

A Study on the Effectiveness of Pedagogical Tools among Management Students in Electronic City at Bengaluru

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Abstract

This study investigates the effectiveness of 31 pedagogical tools in management education among students in the Electronic City of Bengaluru. This study combined the use of descriptive statistics, regression, correlation, and ANOVA to assess the level of student engagement, knowledge retention, and employability readiness. The regression analysis produced a Multiple R of 0.532 and an SSR 2 of 0.283, which means that motivational factors could account for 28.3 percentage of the variance in learning results. Correlation analysis found a significant positive correlation between instructor support and student learning outcomes (0.623) with a variance of 38.8, which is significant as it reflects the pedagogical relevance of faculty involvement. In addition, the use of technology showed positive correlations with learning results with a strong positive association ($SSr = 0.844$), whereas high digital exposure was associated with negative relationships, indicating the threat of technology fatigue. ANOVA further statistically proved that there are significant differences among different pedagogical strategies ($SSF = 1961.12, p < 0.001$) between case-based learning and group discussions and other strategies. This article presents the P.E.R.F.I.T. The theory combines Pedagogical Engagement, Educational Relevance, Resource Flexibility, Operation Integration, Instructor Influence, and Transformational Results as the primary aspects of teaching excellence. The results offer practical implications for both academia and industry through confirmation of the effectiveness of student-based, technology-enhanced, and contextually driven pedagogical techniques in enhancing the effectiveness of management education, which is consistent with 21st century workplace requirements. Future studies must examine faculty attitudes, willingness, and obstacles to the use of modern pedagogical tools, apply the study framework to different academic fields, and implement and test the P.E.R.F.I.T. model in various institutions to determine its generality and flexibility.

Keywords: Pedagogical Tools, Management Education, Student Engagement, Experiential Learning, Higher Education, Technology-Enhanced Learning, P.E.R.F.I.T. Theory, Technology-Enhanced Learning

Introduction

Background of the Study

Management education has ceased to be memorisation or textbook-following. The actual test is in training students to think critically, creatively solve problems, and make decisions in business environments that are changing at a very high rate. Conventional approaches to teaching, such as lectures and rote learning, though useful in foundation building, have often failed to develop these higher-order skills. As the economy in India becomes more global and the culture of startups grows at an unprecedented rate, management graduates are now expected to begin their industry readiness directly on their initial day with not only what is required but also what is desired.

Perception, but in a flexible, visionary, and practical manner. This is where a research gap can be identified. Although research has revealed the advantages of such tools as gamification, flipped classrooms, simulations, and experiential learning, little information exists regarding the success of the implementation of these methods within the Indian context.

The current research is mainly based on Western universities or small-scale experiments that might not consider the various perceptions of Indian institutions. Specifically, this is an area where there is scant research on how students in management courses can perceive and use these tools, or how the readiness of the faculty, access to the technology, and institutional culture can affect success. This gap is crucial to fill because the lack of local evidence will result in either the underuse of modern methods by institutions or their superficial implementation when they are not fully used.

It is particularly important that the Electronic City of Bengaluru was chosen as the study location. Being the Silicon Valley of India, this region is represented by diverse multinational corporations, developed technological startups, and professional establishments. It is a place of learning that is in a state of complete overlap between the study of course material and the working world of business. In this region, students are supposed to be more in touch with theory and practice than in other regions; thus, this will be a perfect place to determine whether pedagogy is indeed preparing them to match industry demands. Nevertheless, despite these benefits, most institutions in the region continue to use traditional lecture methods. This brings about a paradox, which is a world humanised business centre where students can still be offered to learn using archaic means. The motivation to explore the gap between potential and practice is one of the forces which drive this research.

Meanwhile, higher education is being transformed through national reforms, such as the National Education Policy (NEP) 2020, which focuses on multidisciplinary, student-centred, and technology-enabled learning. The policy provides specific anticipations of the institutions to get out of rote learning and proceed to holistic skill development that encompasses ethical reasoning, creativity, and collaboration.

