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Prof. Birendra Nath Singh
Chief Mentor & Chief Consultant, Career Guru, Kharagpur
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Email: kukretibr77@gmail.com

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Email: pbsingh1967@gmail.com

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Email: president@maaun.edu.ng

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From the Desk of the Chief Editor

I am pleased to present this issue of Omniscient: An International Peer-Reviewed Multidisciplinary Journal, a platform dedicated to advancing scholarly research across a wide range of disciplines. As a globally recognized journal, Omniscient upholds the highest standards of academic excellence, intellectual integrity, and impactful research dissemination. This issue features contributions from diverse fields, including science, humanities, social sciences, education, and technology, reflecting the dynamic and evolving landscape of global scholarship.

Academic writing serves as the foundation of knowledge creation, allowing scholars to engage in meaningful discourse, challenge existing perspectives, and introduce innovative ideas. The quality of research and its presentation determines its impact, making it essential to uphold clarity, coherence, and ethical rigor in scholarly work. Leadership in academia is not merely about administrative efficiency; it is about fostering an environment that nurtures critical thinking, creativity, and responsible scholarship. True academic leadership lies in mentorship, collaboration, and the continuous pursuit of intellectual advancement that benefits both the academic community and society at large.

At MJP Rohilkhand University, we remain committed to cultivating a culture of academic integrity, innovation, and interdisciplinary collaboration. Research must not only contribute to the expansion of knowledge but also address contemporary challenges, offering solutions that shape the future of education, technology, and societal progress. A strong academic culture is built on transparency, ethical responsibility, and a commitment to excellence, ensuring that knowledge dissemination remains a powerful tool for transformative change.

I am confident that this issue of Omniscient will serve as a valuable resource for scholars, educators, and professionals, inspiring further research, academic leadership, and intellectual engagement. I extend my gratitude to the authors, reviewers, and editorial team for their dedication to scholarly excellence. I invite readers to engage with the thought-provoking research featured in this edition as we continue our collective journey toward academic distinction and meaningful innovation.

Prof. K.P. Singh

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Content

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Unlocking the Flavour of Financial Literacy among Higher Education Teachers: An Insight

Rajkumar B Nanaware

School of Education, Yashwantrao Chavan Maharashtra Open University, Nashik
Corresponding author: drrk711829@gmail.com
Available at https://omniscientmjprujournal.com

Abstract

Enhancing one's financial literacy is crucial, and it is equally difficult to manage savings in today's increasingly complex financial markets, which leaves many people with little or no wealth. Understanding finance allows one to participate more and choose wisely when making investments, which leads to sensible plans for long-term financial growth. This study assesses the awareness of financial literacy among higher education teachers to determine how well financially literate they are. A descriptive survey approach was employed, utilizing the Simple Random Sampling Technique, to gather data from 117 Higher Education Teachers in Bangalore suburbs. The standardized tool was used for the survey. The test of normality was run before moving on to parametric testing under the assumption of the null hypothesis. Both descriptive and inferential statistics were employed to examine the percentile analysis and variations in financial literacy. The 0.05 level of significance was used for the formulated hypotheses. It was revealed that there are no appreciable differences in financial literacy within gender, age, and locale of higher education teachers. In terms of their teaching level, designation, and discipline, there was a discernible difference. Commerce teachers are found to be more financially literate than Arts and Science teachers. Professors are considered better planners compared to associate and assistant professors. It is possible that the differences result from their qualifications, experience, and service rendered in the organization as a result of enhanced education, or they may have other reasons.

Keywords: *Financial Literacy, Higher Education Teachers, Financial Growth, Financial Wellbeing.*

Developing financial literacy is of utmost importance. With increasingly complex financial markets, retirement savings can be challenging to navigate, leading to minor to no wealth for many individuals. Educating oneself on finances makes it possible to increase participation and make informed investment decisions, resulting in sound strategies for long-term financial success, which leads to a country's financial growth (Hanna et al., 2010). The significance of higher education cannot be overstated. It provides the workforce necessary for numerous fields, including production, planning, management, and technological development. Its impact on national activities is far-reaching, ultimately shaping the future of our nation. Financial literacy has become necessary due to the proliferation of complex financial products, the shift towards personal responsibility, and the advent of electronic banking, encouraging saving, budgeting, and responsible credit use, financial literacy increases access to financing. A more knowledgeable person can use their savings more effectively for emergencies, retirement, and

unanticipated events. Higher financial literacy teachers can help students make sound financial decisions by serving as role models, **Matey et al. (2021)**.

Dimension of Financial Literacy

Financial literacy has several dimensions. Financial knowledge, financial behaviour, financial attitude, and financial risk are some of the elements of financial literacy. Financial behaviour refers to how people handle their money daily, whereas financial knowledge entails knowing fundamental economic concepts. Financial planning and consumption attitudes are correlated with financial attitudes. Taking risks is essential while making financial decisions. A strong financial attitude can result in less acceptable financial behaviour, whereas a low financial knowledge can influence both economic behaviour and attitude.

Conceptual Model of Financial Literacy

Acquiring financial literacy requires both hands-on learning and active integration of existing information. People grow more competent and financially smart as their literacy levels rise. Due to the complexity of financial markets and the aging population in many Asian countries, financial literacy is becoming more and more crucial. Due to insufficient savings and the necessity to learn about investing for the future, many people have little money when they retire. Due to complicated financial products, an increasing number of seniors, individual retirement funding responsibility, and Internet banking, financial literacy is required. It encourages budgeting, savings, credit utilization sensibly, and financial accessibility. Financially literate people may choose suitable products, save money more effectively, and establish a strong financial system. More resources are needed to protect financially illiterate people, especially those at the bottom of the pyramid—from losing investments or savings. They avoid complicated financial items, which makes them less likely to create bank accounts, buy investment products, and participate in the market. Encouraging prudent investment practices through financial education can boost involvement and facilitate the effective use of the financial market's resources. The financial prospects of the impoverished can be greatly impacted by their access to safe savings.

Need and Emergence

Financial literacy is crucial for higher education teachers, ensuring personal stability and effective student mentorship. Despite their role in shaping future generations, educators often face financial challenges such as managing income, retirement planning, and debt management. A lack of financial awareness can lead to stress, poor investment choices, and an uncertain financial future. Teachers must navigate economic uncertainty, diverse income sources, and long-term security, and serve as financial role models. Enhancing financial literacy among

teachers leads to better decision-making and stability. Financially empowered teachers can focus more on their teaching responsibilities without financial stress. Institutions and policymakers must prioritize financial education at early stages to benefit prospective students, ensuring that teachers receive the resources and training necessary to secure their financial future and positively influence and educate future generations.

Objectives

To study the awareness of financial literacy among Higher Education Teachers.

To compare the difference in financial literacy awareness among Male and Female Higher Education Teachers.

To find the difference in financial literacy awareness among the Urban and rural Higher Education Teachers.

To ascertain the significant difference between the financial literacy and levels of teaching (PU/UG/PG), designation (Prof/Associate Prof/Asst Prof and lecturer), Streams of Education (Arts /Commerce/Science, etc.) and different age groups.

Hypotheses

To make the prediction about the main study and to get the answers to research questions, the following null hypotheses were framed and tested. The outcomes were discussed under each.

