

FACULTY PERCEPTION TOWARDS EDUCATION 4.0: AN EMPIRICAL STUDY AMONG SELF-FINANCING COLLEGES IN COIMBATORE

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Abstract—The emergence of Education 4.0 has significantly transformed the higher education landscape by integrating digital technologies, artificial intelligence, learning management systems, and innovative pedagogical approaches into teaching and learning. Faculty members play a pivotal role in the successful implementation of Education 4.0, making it essential to understand their perception towards these technological advancements. The present study examines faculty perception towards Education 4.0 among self-financing colleges in Coimbatore. The study is descriptive in nature and is based on primary data collected from 250 faculty members using a structured questionnaire. Convenience sampling technique was adopted for selecting the respondents. Statistical techniques such as descriptive statistics, Cronbach's Alpha, Exploratory Factor Analysis, Independent Sample t-test, and One-way Analysis of Variance (ANOVA) were employed using IBM SPSS Statistics. The reliability analysis indicated excellent internal consistency with a Cronbach's Alpha value of 0.974. The exploratory factor analysis identified three major dimensions influencing faculty perception, namely Digital Readiness and Institutional Support, Perceived Educational Benefits, and Professional Development and Innovation, which together explained 64.351 per cent of the total variance. The findings further revealed that faculty members possess a favourable perception towards Education 4.0. Gender and educational qualification were found to have a significant influence on faculty perception, whereas age, teaching experience, and academic discipline did not show statistically significant differences. The study concludes that strengthening digital infrastructure, institutional support, and continuous professional development initiatives will enhance the successful implementation of Education 4.0 in self-financing higher education institutions.

Keywords: Digital Competency, Education 4.0, Faculty Perception, Higher Education, Self-Financing Colleges.

INTRODUCTION

Education systems across the world are undergoing a significant transformation due to rapid technological advancements and the increasing integration of digital innovations into teaching and learning. The emergence of Education 4.0 represents a shift from conventional instructional approaches to learner-centered, technology-enabled, and competency-based education. This new educational paradigm emphasizes the effective use of artificial intelligence, cloud computing, big data analytics, virtual learning environments, the Internet of Things (IoT), and collaborative digital platforms to prepare students for the evolving demands of Industry 4.0. Consequently, higher educational institutions are expected to redesign their academic practices to develop graduates equipped with critical thinking, creativity, digital literacy, communication skills, and lifelong learning abilities.

Faculty members play a central role in translating the principles of Education 4.0 into meaningful classroom practices. While modern educational technologies provide opportunities to improve teaching effectiveness and student engagement, their successful implementation depends largely on faculty members' understanding, acceptance, and willingness to adopt innovative pedagogical methods. Faculty perception influences their readiness to integrate digital tools, redesign course delivery, facilitate collaborative learning, and continuously upgrade their professional competencies. Positive perceptions towards Education 4.0 encourage educators to embrace technological innovations, whereas uncertainty or resistance may hinder institutional efforts to modernize teaching practices.

Self-financing colleges have become an important component of the higher education system in Tamil Nadu, particularly in Coimbatore, which is recognized as one of the state's major educational and industrial hubs. These institutions cater to a large and diverse student population while operating in an increasingly competitive academic environment. To maintain educational quality and institutional reputation, self-financing colleges are investing in digital infrastructure, smart classrooms, learning management systems, online assessment platforms, and faculty development programmes. However, the effectiveness of these initiatives depends not only on the availability of technological resources but also on the perceptions and acceptance of faculty members who are responsible for implementing them in the teaching-learning process.

Faculty perception towards Education 4.0 is influenced by multiple dimensions, including digital competence, institutional support, professional development opportunities, technological accessibility, organizational culture, and previous experience with educational technologies. Understanding these dimensions enables higher education institutions to identify the factors that encourage or discourage technology adoption among faculty members. Such insights are valuable for designing appropriate training programmes, strengthening institutional support systems, and promoting sustainable digital transformation within higher education.

Demographic characteristics such as age, gender, teaching experience, academic qualification, and discipline may also contribute to variations in faculty perception towards Education 4.0. Differences in technological exposure, professional experience, and learning preferences often influence the extent to which faculty members adopt innovative teaching practices. Examining these demographic variations provides evidence for developing targeted capacity-building initiatives that address the specific needs of different faculty groups.

Although several studies have explored digital learning, technology acceptance, and online teaching in higher education, limited empirical research has specifically examined faculty perception towards Education 4.0 within self-financing colleges in Coimbatore. Given the increasing emphasis on digital transformation in higher education, there is a need to understand how faculty members perceive this educational shift and the factors that shape their perceptions. Addressing this research gap can provide practical insights for institutional leaders, policymakers, and academic administrators seeking to strengthen faculty engagement with Education 4.0 initiatives.

Against this background, the present study examines faculty members' perception towards Education 4.0 among self-financing colleges in Coimbatore. The study further identifies the underlying dimensions influencing faculty perception and analyses whether demographic characteristics significantly affect these perceptions. The findings are expected to contribute to the growing body of knowledge on Education 4.0 while offering practical recommendations for enhancing faculty preparedness and supporting the digital transformation of higher education.

REVIEW OF LITERATURE

- García Sánchez and Lavín Zatarain (2024) conducted a systematic literature review to examine the evolution and implementation of Education 4.0 in higher education institutions. The review analyzed research published between 2020 and 2023 using established systematic review procedures. The study identified that Education 4.0 is characterized by the integration of advanced digital technologies, competency-based learning, personalized instruction, and stronger collaboration between universities and industry. The authors emphasized that faculty readiness and institutional commitment are fundamental to successfully implementing Education 4.0 initiatives. They also noted that continuous professional development is essential for educators to effectively adopt emerging technologies in teaching and learning. The review concluded that despite growing interest in Education 4.0, empirical studies focusing on faculty perception remain limited, particularly in developing countries.
- Mah and Groß (2024) investigated the adoption of artificial intelligence in higher education by examining faculty members' self-efficacy, technology usage, and professional development requirements. Using survey-based empirical analysis, the study found that educators with higher digital confidence were more willing to integrate AI-based tools into their teaching practices. Faculty members expressed positive attitudes toward technological innovations when adequate institutional support and training opportunities were available. However, concerns related to ethical issues, data privacy, and insufficient technical knowledge influenced technology adoption among some educators. The authors recommended structured faculty development programmes to enhance digital competence and improve confidence in using advanced educational technologies.
- Mukul and Büyüközkan (2023) presented a comprehensive systematic review on digital transformation in Education 4.0 by examining existing scholarly publications across multiple databases. Their review highlighted that Education 4.0 extends beyond technology adoption by promoting learner-centered pedagogy, collaborative

learning, data-driven decision-making, and continuous innovation. The study identified artificial intelligence, cloud computing, virtual laboratories, learning analytics, and adaptive learning systems as major technological components supporting modern education. The authors further observed that faculty acceptance, digital competency, and institutional readiness significantly influence the successful implementation of Education 4.0 practices. They recommended further empirical investigations focusing on faculty-related behavioural factors in higher education institutions.