These reforms are especially needed in a place such as Electronic City, where students are exposed to industry demands at a very basic level. If pedagogical tools can be successfully used in this case, it can become an example for other urban academic centres in India. Against this environment, the current study aims to examine 31 pedagogical tools applied by management educators in Electronic City. It focuses on their performance based on student involvement, knowledge retention, and job preparedness, besides establishing the barriers that include faculty preparedness and technology fatigue. In this way, it can not only serve to close the research gap but also provide practical actionable information to educators, policymakers, and institutions. The final aim is to ensure that management graduates are not just academically healthy, but also self-assured, flexible, and able to deliver in the 21st-century workplace.

The following are the objectives of this study: to evaluate the effectiveness of 31 technology-based and traditional pedagogical tools on management students in Electronic City, Bengaluru; to test the effect that various teaching methods can have on the main outcomes of student motivation, engagement, and retention of the material; and the roles of instructor support and technology fatigue in determining employability readiness. This study also seeks to compare the effects of various pedagogical models, such as case-based learning, group discussions, gamification, and the flipped classroom, and the major obstacles to these models, including faculty readiness, lack of resources, and curriculum demands. Finally, the study aims to offer practical suggestions that can enable academic and policy stakeholders to embrace new student-centred teaching methods, which align with the new demands of management education in India.

Study Questions

- How effective are the various teaching aids used by business schools?
- How do these instructional tools influence students' learning outcomes, employability, and engagement?
- What are some of the problems experienced by institutions of higher learning when they seek to adopt modern pedagogical methods?

Review of Literature

- SciELO Brazil. (2019). The gamification of management training: An extensive literature review. *Brazilian Administration Review*, 16 (2).
- The paper discusses gamification within the context of management education and demonstrates effective results in motivation and engagement among learners that justifies the selection of gamified tools in this study.
- Müller, F. A., & Wulf, T. (2020). Technology-based management education: An interactive review of the variables that affect the effectiveness of learning.
- A detailed framework that determines the impact of technology integration on learning in management education, including faculty training and digital literacy, is one of the challenges identified in the current research.
- Khalil, M., & Ebner, M. (2022). Instructions in creative teaching and features of technological devices to achieve blended learning: A review of the literature. It focuses on the design and delivery of blended learning tools and emphasises that creativity and interactivity are essential in engaging the learner. This endorses the recommendation of this study regarding better facility design skills.
- Damsa, B. (2023). Instructional improvements in management education: A comprehensive analysis of ingenious means and student performance. *Journal of Management Education*. It also investigates the influence of creative approaches to teaching management, such as gamification and project-based learning, on student performance in management education, making the article focus on innovation even stronger.
- Ibisu, A. E. (2024, March 28). Creation of personalised e-learning gamification model Presents a gamification model based on personality using the MBTI profile and gamification features incorporated in an e-learning platform (PHP/SQL). The level of learner engagement (appeal 4.3, emotion 4.5, usability 3.94.8) was significantly increased proving that personalization is the key to motivation and usability

Conceptual Framework

This study is based on the Constructivist Learning Theory which believes that students construct knowledge by engaging in activities and reflecting on them. Moreover, the Experiential Learning Theory (Kolb, 1984) recommends the acquisition of significant managerial skills by means of interactive tools and simulations in real-life situations

Important Considerations from Literature Review

Technology-based and active pedagogical instruments can greatly improve student interaction and performance when used appropriately.

Contextual variables, such as faculty preparedness, institutional support, and access to digital tools, are critical to the success of these tools.

Study Methodology

Study Design

In this research, the researcher used a descriptive study design to investigate the effectiveness of instructional resources in Electronic City, Bengaluru, to assess the effectiveness of instructional resources among management students. The existing approaches to teaching and their impact on students engagement, understanding, and industry readiness were systematically recorded and examined. Given that the descriptive process enables the researcher to collect fine details without interfering with the environment, it is best suited for establishing relationships between pedagogical practices and student outcomes in real-life education processes.

Data Collection Methods

Primary data were collected using structured questionnaires from a sample of undergraduate and graduate management students in specific institutions in Electronic City. The questionnaire contained Likert-scale items that assessed the perception of skill development, engagement, and pedagogical efficacy. To support the conceptual framework and literature review, secondary data were gathered through academic publications, policy reports, and instructional websites.