H01: There is no significant difference between male and female higher education teachers concerning their Financial Literacy.

H02: There is no significant difference between urban and rural higher education teachers concerning their Financial Literacy.

H03: There is no significant difference among Streams of Education concerning their Financial Literacy.

H04: There is no significant difference among designation of higher education teachers concerning their Financial Literacy.

H05: There is no significant difference among undergraduate, postgraduate, and pre-university lecturers concerning their Financial Literacy.

H06: There is no significant difference among the different age groups of higher education teachers concerning their Financial Literacy.

LITERATURE REVIEW

According to **Prasad, G.R.K., (2022),** teachers in Hyderabad's higher education institutions have the lowest levels of financial literacy of any group, making them the most inspiring. It was discovered that female teachers have a marginally greater level of financial literacy than their male counterparts. The factors influencing digital financial literacy were investigated in

the study "Digital Financial Literacy and its Determinant: An Empirical Evidence from Rural India". Age, gender, landholding, education level, married status, and socioeconomic groupings all have a significant correlation with knowledge and proficiency in digital finance (**Fida Muthia et al., 2023**). They are not correlated with income, occupation, type of ration card holder, or size of family. Significant determinants of digital financial literacy were also found to include gender, occupation, property, income, and education**. Matey et al. (2021)** investigated how financial literacy instruction affected Ghanaian teachers' social and economic lives. The study's findings demonstrated a positive correlation between financial literacy and teachers' lifestyles, as assessed by their proficiency with budgeting, understanding investment rates, conserving money, and preventing identity theft (exchanging private information about credit or debit cards, for example). **Prasad and John (2021)** looked at Hyderabadi teachers' financial literacy and conduct. The study found that professors might know more about general finance. Just 21% of educators possess excellent financial literacy, 23% possess strong financial understanding, and 48.5% demonstrate prudent financial practices. **Zulaithi et al. (2020**) researched to determine the impact of financial literacy on the financial behaviour of secondary school teachers in Jakarta, Indonesia. It has been found that having a good understanding of finance influences one's economic behaviour. It was found that respondents with high financial literacy set up their finances for both short- and long-term goals, made more investments, shopped about and compared prices, and effectively created budgets. **(Bongini & Zia, 2018)** investigated women's financial literacy at work. The results of the survey show that women have low overall financial literacy. The study's recommendations can be used by employers, groups, governments, and legislators to create doable programs that will increase public financial literacy and offer reliable resources for financial advice. To assess financial literacy and its influence on Gujarat State investors' investment decisions, conducted a study. The findings indicated that 44% of the respondents were deemed to be economically illiterate, whereas 56% of the respondents were financially literate. When it came to financial literacy, men were more knowledgeable than women. Furthermore, based on the findings of **Boon, Yee, and Ting, (2011),** the financial literacy of the respondents was highly influenced by their age and income level. Better financially literate people place higher value on personal financial planning to prevent the negative impacts that insufficient financial planning may have on their lives. A university is a symbol of truth, reason, tolerance, humanism, and inquiry. Because of computerized banking, personal responsibility, and sophisticated financial products, financial literacy is essential. Budgeting, managing credit responsibly, and saving are all encouraged by financial literacy. Increased financial literacy promotes effective and independent living.

Higher financial knowledge among educators can help students make sound financial decisions. This study evaluates the awareness of financial literacy among higher education teachers to determine how well financially literate they are.

MATERIALS AND METHODS

Population, Sample, and Sampling Techniques

In the present endeavour, the faculties of Higher Educational Institutions in Bangalore's Urban and Rural areas form the population. The sample of 117 higher education teachers was taken from the whole population of Higher Education Institutions in Bangalore's Urban and Rural areas using the Simple Random Sampling method.

Tool of Research

Data was collected using the Virginia University Financial Literacy Test, a standardized tool based on the OECD questionnaire and modified for local use. Reliability was determined by Cronbach's alpha, with a recorded value of 0.62, and it was fair enough to proceed further.

The respondents' profile is depicted here under.

Table 1: Demographic profile of Respondents'

Gender	**Numbers**	**Percentage (%)**
Male	49	41.88 %
Female	68	58.12 %
Total	117	100 %
Designation	**Numbers**	**Percentage (%)**
Professor	11	09.40 %
Associate Professor	06	05.13 %
Assistant Professor	48	41.03 %
Lecturer	52	44.44 %
Total	117	100 %
Teaching Level	**Numbers**	**Percentage (%)**
Post-Graduation Level	27	23.08 %
Undergraduate Level	55	47.01 %
Pre-University Level	35	29.91 %
Total	117	100 %
Teaching Discipline	**Numbers**	**Percentage (%)**
Arts and Humanities	17	14.53%
Commerce	27	23.08 %

Science	22	18.80 %
Business	02	01.71 %
Education	34	29.06 %
Others	15	12.82 %
Total	117	100 %
Locality	**Numbers**	**Percentage (%)**
Urban	101	86.32 %
Rural	16	13.68 %
Total	117	100 %
Age group	**Numbers**	**Percentage (%)**
31 to 40 years	66	56.41 %
41 to 50 years	28	23.93 %
51 to 60 years	07	05.98 %
Above 60 years	16	13.68 %
Total	**117**	**100 %**

Descriptive analysis provided the data for empirical and statistical analysis to determine the main determinants of finance. Sample attributes are analyzed by computing frequencies and percentages to compare with the obtained results. This endeavor aimed to analyze the awareness of financial literacy among higher education teachers. The sample attributes were analysed using percentages and t-tests. The 0.05 level of significance was used to formulate and evaluate the hypotheses.

Hypotheses Testing

H01: There is no significant difference between male and female higher education teachers concerning their Financial Literacy.

Table: Difference between male and female higher education teachers

	Gender	N	Mean	Std Dev	df	t-calculated	t-critical	Sig.
Financial Literacy	Male	49	64.00	12.89	115	0.53976	1.962	NS
	Female	68	65.26	9.36				

Not Significant at 0.05 level

In terms of gender, there is no significant difference between male and female higher education teachers' financial literacy awareness. Therefore, there is no discrimination between male and female teachers regarding their financial literacy.

H02: There is no significant difference between urban and rural higher education teachers concerning Financial Literacy.

Table: Difference between urban and rural higher education teachers

	N	Mean	Std Dev	df	t-calculated	t-critical	Sig
Urban	101	65.08	10.77	115	0.395	1.96	NS
Rural	16	62.56	12.15				

Not Significant at 0.05 level

It is concluded that the financial literacy awareness between urban and rural higher education teachers is the same.

The implications of this conclusion may indicate that financial literacy programs could be equally effective across different geographical settings, as the baseline awareness appears to be consistent. Overall, the research highlights the importance of addressing financial literacy in higher education, regardless of the urban or rural context.

H03: There is no significant difference among arts, commerce, science, and other education teachers concerning their Financial Literacy.