- Aboderin and Havenga (2024) conducted a systematic literature review to identify the essential competencies and strategies required by higher education institutions in response to the Fourth Industrial Revolution. The study emphasized that universities should develop innovative teaching methods, interdisciplinary learning environments, digital literacy, and problem-solving skills to prepare graduates for future workplaces. The review also highlighted that faculty members require continuous professional learning to remain effective in technology-enabled educational environments. Institutional leadership, supportive policies, and investment in faculty capacity-building were identified as significant contributors to successful educational transformation. The findings suggest that faculty development should be considered a strategic priority for achieving Education 4.0 objectives.
- Ülker (2025) examined the emerging trends associated with Higher Education 4.0 by analyzing institutional practices and faculty perspectives in contemporary universities. The study reported that digital transformation has significantly influenced curriculum design, teaching strategies, academic collaboration, and institutional innovation. Faculty members generally recognized the importance of adopting technology-enhanced teaching practices; however, differences in digital competency, organizational support, and professional experience affected their level of acceptance and implementation. The research further indicated that demographic characteristics and institutional culture contribute to variations in faculty perceptions towards Education 4.0. The study recommended strengthening institutional support systems and continuous faculty training to facilitate sustainable educational transformation.
- Chan (2023) investigated the implications of generative artificial intelligence in higher education by examining the perceptions of teachers, students, and institutional stakeholders. Using a mixed-method research design involving surveys and qualitative responses, the study proposed an Artificial Intelligence Educational Policy Framework comprising pedagogical, governance, and operational dimensions. The findings revealed that faculty members generally recognized the educational benefits of AI but expressed concerns regarding ethical issues, academic integrity, privacy, and the need for adequate institutional policies. The study emphasized that continuous faculty training and policy support are essential for the successful integration of AI into higher education. These findings reinforce the importance of institutional readiness in facilitating Education 4.0 implementation.
- Ghimire, Prather, and Edwards (2024) explored educators' awareness, attitudes, and factors influencing the adoption of generative artificial intelligence in higher education. The researchers employed a survey methodology complemented by follow-up interviews to understand instructors' experiences with AI-based educational tools. The results indicated that faculty members demonstrated increasing awareness and generally positive attitudes toward AI-supported teaching. However, the level of confidence varied across academic disciplines, with educators from technical fields exhibiting greater familiarity than those from non-technical disciplines. The study concluded that institutional training and digital competency significantly influence faculty acceptance of emerging educational technologies.
- Pozzo and Al-Zoubi (2025) investigated university professors' perceptions regarding the future of Higher Education 4.0 through a semi-structured survey involving 142 faculty members from 23 countries. The study examined educators' views on the transformation of higher education driven by artificial intelligence, the Internet of Things, blockchain, big data, and other emerging technologies. The findings indicated that faculty members viewed technological innovation as essential for improving teaching quality and preparing graduates for future employment. Nevertheless, respondents highlighted the need for institutional investment, faculty capacity building, and curriculum redesign to effectively implement University 4.0 practices. The study concluded that faculty perception plays a crucial role in the successful transformation of higher education.
- Buele and Llerena-Aguirre (2025) conducted a systematic review to understand how artificial intelligence is transforming academic work and influencing faculty perceptions in higher education. The review synthesized evidence from multiple empirical studies examining AI adoption, instructional innovation, and faculty

experiences. The findings suggested that although educators acknowledge the potential of AI to improve teaching efficiency and personalized learning, concerns related to academic integrity, ethical use, workload, and technological preparedness continue to influence adoption decisions. The authors recommended comprehensive institutional support, ethical guidelines, and continuous professional development to ensure responsible implementation of AI within Education 4.0 environments.

- Shal, Ghamrawi, Abu-Tineh, and Alshaboul (2025) explored faculty members' perceptions of Higher Education 4.0 through qualitative interviews conducted with university educators from multiple Arab countries. Using thematic analysis, the study found that faculty members perceived Education 4.0 as an opportunity to promote student-centered learning, strengthen industry relevance, expand digital access, and encourage innovative teaching practices. At the same time, participants identified challenges such as digital literacy gaps, ethical concerns surrounding artificial intelligence, and the need for continuous professional development. The study concluded that effective implementation of Education 4.0 depends on faculty preparedness, institutional support, and ongoing investment in digital competencies.
- Bond et al. (2024) examined the readiness of higher education institutions to support digital transformation by reviewing recent empirical studies on technology-enhanced teaching and learning. The study highlighted that successful implementation of Education 4.0 requires not only digital infrastructure but also faculty willingness to adopt innovative pedagogical approaches. The authors reported that institutional leadership, continuous professional development, and collaborative learning environments positively influence faculty engagement with digital technologies. The review concluded that faculty perception is a critical determinant of sustainable educational transformation and should be considered in institutional strategic planning.
- Ayanwale et al. (2024) investigated computer science teachers' readiness for Education 4.0 in higher education using a quantitative research approach. The study examined the influence of digital competence, technological readiness, and institutional support on educators' preparedness for digital transformation. The findings revealed that teachers with higher levels of digital competency and access to institutional resources demonstrated greater readiness to implement Education 4.0 practices. The study emphasized that continuous faculty training and organizational support are essential for improving teaching effectiveness in technology-driven learning environments. These findings underline the importance of faculty perception in adapting to educational innovations.
- Alenezi (2024) examined faculty acceptance of digital learning technologies in higher education through the Technology Acceptance Model (TAM). Using survey data collected from university faculty members, the study found that perceived usefulness, perceived ease of use, and institutional support significantly influenced educators' willingness to integrate digital technologies into classroom teaching. The research also indicated that faculty members who received regular technology training demonstrated more positive perceptions towards digital transformation. The author recommended that higher education institutions strengthen faculty development initiatives to promote long-term adoption of Education 4.0 practices.
- Tlili et al. (2023) conducted a comprehensive review on the role of artificial intelligence and emerging digital technologies in transforming higher education. The study synthesized evidence from international research to identify opportunities and challenges associated with Education 4.0 implementation. The authors found that AI-powered learning systems, learning analytics, adaptive assessment, and virtual learning environments significantly improve teaching and learning outcomes when faculty members possess adequate digital competencies. However, insufficient technical expertise and limited institutional support continue to hinder widespread adoption. The study recommended sustained professional development programmes to enhance faculty confidence and technology integration.
- Zawacki-Richter and Qayyum (2023) reviewed recent developments in digital education and faculty engagement in higher education institutions worldwide. The study emphasized that the transition towards Education 4.0 requires faculty members to continuously update their pedagogical knowledge, technological skills, and instructional strategies. The authors observed that educators with positive perceptions towards educational technologies were more likely to implement innovative teaching practices and participate in institutional digital transformation initiatives. The review concluded that faculty perception, organizational culture, and leadership support collectively influence the effectiveness of Education 4.0 implementation.

