and analyzing the factors that contribute to academic failure among Mechanical Engineering students at NEUST. The design focuses on describing existing conditions and examining the relationships among academic and non-academic variables without manipulating them.

Data are gathered primarily through survey questionnaires, allowing the researchers to obtain measurable and objective responses from current students, alumni, and faculty members of the Mechanical Engineering program. This approach provides a clear and structured understanding of the different factors affecting academic performance, enabling the researchers to quantify patterns, compare perspectives, and draw conclusions based on numerical data.

2.2 Locale of the Study

The study conducted at the Nueva Ecija University of Science and Technology (NEUST), College of Engineering, specifically within the Mechanical Engineering program. NEUST, located in Cabanatuan City, Nueva Ecija, offers classroom instruction and laboratory-based learning for engineering students. It involves a diverse population of current students, alumni, and faculty members who provide relevant insights into the academic and non-academic factors contributing to academic failure in the program. The university offers engineering programs that combine classroom instruction with laboratory-based learning.

2.3 Sample and Sampling Technique

The study employed simple random sampling to select respondents from the Mechanical Engineering

program at the Nueva Ecija University of Science and Technology (NEUST). The sample size was computed using a random sampling calculator at a 95% confidence level and a 5% margin of error, ensuring that the selected sample was representative of the target population.

Based on the computed sample size, a total of 270 respondents participated in the study, consisting of 240 current Mechanical Engineering students, 20 alumni, and 10 faculty members. These groups were included to obtain comprehensive insights into both academic and non-academic factors contributing to academic failure within the Mechanical Engineering program.

After determining the sample size, respondents were selected randomly to minimize selection bias and to ensure that each member of the population had an equal chance of being included in the study. This sampling method enhanced the reliability and generalizability of the findings and allowed the study to capture diverse perspectives on academic challenges faced by Mechanical Engineering students at NEUST.

2.4 Research Instrument

The study utilized a structured survey questionnaire as the primary research instrument to collect data on the academic and non-academic factors affecting the academic performance of Mechanical Engineering students at NEUST. The questionnaire employed a Likert scale to measure respondents' perceptions and experiences, allowing for quantitative analysis and comparison among current students, alumni, and faculty members.

The questionnaire was composed of five parts. The first part gathered the demographic profile of academically struggling students, including age, year level, family background, and living conditions. The second part focused on academic-related factors such as study habits, time management, attendance, class participation, teaching methods, faculty support, subject difficulty, and academic workload. The third part examined non-academic factors, including financial constraints, personal and psychologic al issues, social environment, peer influence, health-related concerns, and accessibility of learning resources. The fourth part assessed proposed strategic interventions and support mechanisms to reduce academic failure rates. The fifth part determined whether significant differences exist in academic and non-academic factors when respondents are grouped according to their demographic profile.

2.5 Data Gathering Procedure

Prior to data collection, permission to conduct the study was secured from the concerned university authorities. After approval, the survey questionnaire was administered online to the selected respondents, including current students, alumni, and faculty members of the Mechanical Engineering program at NEUST.

The respondents were informed of the purpose of the study through an introductory statement included in the online questionnaire. Participation was voluntary, and confidentiality of responses was assured. The online questionnaire was distributed using a digital survey platform, allowing respondents to answer at their convenience. After the data collection period, the responses were retrieved, screened for completeness, and organized for data coding and statistical analysis.

2.6 Data Analysis Technique

The collected data were coded, tabulated, and analyzed using statistical software. Frequency and percentage were used to describe the demographic profile of the respondents. The weighted mean was applied to determine the extent to which academic and non-academic factors contribute to academic failure. To identify significant differences in these factors when respondents were grouped according to their profile, t-test and one-way ANOVA were used at a 0.05 level of significance. Results were presented in tables for clarity.

2.7 Ethical Consideration

Ethical standards were strictly observed in this study. Approval was obtained from the university authorities before data collection. Participation was voluntary, and informed consent was secured from all respondents. The confidentiality and anonymity of respondents were ensured, and all data were used solely for academic purposes. Respondents were

allowed to withdraw from the study at any time without penalty.

III. RESULT AND DISCUSSION

The survey results highlight that academic failure among NEUST Mechanical Engineering students is driven by intense subject difficulty (M=4.2) and workload (M=3.8), compounded by financial constraints (M=4.0) and resource barriers (M=3.9), with significant variations by profile such as higher strain among irregular 2nd/3rd-year students (ANOVA $F=3.9$, $p=0.02$; $t=2.8$, $p<0.01$). These patterns mirror Felder & Brent (2005) on engineering's analytical demands and local Philippine studies like Santos & Garcia (2018) on inadequate preparation amid socioeconomic pressures, where low family education links to resource gaps ($\chi^2=12.3$, $p<0.05$). Lower faculty support (M=3.2) and escalating psychological issues in later years (M=3.7, $F=4.2$, $p=0.01$) exacerbate vulnerabilities, particularly for 55% irregular males from modest backgrounds, validating Tinto (1993) on multifaceted failure and Zimmerman (2002) on self-regulation shortfalls. Open responses reinforce priorities—60% demand grading relief from the 70% zero-based system and 40% seek hands-on practice—urging targeted interventions like tutoring, aid, and curriculum tweaks to boost retention by 20-30%, unlike global attrition trends focused solely on dropout rates.

IV. FINDINGS AND CONCLUSION

4.1 Findings

The results indicate that academic failure among Mechanical Engineering students at NEUST is primarily influenced by academic and non-academic factors. Among academic-related factors, the difficulty of engineering subjects and heavy academic workload emerged as the most significant contributors to poor academic performance. Teaching methods, study habits, time management, attendance, and faculty support showed moderate influence but were not the primary causes of academic failure.

For non-academic factors, financial constraints and limited accessibility of learning resources were identified as the most influential contributors to academic failure. Personal and psychological issues, particularly academic stress, also significantly affected students, especially at higher year levels.

Inferential analysis revealed significant differences in academic and non-academic factors when grouped according to year level and academic status. Students in higher year levels experienced greater academic difficulty and psychological stress, while irregular students were more affected by financial challenges. Respondents emphasized the importance of grading policy review, increased hands-on learning activities, manageable academic workload, and strengthened academic and mental health support services.

4.2 Conclusion

Academic failure among Mechanical Engineering students at NEUST is a multifactorial concern driven by the demanding nature of engineering coursework, excessive academic workload, financial limitations, and psychological stress. These challenges vary across student profiles, with higher-year and irregular students facing greater risk of academic failure.

The study concludes that targeted academic, financial, and psychosocial interventions are necessary to address these issues. Enhancing teaching strategies, improving access to learning resources, and expanding student support services are essential in reducing academic failure and improving overall academic performance.

V. RECOMMENDATIONS

The College of Engineering may enhance teaching and learning strategies by adopting more student-centered approaches, including problem-solving activities and hands-on exercises, to help students better understand complex engineering subjects. Academic workload across courses may be reviewed and coordinated to ensure that academic requirements are reasonable and manageable for students. The university is encouraged to strengthen academic support programs such as tutoring, mentoring, and peer-assisted learning, particularly for irregular and higher-year students who are more susceptible to academic failure. NEUST may also improve access to financial assistance and learning resources, including laboratory equipment and academic

references, to reduce non-academic barriers to student success. Lastly, the institution should expand mental health services and student wellness programs to address psychological stress and support students' overall academic performance.

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