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Digital Transformation in Education: Leveraging informatics for Innovative Learning Solutions

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Abstract:

The Covid-19 pandemic has accelerated the adoption of information and communication technology (ICT) across primary, secondary and higher education levels in India. This article examines the relationship between assistant professors' innovative learning and digital transformation in education. The study uses Google Forms to collect survey data from 210 college professors using convenience sampling, ensuring representation across gender, educational levels, and years of experience. The findings reveal significant variations in respondents' perceptions of Digital Transformation, Service Quality and Digital Competence based on their educational levels. Post hoc tests further elucidate the nuanced differences among educational levels and years of experience. The analysis reveals the pivotal role of digital transformation in shaping perceptions and experiences in higher education. This research contributes valuable insights into the evolving landscape of digital education, shedding light on the dynamic interplay between educational levels, experiences, and key variables in the realm of digital transformation.

Keywords: DTE, ICT, Digital Transformation, Service Quality, Digital Competence

1. Introduction:

In the era of digitization, many organizations are engaging in initiatives for digital transformation, motivated by business objectives to optimize profits through the efficient use of information technology. This transformative process involves a shift in work dynamics and corporate culture, initially transitioning from analog to digital data sources with the aid of technology.

Digital Transformation in Education (DTE) serves as a dynamic process implemented by both service and manufacturing entities, aiming to identify novel opportunities for improving products or services through technology integration. While functioning as a tool to reshape organizational elements, culture, and business procedures in response to market demands via information technology, the Covid-19 pandemic has necessitated the education sector to embrace information and communication technology (ICT) for both learning processes and management across primary, secondary and higher education levels, aligning with government policies in India.

In the broader context, the execution of education during the Covid-19 pandemic has manifested in three forms: full-distance learning, limited face-to-face learning, and blended learning. Responding to the challenges posed by the pandemic, the government has enacted measures to adjust learning policies. Noteworthy is the prolonged use of information technology in the higher education sector, particularly in institutions offering distance education. The government's endeavor to provide higher education through an open and online distance model seeks to expand accessibility for all

citizens, addressing the constraints in India's higher education capacity. This article aims to measure the relationship between assistant professors innovative learning through digital transformation in education.

2. Literature review

Alenezi, M. (2021) Digital transformation has gained momentum. Contemporary higher education institutions have been embracing new technologies and transforming their practices, business models and process. Digital transformation in the higher education institutions is about the development of new more advanced and effective methods and practices in pursuit of the higher education's mission. The present paper links digital transformation and higher education institutions. The paper discusses existing models for the incorporation of digital transformation in higher education institutions. The paper also delineates the challenges faced by higher education institutions in pursuit of digital transformation.

M, Monisha & D, Valanteena. (2022) The majority of students prefer improvement in learning through digitalization. although many institutions of higher learning are practicing digital media for the benefit of instructors and students, there is still a lot that needs to be done. It was also found that majority of the students prefer improvement in learning through digitalization.

Bilyalova et al., (2020) In the contemporary world, digital technology transcends its role as a mere tool, evolving into a lifestyle that unfolds new possibilities, including continuous education and flexible study times. This article aims to delineate the distinctive features of digital education, its current implementation stage, expected outcomes, and associated challenges. Following an exposition of the core aspects of digital education and its existing societal integration, a critical assessment is imperative to weigh the advantages and disadvantages of this educational paradigm concerning today's students and the efficacy of their learning processes. The examination brings to light both the merits and pitfalls of digital learning.

Schmidt, J. T., & Tang, M. (2020) Beyond the office, digitalization is changing every aspect of society. Whether intentional strategic initiatives are in place to guarantee the ongoing quality of teaching and learning environments, this shift is occurring in educational contexts. Although the idea of integrating technology into education is not new, the exceptional rate of technical development, especially in the fields of digital, ICT, and Internet technologies, sets a new standard. When disruptive technologies emerge in other industries, education typically responds by incorporating them into pre-existing educational cultures and institutions. From PCs to more advanced digital technologies, this chapter provides a thorough review of technology integration in education. It is both thrilling and thrilling to think about how digitization in education could change things.

Truong, T. C., & Diep, Q. B. (2023) The current technology trends that are being concerned and deployed in the educational environment are artificial intelligence, the Internet of Things, blockchain technology and other relevant platforms and technologies. Current technology trends being concerned and deployed in the educational environment, including Artificial intelligence, the Internet of Things, blockchain technology and other relevant platforms and technologies such as Social networks, Mobile platforms, Big data analytics, Cloud computing, Robotic Process Automation, Virtual reality and Augmented reality and Additive manufacturing

Gürbüz, T. (2021) It is clear that educational institutions that do not adopt digital transformation would inevitably lag behind in the years to come. As a result, the purpose of this chapter is to examine the digital revolution that is taking place in the fields of training and education, as well as creative approaches to building digital learning spaces and surroundings of the future.