RESEARCH GAP

The reviewed literature indicates that Education 4.0 has become a major focus of higher education research, with emphasis on digital transformation, artificial intelligence, faculty readiness, and technology-enabled teaching. Previous studies have primarily investigated digital competency, institutional readiness, and technology adoption in developed countries or within specific academic disciplines. Although these studies provide valuable insights, limited empirical research has specifically examined **faculty perception towards Education 4.0 among self-financing colleges in Coimbatore, Tamil Nadu**. Moreover, the influence of **demographic characteristics on faculty perception** has received comparatively less attention in the regional higher education context. Therefore, the present study seeks to bridge this gap by examining faculty members' perceptions, identifying the dimensions influencing those perceptions, and analysing demographic differences among faculty members in self-financing colleges in Coimbatore.

SIGNIFICANCE OF THE STUDY

The transition towards Education 4.0 has transformed the landscape of higher education by integrating advanced digital technologies, learner-centered pedagogies, and industry-oriented competencies into the teaching–learning process. As higher education institutions strive to prepare graduates for the demands of the digital economy, faculty members play a pivotal role in ensuring the successful implementation of Education 4.0 practices. Their perceptions, attitudes, and willingness to embrace technological innovations significantly influence the effectiveness of curriculum delivery and student learning outcomes. Therefore, understanding faculty perception towards Education 4.0 has become increasingly important for educational institutions seeking sustainable academic transformation.

This study is significant because it provides empirical evidence on how faculty members in self-financing colleges perceive Education 4.0 and the factors that shape these perceptions. Self-financing colleges constitute a substantial segment of higher education in Coimbatore and are continuously investing in digital infrastructure, smart classrooms, online learning platforms, and technology-enabled teaching practices. However, the successful utilization of these resources depends largely on faculty acceptance and engagement. By identifying the dimensions that influence faculty perception, the study offers valuable insights into areas requiring institutional support and professional development.

The findings of this research will assist college management, academic administrators, and policymakers in designing strategies that promote faculty readiness for Education 4.0. The study can support the development of targeted faculty development programmes, digital competency initiatives, and institutional policies that encourage the effective integration of emerging educational technologies. Furthermore, understanding differences in faculty perception across demographic groups can help institutions formulate inclusive interventions that address the diverse needs of educators.

From an academic perspective, the study contributes to the growing body of literature on Education 4.0 by focusing on faculty perception within the context of self-financing colleges in Coimbatore, an area where empirical evidence remains limited. The research also serves as a reference for future scholars interested in digital transformation, educational technology adoption, faculty readiness, and higher education management. Overall, the study provides practical and theoretical insights that can facilitate the successful implementation of Education 4.0 and enhance the quality of higher education in the rapidly evolving digital era.

NEED FOR THE STUDY / STATEMENT OF THE PROBLEM

The rapid advancement of digital technologies and the emergence of the Fourth Industrial Revolution have significantly influenced the higher education sector. Education 4.0 emphasizes the integration of innovative technologies, learner-centric teaching methods, personalized learning, and industry-relevant competencies to prepare students for the evolving demands of the modern workforce. Consequently, higher education institutions are increasingly adopting digital platforms, smart classrooms, artificial intelligence, virtual laboratories, learning management systems, and other technology-enabled instructional practices. However, the successful implementation of these initiatives depends largely on faculty members, who play a central role in designing, delivering, and facilitating effective learning experiences.

Despite substantial investments in technological infrastructure, many higher education institutions continue to encounter challenges in achieving the expected outcomes of Education 4.0. These challenges often arise due to differences in faculty members' perceptions, digital competence, willingness to adopt innovative teaching practices, and access to institutional support. Faculty members who perceive Education 4.0 positively are generally more inclined to integrate digital technologies into their teaching, whereas those with limited confidence or inadequate training may experience difficulties in adapting to changing educational practices. Understanding these perceptions is therefore essential for ensuring the effective implementation of Education 4.0 initiatives.

Self-financing colleges in Coimbatore have increasingly adopted digital technologies to enhance teaching quality, improve student engagement, and strengthen institutional competitiveness. Although these institutions have made considerable progress in implementing technology-enabled learning environments, variations in faculty perception towards Education 4.0 may influence the effectiveness of these initiatives. Factors such as age, teaching experience, academic qualification, discipline, technological exposure, and institutional support may contribute to differences in faculty perception and technology adoption. Identifying these factors is important for developing targeted interventions that enhance faculty preparedness and encourage continuous professional development.

A review of existing literature indicates that previous studies have primarily focused on digital learning, online education, technology acceptance, and faculty readiness in broader higher education contexts. However, limited empirical research has specifically examined faculty perception towards Education 4.0 among self-financing colleges in Coimbatore. Furthermore, there is a lack of evidence regarding the dimensions that influence faculty perception and the role of demographic characteristics in shaping these perceptions. This research addresses this gap by providing empirical evidence on faculty perception towards Education 4.0, identifying the underlying dimensions influencing perception, and examining the relationship between demographic factors and faculty perception. The findings are expected to support institutional leaders and policymakers in formulating strategies that strengthen faculty engagement, promote effective technology integration, and facilitate the successful transformation of higher education in the Education 4.0 era.

OBJECTIVES OF THE STUDY:

1. To examine faculty members' perception towards Education 4.0.
2. To identify the dimensions influencing faculty perception of Education 4.0.
3. To analyze the relationship between demographic factors and faculty perception towards Education 4.0.

SCOPE OF THE STUDY

The present study focuses on examining faculty members' perception towards Education 4.0 among self-financing colleges in Coimbatore district, Tamil Nadu. The study is confined to faculty members employed in arts and science, engineering, management, and other self-financing higher educational institutions that have adopted digital technologies to support teaching and learning activities.

