Proceeding of ICMR 7(1), 157-161 DOI: https://doi.org/10.32672/picmr.v7i1.2979

The Synergy of Knowledge, Experience, and Satisfaction in Engineering Education

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Abstract. *This study aims to investigate the knowledge mastery, experience, and satisfaction of engineering lecturers at University and Polytechnic in teaching engineering subjects. Using a quantitative approach, data were collected from 248 lecturers across the Civil, Electrical, and Mechanical Engineering departments through a questionnaire. Descriptive statistical analysis via SPSS was employed, analyzing mean scores, Pearson correlations, and regression results. The findings reveal that the lecturers possess a high level of knowledge (mean score = 3.97) in the engineering subjects they teach, particularly in the areas of application (mean score = 4.01) and understanding (mean score = 3.98). Approximately 70.3% of lecturers have adequate teaching experience, which they enhance through peer discussions. Satisfaction levels are also high, with a mean score of 4.12 for job satisfaction and 4.15 for responsibility. The analysis found a weak but positive correlation (0.205) between knowledge mastery and experience, although regression analysis indicated that experience only explained 4.5% of knowledge mastery. In contrast, a strong positive correlation (0.756) was found between knowledge mastery and job satisfaction, with satisfaction accounting for 57.1% of the variation in knowledge mastery. The results suggest that while experience has a limited impact on knowledge mastery, satisfaction plays a significant role, implying that lecturers with greater knowledge of their subjects are more likely to experience higher job satisfaction.*

Keywords: *knowledge mastery, engineering lecturers, teaching experience, job satisfaction, pearson correlation analysis*

1. Introduction

In today's era of rapid scientific and technological advancements, education plays a pivotal role in shaping societies and economies. It forms the backbone of national development by nurturing skilled human capital and fostering innovation. To maintain high standards, education systems must implement strategic efforts to enhance teaching quality and institutional performance.

Educators act as the primary agents of change, translating educational plans into practice. Without their active involvement, even the best-laid strategies would remain theoretical. The success of future generations hinges upon educators' ability to fulfill their roles effectively, which, in turn, requires continuous development and engagement. For educators to remain effective, emphasis must be placed on their professional knowledge, experience, and interpersonal skills, which collectively influence learning outcomes (Aroff & Kasa, 2014). Educators' knowledge is particularly critical in understanding how learning theories translate into classroom practices. Mastery in teaching strategies and professional development enhances instructional quality, thereby supporting both academic achievements and social needs (Goodwin et al., 2023; Cramer, 2014).

The rapid progression of technology presents both challenges and opportunities for

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educators, driving the need for continuous adaptation. In line with these developments, educators are expected to remain up-to-date with current trends to stay relevant and foster a knowledgeable society (Nature Journal, 2023). Ultimately, the aim of education is to cultivate educators who are not only knowledgeable but also dedicated, creative, and sensitive to the evolving demands of the field. Professionalism in education is essential for fostering human development, which underscores the importance of aligning educators' skills with contemporary needs to thrive in today's dynamic landscape (Busher et al., 2020).

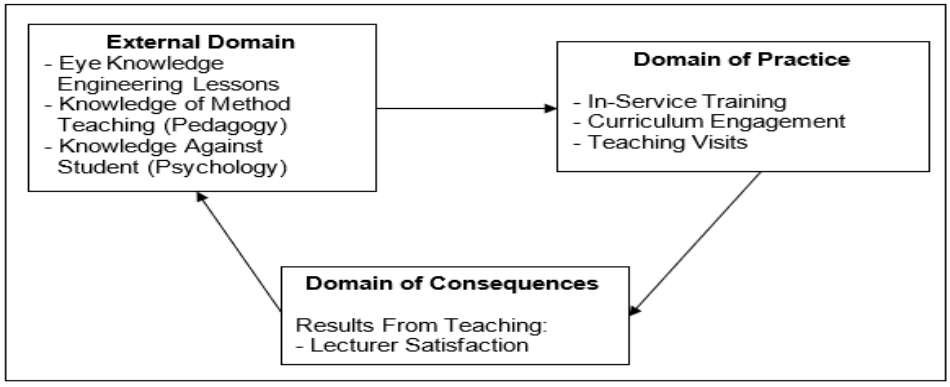

Figure 1. Theoretical framework "Interconnected model of professional teacher"