Balyer, A., & Öz, Ö. (2018) reveals that to establish and sustain a successful learning atmosphere, administrators should initially formulate a vision for the digital transformation process. Another discovery implies that participants within the school community can facilitate this process by providing access to appropriate technological infrastructure and resources in terms of both location and time. It is recommended that specialists in programs and educational administrators possess the required expertise to supervise and ready themselves for this transformation.

Bogdandy et al., (2020)Based on the results, students said they enjoyed learning with digital media, and half said they would like to continue. Additionally, students indicate that they would rather use their own devices for tutorials, which allows for certain modifications to be made to work environments. Unfortunately, a few students experienced technological difficulties. These could have been caused by the different software environment, but more resources can help resolve these problems. All things considered, the digital transformation was a success, and we will use the input we received to improve our online courses.

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Gillpatrick, T. (2020) Institutions engaged in digital transformation anticipate significant shifts in the dynamics of supply and demand within the higher education economy. This means that new delivery strategies and a reorganization of educational structures and systems are needed.

3. Methodology:

In order to evaluate the connection between digital competency, digital transformation, and service quality in the higher education industry, this paper employs a quantitative methodology. This article uses Google Forms to collect data through a survey with online questionnaires. The survey received 210 responses in total using convenience sampling method. Regarding years of experience, years of education, and gender, the sample was representative of college professors.

4. Finding and Discussion:

Table 1 Socio-Democratic Profile of the respondent

	Particulars	**Frequency**	**Percent**
Gender	Female	112	53.3
	Male	98	46.7
	Total	**210**	**100.0**
Educational level	Bachelor's Degree	60	28.6
	Master's Degree	55	26.2
	Professional Degree	48	22.9
	Doctoral Degree	47	22.4
	Total	**210**	**100.0**
Years of Experience	>20 years	42	20.0
	16-20 years	38	18.1
	11-15 years	44	21.0
	6-10 years	41	19.5
	1-5 years	45	21.4
	Total	**210**	**100.0**

The table 1 provides a detailed breakdown of survey respondents based on gender, educational level, and years of experience. Out of 210 respondents, 53.3% are female and 46.7% are male. The respondents have a diverse range of educational qualifications, with 28.6% holding a Bachelor's Degree, 26.2% holding a Master's Degree, 22.9% possessing a Professional Degree, and 22.4% having a Doctoral Degree.

Table 2 ANOVA Test
Difference between Educational level and the DTE Variable

Educational level of the respondent		Sum of Squares	df	Mean Square	F	Sig.
Digital Transformation	Between Groups	48.884	3	16.295	8.954	.000
	Within Groups	374.873	206	1.820		
	Total	423.757	209			
Service Quality	Between Groups	49.870	3	16.623	9.482	.000
	Within Groups	361.158	206	1.753		
	Total	411.029	209			

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Digital Competence	Between Groups	49.800	3	16.600	8.296	.000
	Within Groups	412.223	206	2.001		
	Total	462.024	209			

The table 2 presents the results of an analysis of variance (ANOVA) for three variables: Digital Transformation, Service Quality and Digital Competence, with the Educational Level of the respondents as a factor.

The analysis indicates a statistically significant difference in perceptions of Digital Transformation across different educational levels ($F(3, 206) = 8.954$, $p < 0.001$). The calculated mean square values suggest that the variance between groups is considerably higher than the variance within groups, supporting the significance of the observed differences. Similar to Digital Transformation, there is a statistically significant difference in perceptions of Service Quality among respondents with different educational levels ($F(3, 206) = 9.482$, $p < 0.001$). The substantial between-group variance compared to within-group variance supports the significance of the observed distinctions. The analysis reveals a statistically significant difference in perceptions of Digital Competence based on educational levels ($F(3, 206) = 8.296$, $p < 0.001$).

The mean square values indicate a notable between-group variance, emphasizing the significance of the observed differences. In summary, the results suggest that there are significant variations in respondents' perceptions of Digital Transformation, Service Quality and Digital Competence based on their educational levels. The calculated F-values and associated p-values ($p < 0.001$) indicate that these differences are highly unlikely to be due to random chance. This statistical analysis provides valuable insights into the relationship between educational levels and perceptions of these three key variables.