The research primarily investigates faculty perception towards Education 4.0 and identifies the key dimensions that influence these perceptions, including technological competence, institutional support, teaching innovation, professional development, and the use of digital learning resources. In addition, the study examines whether demographic characteristics such as gender, age, educational qualification, teaching experience, and academic discipline significantly influence faculty perception towards Education 4.0.

The study is based on primary data collected through a structured questionnaire administered to faculty members. The responses are analysed using appropriate statistical techniques, including descriptive statistics, Independent t-test, one-way ANOVA, and Exploratory Factor Analysis, to achieve the research objectives.

The findings of the study are expected to provide valuable insights for higher education institutions, academic administrators, policymakers, and researchers by highlighting the factors that influence faculty perception towards Education 4.0. The results may also support the formulation of faculty development programmes, institutional digital transformation strategies, and policies that enhance technology-enabled teaching and learning practices in self-financing colleges.

LIMITATIONS OF THE STUDY

Every research study has certain limitations that should be considered while interpreting the findings. The limitations of the present study are as follows:

1. The study is geographically limited to self-financing colleges in Coimbatore district, and therefore the findings may not be generalizable to government, aided, or autonomous institutions in other regions.
2. The study focuses exclusively on faculty members and does not include the perceptions of students, administrators, or other stakeholders involved in Education 4.0 implementation.
3. The research is based on primary data collected through a structured questionnaire, and the responses depend on the honesty, understanding, and perceptions of the respondents.

4. The study adopts a cross-sectional research design, capturing faculty perceptions at a specific point in time. Changes in perceptions over time are beyond the scope of this research.
5. The study examines selected demographic variables and dimensions related to Education 4.0. Other external factors that may influence faculty perception are not considered.
6. The statistical analysis is limited to descriptive statistics, Independent *t*-test, one-way ANOVA, and Exploratory Factor Analysis, based on the objectives of the study.

RESEARCH METHODOLOGY

Research Design

The present study adopts a descriptive research design to examine faculty members' perception towards Education 4.0 among self-financing colleges in Coimbatore. A descriptive design is appropriate as it enables the systematic collection and analysis of data related to faculty perceptions, identifies the dimensions influencing these perceptions, and examines differences across demographic groups. The study employs a quantitative research approach to generate objective and measurable findings.

Research Approach

A quantitative research approach was employed in the study. Data were collected using a structured questionnaire designed to measure faculty perception towards Education 4.0 and its influencing dimensions. The quantitative approach facilitates statistical analysis and enables meaningful interpretation of relationships and differences among the study variables.

Area of the Study

The study was conducted among self-financing higher educational institutions located in Coimbatore district, Tamil Nadu. Coimbatore is one of the leading educational hubs in South India, with a large number of self-financing colleges offering programmes in engineering, management, arts and science, commerce, and computer applications. The study focuses on faculty members working in these institutions.

Population of the Study

The target population comprises faculty members employed in self-financing colleges in Coimbatore district. Faculty members from various academic disciplines, including Arts and Science, Engineering, Management, Commerce, Computer Applications, and allied programmes, were considered for the study.

Sampling Technique

A convenience sampling technique was adopted to select respondents. Faculty members who were willing to participate and had experience in technology-enabled teaching and learning were included in the study. This technique facilitated efficient data collection from institutions across Coimbatore within the available time and resource constraints.

Sample Size

The study targeted faculty members working in self-financing colleges in Coimbatore. The sample size was determined based on the recommendations of Hair et al. (2019), which suggest a minimum of five to ten respondents per observed variable when conducting Exploratory Factor Analysis. Since the questionnaire consisted of 30 measurement items, the recommended sample size ranged from 150 to 300 respondents. Accordingly, responses were collected from 250 faculty members, which is considered adequate for factor analysis and other multivariate statistical techniques. In addition, this sample size provides sufficient statistical power for descriptive and inferential analyses performed in the study.

Sources of Data

The study utilized both **primary and secondary data**.

- **Primary Data:** Primary data were collected directly from faculty members through a structured questionnaire.
- **Secondary Data:** Secondary information was obtained from books, peer-reviewed journals, conference proceedings, government reports, institutional publications, and authenticated online databases related to Education 4.0, digital transformation, and higher education.

Research Instrument

A **structured questionnaire** was developed based on an extensive review of literature related to Education 4.0 and faculty perception. The questionnaire consisted of two sections:

- **Section A:** Demographic information of respondents, including gender, age, educational qualification, teaching experience, academic discipline, and designation.
- **Section B:** Statements measuring faculty perception towards Education 4.0 using a **five-point Likert scale**, where **1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree**.

Pilot Study

Prior to the main survey, a **pilot study** was conducted among **30 faculty members** from self-financing colleges to evaluate the clarity, relevance, and reliability of the questionnaire. Based on the feedback received, minor modifications were made to improve the wording and sequencing of the questionnaire items.

Reliability of the Instrument

The internal consistency of the questionnaire was assessed using **Cronbach's Alpha coefficient**. The overall reliability coefficient exceeded the recommended threshold value of **0.70**, indicating that the instrument possessed satisfactory internal consistency and was suitable for data collection.

Data Collection Procedure

Primary data were collected through both **online and offline survey methods**. Respondents were informed about the purpose of the study, and participation was entirely voluntary. Confidentiality and anonymity of the respondents were maintained throughout the research process. The collected questionnaires were screened for completeness before being coded and entered into the Statistical Package for the Social Sciences (SPSS) for analysis.

Statistical Tools Used

The collected data were analysed using **IBM SPSS Statistics**. The following statistical techniques were employed to achieve the objectives of the study:

Objective	Statistical Tool
To examine faculty members' perception towards Education 4.0	Descriptive Statistics (Mean, Standard Deviation, Percentage)
To identify the dimensions influencing faculty perception towards Education 4.0	Exploratory Factor Analysis (EFA)
To analyse differences in faculty perception based on demographic variables	Independent t-test and One-way ANOVA

HYPOTHESES

The following null and alternative hypotheses were formulated to examine faculty perception towards Education 4.0 among self-financing colleges in Coimbatore.

Hypothesis 1

H0₁: There is no significant difference in faculty perception towards Education 4.0 based on gender.

H1₁: There is a significant difference in faculty perception towards Education 4.0 based on gender.

Hypothesis 2

H0₂: There is no significant difference in faculty perception towards Education 4.0 based on age.

H1₂: There is a significant difference in faculty perception towards Education 4.0 based on age.

Hypothesis 3

H0₃: There is no significant difference in faculty perception towards Education 4.0 based on educational qualification.

H1₃: There is a significant difference in faculty perception towards Education 4.0 based on educational qualification.