Summary and Analysis of Variance

Table 4: ANOVA (single factor) – Teaching Discipline

Groups	***Count***	***Sum***	***mean***	***Variance***		
Arts	17	1159	68.18	182.03		
Commerce	27	1804	66.81	105.77		
Science	22	1356	61.64	98.91		
Others	51	3255	63.82	111.67		
Source of Variation	***Sum of Squares***	***df***	***Mean Square***	***F***	***P-value***	***F critical***
Between Groups	571.74	3.00	190.58	1.62	0.19	2.68
Within Groups	13323.05	113.00	117.90			
Total	13894.79	116	F statistics < F critical #Test is Significant			

Significant at 0.05 level

Concerning teaching discipline, there is a significant difference among the Arts, Commerce, Science, and other faculties, and the Arts faculty is seen as better than others. The text highlights a notable distinction in teaching discipline across various academic faculties, specifically emphasizing the Arts, Commerce, and Science disciplines. It suggests that the Arts faculty is

perceived as superior compared to the others. This perception may stem from differing educational approaches, methodologies, and the value placed on creative and critical thinking skills inherent in the Arts.

H04: There is no significant difference among Professors, Associate Professors, Assistant Professors, and Lecturers concerning their Financial Literacy.

Table 5: ANOVA (single factor) - Designation

Groups	***Count***	***Sum***	***mean***	***Variance***		
Professor	12	826	68.83	115.61		
Associate Professor	6	372	62	306.4		
Assistant Professor	48	3064	63.83	98.61		
Lecturer	51	3312	64.94	123.38		
Source of Variation	***Sum of Squares***	***df***	***Mean Square***	***F***	***P-value***	***F critical***
Between Groups	287.63	3	95.88	0.80	0.50	2.68
Within Groups	13607.16	113	120.42			
Total	13894.79	116	F statistics < F critical #Test is Significant			

Significant at 0.05 level

Regarding designation, there is a significant difference among professors, associate professors, assistant professors, and lecturers. This explains the distinctions between academic titles in universities, emphasizing the importance of understanding these differences for recognizing the hierarchy and roles within academic institutions. It highlights the roles of professors, associate professors, assistant professors, and lecturers.

H05: There is no significant difference among undergraduate, postgraduate, and pre-university lecturers concerning their Financial Literacy.

Table 6: ANOVA (single factor) – Teaching Level

Groups	***Count***	***Sum***	***mean***	***Variance***
Pre University level	35	2388	68.23	71.01
Under Graduate level	55	3413	62.05	120.87
Post Graduate Level	27	1773	65.67	158.00

Source of Variation	***Sum of Squares***	***df***	***Mean Square***	***F***	***P-value***	***F critical***
Between Groups	845.78	2.00	422.89	3.69	0.03	3.08
Within Groups	13049.01	114.00	114.46			
Total	13894.79	116	F statistics > F critical #Test is Not Significant			

Not Significant at 0.05 level

Teaching level showed no significant difference among undergraduate, postgraduate, and pre-university lecturers concerning their Financial Literacy. The study found that there is no significant difference in financial literacy levels among lecturers at various teaching levels, including undergraduate, postgraduate, and pre-university. This suggests that the financial literacy of educators does not vary based on their teaching experience or the academic level they are involved. The findings highlight a potential area for improvement in financial education across all teaching levels, indicating that further training or resources may be beneficial for lecturers to enhance their financial literacy skills.

H06: There is no significant difference among the different age groups of higher education teachers concerning their Financial Literacy.

Table 7: ANOVA (single factor) – Age Group

Groups	***Count***	***Sum***	***Mean***	***Variance***		
Age Group (31-40)	68	4460	65.59	118.99		
Age Group (41-50)	44	2783	63.25	107.49		
Age Group (51-60)	5	331	66.20	285.70		
Source of Variation	***Sum of Squares***	***df***	***Mean Square***	***F***	***P-value***	***F critical***
Between Groups	157.2657	2	78.63	3.69	0.03	3.08
Within Groups	13737.52	114	120.50			
Total	13894.79	116	F statistics < F critical #Test is Significant			

Significant at 0.05 level

The different age groups revealed a significant difference in financial literacy. As stated earlier, in some cases the differences may be attributed to both the qualifications and the experience he/she has gained, as well as the enhanced education that they have undergone. The analysis indicates a notable disparity in financial literacy across various age groups. This difference can be linked to factors such as educational qualifications and the practical experience individuals

have acquired over time. Additionally, the level of education attained plays a crucial role in shaping financial literacy, suggesting that enhanced educational opportunities contribute to better financial understanding.

DISCUSSION

Financial literacy is crucial for the growth and development of a country's financial system **(Hanna et al., 2010).** It involves understanding economics and how it affects household decisions. Financial literacy is positively correlated with education level and individual aggressiveness, as noted by **Agarwal et al. (2010**). Various factors influence financial literacy, including gender, education, income, employment type, and workplace location, according to **Bhushan and Medury (2013**). Additionally, the study concludes that there is no significant difference in financial literacy awareness between urban and rural higher education teachers. This finding suggests that both groups possess a comparable level of understanding regarding financial concepts and practices. Furthermore, **Jappelli (2009)** points out that financial literacy levels differ significantly across countries, with educational achievement and social interactions playing crucial roles in these variations. The study discovered no significant variation in financial literacy levels among lecturers at all teaching levels, including undergraduate, postgraduate, and pre-university. This shows that educators' financial literacy is unaffected by their teaching experience or academic degree of involvement **(P. Bhushan and Y. Medury, 2013**). Overall, the findings highlight the need for a more consistent approach to financial literacy teaching across instructors, regardless of academic status. The study reveals a substantial difference in financial literacy among different age groups. This distinction can be attributed to factors such as educational background and practical experience gained over time **Lusardi et al. (2007)** highlight a strong relationship between financial literacy and socio-demographic characteristics, as well as family financial sophistication. Furthermore, the amount of education achieved has a significant impact on financial literacy, implying that increased educational possibilities lead to improved financial awareness.

CONCLUSION

The results show that there is no discernible difference in financial literacy between urban and rural teachers, or between male and female higher education teachers. Higher Education Teachers differ significantly in awareness of financial literacy in terms of their teaching level, designation, discipline, and different age groups. The findings showed that financial literacy is higher among teachers of commerce than among teachers of arts and science. Professors are perceived as better future planners than Associate and Assistant Professors, these differences may be attributed to their education, experiences, and service rendered within the organization

through enhanced education. Overall, the results emphasize the need for a more uniform approach to financial literacy education among educators, regardless of their academic position, stream, or level of teaching.

Educational Implications

Financial literacy education in higher secondary or pre-university college-level courses can improve financial literacy, leading to economic well-being. It also benefits educational institutions by increasing enrollment and retention, community awareness, and potential grants and sponsorships. For success, it is expected that the government should initiate the right curriculum for students to grasp financial literacy along with their regular studies. It is essential to provide financial expertise from the early levels of education.