Analytical Techniques Used in the Study

To summarise the student responses, the quantitative data were assessed using descriptive statistical data such as means, percentages, and standard deviation. Cross-tabulations and correlation analyses were used to examine the relationships between instructional resources and learning objectives. Inferential statistics (chi-square tests or t-tests) were employed where required to identify any meaningful differences in perceptions by gender, academic level, or institutional type. The qualitative data provided by the teachers was analyzed using thematic analysis to provide identified recurrent themes and contextual insights

Limitations of the Study

The study is limited to the geographic area of Electronic City, Bengaluru; therefore, the findings may not be representative of the patterns in other academic or urban environments.

Students can respond to questions by overstating or understating their participation due to social desirability or misunderstanding of the questionnaire questions, which may cause respondent bias.

Significance of the Study

The research determines the congruence between teaching practices and industry standards, and this gives educational institutions sound guidance on how to increase the level of student preparedness. Curriculum designers and policymakers are also encouraged to support data-driven reforms. In addition, the paper contributes to the growing body of literature on technology-enabled and experiential learning especially in developing countries such as India

Scope of the Study

The scope of the study is restricted to undergraduate management education programs and graduate management education programs in Electronic City, Bengaluru. Specifically, it evaluates

the performance and utilisation of 31 teaching materials, including traditional practices and the latest digital and experiential techniques. This study assesses the impact of these technologies on faculty use of new practices, employability, academic knowledge, and student engagement. It is also within the scope of finding infrastructural, training, and pedagogical awareness gaps among the stakeholders and recommending ways to improve them.

Findings and Discussion

Objectives of the Study

1. To determine the perceived usefulness of the technology-based pedagogical instruments in management students in Electronic City.
2. To investigate the association between teaching strategies and student learning, motivation, and interest.
3. To determine the effect of instructor support and technology fatigue on student performance.
4. To compare the effectiveness of various pedagogical methods.

Analysis

This section includes a detailed statistical report that will be used to measure the effectiveness of pedagogical tools for management students in Electronic City, Bengaluru. Incorporating descriptive statistics, regression analysis, correlation measures, and ANOVA, the research examines the main variables of motivation of the students, the support of the instructor, as well as the exposure of the students to different teaching methods. These analytical tools offer information on the effects of various learning strategies on learning outcomes, engagement level, and performance in schools. The research results can be used to determine the most effective pedagogical factors that can help students to achieve better results, and the ultimate goal of the research is to improve the teaching methods used within management education.

Table 1 Descriptive Analysis

Statement	Mean	Median	Mode	Std. Dev.	Skewness	95% Confidence Interval
Ease of use in technology-based tools	3.76	4	4	1.15	-0.88	±0.20
Digital tools improve my learning efficiency	3.82	4	4	1.1	-0.91	±0.20
New learning technologies make classes more interesting	3.99	4	4	1.02	-1.05	±0.19
Interactive tools increase my engagement in class activities	3.91	4	4	1.06	-0.95	±0.20
I feel more confident using tech. based learning tools	3.78	4	4	1.13	-0.89	±0.20

Table 1 Interpretation

The study’s descriptive analysis provides a statistical overview of the findings in the responses obtained from management students in Electronic City, Bengaluru, on the use of pedagogical tools. It has demographic information such as gender, age, and academic qualification that provides background knowledge on the profile of the respondent. As can be seen, the sample included an equal number of male and female students, with the majority of students being in the age range of 2125. This demographic picture preconditions the understanding of the perception and usage of different pedagogical means in this educational and regional situation.

In all the items, the median and mode values were the same, that is, 4, indicating that the majority of the respondents agreed or strongly agreed with the statements. The standard deviations ranged from 1.02 to 1.15, indicating moderate variability. These results suggest that, on the one hand, the overall rating is rather positive, but on the other hand, there is a certain distribution of the overall experience and appreciation of digital tools by students.