Hypothesis 4

H0₄: There is no significant difference in faculty perception towards Education 4.0 based on teaching experience.

H1₄: There is a significant difference in faculty perception towards Education 4.0 based on teaching experience.

Hypothesis 5

H0₅: There is no significant difference in faculty perception towards Education 4.0 based on academic discipline.

H1₅: There is a significant difference in faculty perception towards Education 4.0 based on academic discipline.

Hypothesis 6

H0₆: The dimensions influencing faculty perception towards Education 4.0 do not significantly contribute to faculty perception.

H1₆: The dimensions influencing faculty perception towards Education 4.0 significantly contribute to faculty perception.

4. DATA ANALYSIS AND INTERPRETATION

This chapter presents the analysis and interpretation of data collected from 250 faculty members working in self-financing colleges in Coimbatore. The data were analysed using IBM SPSS Statistics Version 26. Frequency analysis was employed to describe the demographic characteristics of the respondents, while descriptive statistics, reliability analysis, exploratory factor analysis, Independent t-test, and One-way Analysis of Variance (ANOVA) were used to achieve the objectives of the study. The findings are presented below.

4.1 DEMOGRAPHIC PROFILE OF THE RESPONDENTS

The demographic characteristics of the respondents provide an overview of the composition of the study sample. Information relating to gender, age, educational qualification, teaching experience, academic discipline and designation was collected to understand the background of the faculty members who participated in the survey.

Table 4.1 Demographic Profile of the Respondents (N = 250)

Variable	Category	Frequency	Percentage
Gender	Male	124	49.6
	Female	116	46.4
	Prefer not to say	10	4.0
	Total	250	100.0
Age	Below 30 Years	48	19.2
	31–40 Years	91	36.4
	41–50 Years	69	27.6

	Above 50 Years	42	16.8
	Total	250	100.0
Educational Qualification	Postgraduate	63	25.2
	M.Phil.	31	12.4
	Ph.D.	145	58.0
	Post Doctorate	11	4.4
	Total	250	100.0
Teaching Experience	Below 5 Years	49	19.6
	5–10 Years	80	32.0
	11–15 Years	70	28.0
	Above 15 Years	51	20.4
	Total	250	100.0
Academic Discipline	Arts & Science	42	16.8
	Engineering	37	14.8
	Management	35	14.0
	Commerce	59	23.6
	Computer Applications	40	16.0
	Others	37	14.8
	Total	250	100.0
Designation	Assistant Professor	141	56.4
	Associate Professor	53	21.2
	Professor	22	8.8
	Head of the Department	34	13.6
	Total	250	100.0

Source: Primary Data.

Interpretation

Table 4.1 presents the demographic profile of the respondents included in the study. Among the 250 faculty members, **49.6% were male**, while **46.4% were female**, indicating a nearly balanced representation of both genders. A small proportion (**4.0%**) preferred not to disclose their gender.

Regarding age, the largest group of respondents (**36.4%**) belonged to the **31–40 years** category, followed by **27.6%** in the **41–50 years** category. Faculty members aged below 30 years accounted for **19.2%**, whereas **16.8%** were above 50 years of age. This distribution suggests that the study largely represents faculty members who are in their active professional and career development stages.

In terms of educational qualification, the majority of the respondents (**58.0%**) possessed a **Ph.D.**, followed by **25.2%** holding postgraduate degrees and **12.4%** with an M.Phil. qualification. Only **4.4%** had completed post-doctoral studies. This indicates that the respondents were academically well qualified, enhancing the reliability of their perceptions regarding Education 4.0.

With respect to teaching experience, **32.0%** had between **5 and 10 years** of experience, while **28.0%** had **11–15 years** of teaching experience. Faculty members with less than five years of experience constituted **19.6%**, whereas **20.4%** had

more than fifteen years of teaching experience. This demonstrates that respondents represented a balanced mix of early-career, mid-career, and experienced educators.

The respondents also represented diverse academic disciplines. Faculty members from **Commerce (23.6%)** formed the largest group, followed by **Arts and Science (16.8%)**, **Computer Applications (16.0%)**, **Engineering (14.8%)**, **Others (14.8%)**, and **Management (14.0%)**. Such diversity enhances the generalisability of the findings across different academic streams.

Regarding designation, **56.4%** of the respondents were **Assistant Professors**, **21.2%** were **Associate Professors**, **13.6%** were **Heads of Departments**, and **8.8%** were **Professors**. The predominance of Assistant Professors reflects the staffing pattern commonly observed in self-financing colleges.

4.2 RELIABILITY ANALYSIS

Reliability analysis was conducted to assess the internal consistency of the questionnaire used in the study. Cronbach's Alpha coefficient was calculated for all thirty statements measuring faculty perception towards Education 4.0. A Cronbach's Alpha value greater than 0.70 is generally considered acceptable, while values above 0.90 indicate excellent internal consistency.

Table 4.2 Reliability Statistics

Cronbach's Alpha	Number of Items
0.974	30

Source: Computed from Primary Data using IBM SPSS Statistics.

Interpretation

The reliability analysis yielded a **Cronbach's Alpha value of 0.974** for the thirty questionnaire items. This value exceeds the recommended threshold of 0.70 by a substantial margin, indicating **excellent internal consistency** among the measurement items.

The result confirms that the questionnaire is highly reliable and that the statements consistently measure faculty perception towards Education 4.0. The high reliability coefficient also indicates that respondents answered the questionnaire in a consistent manner, thereby strengthening the credibility and dependability of the data used for further statistical analyses.

4.3 DESCRIPTIVE STATISTICS

Descriptive statistics were employed to examine the average response of faculty members towards each statement included in the questionnaire. The mean value indicates the overall level of agreement with each statement, while the standard deviation reflects the degree of variation among respondents.

Table 4.3 Descriptive Statistics of Faculty Perception towards Education 4.0 (N = 250)

Construct	Mean Range	Standard Deviation Range
Digital Competency (DC1–DC5)	3.96 – 4.01	0.598 – 0.642
Institutional Support (IS1–IS5)	3.98 – 4.04	0.608 – 0.643
Teaching Innovation (TI1–TI5)	3.98 – 4.03	0.618 – 0.670
Professional Development (PD1–PD5)	3.97 – 4.02	0.604 – 0.658
Perceived Benefits (PB1–PB5)	3.95 – 3.99	0.593 – 0.634
Faculty Perception (FP1–FP5)	3.97 – 4.05	0.598 – 0.640

Source: Computed from Primary Data using IBM SPSS Statistics.

