



Increasing the Pass Rate of G.C.E. Advanced Level Engineering Technology Stream Students in a 1AB National School in the Matugama Zone through Comprehensive Process Management, Training and Development, and Supervision System

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Abstract

Education plays a vital role in shaping Sri Lankan society, with national-level exams, especially the Advanced Level (A/L) exams, being highly influential. There are growing concerns about pass rates in the A/L engineering technology stream. This study aimed to increase the pass rate in a selected school from 51.38% to 60.00% within a year by implementing a comprehensive framework involving process management, training and development, and supervision system. The methodology used both qualitative and quantitative approaches. Structured interviews with six engineering technology teachers helped to develop a questionnaire, which was distributed to 100 students who had taken the A/L engineering technology exam. Quantitative data were also collected from various sources. Root cause analysis using the Ishikawa diagram revealed seven root causes. Proposed solutions included implementing Standard Operating Procedures (SOPs) and flow charts for better process management, conducting comprehensive training needs analysis, designing and evaluating training programs, and introducing checklists and Key Performance Indicators (KPIs) to enhance supervision. These measures aimed to systematically address issues and improve educational outcomes of the school. Improved process management was expected to enhance both teacher and student skills. Training and development efforts aimed to boost student engagement, teacher satisfaction, and teaching effectiveness. The supervision system focused on

increasing teacher participation, enhancing the teaching-learning process, and improving student performance. The study suggested that increasing pass rates is a significant indicator of a school's overall quality and effectiveness. Effective planning, adherence to established processes, identifying staff training needs, and regular observation and feedback mechanisms are essential for improving pass rates.

Keywords: Students' pass rate; Process management; Training and development; Supervision system; Engineering Technology

Introduction

Education plays a crucial role in shaping Sri Lanka's society and progress. According to the National Education Commission (2016), the primary goal of the Sri Lankan educational system is to nurture individuals who can apply their skills and knowledge to positively impact the nation's welfare and quality of life. The educational system consists of early childhood, primary, secondary, and higher education phases, influencing academic outcomes in national exams. Zonal and divisional bodies, along with individual schools, play vital roles in curriculum development, teaching, student assessment, and professional growth. Schools are responsible for curriculum delivery, teaching, student assessment, and academic achievement. Student performance is primarily evaluated through national exams such as the Grade Five Scholarship, G.C.E. O/L, and G.C.E.

A/L. The A/L examination offers six streams, with engineering technology and biotechnology gaining prominence. However, concerns have risen regarding the pass rates in the A/L engineering technology stream.

The introduction of the A/L technology stream in Sri Lanka is a significant step in addressing the requirements of a changing global environment, particularly the pressing demand for proficient individuals in the engineering sector. This stream, comprising engineering technology and biotechnology, is currently the most sought-after among A/L students due to its relevance and potential. This research focuses on increasing the pass rate in the A/L engineering technology stream at a selected 1AB national school in Matugama. Despite the overall excellence in the school's national exam results, the A/L technology stream's pass rate is 51.38%, compared to the Matugama division average of 68.48%, placing the school second in the zonal rankings. Thus, this study proposes strategies to improve student outcomes in this stream.

Research Problem

The research problem of the study is the lower pass rate of engineering technology stream in the selected school.

Research questions

1. What are the main associated problems contributing to the low pass rate in the engineering technology stream?
2. What are the root causes incorporated with the low pass rate in the engineering technology stream?
3. What interventions or strategies could be implemented to improve the pass rate in the engineering technology stream?

Objectives of the Study

The aim of this study is to increase the students' pass

rate in the A/L engineering technology stream in, the selected school from 51.38% to 60.00% within a year under the proposed study framework components; Process Management, Training and Development, and Supervision Systems. Figure 1 shows the pass rate of the engineering technology stream in the school and the average pass rate with the expected pass rate to be achieved.

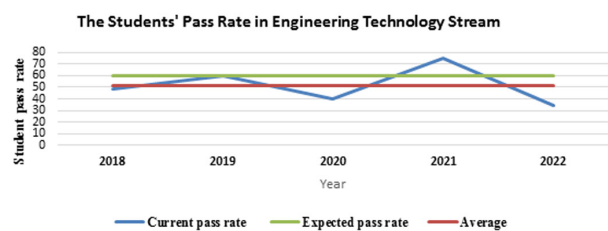


Figure 1. The Students' Pass Rate in Engineering Technology Stream

Theoretical background to the problem

Students' Pass Rate

The pass rate of students is a critical measure of their academic success and proficiency in examinations. Students' pass rate is a benchmark or criterion for measurement when evaluating a school's level of performance (Adhikari et al., 2022). The pass rate, which represents the percentage of students who attain a satisfactory level of performance on standardized tests, is frequently reported for each school (Papke, 2005). According to Wyse and Anderson (2020), the pass rate is an important indicator that measures the percentage of students who successfully pass high-stakes examinations.