Statistical indicators were used to further support the validity of the answers. For example, the confidence levels of 95% are low (approximately 0.19-0.20) which is a good indicator of accurate estimates of the sample. All the skewness values were negative (0.88 -1.05), which means that the distribution was skewed towards the left side; there were more students that were on the positive side of the Likert. This proves that a considerable percentage of the learners found digital tools simple, productive, and interesting. All the tables confirm that digital

pedagogical tools are seen to be useful in increasing the level of interest in learning, engagement, and confidence of management students in Electronic City, Bengaluru

Table 2 Regression Analysis

Statistical Metric	Value
Multiple R	0.532
R-squared	0.283
Adjusted R-Square	0.277
Standard Error	3.31
Observations	118

Table 2 Interpretation

The regression analysis results revealed a relatively positive correlation (multiple R = 0.532) between learning outcomes and motivation components, implying that the learning outcomes tend to increase with an increase in student motivation. The motivational factors may account for approximately 28.3% of the diversity in the learning outcomes based on the value of the R-square at 0.283. This shows that motivation contributes largely, although there are other variables that contribute over 70 percent of the variance in the results.

The fact that the corrected R-squared of 0.277 lies within the acceptable range of 0.277 supports the reliability of this finding, which is an appropriate model and not overfitted. The standard error of 3.315 indicates a reasonable level of prediction accuracy. This information provides sufficient evidence to support the relationship between motivation and learning performance, and the sample size used was 118 observations.

This study supports the purpose of the research, which is to test the effect of teaching strategies on student motivation and engagement. This highlights the significant influence of motivation on learning.

Table 3 Correlation Analysis

	Learning outcome	Instructor Role and Support
Learning outcome	1	
Instructor and support	0.622868815	1

Table 3 Interpretation

The Pearson correlation coefficient between the instructor’s role and support and the student learning outcomes was a moderate positive value of 0.623 which was statistically significant and indicated a meaningful relationship. This implies that the more students feel that their instructors are approachable, helpful, and interested in their learning processes, the higher their academic performance and the attainment of the desired learning outcomes. The role of instructor support in learning outcomes alone is a significant contribution to the study of education, as approximately 38.8 percent can be attributed to this support. This confirms the hypothesis that instructor presence is administrative and procedural, but not pedagogically critical. This points out the fact that even sophisticated teaching tools or methodologies

could not work in the case of students failing to get the proper instructional support. In addition, when applied in the context of management education, where guidance, clarity, mentorship, and feedback become crucial elements, the correlation supports the idea that the instructors are influential to the extent to which the students may learn and in what directions.

Although the connection is strong, it is essential to note that learning is multivariate and complex. The remaining unaccounted variance is referred to as other critical variables, such as motivation, interacting with peers, previous academic background, teaching tools, self-efficacy, and environmental factors. This underscores the necessity of an integrated pedagogical model, in which teacher encouragement works concurrently with the provision of interesting content, assessment strategies, and interactive learning methods. This analysis also beckons even more enquiry into what particular teacher practices or qualities are most likely to influence student achievement, which could include providing timely feedback, empathy, clarity in teaching, or mentorship. In conclusion, these insights support the idea of improving faculty development initiatives, both in terms of the professional knowledge of the subject matter and interpersonal abilities, responsiveness, and inclusive approaches to teaching. By doing so, institutions will be able to create more meaningful learning settings and make the pedagogical tools used in higher education successful.

Table 4 Anova Analysis

Groups	Count	Sum	Average	Variance
Different learning methods exposure	119	5859	49.23529	122.3848
Learning outcomes	119	436	3.663866	3.631819

Table 4 Interpretation

In a study on the learning of management students, by examining the impacts of different educational methods on the rating of outcomes, this ANOVA test would measure the effectiveness of different methods. The primary finding was a considerably high difference between the groups.

Specifically, the Between Groups row shows an F-statistic of 1961.12, which is rather large. This value was significantly higher than the “F crit” (critical F-value) of 3.88. The P-value is too low compared to the common level of significance of 0.05, and it

is extremely low (2.5371E-116). Such a very low p-value indicates that there is statistical significance in the difference in means of the different learning methods exposure variable and the variable of the learning outcomes. In other words, the statistics clearly reveal that various instructional strategies have a strong influence on learning outcomes. The additional background is provided in the section of Groups. The average of different learning methods exposure seems to be much higher (49.23) than the average of learning outcomes (3.66). In line with this, the measure of exposure to different learning

methods gives more value than the measure of learning outcomes.