2. Background of the Study

Cook, Semmel, and Gerber (2015) noted concerns about teachers' readiness to engage students deeply in classroom sessions. Although 98% of teachers believed they were delivering quality education, only 39% felt truly prepared with the necessary advanced knowledge, skills, and competencies to teach effectively. This suggests a gap between teacher confidence and actual preparedness in instructional practice.

Rahim (2015) emphasized that many lecturers are assigned to teach subjects outside their areas of expertise, resulting in disengagement and poor teaching outcomes. Such mismatches between expertise and teaching assignments can lead to uninspired classroom sessions that negatively impact student learning. The issue highlights the importance of aligning teaching responsibilities with subject-specific knowledge to maintain professionalism and engagement.

Recent studies continue to explore this theme, suggesting that teachers lacking sufficient professional training often struggle with subject mastery and classroom management, diminishing both their teaching quality and satisfaction (Witterholt et al., 2022; Justi & van Driel, 2016). Furthermore, educators who lack interest in their subjects, due to knowledge gaps, exhibit lower motivation and teaching effectiveness, directly affecting student outcomes (Schyns & Schilling, 2013; IEEE Xplore, 2021).

This study aims to explore several key aspects related to the teaching practices of engineering lecturers. The first objective is to assess the level of mastery these lecturers exhibit in teaching engineering subjects, focusing on their ability to convey complex concepts effectively. Additionally, the study seeks to identify the teaching experience lecturers possess prior to starting their careers, as this experience plays a critical role in shaping their pedagogical skills. Another important objective is to evaluate the level of satisfaction lecturers derive from teaching engineering courses, as job satisfaction is closely linked to performance and motivation. Finally, the study aims to explore the relationships between mastery and experience, as well as between mastery and

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satisfaction, providing insights into how these factors interact and contribute to effective teaching and positive learning environments.

3. Study Design

This study adopts a quantitative research design, where statistical data is gathered and analyzed to explore the relationships between key variables. Respondents are selected from a population group using cluster random sampling, focusing on lecturers from the Mechanical, Electrical, and Civil Engineering departments to ensure representative insights for the study.

The research examines two categories of variables: dependent and independent. Lecturer satisfaction serves as the dependent variable, while lecturer experience represents the independent variable. Additionally, the lecturers' level of knowledge is treated as both a dependent and independent variable, depending on the specific hypothesis under investigation. This structure reflects the assumption that lecturer satisfaction is influenced by their knowledge, which in turn is shaped by their teaching experience.

Data collection is conducted through a structured questionnaire divided into four sections: A, B, C, and D. Section A covers demographic information, while Sections B and D contain closed-ended questions following the Five-Point Likert Scale to measure attitudes and perceptions. Section C employs a dichotomous format, offering two response options (Yes/No) to capture binary data efficiently. This comprehensive questionnaire structure ensures robust data collection, facilitating detailed statistical analysis.

4. Result and Discussion

Lecturer's Mastery Level in Terms of Knowledge About Engineering Subjects

Each item has been divided into six main aspects based on Bloom's taxonomy, namely in terms of aspects of knowledge (mean score = 3.95), understanding (mean score = 3.98), application (mean score = 4.01), analysis (mean score = 3.88), synthesis (score mean = 3.96) and evaluation (mean score = 3.95). Therefore, the overall average mean score for the level of knowledge mastery of lecturers in the field of engineering is high (mean score = 3.97) which shows that the lecturers are really knowledgeable and knowledgeable about the subjects being taught. This finding shows that lecturers are very sensitive to the subjects taught by mastering each subtopic of a subject in addition to being able to provide the latest examples in line with the needs of the industry today.