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Challenges of Apparel Women Entrepreneurs: With Special Reference to Agra

Megha Sharma, Sunita Malhotra, Shalini Nigam

Department of Management, Dayalbagh Educational Institute, Agra
Corresponding author: meghasharmagbps@gmail.com
Available at https://omniscientmjprujournal.com

Abstract

An entrepreneur is someone who establishes a business and embodies qualities such as confidence, creativity, and leadership. Women's growing participation in entrepreneurship challenges traditional gender roles imposed by patriarchal norms and signifies progress in women's empowerment. The conventional perception of women as homemakers who support their husbands is gradually being replaced by their active involvement in business ownership and entrepreneurial ventures. In Agra, however, it has been observed that most women entrepreneurs primarily operate in the apparel sector or manage small-scale enterprises. To understand the challenges faced by these women, a study was conducted involving 49 female entrepreneurs engaged in various business activities. The findings highlighted several obstacles, including limited access to financial resources, difficulties in marketing, and the struggle to balance societal expectations and personal responsibilities. Recognizing the economic importance of fostering female entrepreneurship, the study emphasizes the need for government initiatives to support women entrepreneurs. Tailored programs focusing on financial assistance, skill development, and market access can play a crucial role in ensuring their businesses thrive and grow.

Keywords: *Women Entrepreneur, Apparel Industry, Challenges of Entrepreneur*

As Vivekananda (2019) aptly stated, “There is no chance for the welfare of the world unless the condition of women is improved; it is not possible for a bird to fly on only one wing.” This quote underscores the paradox of India’s progress. While the country recently earned global acclaim as the first Asian nation to achieve a successful Mars mission on its maiden attempt, it still ranks 108th out of 146 countries in the World Economic Forum (WEF) Gender Gap Index, the same position it held in 2017 (Ministry of MSME, 2021).

Overcoming societal barriers, women have started to break through the glass ceiling and are now actively involved in various business sectors. Educated women increasingly resist being confined to traditional domestic roles and demand equal respect and opportunities from their partners. However, Indian society, with its deeply entrenched traditions and patriarchal setup, continues to hinder women’s progress toward equality (Sathyadevi & N.P, 2016). Despite these challenges, the nation is witnessing inspiring success stories of women entrepreneurs.

The trend of working women transitioning into entrepreneurs has gained traction globally. Yet, in India, women’s economic participation remains limited. Female labor force participation is recorded at only 32%, with women constituting just 13.78% of the self-employed workforce. Among the 52% of self-employed individuals, most women operate at a

micro level, significantly limiting the potential of entrepreneurship as a tool for socio-economic empowerment and equity (Patnaik, 2021).

According to the Global Alliance for Mass Entrepreneurship (GAME), women entrepreneurship in India faces significant constraints, with over 80% of ventures relying on family funding and limited networks for sales. Additionally, 86% of women-owned businesses are self-funded and run as solo ventures. Women entrepreneurs contribute a mere 3.09% to India's total industrial output, with most of their activity concentrated in four sectors: textiles and apparel, food, health and wellness, and education (Bhagnari, 2020).

Although numerous government schemes and benefits exist to support women entrepreneurs, 84% of women still depend on their husbands, families, or the sale of personal assets to finance and sustain their businesses. Deep-rooted socio-economic challenges continue to limit women's access to stable employment and reliable incomes, leaving their entrepreneurial potential underutilized (Patnaik, 2021).

This context highlights the urgent need for targeted interventions and systemic support to empower women entrepreneurs and harness their contributions to India's economic growth.

Concept of entrepreneurship

The term "entrepreneur" was first introduced in a business context by the French economist Richard Cantillon in the 18th century. He is credited as the originator of the term, having developed one of the earliest theories of entrepreneurship. Cantillon described entrepreneurs as risk-takers, encompassing individuals such as merchants, farmers, craftsmen, and other sole proprietors.

Peter F. Drucker later defined an entrepreneur as someone who consistently seeks out change, responds to it, and leverages it as an opportunity. Similarly, Joseph A. Schumpeter recognized entrepreneurs as innovators and agents of change, treating them as integral to economic growth. According to Schumpeter, entrepreneurs are the fundamental drivers of economic equilibrium, fostering innovation and transformation in the market.

Women: Harbingers of Change

The era when women confined their lives within the four walls of a home is a thing of the past. Today, women stand shoulder-to-shoulder with their male counterparts, crafting inspiring stories of success through their determination, intelligence, and hard work. An increasing number of women are broadening their entrepreneurial pursuits and making their mark in the business world.

Traditional skills once considered hobbies are now being transformed into sustainable livelihoods. Many women are starting home-based businesses in areas such as textiles,

catering, embroidery, boutiques, crafts, and more. They have begun entering the highly competitive world of business, striving for economic independence, and carving out a space for themselves in the entrepreneurial landscape (Ministry of MSME, 2021).

Transforming Homemakers into Entrepreneurs

Women are the backbone of society, and empowering them leads to the empowerment of the entire world. The Ministry of Micro, Small, and Medium Enterprises (MSME) has played a pivotal role in fostering women entrepreneurs through various schemes designed to nurture their talent and help them establish their own identities. Under the Prime Minister's Employment Generation Programme (PMEGP), women have set up 1.38 lakh projects since its inception up to January 23, 2019, accounting for approximately 30% of the total projects under the scheme.

Women entrepreneurs under PMEGP are categorized as a special group and are entitled to subsidies of 25% for urban projects and 35% for rural projects. Furthermore, their required personal contribution is only 5% of the project cost, compared to 10% for general beneficiaries. During 2016-17 and 2017-18, the Khadi and Village Industries Commission (KVIC) reported that women entrepreneurs launched 30,437 projects under the khadi program, with margin money assistance totaling ₹85,305 lakh.

Beyond MSME, the Government of India has introduced several initiatives aimed at empowering and ensuring the safety of women. Programs such as *Beti Bachao, Beti Padhao, Stand Up India*, *Mission Indradhanush*, *Mudra Yojana*, and entrepreneurship-focused schemes like *TREAD (Trade Related Entrepreneurship Assistance and Development)*, *Mahila Udyam Nidhi Scheme*, *Annapurna Scheme*, *Stree Shakti Package for Women Entrepreneurs*, *Bhartiya Mahila Business Bank Loan*, *Dena Shakti Scheme*, *Udyogini Scheme,* and *Cent Kalyani Scheme* have significantly contributed to the welfare and growth of women across the country (Ministry of MSME, 2021).

These efforts reflect the government's commitment to transforming homemakers into entrepreneurs, enabling women to achieve economic independence and contribute to the nation's progress.

Women Entrepreneurs in the Apparel Industry

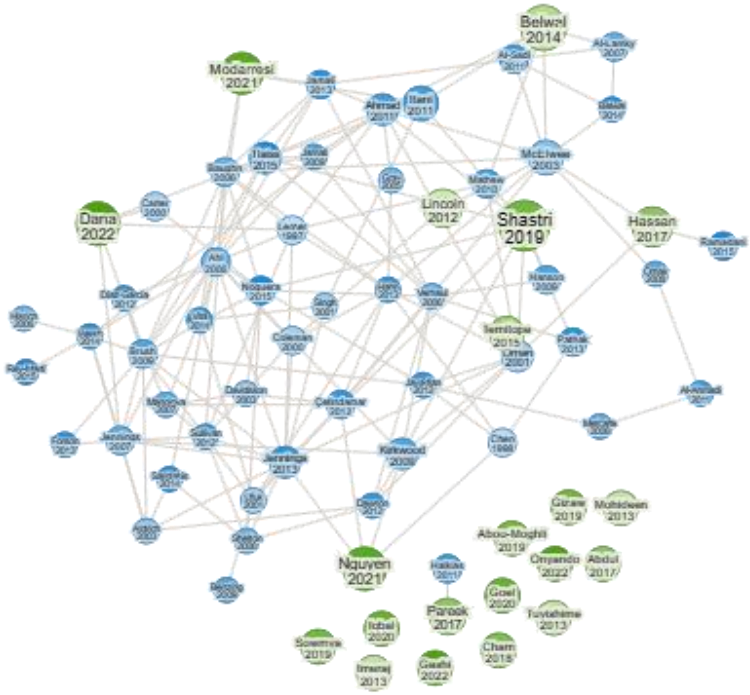
As Pandit Jawaharlal Nehru famously remarked, "When women move forward, the family moves, the village moves, and the nation moves." Over the past decade, women's entrepreneurship has been recognized as a critical yet underutilized driver of economic growth. Women entrepreneurs now play a vital role in the global entrepreneurial ecosystem, contributing significantly to economic development.

