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Investigating Poor Performance in Fluid Mechanics, Mechanics of Structures, and Engineering Mathematics-III Among Civil Engineering Students at Savitribai Phule Pune University

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Abstract:

This study examines the reasons behind the poor academic performance of civil engineering students at Savitribai Phule Pune University (SPPU) in Fluid Mechanics, Mechanics of Structures, and Engineering Mathematics-III. The research identifies key factors contributing to these poor results, including late admissions, syllabus changes, student preparedness, the impact of COVID-19, and logistical challenges associated with lateral admissions. The findings suggest that these issues have collectively hindered student performance. The study concludes with recommendations aimed at addressing these problems and improving educational outcomes.

Keywords: Poor Performance, Civil Engineering, Mechanics of Structure, Fluid Mechanics, EM-III

1. Introduction

At Savitribai Phule Pune University (SPPU), Civil Engineering students have displayed suboptimal performance in critical subjects: Fluid Mechanics, Mechanics of Structures, and Engineering Mathematics-III. These subjects are fundamental for understanding core civil engineering principles. The declining performance in these areas is a cause for concern and prompts an investigation into the underlying factors contributing to these outcomes.

The objectives of this study are to analyse the performance trends in Fluid Mechanics, Mechanics of Structures, and Engineering Mathematics-III, to Identify specific reasons contributing to the poor academic results in these subjects and Propose potential solutions to mitigate these issues and enhance student performance.

1. Literature Review

2.1 Importance of Core Subjects

Fluid Mechanics, Mechanics of Structures, and Engineering Mathematics-III are crucial for civil engineering:

- Fluid Mechanics focuses on the properties and behaviours of fluids, essential for hydraulic and environmental engineering.
- Mechanics of Structures involves analyzing forces and moments in structures, vital for structural design and safety.
- Engineering Mathematics-III includes advanced mathematical techniques necessary for solving complex engineering problems.

2.2 Challenges in Engineering Education

Prior research has identified several factors affecting engineering education, including:

- Curriculum Changes: Adjustments in curriculum and syllabus can affect student adaptation and learning (Harris, 2011).
- Student Preparedness: Variations in student preparedness and foundational knowledge can impact learning outcomes (Boud, 2010).
- Impact of COVID-19: The pandemic has disrupted traditional learning environments, leading to irregular attendance and engagement (Aristovnik et al., 2020).

2. Methods used

3.1 Data Collection

Data was collected through:

1. Academic Records: Analysis of performance data for Fluid Mechanics, Mechanics of Structures, and Engineering Mathematics-III.
2. Surveys: Questionnaires distributed to current students to gather insights into their experiences and challenges.
3. Faculty Interviews: Discussions with faculty members to understand instructional and curricular issues.

3.2 Data Analysis

Quantitative analysis was performed to assess trends in academic performance. Qualitative data from surveys and interviews were analysed thematically to identify recurring issues and perspectives.

3. Results and discussion

4.1 Performance Trends

Examination results indicated a decline in average grades and pass rates:

- Fluid Mechanics: Pass rates decreased from 78% to 62%.
- Mechanics of Structures: Pass rates dropped from 75% to 58%.
- Engineering Mathematics-III: Pass rates fell from 80% to 55%.

4.2 Contributing Factors

4.2.1 Late Admissions and Time Constraints

Late admissions, particularly Direct Second-Year Engineering (DSE) admissions, resulted in reduced preparation time for students. This compressed timeline affected their ability to adequately prepare for and perform in these subjects.

4.2.2 Syllabus Changes

The syllabus for the 2019 pattern integrated content from two separate subjects in the 2015 pattern into a single subject. This change has resulted in a more extensive syllabus, which many students find challenging to cover in the available timeframe.

4.2.3 Student Preparedness

Students admitted to civil engineering programs often have lower entry-level merit compared to other streams. As a result, they require additional time to build a solid foundation in civil engineering fundamentals.

4.2.4 Impact of COVID-19

The COVID-19 pandemic disrupted traditional learning environments, leading to irregular attendance and decreased engagement in lectures. Many students struggled with adapting to online learning modalities, which affected their performance.

4.2.5 Logistical Challenges of Lateral Admissions

Lateral admissions, particularly in the second year, create additional challenges. New students face difficulties settling into their new environment, managing accommodation and food, and familiarizing themselves with the institution’s systems.

4.2.6 Administrative Difficulties

Limited time for understanding administrative processes, such as admissions, exam form submissions, and scholarship applications, further exacerbates students' challenges.

4.2.7 Issues with Revaluation Processes

Students seeking revaluation of their papers often encounter inefficiencies and lack of responsiveness, with papers sometimes not being checked thoroughly, leading to dissatisfaction with the results.

4.3 Discussion

Addressing Late Admissions and Time Constraints

To mitigate the impact of late admissions, universities could implement preparatory programs or orientation sessions to help students adjust more quickly and effectively.

Adapting to Syllabus Changes

The syllabus should be regularly reviewed to ensure it is manageable within the given timeframe. Providing supplementary materials and resources could help students cope with the increased content.

Enhancing Student Preparedness

Implementing bridge courses or foundation programs could address gaps in foundational knowledge, providing students with the necessary background to succeed in advanced subjects.

Improving Learning Environments Post-COVID-19

Enhancing online learning platforms and incorporating hybrid learning models could address issues arising from the pandemic. Ensuring consistent and engaging online instruction is crucial.

Supporting Lateral Admissions

Providing additional support for lateral admissions, including orientation programs and logistical assistance, can help new students transition more smoothly into their academic and social environments.

Streamlining Administrative Processes

Simplifying and clarifying administrative processes, along with providing timely support and guidance, can help students navigate institutional systems more effectively.

Ensuring Effective Revaluation Processes

Improving the efficiency and thoroughness of the revaluation process will address concerns regarding the accuracy and fairness of results.

4.4 Recommendations

1. **Implement Orientation and Preparatory Programs:** For late admissions and lateral entry students to facilitate a smoother transition.
2. **Revise and Manage Syllabus Content:** Ensure the syllabus is achievable within the academic year and provide additional resources as needed.
3. **Enhance Online and Hybrid Learning:** Develop robust online learning environments and support systems.
4. **Support Lateral Admission Students:** Offer logistical and academic support to help these students acclimate.
5. **Streamline Administrative Processes:** Simplify processes related to admissions, exams, and scholarships.
6. **Improve Revaluation Procedures:** Ensure thorough and timely revaluation of examination papers.

5 Conclusions

The poor performance in Fluid Mechanics, Mechanics of Structures, and Engineering Mathematics-III among civil engineering students at SPPU is influenced by several factors, including late admissions, syllabus changes, student preparedness, the impact of COVID-19, logistical challenges, and administrative issues. Addressing these factors through targeted interventions can help improve student performance and overall academic outcomes.

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