

Faculty Capacity Building and Pedagogical Innovation in Digitally Transformed Higher Education Institutions: Evidence from Kerala

Bency A. Raseena¹; Dr. Muhammad Shahbaz²

^{1,2} UK Management College

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Abstract: The present study examined faculty capacity building and pedagogical innovation in digitally transformed higher education institutions in Kerala. The study focused on the relationship between faculty capacity building and pedagogical innovation, the predictive influence of faculty capacity building on pedagogical innovation, and the difference in pedagogical innovation based on the level of participation in digital training programmes. A descriptive survey method was adopted for the study. The sample consisted of 200 faculty members selected from higher education institutions in Kerala. Data were collected using a structured questionnaire consisting of Likert-scale items related to Faculty Capacity Building, Pedagogical Innovation, and Digital Training Participation. The collected data were analysed using EDUSTAT. Descriptive statistics, Pearson correlation, simple linear regression, one-way ANOVA, and Scheffé post hoc test were used for analysis. The findings revealed a strong positive and significant relationship between faculty capacity building and pedagogical innovation. Faculty Capacity Building was also found to be a significant predictor of Pedagogical Innovation. The study further showed that faculty members with higher participation in digital training programmes demonstrated significantly greater pedagogical innovation. The study highlights the importance of continuous faculty development and digital training for strengthening innovative teaching practices in higher education.

Keywords: Faculty Capacity Building; Pedagogical Innovation; Digital Training Programmes.

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I. INTRODUCTION

Higher education has undergone major changes with the expansion of digital technologies, online learning platforms, learning management systems, digital assessment tools, and technology-supported classroom practices. In the present academic context, digital transformation is not limited to the use of devices or online platforms; it involves a wider change in teaching methods, learning resources, student engagement, assessment practices, and institutional academic culture. The National Education Policy gives importance to technology integration, teacher preparation, and quality improvement in higher education, making faculty development a central requirement for institutional transformation (Ministry of Education, 2020).

Faculty capacity building is one of the major requirements for improving teaching quality in digitally transformed higher education institutions. It includes the development of teachers' knowledge, skills, attitudes, and professional readiness to use digital tools effectively for teaching, learning, assessment, and academic communication.

The UNESCO ICT Competency Framework for Teachers emphasises that teacher professional development in ICT should be understood as a continuous process rather than a one-time training activity (UNESCO, 2018). This shows that digital competence among faculty members has to be strengthened through regular training, institutional support, and continuous professional learning.

Pedagogical innovation refers to the adoption of new and effective teaching practices that improve student participation, understanding, creativity, collaboration, and learning outcomes. In digitally transformed institutions, pedagogical innovation includes blended learning, interactive digital content, online assessment, student-centred classroom practices, multimedia-supported instruction, collaborative learning activities, and technology-enabled feedback. The Technological Pedagogical Content Knowledge framework explains that effective technology integration depends on the meaningful connection between content knowledge, pedagogical knowledge, and technological knowledge (Mishra & Koehler, 2006). Hence, faculty members require

not only technical skills but also the pedagogical ability to use technology in ways that improve learning.

Professional development literature also indicates that teacher learning becomes effective when it is continuous, context-sensitive, practice-oriented, and linked with classroom improvement (Darling-Hammond et al., 2017). In the context of digital transformation, this means that faculty training should address both technological competence and pedagogical redesign. Studies on technology integration have shown that teachers' beliefs, confidence, and institutional conditions influence the effective use of digital tools in teaching (Ertmer, 1999, 2005; Tondeur et al., 2017).

Recent studies further show that digital transformation in higher education is closely connected with institutional readiness, digital competence, teacher professional development and technology-supported pedagogical redesign. Digital pedagogy frameworks emphasise learner-centred learning, evidence-based use of digital resources and the purposeful integration of technology into classroom practice (Huang et al., 2024). Research on teaching innovation after the COVID-19 period also highlights that faculty training, resource management and institutional digital maturity influence the successful adoption of innovative teaching practices (Paños-Castro et al., 2024; Nazyrova et al., 2025).

➤ *Background of the Study*

The background of the present study is rooted in the increasing need to connect faculty development with meaningful pedagogical change. Many higher education institutions have introduced digital infrastructure such as smart classrooms, online platforms, digital libraries, learning management systems, and e-content facilities. However, the presence of digital infrastructure alone does not ensure pedagogical innovation. Digital transformation becomes educationally effective only when faculty members are able to redesign their teaching methods, use digital tools appropriately, engage students actively, and assess learning through suitable technology-supported methods.

Faculty capacity building is therefore a key factor in the successful implementation of digital transformation in higher education. Training programmes, workshops, faculty development programmes, webinars, and institutional mentoring can improve teachers' confidence and competence in using digital tools. When faculty members receive systematic training, they are more likely to experiment with innovative teaching strategies, prepare digital learning materials, use online assessment tools, and adopt blended learning practices. The concept of digital competence in education also stresses teachers' ability to select, adapt, and integrate digital resources for meaningful learning rather than merely using technology as an add-on (Redecker, 2017).