The apparel industry has seen remarkable growth in women-led ventures. What was once considered a hobby or a home-based activity has transformed into a thriving business domain. Today, women entrepreneurs are leading successful fashion boutiques and shaping the industry with creativity and innovation (Shah & Mehta, 2009).

By combining traditional skills with modern business practices, women in the apparel sector have carved out a significant niche for themselves, proving that their contributions are indispensable to the economy and society at large.

LITERATURE REVIEW

Classification of Literature Review: A broad classification of the previous paper is given as follows:



Source: Self constructed with the help of Research Rabbit software

A literature review involves the analysis of various secondary sources, including books, journals, articles, reports, case studies, and other materials relevant to the research topic. The primary purpose of a literature review is to identify existing studies, highlight gaps in the research, and provide insights that can guide and inform future investigations. By synthesizing prior findings, the literature review serves as a foundation for understanding the subject area and framing new research directions.

1.0 Studies on Problems and Challenges of Entrepreneur

Women entrepreneurs in India face a range of challenges and opportunities as they navigate the business landscape. According to Pallvi (2020), societal and familial opposition, lack of

confidence, limited financial access, mobility restrictions, and inadequate education remain key obstacles. The study underscores the importance of empowering initiatives, mass awareness campaigns, and support systems to educate and motivate women toward entrepreneurship. Similarly, research by Shakila and Melwya (2021) highlights financial constraints, conflicts between family and work obligations, and difficulties in sourcing raw materials and accessing markets. They suggest that support from family, society, government, and financial institutions can significantly improve marketability and profitability, allowing women entrepreneurs to surpass their male counterparts in success.

In Kerala, Iyer (2016) identifies financial constraints, inadequate institutional support, marketing challenges, societal attitudes, and a lack of skilled workers as major hurdles for women entrepreneurs in Ernakulam District. The study advocates for improved access to credit, institutional reforms, and governmental interventions to enhance entrepreneurial efficiency. Similarly, Sathyadevi and N.P (2016) examined women entrepreneurs in the Pattambi Block Panchayat, Palakkad District, and found that formal education and family support were key factors contributing to their success. Financial constraints and lack of workspace were also noted as significant challenges, reinforcing the need for family encouragement to boost confidence and business expansion.

A study conducted in Mysore District by Veena and Nagaraja (2014) highlights inadequate institutional support and societal attitudes as major barriers. They recommend increasing awareness about women's economic contributions and providing structured skill training programs to empower them. Meanwhile, Sahoo (2020) emphasizes that women entrepreneurs are a driving force in the corporate world, often balancing family responsibilities with business ventures. The research calls for more entrepreneurial awareness, orientation, and skill development programs to fully unlock their potential.

Dr. B. Ramesh (2018) further discusses the critical role women play in economic development despite challenges in a male-dominated society. The study notes that with adequate family, societal, and governmental support, women entrepreneurs can overcome barriers and achieve business growth and profitability. Research by Mauchi, Mutengezanwa, and Damiyano (2014) presents a case study from Mashonaland Central Province, revealing that most women entrepreneurs in the region were involved in traditional businesses like retailing and services, often operating for less than three years due to challenges in growth and sustainability.

A study by Ruiying Xiao (2024) examined the impact of female leadership on corporate financial constraints in China. The research found that companies with female CEOs or a

higher proportion of women in top management experienced reduced financial constraints. However, the influence of female board members was less definitive. These findings suggest that female leadership can enhance corporate financial resilience, which is crucial for women entrepreneurs in the apparel sector.

Aditi Bhatia-Kalluri's (2021) research, while not specific to the apparel industry, addressed the challenges rural micro-entrepreneurs in India face in adopting e-commerce. The study highlighted infrastructure limitations and information asymmetries as significant barriers. Given the increasing importance of online sales in the apparel industry, these insights are pertinent for women entrepreneurs seeking to expand their market reach.

Research by Petrescu and Suciu (2024) explored perceptions of entrepreneurship among graduate students, focusing on challenges related to cultural biases and gender discrimination. The study revealed that women continue to face limited representation in leadership roles and are often perceived as less capable in business. These biases can hinder the growth and success of women entrepreneurs in the apparel industry.

On a global level, Jahanshahi, Pitamber, and Nawaser (2010) highlight that government development initiatives have largely benefited urban, middle-class women, leaving rural and underprivileged women with limited support. They call for more inclusive policies, better schemes, and development programs to encourage entrepreneurship across all demographics. Lastly, Gaur, Kulshreshtha, and Chaturvedi (2018) acknowledge the increasing acceptance of women entrepreneurs in the economic landscape, aided by financial institutions and special banking cells. However, societal and familial challenges persist, with many women choosing entrepreneurship for its work-life balance advantages, demonstrating their growing significance as economic contributors.

Overall, the literature suggests that while women entrepreneurs in India face significant challenges, supportive measures from family, society, and government can help them thrive in the business sector. Addressing these issues through policy interventions, financial access, and skill development programs is crucial for fostering a more inclusive entrepreneurial environment.

2.0 Studies related to Problems of entrepreneurs in Apparel or Textile Industry

Women entrepreneurs in the fashion and apparel sector face numerous challenges that impact their growth and success. Rao and H.G. (2012) conducted a study on women entrepreneurs in Coastal Karnataka, highlighting key obstacles such as limited access to finance, intense competition, and a shortage of skilled labor. Their research emphasizes that formal education and training play a crucial role in helping women overcome these barriers and establish

successful enterprises in the fashion and apparel industry. Similarly, Viswapriya and Mayilvaganan (2020) examined the challenges faced by women micro-entrepreneurs in the textile industry of Tirupur District, Tamil Nadu. They found that 65% of women engaged in the sector were unskilled, which restricted their entrepreneurial potential. The study advocates for targeted training programs and support systems, particularly through self-help groups in ready-made garment production, to enhance women's contribution to the textile industry.

Government initiatives have played a role in fostering women entrepreneurship in the textile and technical textile sectors, as discussed by Gurusamy, Umamaheswari, and Rajasekar (2012). Despite India's strong presence in apparel exports, the study argues that the country has missed growth opportunities due to the inadequate development of women entrepreneurs in the textile sector. It calls for increased awareness and structured support to help women capitalize on emerging opportunities. A case study by Chandwani, Bulsara, and Gandhi (2015) on Jaishree Kabra, an entrepreneur in the garment sector in Surat, presents a unique perspective. Unlike many others, Kabra reported no significant barriers in her entrepreneurial journey, illustrating that success is possible with determination and support. However, the study acknowledges the presence of broader structural challenges that need to be addressed to create a more favorable business environment for women entrepreneurs.