Lecturer's Experience Level in Teaching Engineering Subjects

From the research findings obtained, all lecturers have experience either formally or informally. The overall percentage shows that 70.3% of the lecturers have experience and this percentage is among a large range. Through the research that has been analyzed, the lecturers often seek experience by conducting scientific discussions among themselves about the field of teaching in the engineering subjects taught.

Lecturer's Satisfaction Level in Teaching Engineering Subjects

The findings of the study show that the majority of lecturers are satisfied with the subjects they teach. The results of the analysis from the feedback show that each item has received a positive reaction based on the mean score for each aspect of satisfaction, namely work (mean score = 4.12, standard deviation = 0.720) and responsibility (mean

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score = 4.15, standard deviation = 0.660). Lecturers were found to be very happy when given the trust to teach.

Relationship Lecturer's Mastery Level with the Lecturer's Experience Level

Based on Table 1, the findings obtained from the analysis of the Pearson correlation method show that there is a positive relationship between the level of knowledge mastery of lecturers and their level of experience. A positive relationship exists at a rate of 0.205 which is at a weak level. However, the regression analysis (Table 2) can be said to reject this finding by showing that there is no real relationship between the level of knowledge mastery of lecturers and their level of experience. The R Square value of 0.045 shows that the level of experience only affects 4.5% with the level of mastery of the lecturer's knowledge and the rest which is 95.8% is other factors that were not studied.

Table 1. Relationship lecturer's mastery level and lecturer's experience level

Variables	Level of Lecturer's Mastery	Level of Lecturer's Experience
Pearson Correlation	0.205	0.205
Significant (2 Tailed)	0.001	0.001

Table 2. Regression lecturer's mastery level with lecturer's experience level

Variables	R	R Square	Understandized Coefficient B	t value	Significant Value
Constant	0.205	0.045	83.799	36.729	0.000
Experience Level			0.685	3.286	0.001

Relationship Lecturer's Mastery Level with Lectures's Satisfaction Level

Based on Table 3, the Pearson correlation value is 0.756 and the significant value is 0.000 which is less than the 0.01 significance level, indicating that there is a relationship between the level of knowledge mastery of lecturers and their level of satisfaction. The regression analysis also supports this statement (Table 4) where the R Square value obtained is 0.571 which shows that the level of satisfaction affects 57.1% with the level of mastery of the lecturer's knowledge, while the remaining 42.9% is other factors that were not studied.

Table 3. Relationship lecturer's mastery level and lecturer's satisfaction level

Variables	Level of Mastery of the Lecturer	Level of Lecturer Satisfaction
Pearson Correlation	0.756	0.756
Significant (2 Tailed)	0.000	0.000

Table 4. Regression lecturer's mastery level with lecturer's satisfaction level

Variables	R	R Square	Understood Coefficient	t value	Significant Value
Constant	0.756	0.571	0.636	3.276	0.001
Experience Level			0.884	18.112	0.000

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5. Conclusion

Based on the analysis of the objectives, three specific conclusions align with each objective, and two broader conclusions summarize the findings from the fourth objective. The first objective indicates that lecturers demonstrate a high level of mastery in teaching engineering subjects. The second objective reveals that lecturers possess a moderate to high level of teaching experience. Furthermore, the third objective shows that lecturers report a high level of satisfaction with teaching engineering subjects.

From the fourth objective, a weak but positive relationship (correlation coefficient of 0.205) is observed between lecturer's knowledge mastery and their teaching experience. Additionally, a strong positive relationship (correlation coefficient of 0.756) exists between lecturers' knowledge mastery and their teaching satisfaction.

Overall, the findings suggest that most lecturers engaged in the field of engineering possess a high degree of subject knowledge. This mastery not only enhances their effectiveness in the classroom but also contributes significantly to their satisfaction in teaching engineering-related subjects.

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