Table- 3 Post Hoc Tests

Digital Transformation			
Educational level of the respondent	N	Subset for alpha = 0.05	
		1	2
Bachelor’s Degree	60	2.7333	
Master’s Degree	55	2.7636	
Doctoral Degree	47		3.6809
Professional Degree	48		3.7500
Sig.		.909	.794

The table 3 presents the results of an analysis examining the differences in perceptions of Digital Transformation among respondents with different educational levels. It lists different educational levels (Bachelor's Degree, Master's Degree, Doctoral Degree, Professional Degree) and provides mean scores for each level. The mean scores suggest the perceived levels of Digital Transformation for each educational level. For example, respondents with a Bachelor's Degree have a mean score of 2.7333, while those with a Master's Degree have a mean score of 2.7636. Doctoral Degrees have a mean score of 3.6809, and Professional Degrees have a mean score of 3.7500.

The p-values for pairwise comparisons (Bachelor's vs. Master's and Bachelor's vs. Doctoral) have p-values greater than the typical significance level of 0.05, suggesting that there is not enough evidence to reject the null hypothesis of no significant difference in perceptions of Digital Transformation between these educational groups.

Table 4 Post Hoc Tests

Service Quality			
Educational level of the respondent	N	Subset for alpha = 0.05	
		1	2
Master’s Degree	55	2.7091	
Bachelor’s Degree	60	2.8667	

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Doctoral Degree	47		3.6809
Professional Degree	48		3.8333
Sig.		.545	.558

The table 4 presents the results of an analysis examining the differences in perceptions of Service Quality among respondents with different educational levels. It lists different educational levels (Bachelor's Degree, Master's Degree, Doctoral Degree, Professional Degree) and provides mean scores for each level. The mean scores suggest the perceived levels of Service Quality for each educational level. For example, respondents with a Bachelor's Degree have a mean score of 2.8667, while those with a Master's Degree have a mean score of 2.7091. Doctoral Degrees have a mean score of 3.6809, and Professional Degrees have a mean score of 3.833. The p-values for pairwise comparisons (Bachelor's vs. Master's and Bachelor's vs. Doctoral) have p-values greater than the typical significance level of 0.05, suggesting that there is not enough evidence to reject the null hypothesis of no significant difference in perceptions of Service Quality between these educational groups.

Table 5 Post Hoc Tests

Digital Competence			
Educational level of the respondent	N	Subset for alpha = 0.05	
		1	2
Master’s Degree	55	2.5636	
Bachelor’s Degree	60	2.8000	
Doctoral Degree	47		3.5532
Professional Degree	48		3.7292
Sig.		.395	.527

The table 5 presents the results of an analysis examining the differences in perceptions of Digital Competence among respondents with different educational levels. It lists different educational levels (Bachelor's Degree, Master's Degree, Doctoral Degree, Professional Degree) and provides mean scores for each level. The mean scores suggest the perceived levels of Digital Competence for each educational level. For example, respondents with a Bachelor's Degree have a mean score of 2.8000, while those with a Master's Degree have a mean score of 2.5635. Doctoral Degrees have a mean score of 3.5532, and Professional Degrees have a mean score of 3.7292. The p-values for pairwise comparisons (Bachelor's vs. Master's and Bachelor's vs. Doctoral) have p-values greater than the typical significance level of 0.05, suggesting that there is not enough evidence to reject the null hypothesis of no significant difference in perceptions of Digital Competence between these educational groups.

Table 6 ANOVA Test
Difference between years of experience and the DTE Variable

Years of Experience		Sum of Squares	df	Mean Square	F	Sig.
Digital Transformation	Between Groups	40.849	4	10.212	5.467	.000
	Within Groups	382.908	205	1.868		
	Total	423.757	209			
Service Quality	Between Groups	58.738	4	14.685	8.545	.000
	Within Groups	352.290	205	1.718		
	Total	411.029	209			
Digital Competence	Between Groups	73.728	4	18.432	9.731	.000

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	Within Groups	388.296	205	1.894		
	Total	462.024	209			

From the above table 6 reveals a statistically significant difference in perceptions of Digital Transformation ($F(3, 206) = 5.467$, $p < 0.001$), Service Quality ($F(3, 206) = 8.545$, $p < 0.001$), Digital Competence based on Years of Experience ($F(3, 206) = 9.731$, $p < 0.001$).