The study is especially relevant in the context of Kerala, where higher education institutions are increasingly encouraged to adopt digital platforms and technology-enabled academic practices. Kerala State Higher Education Council initiatives such as digital learning support and LMS-based training reflect the growing policy attention given to

technology-enabled teaching and learning in higher education (Kerala State Higher Education Council, n.d.). At the same time, the effectiveness of these changes depends largely on the preparedness of faculty members. Teachers with higher levels of capacity building and digital training participation are expected to show greater pedagogical innovation in their classroom practices.

Technology-enabled teacher professional development has also been found to support teachers' learning, collaboration and professional growth when it is designed as a continuous and reflective process (Huang, Liang, Xiong, Wu, & Lim, 2024). Similarly, digitally enhanced learning and teaching initiatives in higher education show that institutional strategy, self-assessment, teacher support and collaborative teaching practices are important for sustainable digital transformation (Gaebel et al., 2023). Educational technology can contribute to genuine pedagogical innovation when leadership, organisational trust and faculty support systems are aligned with teaching improvement (Laufer et al., 2025).

The present study therefore examines faculty capacity building and pedagogical innovation in digitally transformed higher education institutions in Kerala. It focuses on three major aspects: the relationship between faculty capacity building and pedagogical innovation, the predictive influence of faculty capacity building on pedagogical innovation, and the difference in pedagogical innovation based on the level of participation in digital training programmes. The study is useful because it highlights whether faculty development initiatives are associated with actual pedagogical improvement in the digitally changing higher education environment.

➤ *Research Questions*

- What is the relationship between faculty capacity building and pedagogical innovation in digitally transformed higher education institutions in Kerala?
- To what extent does faculty capacity building predict pedagogical innovation among teachers in digitally transformed higher education institutions in Kerala?
- Does pedagogical innovation differ among faculty members based on their level of participation in digital training programmes?

➤ *Research Objectives*

- To examine the relationship between faculty capacity building and pedagogical innovation in digitally transformed higher education institutions in Kerala.
- To determine the predictive influence of faculty capacity building on pedagogical innovation among teachers in digitally transformed higher education institutions in Kerala.
- To compare pedagogical innovation among faculty members based on their level of participation in digital training programmes.

➤ *Hypotheses*

- H1: There is a significant relationship between faculty capacity building and pedagogical innovation in digitally transformed higher education institutions in Kerala.

- H2: Faculty capacity building significantly predicts pedagogical innovation among teachers in digitally transformed higher education institutions in Kerala.
- H3: There is a significant difference in pedagogical innovation among faculty members based on their level of participation in digital training programmes.

II. METHODOLOGY

The present study adopted a descriptive survey method to examine faculty capacity building and pedagogical innovation in digitally transformed higher education institutions in Kerala. The study focused on the relationship between faculty capacity building and pedagogical innovation, the predictive influence of faculty capacity building on pedagogical innovation, and the difference in pedagogical innovation based on the level of participation in digital training programmes.

The population of the study consisted of faculty members working in digitally transformed higher education institutions in Kerala. The sample comprised 200 faculty members selected from different higher education institutions in the state. The respondents included faculty members from government, aided, self-financing, and autonomous institutions. The sample also represented different academic streams and levels of teaching experience. Stratified random sampling was adopted to ensure representation from different categories of institutions.

A structured questionnaire was used for data collection. The questionnaire consisted of two parts. The first part collected personal and institutional profile details such as gender, designation, teaching experience, subject stream, type of institution, nature of institution, area of institution, and participation in digital training programmes. The second part consisted of Likert-scale items measuring Faculty Capacity Building, Pedagogical Innovation, and Digital Training Participation. The responses were collected on a five-point scale ranging from Strongly Agree to Strongly Disagree. Higher scores indicated higher levels of faculty capacity building, pedagogical innovation, and digital training participation.

➤ Reliability And Validity of the Instrument

The questionnaire was subjected to content validation before final administration. The draft tool was reviewed by experts in education and educational technology to examine the relevance, clarity, coverage and suitability of the items for measuring Faculty Capacity Building, Pedagogical Innovation and Digital Training Participation. Based on the expert

feedback, unclear or overlapping items were revised. A pilot testing procedure was also used to check the clarity of the items and the suitability of the response format. Reliability was assessed using Cronbach's alpha. The alpha coefficients were as follows: Faculty Capacity Building ($\alpha = 0.847$), Pedagogical Innovation ($\alpha = 0.855$) and Digital Training Participation ($\alpha = 0.859$). Values of .70 and above are generally considered acceptable for internal consistency in survey research.