Shah and Mehta (2009) explored the specific challenges faced by women entrepreneurs in the fashion design industry in Ahmedabad. Their study identifies barriers such as low confidence, inadequate financial support, socio-cultural constraints, male-female competition, limited mobility, a lack of professional attitude, and insufficient knowledge of the latest technological advancements. To help women overcome these hurdles, the research emphasizes the need for improved educational opportunities and professional development programs in the fashion industry.

Overall, these studies indicate that women entrepreneurs in the fashion and apparel sector continue to struggle with financial constraints, skill shortages, and societal barriers. Addressing these issues through enhanced education, skill development, and supportive policies will be critical in fostering a more inclusive and growth-oriented entrepreneurial ecosystem for women in the industry.

Summary of research gap

From the literature reviewed, it is evident that while significant research has been conducted on the challenges faced by women entrepreneurs in various regions of India, there is a noticeable gap in studies specifically addressing the situation in Agra, particularly in the

context of the apparel industry. Most existing studies highlight the broad range of challenges faced by women entrepreneurs, such as financial constraints, lack of education and training, socio-cultural barriers, and market competition, but these studies are not specific to the Agra region.

In Agra, the pace of women entrepreneurship development remains relatively slow, and the reasons behind this stagnation have not been adequately explored. The lack of focus on Agra, especially in the context of women entrepreneurs in the apparel sector, suggests that there is a need for targeted research to understand the unique challenges faced by these women. By conducting research specifically in Agra, it is possible to uncover region-specific issues that may be hindering the growth of women-led businesses, such as local economic conditions, societal attitudes, or specific barriers within the apparel industry.

This study, therefore, aims to fill the existing research gap by examining the challenges faced by women entrepreneurs in Agra, with a particular focus on the apparel industry. The findings could offer valuable insights into the specific obstacles faced by women in this region, helping to inform policies and initiatives that can support the growth of women entrepreneurship in Agra. By identifying and addressing these challenges, suitable measures can be developed to foster the development and success of women entrepreneurs in the region, ultimately contributing to broader economic growth and gender equality.

Statement of the Problem

The increasing participation of women in the global workforce has paved the way for a significant rise in the number of women entrepreneurs across different sectors. In India, women constitute a substantial portion of the population and represent the second-largest group of potential entrepreneurs. Despite this, women remain a largely underrepresented and neglected segment of India's paid labor force. Recognizing the critical role women play in the nation's economic development, the Government of India has initiated numerous developmental programs since the fifth Five-Year Plan (1974–78) to foster entrepreneurship among women.

However, despite these efforts, it continues to be a major challenge for the government and supporting agencies to effectively identify and engage potential women entrepreneurs, assess their status, and understand the specific challenges they face. The goal is to optimize the benefits of promotional measures and ensure sustainable growth of women entrepreneurship across the country. Over the years, the promotion of women entrepreneurship has become an important area of debate among academics, policymakers, and support agencies.

While several studies have been conducted in the southern regions of India, there has been limited research on women entrepreneurship in specific regions, such as Agra. Despite the government's special incentives and concessional packages designed to encourage women entrepreneurship, there are significant barriers at every stage of development that hinder their progress. These challenges pose a serious threat to the growth and success of women-led businesses.

Therefore, it is crucial to conduct more specific studies on women entrepreneurship in Agra and similar regions to gain a better understanding of the unique problems faced by women entrepreneurs. Addressing these challenges through targeted research will help develop tailored strategies and interventions that can support the growth and empowerment of women entrepreneurs, leading to broader economic development and greater gender equality.

Objectives of the study

- To identify the current scenario of Women Entrepreneurs in Agra Region.
- To find out the problems of Women Entrepreneurs.
- To suggest the prospects of women entrepreneurship in the Apparel Industries.

Scope of the Study

The study aims to focus specifically on the apparel or textile-related industries run by women entrepreneurs in the Agra region. The primary objective of the research is to identify and understand the challenges faced by women entrepreneurs in the textile and apparel sectors, particularly in the context of Agra, without distinguishing between urban or rural settings. The study encompasses both registered and unregistered units, as these are crucial to accurately representing the entrepreneurial landscape in the region.

A critical aspect of the study is that it includes women entrepreneurs operating in both formal and informal sectors, as data from official records, such as MSME or District Industry Centre (DIC) reports, often fails to reflect the true representation of women-led businesses. This is due to issues like closures of registered units or instances where male entrepreneurs are listed as the owners, yet women are running the businesses without receiving formal recognition or ownership. This discrepancy makes it essential to broaden the scope of the research to include both registered and unregistered units, ensuring that the study reflects the real situation of women entrepreneurs in the apparel and textile industries of Agra.

By focusing on this comprehensive approach, the study seeks to provide a more accurate and holistic understanding of the challenges and opportunities faced by women entrepreneurs in Agra’s apparel and textile sector.

Purpose of the Study

The purpose of this study is to examine the challenges and issues faced by women business owners, particularly in the Agra district of Uttar Pradesh. The study aims to provide an in-depth understanding of the obstacles and opportunities for women entrepreneurs in the textile and apparel sectors in this region. The research investigates the conditions under which women entrepreneurs operate, with a particular focus on those involved in handlooms, boutiques, knitting and embroidery businesses, carpet production, and factories that manufacture jute bags.

Methodology

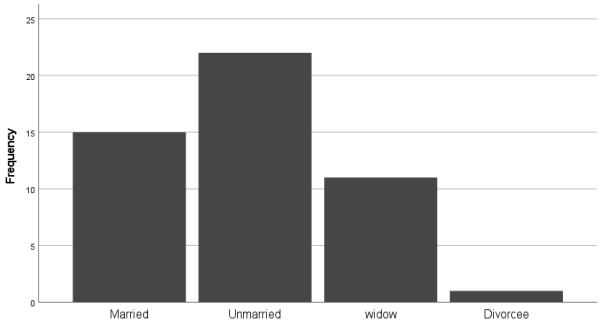
The study uses both primary and secondary sources of data. Primary data was collected through purposive sampling, selecting 49 female entrepreneurs who are engaged in various sectors of the textile and apparel industry. The purposive sampling technique was chosen to ensure that the sample includes only those women who are actively involved in their businesses, providing a targeted insight into the challenges they face.

A semi-structured interview schedule was developed as the primary data collection tool. This interview schedule was designed to gather detailed, qualitative information regarding the issues these female business owners confront in their operations. The interviews provided an opportunity to understand the unique difficulties related to managing handlooms, boutiques, knitting, embroidery, carpets, and jute bag manufacturing businesses.

