A Study on Professors' Adeptness and Students' **Expectations on Perceived Student Learning** Outcomes

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Abstract

Higher education plays a major role in defining the education system in India. This paper aimed at devising a structural equation model on professors' adeptness, students' expectations, and student perceived learning outcomes among engineering college students studying in Chennai. The study analyzed the impact of faculty performance and students' expectations on perceived performance of the students. A structured questionnaire was administered for gathering the data. Primary data were collected from 250 engineering college students in Chennai. Exploratory factor analysis and confirmatory factor analysis were used to identify the various faculty performance factors, students' expectations, and their effect on students' performance. The results suggested that faculty behaviors and attitudes affect students profoundly, which in turn suggests that teachers play the single-most important role in student learning outcomes.

Keywords: education management, higher education, learning outcome, NAAC, NBA, professors' adeptness, student engagement

JEL Classification: A2, I21, I22, I23

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eaching aids used by professors provide students with the ability to internalize the subject delivered by them. Students internalize the subject when they feel connected and engaged. The more the students are engaged, the more likely they are to complete assignments given and in turn adopt what is taught. Effective teaching aids used by the professors are thought to have a positive impact on students and thereby result in improved retention and performance. The use of communication and interactive features in their teaching has been proven to expressively increase the performance and productivity of the students. Jankowski (2017) stated that transparency, pedagogy, assignment, self-regulation, and assessment are the five major areas that a teacher needs to exhibit to ensure consistency in students' performance. The first and foremost objective for using student satisfaction surveys by the National Assessment Accreditation Council is to help the educational institutions to focus on quality education in terms of teaching, learning, and outcome-based education that has the potential to develop teaching efficacy. Ngware and Ndirangu (2005) observed that learning as against teaching is the order of the day. The paper aims at identifying the perceived student learning outcomes with reference to teachers' ability to connect with students and their expectations. Students' learning is said to depend on effective teaching and the ability of the professors to engage the students in the learning process; hence, it is inevitable that we get to know what quality of professors motivates students.

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Literature Survey

Quality teaching is considered as a strategic tool for the success of any educational institution due to the following reasons: First, higher education assessment bodies, be it NAAC/UCG/AICTE, are investing in researching the connections between more effective pedagogical approaches that lead to improved student outcomes. Bagga, Bansal, Kumar, and Jain (2016) articulated that educational institutions with accreditations from NBA and NAAC are forced to impart quality education. Thus, it becomes mandatory that colleges provide a high experiential learning environment. Blackburn and Lawrence (1995) in their model examined the influence of faculty efficiency on educational practices. It is an empirically tested model across global institutions. Kaufer (n.d.) stressed the importance of collaborative learning. Bergmann and Sams (2012) laid emphasis on flipped classrooms to boost learning and retention. Pollock (2014) brought about a paradigm shift in teaching science subjects from teacher-centric to student-centric approach. He articulated that successful colleges would be those that will be able to demonstrate active and collaborative learning activities along with application-oriented activities. In their article, Bowden and D'Alessandro (2011) stated that in order to gain competitive advantage, academic institutions are constantly working on to increase their service quality to enable them to get their stakeholders' expectations fulfilled. Pat (2016) approved that those teachers who exercise different teaching practices keeping in mind the ability of the students are likely to influence students and thereby enhance their retention capacity and performance. Hattie (2009) put it in simple terms "what the teachers do matters." Jankowski (2017) stated that problem solving and group learning methodologies used in teaching have a great impact on student engagement and retention.

Dužević (2015) pointed out that when students are involved in the learning process, the outcome in terms of students' performance is generally high. Kalvokolanu, Balaji, and Bommaraju (2018) stated that aligning subject delivery and learning approaches would result in desired student learning outcomes. Based on their aspirations, they choose either deep or surface approach. Students' participation in learning is said to increase when they are given an opportunity to exhibit their learning and are provided with relevant feedback (Tinto, 2012). Aggarwal (2017) stated that usage of E-learning in higher education is said to improvise the skills and ability of the students. Ramanathan (2018) highlighted that one of the major challenges that India is experiencing in internationalizing higher education is the ability of the educational institutions to provide requisite employability skills to its stakeholders. Thus, it can be understood that creating a congenial learning environment and getting the students involved is a complicated activity and its success depends on the ability of the teacher to identify the students' expectations and meet the same. The irony being the expectations of students is generally varied. Thus, it can be understood that student learning outcomes occur when professors are able to involve students in the process of learning. Hence, this paper aims at identifying the role of professors' adeptness in enhancing students' engagement and learning outcomes.