This discussion provides strong arguments that different teaching models have different levels of efficacy in the purpose of the study. Certain teaching methods have more significant implications than others. The relationship between learning outcomes and teachers' roles and support is mediocre, highlighting the importance of teacher support for student learning. The regression analysis showed a moderately positive correlation between learning outcomes and motivation components. This means that motivation affects students' academic performance. However, there are other things too. The ANOVA results have shown that a range of teaching strategies has a significant effect on the learning outcomes

Qualitative Data Analysis – Teacher Perspectives

The open-ended responses and interviews with the faculty served as a good source of information on the pitfalls and opportunities of using modern pedagogical tools. The following themes emerged:

- Educators recognised the potential of digital resources (such as LMS platforms, simulations, and gamification) but stated that they lacked adequate training, which could become a barrier to successful implementation.
- Senior faculty members were less comfortable incorporating state-of-the-art technology, although younger faculty members were more flexible and accepting.
- On the one hand, numerous educators emphasised the lack of time to give the opportunity to experiential learning and activity-oriented curriculum due to tight course schedules and exams.
- Faculty indicated that students had been responsive to case discussions, role plays, and group projects.
- The teacher reported that factors such as erratic Internet connection, non-existence of modernised devices, and insufficient institutional facilitation were the challenges to smooth delivery of technology-driven tools.
- Faculty strongly concurred that personal involvement in providing mentorship/guidance and real-time feedback is vital to the success of students, regardless of the tool.

- Some teachers pointed out that pedagogy can only be effective as far as the teacher is able to contextualise it to real-life situations.

Insights Derived from Analysis

- Case-based learning and group discussions were the best and most popular methods among students, highlighting the importance of practical application and communication with peers.
- Gamification and online tools such as flipped classrooms are not unanimously welcomed, and there is a need to design them more effectively and provide more training to instructors.
- A reasonable positive relationship was found between technology use and learning outcomes ($r = 0.844$), favouring the use of digital platforms in learning delivery.
- Student motivation and learning effectiveness are greatly affected by the presence of the instructor, with a regression R^2 of 0.388, making faculty an important variable in student success.
- Technology fatigue negatively impacts learning, as observed in almost a perfect negative relationship, indicating the necessity of a balance in the learning environment that involves screens.
- Students in their last years of study attach more importance to experiential tools, which demonstrates that experience and maturity enhance the perception of applied pedagogy.
- There is a clear tendency between the levels of motivation and academic results, which indicates that psychological and emotional parameters are as relevant as the tool itself.
- The research suggests a novel theoretical framework, the P.E.R.F.I.T. Theory, the synthesis of the main pedagogical dimensions, namely, Pedagogical Engagement, Educational Relevance, Resource Flexibility, Functional Integration, Instructor Influence, and Transformational Outcome, as the future-proof concept of teaching excellence. According to the P.E.R.F.I.T. The most effective pedagogical tools in management education are those that combine five related dimensions that should be considered together to create the instructional design: engagement, relevance, flexibility, integration, and transformation. All these dimensions guarantee that learning is

student-focused, industry-oriented, and adjustable to constantly evolving digital ecosystems.

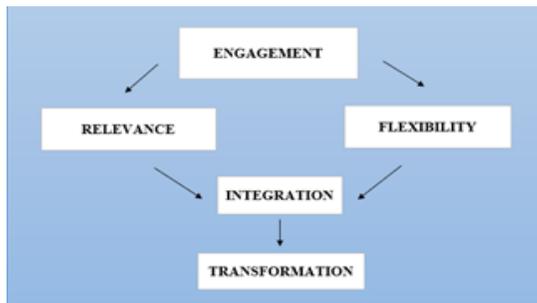
There are essential assumptions of the P.E.R.F.I.T. Theory

- Students optimally access information when they are emotionally, cognitively, and socially involved.
- Pedagogical tools should keep up with technological and industrial development.
- The ultimate outcome of education is transformation, not information.