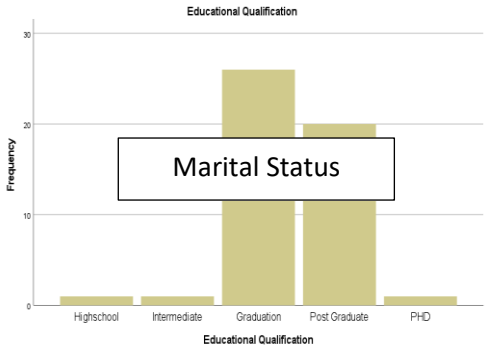
Through this approach, the study aims to identify the key barriers to growth and development for women entrepreneurs in Agra, offering valuable insights into the specific context of the region and the industries they operate in.

Results and Discussions

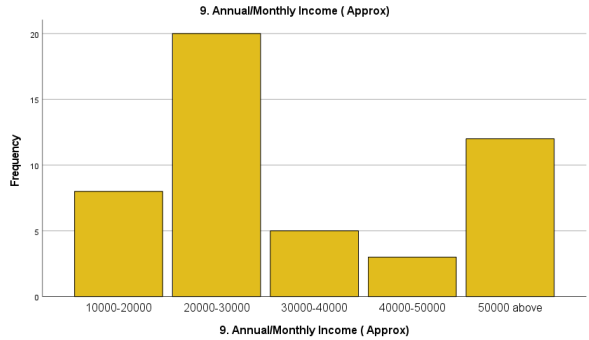
Demographic Variables

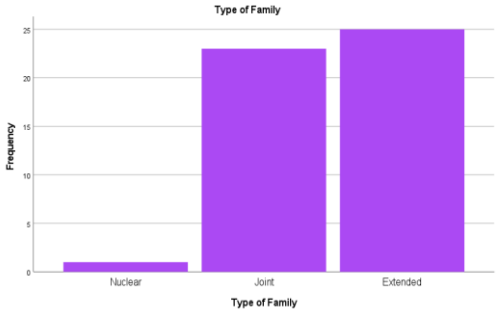


Marital Status



Educational Qualification





Problems of Women Entrepreneurs

Financial Problems of Women Entrepreneurs

Finance is a critical element for the success of any business and is often referred to as the "lifeblood" of entrepreneurial ventures. It is essential for acquiring supplies, tools, equipment, and for engaging in innovation. Capital serves as a lubricant for the production process, enabling businesses to function smoothly. However, for many women entrepreneurs, financial barriers remain one of the most significant challenges they face.

A lack of funding can discourage potential women entrepreneurs from starting new businesses, as many are unable to access the necessary financial resources to launch and sustain their operations. This financial gap can prevent women from acquiring the required fixed and working capital, which are essential for business growth and stability. Without adequate capital, it becomes difficult for women to invest in business expansion, infrastructure, or technology, which in turn limits their ability to innovate and remain competitive in the market.

This lack of access to finance is particularly pronounced for women in rural areas or those without the necessary social connections, and it can perpetuate existing gender inequalities. Many women entrepreneurs are often unable to secure loans or financial support from traditional financial institutions, due to factors such as limited credit history, collateral requirements, and biases against women-owned businesses. Therefore, addressing financial constraints is essential for the growth and development of women entrepreneurship. Support mechanisms such as easier access to credit, government grants, microfinance, and other funding options can significantly contribute to empowering women entrepreneurs and fostering their success in the business world.

The table below presents the nature of problems faced by women entrepreneurs in the Agra region, along with their frequency and percentage distribution:

S.No	Nature of Problems	Frequency	Percentage
1	High cost of required machines	17	34.69%
2	Difficulties in obtaining financial aid	19	38.77%
3	Lack of knowledge about government subsidies	14	28.57%

Analysis:

- **High cost of required machines**: 34.69% of women entrepreneurs face the challenge of acquiring machinery due to high costs. This indicates a barrier to scaling their businesses and modernizing their operations.
- **Difficulties in obtaining financial aids**: 38.77% of respondents cited difficulties in accessing financial support, which is the most common challenge. This reflects the broader financial constraints faced by women entrepreneurs in securing necessary funds for business development.
- **Lack of knowledge about government subsidies**: 28.57% of women entrepreneurs lack awareness of available government subsidies, which limits their ability to benefit from schemes that could support their growth.

These findings highlight the financial struggles that many women entrepreneurs encounter, emphasizing the need for improved access to financial resources and awareness programs on government incentives.

2. Marketing Problems of Women

The table below outlines the marketing problems faced by women entrepreneurs in the Agra region, along with their frequency and percentage distribution:

S.No	Nature of Problems	Frequency	Percentage
1	Lack of demand in the local market	23	46.93%
2	Competition from major brands	19	38.77%
3	Lack of marketing competency	7	14.2%

Analysis:

- **Lack of demand in local market**: 46.93% of women entrepreneurs report that a lack of demand in the local market is a significant challenge. This points to potential issues related to market research, customer awareness, or product-market fit.
- **Competition from major brands**: 38.77% face competition from larger, well-established brands, which can affect their ability to capture market share, especially in price-sensitive or brand-conscious markets.

- **Lack of marketing competency**: 14.2% of women entrepreneurs struggle with marketing skills, which limits their ability to promote their products effectively and reach a wider customer base.

These marketing challenges indicate the need for support in market analysis, branding strategies, and enhancing marketing capabilities to improve the visibility and demand for products from women-owned businesses.

The table below presents the social problems faced by women entrepreneurs in the Agra region, along with their frequency and percentage distribution:

S.No	Nature of Problems	Frequency	Percentage
1	Dominance of male	29	59.18%
2	Family commitments	15	30.61%
3	Personal health issues	5	10.20%

Analysis:

- **Dominance of male**: A significant 59.18% of women entrepreneurs report that male dominance is a primary issue. This highlights the patriarchal societal structure where major decisions are often made by male family members, particularly husbands. This can limit the autonomy of women in business operations.
- **Family commitments**: 30.61% of women entrepreneurs face constraints due to family responsibilities, such as caring for young children or dependent in-laws. This adds additional burden to their professional lives, limiting their time and energy for business growth.
- **Personal health issues**: 10.20% of respondents cite personal health issues as a barrier. This indicates that physical well-being can affect the ability of women entrepreneurs to fully engage in business activities, potentially leading to increased absenteeism or decreased productivity.

These social challenges emphasize the need for addressing gender dynamics, providing family-friendly policies, and supporting the well-being of women entrepreneurs to ensure they can balance personal and professional responsibilities effectively.

Suggestions and conclusions

The study's findings offer valuable insights into the factors affecting the growth of women entrepreneurs, particularly in the Agra region. Based on these findings, the following suggestions have been put forward to help improve the entrepreneurial ecosystem for women:

1. **Selection of Potential Female Entrepreneurs**: A structured method should be developed to identify potential female managers and entrepreneurs at the outset. This would involve assessing their capabilities and developing necessary skills and philosophies from the early stages.

2. Comprehensive Training Programs: Women entrepreneurs need access to training that focuses not only on technical skills but also on **Achievement Motivation-Training**. Support should also include management training and technical orientation, which would be vital for boosting confidence and competence in running their businesses effectively.

3. Support for SC/ST Community Members: Members of the **SC/ST community** face additional challenges due to lower access to education and training. Special motivational programs should be tailored to this group, helping them unlock their potential by providing them with adequate training, education, and counseling. Such initiatives would encourage goal-oriented behavior and entrepreneurial growth.