Research Gaps

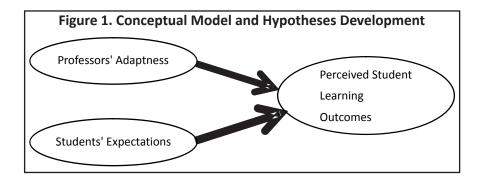
Based on the review of literatures, there is a scope for research in the domain of professors' adeptness, students' expectations, and students' perceived learning outcomes among engineering college students in Chennai. Thus, the research gaps are:

- Relationships between professors' adeptness, students' expectations, and students' perceived learning outcomes have not been adequately explored by studies.
- There is a lack of integrated framework of professors' adeptness, students' expectations, and perceived student learning outcomes in case of engineering college students in Chennai.

Objectives of the Study

- (1) To identify the factors of professors' adeptness, students' expectations, and perceived learning outcomes amongst engineering college students in Chennai.
- (2) To develop an adept scale for professors' adeptness, students' expectations, and perceived learning outcome constructs, and to evaluate the validity and reliability for each of the constructs.
- (3) To test the theoretical framework.

The conceptual model of the research is developed based on the literature survey in which two main constructs and their components are integrated together as shown in Figure 1. Each path between the constructs and the components represents the hypothetical relationship to be verified using structural equation modeling.



Research Methodology

Primary data were collected for the purpose of the research from engineering college students from Chennai during the year 2019 and secondary data were also used.

- (1) Research Instrument: The primary data for the purpose of the study were collected using a structured questionnaire answered by 250 engineering college students.
- (2) Sampling Details: The sample for this study includes 250 students from the city of Chennai. Convenience method of sampling was employed for selecting the respondents.
- (3) Pilot Study: A preliminary exploration was conducted to check the consistency of the statements (permanent and dependent variables) using Likert's 5-point scale. The reliability was measured through Cronbach's alpha method to verify the concurrent variance for all the items regarding professors' adeptness, students' expectations, and perceived student learning outcomes. At the point of inception, Cronbach's alpha scores revealed are presented in Table 1. These values are above the yardstick values of .75; therefore, it can be concluded that the statements were very clear for the respondents to express their understanding.

Structural equation modeling (SEM) is used to reconnoiter the relationship between the components of professors' adeptness, students' expectations, and learning outcomes. The types of analysis for scale development used are exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and SEM. In the first place, to detect the number of factors, exploratory factor analysis is used. In EFA, Kaiser-Meyer-Olkin (KMO) and Bartlett's tests, communalities, total variance explained, and rotation component matrix are used for professors'

Table 1. Cronbach's Alpha Reliability Table

Measure	No. of Statements	Range	Cronbach's Alpha	Variance
Professors' Adeptness	15	1–5	.850	85
Students' Expectations	12	1–5	.757	75.7
Perceived Learning Outcomes	9	1–5	.799	79.9

adeptness, students' expectations, and perceived student learning outcomes construct followed by confirmatory factor analysis that is used to authenticate the up-coming factors. CFA deals with measurement models on the relationship between latent variable and observed measure. In CFA, the measurement model is used as a positive tool for testing the measurement theory.

CFA results in a three-factor model for professors' skill sets, a four-factor model for students' expectations, and a three-factor model for perceived student outcomes. Finally, structural equation modeling technique, which is a combination of factor analysis and multiple regression analysis, is used to test the structural relationship. This requires a confirmatory approach to analyze a structural theory. The second-order structural equation modeling is used to test the hypotheses. In SEM, three constructs and 10 factors are used to run the model.