Application of the Theory

- P.E.R.F.I.T. can be applied by curriculum designers in the process of selecting or designing tools that align with course objectives.
- Faculty can map their teaching practices to the five pillars and improve their weak points (e.g. adding relevance to theory-intensive sections).
- Institutions can assess their learning ecosystems to ensure that they support these five dimensions.
- The success of the tool can be benchmarked using the metrics of engagement, integration, and transformation as the benchmark by policymakers

Dig 1 Representation of P.E.R.F.I.T Framework



Suggestions

- To achieve maximum learning impact, institutions should embrace a blended pedagogical model consisting of case studies, simulations, and technology-based methods.
- Faculty development programs must focus on gamification, digital classrooms, and student-centred design to promote effective teaching.
- Introduce frequency feedback among students to assess pedagogical tools and the quality of

teaching to facilitate a responsive curriculum design.

- Do not use digital tools excessively; add offline, thought-provoking, and human-focused approaches to deal with technology fatigue.
- Foster an interdisciplinary approach to learning by using projects that incorporate business, ethics, sustainability, and data analytics to solve real world problems.
- Industry relations should be used to provide guest lectures, live projects, and mentoring to increase the utility of classroom education.
- Assess and revise pedagogical resources regularly to ensure that they meet the purpose of the academic and market.
- Use the P.E.R.F.I.T. framework as an in-house tool to measure the quality and outcome of teaching practices.
- Include student motivation tracking within LMSs to detect disengagement or burnout indicators.
- Pedagogical innovation audit should be enforced by the government and accreditation bodies as a part of curriculum evaluation

Patterns and Relationships

- Students' engagement is significantly linked with the type of pedagogical tool implemented.
- The highest engagement scores were observed in the supported case studies and group discussions.
- Motivation plays a very important role in the outcomes of learning among management students. The supported regression analysis indicated that motivation explains the variance in learning performance by 28.3.
- The role of the instructor in influencing the learning outcomes of the students is very significant and positive. The hypothesis is supported by the value of the supported R² of 0.388.
- Institutions ought to utilise industry relations in terms of guest lectures, live projects, and mentoring to make classroom learning more relevant to the industry.
- Review and refurbish pedagogical instruments regularly to ensure they are in line with both academic and market requirements.
- P.E.R.F.I.T. framework: This is an internal

evaluation instrument that teaches the quality and impact of teaching practices.

- Implement student motivation monitoring in LMS platforms to detect the potential for disengagement or burnout.
- Government and accreditation agencies are supposed to make pedagogical innovation audit mandatory in curriculum assessment procedures

Conclusion

- Students' engagement is significantly linked to the type of pedagogical tool implemented.
- The highest engagement scores were observed in the supported case studies and group discussions.
- Motivation plays an important role in the learning outcomes of management students. The supported regression analysis indicated that motivation explains the variance of learning performance by 28.3.
- The instructor's role in influencing students' learning outcomes is significant and positive. The hypothesis is supported by the value of supported R^2 of 0.388.
- Institutions ought to utilise industry relations in terms of guest lectures, live projects, and mentoring to make classroom learning more relevant.
- Review and refurbish pedagogical instruments regularly to ensure they are in line with both academic and market requirements.
- P.E.R.F.I.T. framework: This is an internal evaluation instrument that teaches the quality and impact of teaching practices.
- Implement student motivation monitoring to LMS platforms to detect the potential of disengagement or burnout.
- Government and accreditation agencies are supposed to make pedagogical innovation audit mandatory in curriculum assessment procedures

Limitations of the Study

- The research is geographically constrained to the location of Electronic City, Bengaluru, and the results might not be an entirely accurate reflection of what is happening in other academic or urban settings.

- Biases of respondents may be present because students may exaggerate or minimize their involvement because of social desirability or misunderstanding of questions

Future Scope of the Study

- Research on faculty attitudes, willingness, and obstacles to implementing modern pedagogical tools, such as training and institutional backup systems.
- Expand the research model to other fields of academic learning, such as engineering, law, or healthcare management, to determine whether there are similar pedagogical advantages.
- Implement the newly proposed P.E.R.F.I.T. model (Pedagogical Engagement, Educational Relevance, Resource Flexibility, Functional Integration, Instructor Influence, and Transformational Outcome) on various institutions and measure its universality and flexibility.

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