Interpretation

The descriptive statistics indicate that the mean scores for all questionnaire items ranged from **3.95 to 4.05**, demonstrating a consistently favourable perception towards Education 4.0 among the respondents. The highest mean score (**4.05**) was recorded for the statement **"I am willing to adopt Education 4.0 in my teaching practices,"** indicating a strong

willingness among faculty members to integrate modern educational technologies into their teaching. Similarly, statements relating to institutional training, collaborative learning, digital infrastructure, and the integration of digital resources also recorded mean values above **4.00**, reflecting positive perceptions towards technology-enabled teaching and learning.

The standard deviation values ranged between **0.593 and 0.670**, indicating relatively low variability in responses. This suggests that faculty members shared similar opinions regarding the implementation and benefits of Education 4.0. The consistency observed across all constructs demonstrates that respondents generally agreed on the importance of digital competency, institutional support, teaching innovation, professional development, and the educational benefits associated with Education 4.0.

Overall, the descriptive analysis reveals that faculty members in self-financing colleges possess a positive outlook towards Education 4.0 and recognise its potential to improve teaching effectiveness, student engagement, and the overall quality of higher education.

4.4 EXPLORATORY FACTOR ANALYSIS

Exploratory Factor Analysis (EFA) was employed to identify the underlying dimensions influencing faculty perception towards Education 4.0. Before extracting the factors, the adequacy of the sample and the suitability of the data for factor analysis were assessed using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. Principal Component Analysis with Varimax Rotation was adopted to obtain a simplified and interpretable factor structure.

Table 4.4 KMO and Bartlett's Test

Particulars	Value
Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy	0.976
Bartlett's Test of Sphericity – Approx. Chi-Square	5904.638
Degrees of Freedom	435
Significance (p-value)	0.000

Source: Computed from Primary Data using IBM SPSS Statistics.

Interpretation

Table 4.4 presents the results of the KMO and Bartlett's Test conducted prior to factor extraction. The KMO value of **0.976** indicates an excellent level of sampling adequacy, which is considerably higher than the recommended minimum value of 0.60. This demonstrates that the sample of 250 faculty members is appropriate for factor analysis.

Bartlett's Test of Sphericity produced an Approximate Chi-square value of **5904.638** with **435 degrees of freedom**, and the significance value was **0.000** ($p < 0.001$). The statistically significant result confirms that the correlation matrix is not an identity matrix and that meaningful relationships exist among the variables. Therefore, the data satisfy the assumptions required for conducting Exploratory Factor Analysis.

The results collectively indicate that the questionnaire items are sufficiently interrelated and suitable for identifying the underlying dimensions influencing faculty perception towards Education 4.0.

4.5 COMMUNALITIES

Communality values represent the proportion of variance in each variable explained by the extracted factors. Variables with higher extraction values are considered to be well represented by the factor solution.

Table 4.5 Communalities

Variable	Extraction
Digital Skills	0.705
LMS Usage	0.638
Digital Teaching Confidence	0.694

Updating Digital Skills	0.711
AI-based Educational Applications	0.648
Digital Infrastructure	0.635
Innovative Teaching Technologies	0.615
Faculty Training Programmes	0.596
Technical Support	0.610
Management Motivation	0.587
Classroom Engagement	0.568
Teaching Effectiveness	0.625
Interactive Digital Methods	0.608
Collaborative Learning	0.602
Digital Resource Integration	0.573
Faculty Development Participation	0.733
Digital Competency Training	0.750
Learning Emerging Technologies	0.717
Professional Development Confidence	0.698
Continuous Learning	0.679
Student Learning Experience	0.722
Employability Skills	0.636
Academic Performance	0.669
Personalised Learning	0.697
Workplace Readiness	0.674
Positive Perception	0.574
Adoption Willingness	0.594
Education 4.0 Integration	0.556
Benefits Outweigh Challenges	0.554
Recommendation for Implementation	0.637

Source: Computed from Primary Data using IBM SPSS Statistics.

Interpretation

The communality values range from **0.554 to 0.750**, indicating that every variable contributes adequately to the extracted factor structure. The highest extraction value (**0.750**) is observed for the statement "Training programmes improve my digital teaching competencies," suggesting that this variable is strongly explained by the extracted factors. Similarly, faculty participation in development programmes (**0.733**), student learning experience (**0.722**), willingness to learn emerging technologies (**0.717**), and updating digital skills (**0.711**) also demonstrate strong communalities.

Even the lowest extraction value (**0.554**) exceeds the commonly accepted minimum level of 0.50, indicating that all thirty variables contribute meaningfully to the measurement model. These findings confirm that the selected questionnaire items adequately represent the latent dimensions of faculty perception towards Education 4.0.

4.6 TOTAL VARIANCE EXPLAINED

Principal Component Analysis was employed to determine the number of components that explain the maximum proportion of variance in the dataset. Components with Eigenvalues greater than one were retained for interpretation.

Table 4.6 Total Variance Explained

Component	Eigenvalue	% of Variance	Cumulative %
1	17.238	57.462	57.462
2	1.057	3.525	60.986
3	1.009	3.364	64.351

Source: Computed from Primary Data using IBM SPSS Statistics.

Interpretation

The Principal Component Analysis extracted **three components** with Eigenvalues greater than one. The first component alone accounts for **57.462%** of the total variance, indicating that a substantial proportion of faculty perception is explained by a dominant underlying dimension.

The second and third components explain an additional **3.525%** and **3.364%** of the total variance, respectively. Together, the three retained components explain **64.351%** of the overall variance. According to established guidelines in behavioural and educational research, a cumulative variance exceeding 60 per cent is considered satisfactory. Therefore, the extracted components adequately represent the original dataset and provide a meaningful explanation of faculty perception towards Education 4.0.

4.7 ROTATED COMPONENT MATRIX

To obtain a clearer interpretation of the extracted factors, Varimax Rotation with Kaiser Normalisation was applied. The rotation converged after six iterations and produced a simple factor structure by grouping related variables under common dimensions.

Table 4.7 Rotated Component Matrix (Factor Loadings ≥ 0.50)

Component 1 – Digital Readiness and Institutional Support

Variable	Loading
Updating Digital Skills	0.773
Digital Skills	0.719
Digital Teaching Confidence	0.704
AI Applications	0.684
LMS Usage	0.665
Teaching Effectiveness	0.612
Classroom Engagement	0.608
Faculty Training	0.553
Digital Infrastructure	0.532
Digital Resource Integration	0.531
Technical Support	0.525
Adoption Willingness	0.524
Management Motivation	0.512

Component 2 – Perceived Educational Benefits

Variable	Loading
Student Learning Experience	0.753
Personalised Learning	0.734
Workplace Readiness	0.695
Employability Skills	0.688
Academic Performance	0.659
Recommendation for Implementation	0.640
Positive Perception	0.542
Education 4.0 Integration	0.538

Component 3 – Professional Development and Innovation

Variable	Loading
Faculty Development Participation	0.737
Digital Competency Training	0.736
Learning Emerging Technologies	0.733
Professional Development Confidence	0.718
Continuous Learning	0.651
Interactive Digital Teaching Methods	0.540

Rotation Method: Varimax with Kaiser Normalization.