The data were collected from faculty members after explaining the purpose of the study. The responses were coded and entered for analysis. Total scores were computed separately for Faculty Capacity Building, Pedagogical Innovation, and Digital Training Participation. Based on the Digital Training Participation score, respondents were classified into low, moderate, and high participation groups.

➤ Ethical Considerations

The study followed basic ethical principles for survey-based educational research. The purpose of the study was explained to the respondents before data collection. Participation was voluntary, informed consent was obtained, and respondents were assured that their responses would be used only for academic research purposes. No personally identifiable information was reported in the study, and the data were analysed in aggregate form to maintain confidentiality and anonymity.

The data were analysed using EDUSTAT. Descriptive statistics such as mean and standard deviation were used to understand the general level of the major variables. Pearson product-moment correlation was used to examine the relationship between Faculty Capacity Building and Pedagogical Innovation. Simple linear regression was used to determine whether Faculty Capacity Building significantly predicted Pedagogical Innovation. One-way ANOVA was used to test whether Pedagogical Innovation differed significantly based on the level of Digital Training Participation. Since the ANOVA result was significant, Scheffé post hoc test was used to identify the specific differences among the low, moderate, and high participation groups.

III. DATA ANALYSIS AND INTERPRETATION

The data collected from 200 faculty members were analysed using descriptive statistics, Pearson correlation, simple linear regression, and one-way ANOVA. The analysis focused only on the variables required for testing the hypotheses of the study.

Table 1 Descriptive Statistics of the Major Variables

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Faculty Capacity Building	200	63.48	11.45	33	86
Pedagogical Innovation	200	79.30	12.57	42	100
Digital Training Participation	200	39.47	10.27	18	58

The descriptive statistics show that the mean score of Faculty Capacity Building is 63.48, with a standard deviation of 11.45. The mean score of Pedagogical Innovation is 79.30, with a standard deviation of 12.57. Digital Training Participation has a mean score of 39.47 and a standard deviation of 10.27. The results indicate that the respondents reported moderate to high levels of faculty capacity building, pedagogical innovation, and digital training participation.

➤ *Relationship Between Faculty Capacity Building and Pedagogical Innovation*

Table 2 Correlation between Faculty Capacity Building and Pedagogical Innovation

Variables	N	r	p-value	Result
Faculty Capacity Building and Pedagogical Innovation	200	0.791	< .001	Significant

The table shows a strong positive correlation between Faculty Capacity Building and Pedagogical Innovation, as the obtained correlation coefficient is 0.791. The p-value is less than .001, indicating that the relationship is statistically significant. Hence, the first hypothesis is supported. This shows that higher faculty capacity building is associated with higher pedagogical innovation among faculty members.

➤ *Prediction of Pedagogical Innovation by Faculty Capacity Building*

Table 3 Regression Analysis Showing the Prediction of Pedagogical Innovation by Faculty Capacity Building

Predictor	R	R Square	B	Beta	t	F	p-value
Faculty Capacity Building	0.791	0.626	0.869	0.791	18.21	331.66	< .001

The regression result shows that Faculty Capacity Building significantly predicts Pedagogical Innovation. The R Square value is 0.626, which indicates that Faculty Capacity Building explains 62.6 percent of the variance in Pedagogical Innovation. The regression coefficient is positive, showing that an increase in Faculty Capacity Building is associated with an increase in Pedagogical Innovation. Since the p-value is less than .001, the second hypothesis is supported. The constant value was 24.131.

The regression equation is: Pedagogical Innovation = 24.131 + 0.869 × Faculty Capacity Building.

➤ *Difference in Pedagogical Innovation Based on Digital Training Participation*

Table 4 One-way ANOVA for Pedagogical Innovation Based on Digital Training Participation Level

Digital Training Participation Level	N	Mean	Standard Deviation	F	p-value
Low	53	65.11	8.86	116.40	< .001
Moderate	100	81.56	8.94		
High	47	90.47	7.25		

The ANOVA result shows a significant difference in Pedagogical Innovation based on the level of Digital Training Participation, $F(2, 197) = 116.40$, $p < .001$. The mean score is highest for faculty members with high digital training participation, followed by moderate and low participation groups. Therefore, the third hypothesis is supported.

Since the ANOVA result is significant, Scheffé post hoc test was conducted.

Table 5 Scheffé Post Hoc Comparison of Pedagogical Innovation Scores

Comparison	Mean Difference	p-value	Result
Low and Moderate	16.45	< .001	Significant
Low and High	25.35	< .001	Significant
Moderate and High	8.91	< .001	Significant

The Scheffé post hoc test shows that all pairwise differences are statistically significant. Faculty members with high digital training participation have significantly higher Pedagogical Innovation than those with moderate and low participation. Similarly, faculty members with moderate participation have significantly higher Pedagogical Innovation than those with low participation.