Analysis and Results

The results provide valuable insights into the professors' adeptness, students' expectations, and perceived student learning outcomes. It highlights the methods teachers use to handle students' expectations in class.

Table 2 shows the demographic details of the respondents of the study. Age of the respondents: 12% of the respondents were in the age group of 17 years, followed by 22% of the respondents in the age group of 18 years, followed by 34% in the age group of 19 years, and 32% above 20 years of age. Gender: 60% of the respondents were male, and female respondents accounted for 40%. Stream: 36% of the students were studying BE computer science, followed by 24% studying BE mechanical engineering, followed by 18% from the Biotechnology stream, 8% from robotics, and 14% from the civil engineering stream.

Table 2. Demographic Details

Personal & Occupational Profile Variables	Respondents' Details	Number of Respondents	Percentage of Respondents
Age	17 years	30	12
	18 years	55	22
	19 years	85	34
	20 years	80	32
Total		250	100
Gender	Male	150	60
	Female	100	40
Total		250	100
Stream	Civil	35	14
	Mechanical	60	24
	Computer Science	90	36
	Biotechnology	45	18
	Robotics	20	8
Total		250	100

Factor analysis extracts common variances from a set variables and groups them based on commonalties. Various variables can be analyzed and explained in a single factor using factor analysis. Degroot, Ferber, Frankel, Seneta, Watson, and Kotz (1982) stated that factor analysis is used to reduce a number of variables into overall groups.

Exploratory factor analysis using Varimax rotation is used to summarize the items into an underlying set of professors' adeptness, students' expectations, and perceived student learning outcomes factors. All the factor loadings of 0.5 or above are identified under the principal component analysis method.

Kaiser-Meyer-Olkin test and Bartlett's test of sphericity provide information about the factorability of the data as a measure of sampling adequacy (Kaiser, 1970). KMO is a test of the amount of variance within the data that can be explained by the factors. The Kaiser-Meyer-Olkin measure of sampling adequacy value is 0.835, 0.828, and 0.776 as in Table 3 and Bartlett's test of sphericity with approximate chi-square value is 2,185.547, 1,044.060, and 757.596. These values are statistically significant at the 5% level. Therefore, it can be concluded that the sample size of the research is adequate for the factors and all the variables can be considered for the research.

(1) Professors' Adeptness Factors: It is found that 15 variables pertaining to professors' adeptness are reduced into three prime factors with a total variance of 65.196%. The individual variances possessed by these factors are 32.007%, 20.081%, and 13.108%. The Eigenvalues are above 1 for the three factors. Rotated component matrix is used to measure the variable loadings for each factor and the abbreviations as used in Figure 2 are explained in Table 4 with their corresponding variables.

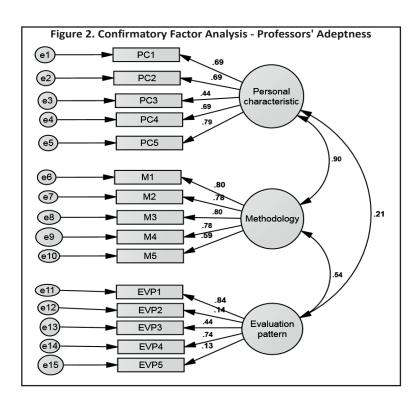
Table 3. Kaiser-Meyer-Olkin and Bartlett's Tests

		Professors'	Students'	Perceived Student
		Adeptness	Expectations	Learning Outcomes
Kaiser-Meyer-Olkin measure of sampling adequacy		0.835	0.828	0.776
Bartlett's test of sphericity	Approx. chi-square	2,185.547	1,044.060	757.596
	Df	0.105	66	36
	Significance	.000	.000	.000