Process management

Process management is recognised as an effective method of overseeing, regulating, and enhancing business operations (Xu et al., 2018). Process management is crucial in education, providing a structured method to enhance educational results by streamlining the flow of resources, information, and staff. Numerous research works underscore the significance of clearly defined instructional processes. According to Guskey (2007), there is a focus on the

necessity of explicit learning goals, efficient teaching methods, and continual formative evaluation to inform instructional choices.

Training and Development

Training and development also play a crucial role in enhancing individual and organizational performance. Training and development are considered as the process through which individuals gain a range of skills and knowledge to enhance their effectiveness in areas such as leadership, direction, organization, and influencing others, among others (Lacerenza et al., 2017). Through training, individuals acquire new knowledge and develop relevant skills that enable them to perform effectively. The benefits and impacts of training are multifaceted, encompassing improved employee performance, enhanced job satisfaction, and organizational growth. Many studies on training expenses and advantages highlight both the direct and indirect costs and benefits associated with the training initiatives conducted (Murray & Efendioglu, 2007).

Supervision System

Availability of a robust supervision system is essential to preserve the stability and effectiveness of an organisation. The supervision system is an approach to oversee and improve performance by reinforcing accountability, enhancing the importance of performance appraisal, and ensuring its effectiveness (Sun et al., 2021). Sahin et al. (2011) stated the supervision process includes a range of actions that focus on enhancing the effectiveness of education and learning. These actions involve implementing programs and support systems, promoting self-control and guidance, and conducting.

Methodology

The research methodology employed both qualitative and quantitative approaches. Qualitative data was collected through structured interviews with six teachers from the engineering technology section. Insights from these interviews were used to develop a questionnaire, which was distributed to 100 students

in the A/L engineering technology stream via Google Forms to identify issues related to the main problem. Participants were randomly selected. Quantitative data, covering the period from 2018 to 2022, was gathered from school documents, laboratory records, class registers, attendance logs, and the school's website. The Ishikawa diagram was used for root cause analysis, identifying the underlying issues. Based on the literature, the authors proposed a study framework and solutions to address these root causes, as outlined in Figure 2.

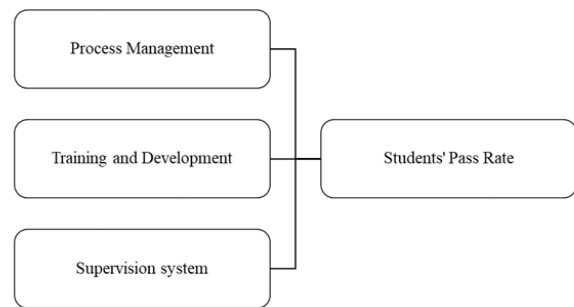


Figure 2. Proposed a study framework

Findings and Discussion

Interviews identified several issues contributing to the low pass rate in the A/L engineering technology stream, including incomplete recommended practicals, student absenteeism, missed teaching hours, lack of exam practice, a heavy curriculum, and low marks in term tests. Student responses to the questionnaire highlighted incompleteness of practicals, absenteeism, and missed teaching hours as key problems (Figure 2). Quantitative data from 2018 to 2022 showed an average practical completion rate of 40.00%, student absenteeism rate of 32.17%, and missed teaching hours at 27.07%.

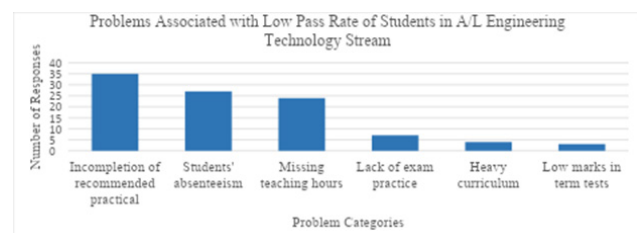


Figure 3. Problems Associated with Low Pass Rate of Students in A/L Engineering Technology Stream