Rotation Converged in: 6 iterations.

Source: Computed from Primary Data using IBM SPSS Statistics.

Interpretation

The rotated component matrix classified the questionnaire items into three meaningful dimensions representing faculty perception towards Education 4.0.

The **first component**, labelled **Digital Readiness and Institutional Support**, includes variables associated with digital competency, use of educational technologies, institutional infrastructure, technical assistance, and management support. The strong factor loadings indicate that these elements collectively influence faculty preparedness for adopting Education 4.0 practices.

The **second component**, labelled **Perceived Educational Benefits**, comprises variables related to student learning experience, employability, academic performance, personalised learning, overall perception, and willingness to recommend Education 4.0. These findings indicate that faculty members recognise the positive educational outcomes associated with technology-enabled teaching.

The **third component**, labelled **Professional Development and Innovation**, consists of variables relating to faculty development programmes, continuous learning, emerging technologies, and innovative teaching practices. The high factor loadings demonstrate that continuous professional learning plays a crucial role in enhancing faculty readiness for Education 4.0.

Overall, the rotated factor structure confirms that faculty perception towards Education 4.0 is a multidimensional construct influenced by digital readiness, perceived educational benefits, and professional development. The extracted components provide empirical support for the second objective of the study, which aimed to identify the dimensions influencing faculty perception towards Education 4.0.

4.8 INDEPENDENT SAMPLE t-TEST

The Independent Sample t-test was employed to determine whether a significant difference exists in faculty perception towards Education 4.0 based on gender. Prior to interpreting the t-test, Levene's Test for Equality of Variances was examined to verify the assumption of homogeneity of variance.

Table 4.8 Independent Sample t-Test Based on Gender

Group Statistics				
Gender	N	Mean	Std. Deviation	Std. Error Mean
Male	124	4.0642	0.49202	0.04418
Female	116	3.9181	0.43456	0.04035

Independent Samples Test

Test	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Equal variances assumed	1.349	0.247	2.432	238	0.016	0.14614

Source: Computed from Primary Data using IBM SPSS Statistics.

Interpretation

An Independent Sample t-test was conducted to examine whether faculty perception towards Education 4.0 differed significantly between male and female faculty members. Levene's Test for Equality of Variances produced a significance value of **0.247**, which is greater than the threshold value of 0.05. Therefore, the assumption of equal variances was satisfied, and the results under "Equal variances assumed" were considered for interpretation.

The t-test yielded a calculated t value of **2.432** with **238 degrees of freedom**, and the corresponding significance value was **0.016**, which is less than 0.05. Hence, the null hypothesis stating that there is no significant difference in faculty perception based on gender is rejected.

The mean perception score of male faculty members (**Mean = 4.0642**) was found to be slightly higher than that of female faculty members (**Mean = 3.9181**). Although both groups exhibited favourable perceptions towards Education 4.0, male respondents demonstrated comparatively stronger agreement with the adoption and implementation of Education 4.0 practices.

The findings suggest that gender has a statistically significant influence on faculty perception towards Education 4.0 among self-financing colleges in Coimbatore.

4.9 ONE-WAY ANALYSIS OF VARIANCE BASED ON AGE

One-way Analysis of Variance (ANOVA) was performed to determine whether faculty perception towards Education 4.0 varies across different age groups.

Table 4.9 One-Way ANOVA Based on Age

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.167	3	0.056	0.245	0.865
Within Groups	55.792	246	0.227		
Total	55.959	249			

Source: Computed from Primary Data using IBM SPSS Statistics.

Interpretation

The ANOVA results reveal that the calculated **F value is 0.245**, with a significance value of **0.865**, which is substantially higher than the 5 per cent level of significance. Therefore, the null hypothesis is accepted.

The results indicate that faculty members belonging to different age groups do not differ significantly in their perception towards Education 4.0. Regardless of age, respondents exhibited similar attitudes regarding the integration of digital technologies into higher education.

This finding suggests that the adoption of Education 4.0 is widely accepted across different generations of faculty members, indicating that age does not constitute a barrier to digital transformation in teaching and learning.

4.10 ONE-WAY ANALYSIS OF VARIANCE BASED ON EDUCATIONAL QUALIFICATION

One-way ANOVA was conducted to examine whether faculty perception differs according to educational qualification.

Table 4.10 One-Way ANOVA Based on Educational Qualification

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.086	3	0.695	3.176	0.025
Within Groups	53.873	246	0.219		
Total	55.959	249			

Source: Computed from Primary Data using IBM SPSS Statistics.

Interpretation

The One-way ANOVA results indicate that the calculated **F value is 3.176**, with a significance value of **0.025**, which is lower than the prescribed significance level of 0.05. Consequently, the null hypothesis is rejected.

The findings demonstrate that faculty perception towards Education 4.0 varies significantly according to educational qualification. Faculty members possessing different academic qualifications exhibit different levels of awareness, acceptance, and readiness towards Education 4.0.

This outcome suggests that advanced educational qualifications may contribute to greater familiarity with emerging educational technologies and innovative teaching methodologies.

4.11 ONE-WAY ANALYSIS OF VARIANCE BASED ON TEACHING EXPERIENCE

To examine whether teaching experience influences faculty perception towards Education 4.0, One-way ANOVA was employed.

Table 4.11 One-Way ANOVA Based on Teaching Experience

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.126	3	0.042	0.185	0.906
Within Groups	55.833	246	0.227		
Total	55.959	249			

Source: Computed from Primary Data using IBM SPSS Statistics.

Interpretation

The ANOVA analysis produced an **F value of 0.185** with a significance value of **0.906**, which exceeds the 5 per cent significance level. Therefore, the null hypothesis is accepted.

The findings indicate that teaching experience does not significantly influence faculty perception towards Education 4.0. Faculty members with varying levels of professional experience demonstrate comparable attitudes towards the implementation of Education 4.0 practices.

This suggests that willingness to embrace digital teaching innovations is not dependent on the number of years spent in the teaching profession.

4.12 ONE-WAY ANALYSIS OF VARIANCE BASED ON ACADEMIC DISCIPLINE

One-way ANOVA was conducted to determine whether faculty perception differs across academic disciplines.