Table 4. Factor Analysis: Professors' Adeptness

F. No	. Variable	Shown as in Figure 2	Factor Loading	Name Given to the Factor
F1	Ability to encourage us to learn.	PC1	0.779	PC-Personal Characteristics
	Highly enthusiastic approach and passionate.	PC2	0.754	
	Has the requisite knowledge and the right attitude.	PC3	0.745	
	Availability outside the class for any clarifications.	PC4	0.735	
	Tactful and possess the right attitude.	PC5	0.524	
F2	Varied teaching methodologies are used.	M1	0.837	M-Methodology
	Appropriate paced sequences.	M2	0.808	
	Teaching aids are used effectively.	M3	0.769	
	Technology is used effectively.	M4	0.700	
	${\it Clarifications} \ are \ provided \ for \ difficult \ materials.$	M5	0.633	
F3	Question paper for this subject is clear.	EVP1	0.968	EVP - Evaluation Pattern
	Marking is impartial in this subject.	EVP2	0.955	
	Tests are given on the materials taught in the subject.	. EVP3	0.845	
	Scores in this subject are within my expectations.	EVP4	0.838	
	Constructive feedback is given.	EVP5	0.551	

Note. Extraction method: Principal component analysis.



\$ Confirmatory Factor Analysis - Professors' Adeptness: AMOS software is used to test the validity of the scales. The data were selected for assumptions of CFA. For the professors' adeptness scale, CFA results reveal the three-factor model. Single-headed arrows represent linear dependents. Double-headed arrows reveal that personal characteristics of the professors have a significant effect on the teaching methodology used by them, and methodology has an effect on the evaluation pattern used by the teaching faculty. Enthusiastic professors are able to give live projects to students that allow them to use their creativity and evaluate the project based on the innovation, teamwork, and the applicability of the projects. Thus, the connection between instructional design, pedagogical approaches, and the evaluation technique applied results in creating a successful learning environment. The CFA provides a satisfactory fit to the data as indicated in Table 5. All estimated loadings are significant.

Table 5. Professors' Adeptness (Model Fit)

Measure	Threshold
Chi-square/df (CMIN/DF)	3.082
<i>p</i> -value for the model	0.010
Goodness-of-fit statistic (GFI)	0.954
Adjusted goodness-of-fit statistic (AGFI)	0.912
Comparative fit index (CFI)	0.913
Normed-fit index (NFI)	0.969
Tucker-Lewis index (TLI)	0.953
Incremental fit index (IFI)	0.912
Root mean square residual (RMR)	0.049
Root mean square error of approximation (RMSEA)	0.041

(2) Students' Expectations Factors: It is found that students' expectations variables are reduced into four predominant factors with a total variance of 65.777%. These factors also possess distinct variances: 30.916%, 13.588%, 10.957%, and 10.316%. The Eigenvalues above 1 are noticed for the four factors. The variable loadings for each factor are measured using rotated component matrix and the abbreviations used in Figure 3 are explained in Table 6.

Table 6. Students' Expectations Factors

F. No	Variable Variable	Shown as in Figure 3	Factor Loading	Name Given to the Factor
F1	The subject is well organized.	P1	0.839	P-Planning
	The subject materials are updated.	P2	0.874	
	The subject syllabus is clear.	P3	0.759	
	Sufficient time has been allotted for the subject.	P4	0.622	
F2	The subject provides interns in the requisite field.	TS1	0.894	TS-Tech and Application Skills
	The subject materials have practical applicability.	TS2	0.772	
	The subject has a theoretical and practical approach.	TS3	0.604	
F3	This subject is very difficult.	TP1	0.749	TP-Thought Provoking
	The main concepts of this subject are tough.	TP2	0.678	
	More time is needed because of its difficulty level.	TP3	0.619	
F4	The subjects are designed focusing on career.	CO1	0.831	CO-Career Oriented
	The subjects provide hands on experience.	CO2	0.547	

Note. Extraction method: Principal component analysis.