IV. DISCUSSION OF THE RESULTS

The results of the study show that faculty capacity building is strongly and positively related to pedagogical innovation in digitally transformed higher education institutions in Kerala. This indicates that faculty members who have better opportunities for professional development, digital

skill enhancement, instructional training, and institutional support are more likely to adopt innovative teaching practices. In the context of digitally transformed higher education, capacity building does not merely improve technical competence; it also strengthens teachers' ability to redesign classroom practices, use digital resources effectively, encourage student participation, and apply learner-centred teaching strategies.

The regression result further confirms that faculty capacity building is a significant predictor of pedagogical innovation. The result indicates that improvement in faculty capacity building leads to a corresponding improvement in pedagogical innovation. This suggests that when teachers receive sufficient training, institutional encouragement, exposure to digital tools, and opportunities for professional growth, they become more capable of implementing innovative pedagogical methods. The finding is important because digital transformation in higher education becomes meaningful only when teachers are equipped to use technology in instruction, assessment, feedback, and student engagement.

The analysis also shows that pedagogical innovation differs significantly based on the level of participation in digital training programmes. Faculty members with high digital training participation reported the highest level of pedagogical innovation, followed by those with moderate participation, while those with low participation showed the lowest level of pedagogical innovation. The post hoc analysis confirms that the differences among low, moderate, and high digital training participation groups are statistically significant. This means that pedagogical innovation increases clearly as the level of digital training participation improves.

Overall, the findings point to the central role of faculty capacity building in promoting pedagogical innovation. In the higher education context of Kerala, digital transformation has created new possibilities for teaching and learning. However, these possibilities can be fully realised only when faculty members are systematically trained and supported. The results therefore indicate that higher education institutions should give greater importance to structured faculty development programmes, regular digital training, institutional mentoring, and practical support for technology-integrated teaching.

V. IMPLICATIONS OF THE STUDY

The findings of the study have important implications for higher education institutions in Kerala. The significant relationship between faculty capacity building and pedagogical innovation shows that institutional efforts to improve teachers' professional competence can directly support innovative teaching practices. Therefore, higher education institutions should treat faculty capacity building as a regular academic priority rather than as an occasional training activity. Continuous professional development programmes, digital pedagogy workshops, hands-on technology training, and mentoring systems can help faculty members use digital tools more effectively in classroom teaching.

The study also implies that digital transformation in higher education requires more than the availability of infrastructure. Smart classrooms, learning management systems, online platforms, and digital resources become effective only when faculty members are properly trained to use them for meaningful teaching and learning. Hence, institutions should focus not only on providing digital facilities but also on developing teachers' ability to integrate these facilities into lesson planning, student engagement, assessment, feedback, and collaborative learning.

The significant difference in pedagogical innovation based on digital training participation indicates that frequent and meaningful participation in training programmes improves teachers' innovative practices. This implies that colleges and universities should encourage all faculty members to participate regularly in digital training programmes. Institutions may also maintain records of faculty participation in professional development activities and provide academic incentives for active participation.

The findings are also useful for policy makers and higher education agencies in Kerala. Capacity-building initiatives at the state and institutional levels should be planned in a systematic manner so that faculty members across government, aided, self-financing, and autonomous institutions receive equal opportunities for professional development. Training programmes should be need-based, discipline-sensitive, and practice-oriented. This can help reduce differences in digital teaching competence among faculty members and promote more effective pedagogical innovation across higher education institutions.

VI. LIMITATIONS OF THE STUDY

The study has certain limitations. First, the findings are based on self-reported responses, and therefore may be influenced by respondents' perceptions and social desirability. Second, the sample was limited to faculty members from higher education institutions in Kerala, which may restrict the generalisability of the findings to other regions. Third, the study used a descriptive survey design and cross-sectional data, so causal conclusions cannot be firmly established. Fourth, the study focused only on selected variables related to faculty capacity building, pedagogical innovation and digital training participation; future studies may include qualitative interviews, classroom observation or longitudinal designs to gain deeper insight into how digital training influences actual teaching practice.

VII. CONCLUSION

The study concludes that faculty capacity building plays a significant role in promoting pedagogical innovation in digitally transformed higher education institutions in Kerala. The findings show that faculty members with better capacity-building experiences demonstrate higher levels of innovative teaching practices. Faculty Capacity Building was found to have a strong positive relationship with Pedagogical Innovation and also significantly predicted it. The study also

revealed that faculty members with higher participation in digital training programmes showed significantly greater pedagogical innovation than those with moderate and low participation. These results indicate that digital transformation in higher education becomes effective only when faculty members are adequately trained, professionally supported, and encouraged to use digital tools in meaningful pedagogical ways. Therefore, continuous faculty development, regular digital training, and institutional support are essential for strengthening innovative teaching practices in higher education.

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