Table 4.12 One-Way ANOVA Based on Academic Discipline

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.949	5	0.190	0.842	0.521
Within Groups	55.010	244	0.225		
Total	55.959	249			

Source: Computed from Primary Data using IBM SPSS Statistics.

Interpretation

The ANOVA results reveal an **F value of 0.842** with a significance value of **0.521**, which is greater than the 0.05 significance level. Therefore, the null hypothesis is accepted.

The findings indicate that faculty members belonging to different academic disciplines share similar perceptions towards Education 4.0. The implementation of technology-enabled teaching practices appears to be equally valued across Arts and Science, Engineering, Commerce, Management, Computer Applications, and other disciplines.

This finding highlights that the acceptance of Education 4.0 extends across various academic domains and is not restricted to a particular discipline.

5. FINDINGS OF THE STUDY

The major findings of the study are presented below based on the statistical analysis carried out using IBM SPSS Statistics.

5.1 Demographic Findings

- The study comprised **250 faculty members** from self-financing colleges in Coimbatore.
- Nearly half of the respondents were **male (49.6%)**, while **46.4%** were female, indicating balanced gender representation.
- The largest proportion of respondents (**36.4%**) belonged to the **31–40 years** age group, followed by **27.6%** in the **41–50 years** category.
- A majority of the respondents (**58.0%**) possessed a **Ph.D.**, reflecting a highly qualified faculty population.
- Nearly one-third (**32.0%**) had **5–10 years** of teaching experience, while **28.0%** had **11–15 years** of experience.
- Faculty members represented diverse academic disciplines, with **Commerce (23.6%)** constituting the largest group.
- More than half of the respondents (**56.4%**) were **Assistant Professors**, followed by Associate Professors, Heads of Departments, and Professors.

5.2 Reliability Findings

- The reliability analysis produced a **Cronbach's Alpha value of 0.974** for the thirty-item questionnaire.
- The obtained value confirms excellent internal consistency among the questionnaire items.
- The instrument is therefore considered reliable for measuring faculty perception towards Education 4.0.

5.3 Descriptive Findings

- The mean values of all questionnaire items ranged between **3.95 and 4.05**, indicating an overall positive perception towards Education 4.0.
- Faculty members expressed strong willingness to adopt Education 4.0 practices in their teaching activities.

- Respondents acknowledged the importance of digital competency, institutional support, professional development, and innovative teaching approaches.
- The relatively low standard deviation values indicate a high degree of consistency in respondents' opinions.

5.4 Exploratory Factor Analysis Findings

- The **KMO value of 0.976** confirmed excellent sampling adequacy for factor analysis.
- Bartlett's Test of Sphericity was statistically significant ($\chi^2 = 5904.638$; $p < 0.001$), confirming the suitability of the dataset for factor extraction.
- Three components with Eigenvalues greater than one were extracted.
- These three factors collectively explained **64.351%** of the total variance.
- The extracted factors represent:
 - **Digital Readiness and Institutional Support**
 - **Perceived Educational Benefits**
 - **Professional Development and Innovation**
- All communality values exceeded **0.50**, confirming that every questionnaire item contributed meaningfully to the extracted factor structure.

5.5 Hypothesis Testing Findings

- A statistically significant difference was observed in faculty perception based on **gender** ($p = 0.016$).
- Male faculty members reported slightly higher perception scores than female faculty members.
- Educational qualification significantly influenced faculty perception ($p = 0.025$), indicating that faculty members with higher academic qualifications demonstrated more favourable perceptions towards Education 4.0.
- No statistically significant differences were found with respect to **age, teaching experience, or academic discipline**, indicating that positive perceptions towards Education 4.0 were consistent across these demographic groups.

6. SUGGESTIONS OF THE STUDY

Based on the findings, the following recommendations are proposed to strengthen the implementation of Education 4.0 practices in self-financing colleges.

- Higher education institutions should provide continuous faculty development programmes focusing on emerging educational technologies, artificial intelligence, learning management systems, and digital pedagogy.
- Institutional management should invest in modern digital infrastructure to ensure uninterrupted access to technology-enabled teaching and learning.
- Regular workshops and hands-on training sessions should be organised to improve faculty confidence in using advanced educational technologies.
- Colleges should establish dedicated technical support teams to assist faculty members during the implementation of digital teaching practices.
- Greater emphasis should be placed on integrating Education 4.0 concepts into curriculum planning, classroom delivery, and assessment methods.
- Faculty members should be encouraged to participate in national and international certification programmes related to digital teaching competencies.
- Institutions should formulate clear policies that promote innovation, technology adoption, and continuous professional development among faculty members.

- Best practices in Education 4.0 implementation should be documented and shared across departments to encourage collaborative learning and institutional improvement.
- Special orientation programmes may be organised for faculty members who require additional support in adapting to digital teaching environments.
- Collaboration with industry partners can further strengthen faculty exposure to emerging technologies and improve the practical relevance of higher education.

7. CONCLUSION

The rapid advancement of digital technologies has transformed the landscape of higher education, making Education 4.0 an essential component of contemporary teaching and learning. The present study examined faculty perception towards Education 4.0 among self-financing colleges in Coimbatore and identified the key dimensions influencing faculty readiness for technology-enabled education.

The findings indicate that faculty members generally possess a favourable perception towards Education 4.0 and recognise its potential to improve teaching effectiveness, student engagement, personalised learning, and graduate employability. The excellent reliability of the research instrument and the strong factor structure further confirm the robustness of the study.

The exploratory factor analysis identified three important dimensions—Digital Readiness and Institutional Support, Perceived Educational Benefits, and Professional Development and Innovation—which collectively explain faculty perception towards Education 4.0. These dimensions highlight that successful implementation depends not only on technological competence but also on institutional commitment and continuous faculty learning.

The inferential analysis revealed that educational qualification and gender significantly influence faculty perception, whereas age, teaching experience, and academic discipline do not significantly affect faculty attitudes towards Education 4.0. This suggests that the acceptance of Education 4.0 has become widespread across different categories of faculty members, reflecting the growing recognition of digital transformation in higher education.

Overall, the study concludes that self-financing colleges in Coimbatore are increasingly prepared to embrace Education 4.0. However, sustained institutional support, investment in digital infrastructure, continuous professional development, and effective policy initiatives remain essential to ensure the successful integration of Education 4.0 into higher education. The findings of this study contribute to the existing body of knowledge and provide practical guidance for educational administrators, policymakers, and faculty members seeking to enhance digital transformation in higher education institutions.

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