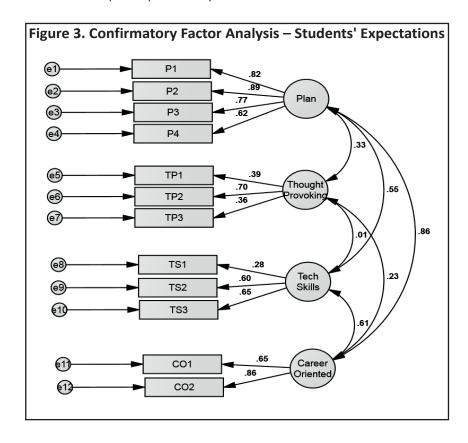


Table 7. Students' Expectations (Model Fit)

Measure	Threshold
Chi-square/df(CMIN/DF)	2.325
p-value for the model	.000
Goodness-of-fit statistic (GFI)	0.927
Adjusted goodness-of-fit statistic (AGFI)	0.903
Comparative fit index (CFI)	0.966
Normed-fit index (NFI)	0.941
Tucker-Lewis index (TLI)	0.961
Incremental fit index (IFI)	0.965
Root mean square residual (RMR)	0.051
Root mean square error of approximation (RMSEA)	0.055

Sometimes Confirmatory Factor Analysis – Students' Expectations: AMOS is used to test and support the validity of the scales. The data were selected for assumptions of CFA. For the students' expectations scale, CFA results reveal the four-factor model. Single-headed arrows represent linear dependents. Double-headed arrows reveal that students' expectations on subject planning have a significant effect on thought-provoking and technical skills learned by them. The technical skills learned by them have an effect on career orientation. Thus, students expect that the course should impart thought-provoking technical and application skills that will be helpful in the career that they take up. The CFA provides a satisfactory fit to the data as indicated in Table 7. All estimated loadings like, GFI, AGFI, CFI, NFI, RMA, and RMSEA are significant.

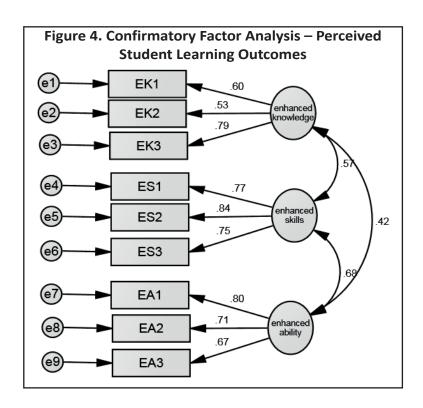
(3) Perceived Student Learning Outcomes Factors: It is found that 10 variables pertaining to student expectations are abridged into three principal factors with a total variance of 69.161%. These factors also possess individual variances, 28.874%, 21.749%, and 18.539%. The Eigenvalues above 1 are noticed for the three factors. The variable loadings for each factor are measured using rotated component matrix and the abbreviations used in Figure 4 are explained in Table 8 with their corresponding variables.

\$\text{Confirmatory Factor Analysis - Perceived Student Learning Outcomes: To test the validity of the scales,

Table 8. Perceived Student Learning Outcomes Factors

F. No	o Variable	Shown as in Figure 4	Factor Loading	Name Given to the Factor
F1	I learned lots of new things in this course.	EK1	0.845	EK-Enhanced Knowledge
	The course has increased my knowledge in this subject.	EK2	0.762	
	The course has created a new learning experience.	EK3	0.655	
F2	The course has enhanced my thinking skills.	ES1	0.861	ES-Enhanced Skills
	The course has enhanced my analytical skills.	ES2	0.821	
	The course has boosted my application-oriented skills.	ES3	0.717	
F3	The course is stimulating.	EA1	0.871	EA-Enhanced Ability
	This course enabled me to take up new projects.	EA2	0.828	
	The course has made me more proficient.	EA3	0.658	

Note. Extraction method: Principal component analysis.



AMOS is used. The data were selected for assumptions of CFA. For the perceived student learning outcomes scale, CFA results reveal the three-factor model. Single-headed arrows represent direct dependents. Doubleheaded arrows reveal that knowledge has a significant effect on skills and skills have a significant effect on ability. Thus, enhanced knowledge leads to enhanced skills and ability. The CFA results in a satisfactory fit to the data as indicated in Table 9. All estimated loadings like, GFI, AGFI, CFI, NFI, RMA, and RMSEA are significant.

Perceived Student Learning Outcomes – Model Fit (Hypotheses Testing):

🕏 H₁: Professors' adeptness is positively related to perceived student learning outcomes.