The significant between-group variance indicated by the mean square values highlights the importance of the observed differences. In conclusion, the findings imply that, depending on the respondents' years of experience, there are notable differences in how they perceive digital competence, service quality and transformation. According to the computed F-values and corresponding p-values ($p < 0.001$), it is extremely unlikely that these differences are the result of chance. This statistical research sheds important light on how educational attainment and opinions of these three crucial variables differ to one another.

Table 7 Post Hoc Tests

Digital Transformation				
Years of Experience	N	Subset for alpha = 0.05		
		1	2	3
16-20 years	38	2.6053		
>20 years	42	2.7143	2.7143	
11-15 years	44		3.2273	3.2273
1-5 years	45			3.6444
6-10 years	41			3.6585
Sig.		.716	.087	.176

Table 7 The post hoc tests analyzed variations in perceptions of Digital Transformation among respondents with different ranges of years of experience. The table covered various experience brackets (16-20 years, >20 years, 11-15 years, 1-5 years, 6-10 years), providing mean scores that reflect the perceived levels of Digital Transformation. Notably, respondents with 16-20 years exhibited a mean score of 2.6053, those with >20 years scored 2.7143, respondents with 11-15 years scored 3.2273, those with 1-5 years scored 3.6444, and those with 6-10 years scored 3.6585. These mean scores offer insights into how respondents across different experience ranges perceive Digital Transformation, where higher scores indicate a more positive perception.

Table 8 Post Hoc Tests

Service Quality				
Years of Experience	N	Subset for alpha = 0.05		
		1	2	3
16-20 years	38	2.3947		
>20 years	42	2.9286		
11-15 years	44		3.2500	
1-5 years	45		3.4667	
6-10 years	41			4.0244
Sig.		.064	.077	.053

The results of post hoc tests examining differences in respondents' opinions of service quality throughout a range of professional experience are shown in Table 8. The table presents the mean scores that indicate perceived levels of service quality for each of the following experience brackets: 16–20 years, >20 years, 11–15 years, 1–5, and 6–10 years. In particular, the mean score for responders with 16–20 years of experience was 2.3947, for those with more than 20 years, it was 2.9286, for those with 11–15 years, it was 3.2500, for those with 1–5 years, it was 3.4667 and for those with 6–10

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years, it was 4.0244. Higher mean scores indicate a more positive assessment of service quality and these scores offer insightful information about how respondents with a range of experience levels view it.

Table 9 Post Hoc Tests

Digital Competence			
Years of Experience	N	Subset for alpha = 0.05	
		1	2
16-20 years	38	2.1579	
>20 years	42	2.6190	
11-15 years	44		3.3636
6-10 years	41		3.6341
1-5 years	45		3.6889
Sig.		.127	.312

The table 9 presents the mean scores that indicate perceived levels of Digital Competence for each of the following experience groups: 16–20 years, >20 years, 11–15 years, 1–5, and 6–10 years. In particular, the mean score for responders with 16–20 years of experience was 2.1579, for those with more than 20 years, it was 2.6190, for those with 11–15 years, it was 3.3636, for those with 1–5 years, it was 3.6889, and for those with 6–10 years, it was 3.6341. Higher mean scores indicate a more positive assessment of Digital Competence, and these scores offer insightful information about how respondents with a range of experience levels view it.

Conclusion:

In the contemporary era of digitization, organizations are fervently pursuing digital transformation initiatives to optimize profits through efficient information technology utilization, marking a shift from analog to digital work dynamics and corporate culture. This paradigm shift extends to the education sector, especially accelerated by the Covid-19 pandemic, necessitating the adoption of information and communication technology (ICT) across primary, secondary and higher education levels in alignment with Indian government policies. Amidst varied forms of education during the pandemic, this article focuses on measuring the relationship between assistant professors' innovative learning and digital transformation in education. The literature review contextualizes this study, exploring existing models and challenges in the incorporation of digital transformation in higher education institutions. Notably, student preferences for enhanced learning through digitalization and the transformative potential of digital education are examined. The quantitative methodology employs Google Forms to collect survey data from 210 college professors, ensuring representation across gender, educational levels, and years of experience. The findings indicate significant variations in respondents' perceptions of Digital Transformation, Service Quality and Digital Competence based on their educational levels. Post hoc tests further elucidate the nuanced differences among educational levels and years of experience. The analysis reveals the pivotal role of digital transformation in shaping perceptions and experiences in higher education. This research contributes valuable insights into the evolving landscape of digital education, shedding light on the dynamic interplay between educational levels, experiences, and key variables in the realm of digital transformation.

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