Figure 4 presents the Ishikawa diagram used for the root cause analysis of the primary issue of the low pass rate in the A/L Engineering Technology stream. The spines of the diagram represent key components, including process management, training and development, and the supervision system. Within the process management component, two significant issues were identified: the lack of coordination between laboratory and class timetables, and the non-availability of a fixed laboratory timetable. These problems create challenges in organizing and conducting practical sessions, which are crucial for students in the engineering technology stream. In the training and development category, the absence of training opportunities for teachers was identified as

a critical issue. This lack of professional development limits teachers' ability to update their skills and knowledge, impacting the quality of instruction. Additionally, inadequate supportive programs for students further contribute to the low pass rate, as students may not receive the necessary guidance and resources to enhance their learning outcomes. In terms of the supervision system, the unavailability of internal supervision plans and the absence of a standardized system for recording and analysing students' marks were highlighted. These deficiencies in the supervision process hinder the effective monitoring of student progress and the ability to implement corrective actions where needed.

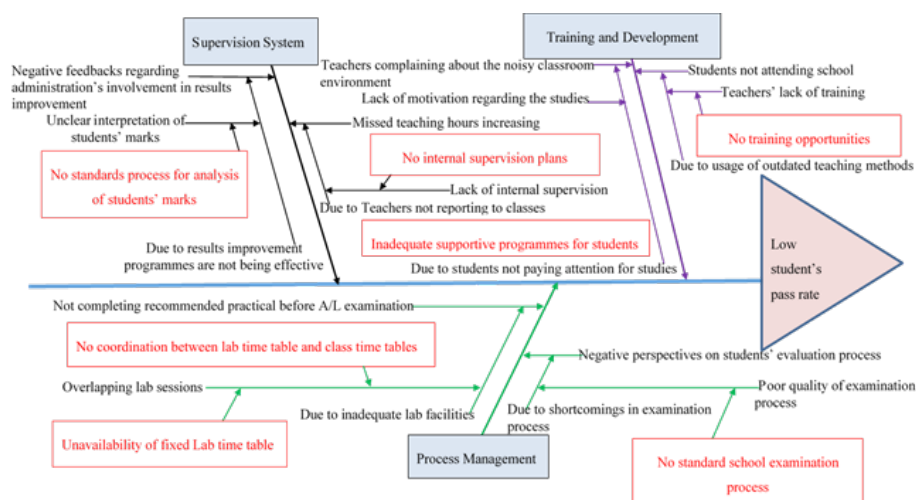


Figure 4. Ishikawa Diagram for Root Cause Analysis

The authors propose several strategies to address the issues in the A/L Engineering Technology stream. These include designing a comprehensive lab schedule to coordinate lab and class timetables, rearranging duty lists to enhance efficiency, creating an examination calendar for better planning, assigning an examination committee, and introducing an SOP for the committee to standardize procedures. Additionally, they recommend revamping the examination and evaluation process to improve effectiveness. In the training and development component, proposals include reinforcing the School-Based Professional Teacher Development (SBPTD) committee, conducting a training needs analysis for teachers, implementing a targeted training program for A/L Technology teachers, evaluating the training program's effectiveness, and designing a supportive program for students to enhance learning outcomes.

For the supervision system, the authors suggest introducing checklists and setting Key Performance Indicators (KPIs). This involves assigning an internal supervision committee, establishing a supervision plan and checklist, and creating an action plan with KPIs to reactivate the data management system for systematic tracking and analysis of student performance. These measures are aimed at strengthening the supervision system and improving educational outcomes.

Recommendations

Enhancing students' pass rates holds immense importance for a school as it serves as a significant indicator of the overall quality and effectiveness of the school's operations. This research focused on addressing the issue of low pass rate of A/L

engineering technology stream. To improve students' pass rate of engineering technology stream, it is essential to have an effective planning in education development sector in the school. Efficient process management is integral to maintaining a seamless and productive school environment, particularly in areas concerning teaching methodologies and student evaluation. For efficient process management, encouraging adherence to established processes and protocols are important. It promotes consistency and adherence to established procedures. It is crucial for educational institutions to prioritize effective training and development programs for both students and staff in order to obtain higher performance. These programs should be aligned with the overall goals of the school, ensuring that the training initiatives directly contribute to desired outcomes, such as improved pass rates. Therefore, for the implementation of this research it is crucial to identify the training requirements of the staff. Effective supervision in schools plays a crucial role in supporting teachers, enhancing student learning outcomes, and fostering a positive school environment. Regular observation and feedback mechanisms within a school environment form a foundation of effective professional development.

All figures in this article were created by the author unless otherwise stated.

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