🕏 H₂: Students' expectations are positively related to perceived student learning outcomes.

Table 9. Perceived Student Learning Outcomes (Model Fit)

Measure	Threshold
Chi-square/df(CMIN/DF)	2.204
<i>p</i> -value for the model	.001
Goodness-of-fit statistic (GFI)	0.940
Adjusted goodness-of-fit statistic (AGFI)	0.916
Comparative fit index (CFI)	0.965
Normed-fit index (NFI)	0.970
Tucker-Lewis index (TLI)	0.945
Incremental fit index (IFI)	0.981
Root mean square residual (RMR)	0.056
Root mean square error of approximation (RMSEA)	0.051

The effect of faculty's adeptness and students' expectations on perceived student learning outcomes among engineering students of Chennai is tested using the structural equation modeling approach. Structural equation modeling is a proficient method of assessing the measurement error where it can be incorporated commonly in the observed and latent variables. Therefore, the association among measured variables – Personal Characteristics, Methodology, Evaluation Pattern, Planning, Technical Skills, Thought-Provoking Skills, Career Oriented, and the latent variable namely – perceived student learning outcomes are assimilated in structural equation modeling.

Figure 5 illustrates the SEM model on the standardized regression coefficients. The current research hypotheses have been delineated on the source of the model fit summary that is sketched underneath and by means of research conducted on the effect of professors' adeptness and students' expectations on student learning outcomes; thus, the above hypotheses are projected. The study reveals that professors' skill sets play a major role in enabling students to learn. Thus, the hypotheses H₁ and H₂ are accepted.

Thus, it can be inferred from Figure 5 that the coefficient of professors' adeptness is 0.88 and that of students' expectations is 0.04, which signifies that for every increase in professors' adeptness and students' expectations, the perceived student learning outcomes increases. The study throws light in understanding the role of faculty in creating a learning atmosphere for the students. The study attempts to provide empirical evidence on how professors' skill sets and attitudes (Personal Characteristics: 0.76) influence the students' learning. The study reveals that professors' enthusiastic and passionate approach with the requisite knowledge and the mindset to clarify doubts and evaluate the students fairly (Evaluation Pattern: 0.69) as well as providing constructive feedback can create an environment that motivates the students to perform well. The above findings are similar to the research findings of Evans (2013) and Plybour (2015). Reviewing student perceived learning outcomes is a necessary step in measuring the students' outcome; yet, it is equally important to understand and evaluate what faculty practices influence student learning gains.

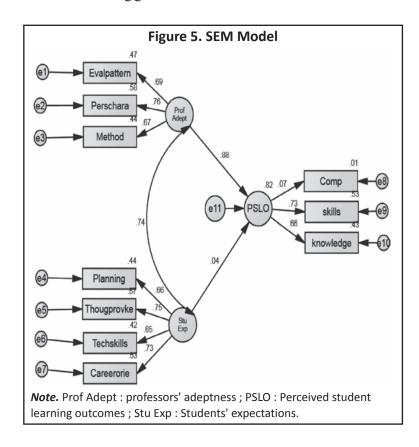


Table 10 shows the model fit summary of the research model. It is understood that the significance p-value is .011 that is superior to 0.05, which is a perfect fit. The goodness fit index and adjusted goodness fit index values are more than 0.90, which indicates that it is an acceptable model fit. The value of comparative fit index is 0.90, which also represents a worthy fit to the model. The value of RMR and RMSEA is 0.59 and 0.52, respectively, which specifies that it is also an acceptable model. Thus, the hypotheses (H₁ and H₂) that professors' adeptness and students' expectations are positively related to perceived student learning outcomes are accepted.

Table 11 summarizes the effect of professors' adeptness and students' expectations on perceived student learning outcomes with standardized and unstandardized estimates. It is observed that the unstandardized regression coefficient of professors' adeptness is 1.06 and students' expectation is 0.35, which signifies the partial effect over perceived student learning outcomes by considering that the other variables are not having any influence over perceived student learning outcomes. The estimate denotes that perceived learning outcomes will

Table 10. Conceptual Model Fit

Measure	Threshold
Chi-square/df (CMIN/DF)	2.246
<i>p</i> -value for the model	.011
Goodness-of-fit statistic (GFI)	0.910
Adjusted goodness-of-fit statistic (AGFI)	0.901
Comparative fit index (CFI)	0.949
Normed-fit index (NFI)	0.914
Tucker-Lewis index (TLI)	0.929
Incremental fit index (IFI)	0.950
Root mean square residual (RMR)	0.59
Root mean square error of approximation (RMSEA)	0.52

Table 11. Structural Equation Model for Testing the Framework

Constructs and Measures	Standardized	Unstandardized	<i>p</i> -Value
Professors' Adeptness–Perceived Student Learning	0.88	1.06	<.001
Students' Expectations–Perceived Student Learning	0.04	0.35	<.001
Professors' Adeptness			
Professors' Adeptness–Methodology	0.67	1.20	<.001
Professors' Adeptness–Personal Characteristics	0.76	1.21	<.001
Professors' Adeptness–Evaluation Pattern	0.69	1.00	
Students' Expectations			
Students' Expectations–Planning	0.66	1.00	
Students' Expectations–Technical Skills	0.65	1.22	<.001
Students' Expectations–Thought Provoking	0.75	1.19	<.001
Students' Expectations–Career Oriented	0.73	1.07	<.001
Perceived Student Learning Outcomes			
Perceived Student Learning Outcomes–EK	0.66	0.88	<.001
Perceived Student Learning Outcomes–ES	0.73	0.94	<.001
Perceived Student Learning Outcomes–EA	0.07	1.00	

increase by 0.88 for every unit rise in professors' adeptness at a given level of significance. Thus, professors who are able to inculcate enthusiasm and use innovative teaching methodology will be able to influence students and enhance their knowledge, skills, and ability. Learning activities like live projects, models, and exhibitions as a part of classroom activity will enhance the analytical and application-oriented skills of students. Approachable professors will be able to have a thoughtful effect on the student learning outcomes. The unstandardized coefficient value of professors' adeptness is 1.21, which represents the effect of professors' personal characteristics on learning outcomes. This suggests that faculty attitudes and beliefs are to create an environment that fosters student learning; likewise, students perceived that Technical Skills (1.22) and Thought-Provoking Skills (1.19) will definitely help them in their career.

Managerial Implications

Students' perceived learning outcome is the result of matching professors' proficiency and students' expectations. Faculty who are able to engage students in class through their charisma, methodology, and right attitude enhance knowledge, skills, and abilities of the students. This is to bring about learning-centric campuses. Thus, to create a student-centric campus, one needs to know how undergraduates learn and what the barriers to student learning are. Thus, the onus of evolving classroom practices that stimulate learning among students lies in the hands of the professors. The study reveals that the efforts of the teachers play a vital role in enabling the students to learn and perform well. Faculty behaviors, attitudes, and pedagogical approaches have an effect on student learning outcomes. Professors who are able to encourage students both inside and outside the classroom are able to involve the students in their class. Involved students are able to exhibit their learning experiences and outcomes in their performance.

Conclusion

The impact that professors' adeptness can have on the students' experience is seen in the way the students look at their professors and the amount of enhanced knowledge, skill, and ability they perceive/learn in the classroom. The results suggest that faculty behaviors and attitudes affect students profoundly, which in turn suggests that teachers play the single-most important role in student learning outcomes. Since faculty plays a critical factor in the collegiate experience, colleges need to find new and innovative ways to support and reward their faculty.

Limitations of the Study and Scope for Further Research

The study is limited to 250 engineering college students. Valid generalizations can be made if a larger sample from different geographical areas is chosen. The mediating and moderating role of students' engagement can be studied between professors' adeptness, students' expectations, and perceived learning outcomes.

Author's Contribution

Srividya Prathiba contributed to the design and implementation of the research, to the analysis of the results, and to the writing of the manuscript.

Conflict of Interest

As an ethical obligation of a researcher, the author declares that this research work is purely based on individual interest for applying for Guideship. There is no specific conflict of interest.

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