4. Building Networks for Support: To create a conducive environment for entrepreneurship, networks should be established for providing **social safety net services**, access to working capital, and connecting vulnerable groups with resources. These networks will offer the necessary backing and encouragement for women entrepreneurs to thrive.

5. Technology and Machinery Access: Many female entrepreneurs face difficulties in selecting the right technology and machinery for their businesses. To address this, **Machine and Process Banks** could be created, providing women with comprehensive information on suitable machines and technologies. These platforms would also offer guidance on technology transfer and appropriate machinery selection.

These suggestions aim to address the financial, social, and personal challenges that women entrepreneurs face in Agra. By implementing such measures, the growth of women-owned businesses can be supported, creating an environment where women entrepreneurs are empowered to succeed and contribute significantly to the economy.

Limitations of the study

The limitations of the study are as follows:

1. Limited Time and Resources: The availability of time and resources was a constraint, which limited the quantity of data collected and analyzed. This restricted the ability to draw more comprehensive conclusions from a larger dataset.

2. Language Barrier: To ensure effective communication with uneducated women entrepreneurs, the study was conducted in Hindi. While this was necessary for ensuring

comfort and clarity, it may have introduced language biases or limitations in expressing certain technical or specific business-related terms.

3. Small Sample Size: Due to time constraints, the study relied on a relatively small sample size. This limited the ability to generalize the findings across a larger population of women entrepreneurs in the Agra region, potentially affecting the representativeness of the data.

4. Despite these limitations, the study provides valuable insights into the challenges faced by women entrepreneurs in the apparel industry in Agra. However, future research could address these limitations by expanding the sample size, conducting the study in multiple languages, and allowing for more time and resources for data collection and analysis.

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Digital Assam: Reshaping Governance for Efficiency and Transparency

Dikumoni Hazarika, Bhawna Gupta

Department of Political Science, Panjab University, Chandigarh
Department of Public Administration, Panjab University, Chandigarh
Corresponding author: dikumonihazarika1@gmail.com
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Abstract

E-governance leverages technology to enhance government services, simplify communication, and integrate systems between the government and citizens. Building on the foundation of Digital India, the Assam government is actively working to enhance 'Digital Assam'. The National e-Governance Service Delivery Assessment (NeSDA) initiative, in collaboration with the National Informatics Centre (NIC) Assam State Centre, has been instrumental in driving digital transformation. NIC Assam has served as the Information and Communication Technologies (ICT) backbone of the state, connecting government offices through NICNET and enabling seamless communication and e-governance services. Assam has made major improvements in establishing digital governance, but challenges remain. Poverty, geographical barriers, infrastructure gaps, digital illiteracy, and funding constraints continue to hinder the full-scale implementation of e-governance initiatives in the state. This paper aims to examine the journey of Digital Assam, highlighting its achievements, challenges, and prospects in e-governance. The study is descriptive and relies on secondary data collected from government reports, policy documents, research studies, books, newspaper reports, etc. The finding shows that the state has successfully launched 100 per cent e-services through its unified portal, Sewa Setu, offering uninterrupted public service access. Key initiatives like Mission Bhumiputra (digital caste certificates), Mission Basundhara 2.0 (land record updates), e-district (Sugam), Direct Benefit Transfer (Arunodoi Scheme), Kritagyata Pension Seva Kendras, and e-Prastuti are driving socio-economic transformation in Assam. The study highlights that the successful implementation of e-governance in Assam requires an effective telecommunications network, skilled IT professionals, a stable electricity supply and government officials' digital competence. The authors have acknowledged the role of NIC in launching several innovative digital initiatives, ensuring that governance becomes more accessible, transparent, and efficient for all citizens.

Keywords: *E-governance, Digitalization, Digital Assam, Digital Divide, Empowerment.*

Introduction

In recent decades, countries around the world have implemented large-scale public sector reforms to prioritize digitalization to improve the effectiveness of public services. As a result, they have built online service platforms shared by various public sector organizations to streamline administrative operations and increase interactions with citizens (OECD, 2019). Even in India the thrust of administrative reforms has been to bring the government and citizens closer together through digital technology, with the policy goal of *'Maximum Governance - Minimal Government'* (Srinivas, 2022). According to the World Bank, e-governance is a technology-driven approach to delivering government services, facilitating information exchange, and integrating systems between the government and citizens. Advancements in ICT

have paved the way for good governance, leading to the growth of e-governance as a progressive concept. The United Nations Sustainable Development Goals (SDGs) framework recognizes the development of ICTs and global interconnection as having tremendous potential to accelerate human progress, close the digital divide, and build knowledge societies. People have been empowered by digital tools and social media due to extensive access to information and worldwide connections. Technology is being used by citizens to hold governments accountable and to exercise their civic rights. Technology is being used by governments to make government more transparent, accountable, and inclusive.

Objectives & Methodology of the Paper

This paper aims to examine the journey of Digital Assam, highlighting its achievements, challenges, and prospects in e-governance. The primary objectives are:

1. To analyse the digital reforms and initiatives undertaken by the Assam government.
2. To identify key challenges hindering digital transformation in the state.
3. To provide recommendations for strengthening Assam's digital governance framework.

The study is descriptive and relies on secondary data collected from government reports, policy documents, research studies, books, newspaper reports, etc. Key sources include reports from the Government of Assam and India, the United Nations Development Programme (UNDP), the United Nations Educational, Scientific and Cultural Organization (UNESCO), Organisation for Economic Co-operation and Development (OECD), the National Institution for Transforming India (NITI Aayog), and the Department of Administrative Reforms and Public Grievances (DARPG).

E-Governance- A Conceptual Framework

In the year 2005, UNDP defined, *"e-Governance as ICT to improve information and service delivery, encouraging citizen participation in the decision-making process, and making government more accountable, transparent, and effective."*

According to UNESCO, the goal of implementing e-governance is to improve good governance. Recent improvements in communication technologies and the internet offer chances to reshape the interaction between governments and citizens in novel ways, thereby contributing to the attainment of good governance objectives.

UNESCO identifies the fields of implementation of e-governance as follows:

E-Administration focuses on using technology to enhance government processes and how the public sector operates internally.

E-Services aims to improve public service delivery to citizens, like providing access to documents, certificates, and permits online.

E-Democracy promotes greater citizen participation in decision-making using technology. Some key principles that are significant for digital development, as explained by the Organisation for Economic Co-operation and Development (OECD), 2018 report, have been discussed in Table 1.

Table 1: Principles for Digital Development

Principle	Description
Design with the user	Focus on the users by understanding their needs through conversations, observation, and collaboration.
Understand the existing ecosystem.	Consider the local structures and needs when designing initiatives and digital tools.
Design for scale	Plan for expansion beyond the initial group, often by securing resources to reach more communities.
Build for sustainability	Create long-lasting programs and tools that continue to engage users and stakeholders.
Be data-driven	Use accurate data to inform decisions, ensuring the right people have the right information.
Use open standards, data, and sources.	Promote collaboration by sharing digital solutions, reducing redundant efforts.
Reuse and improve	Build on existing work to enhance what others have already developed.
Address privacy and security.	Ensure proper handling of data, focusing on how it's collected, used, stored, and shared.
Be collaborative	Share knowledge, strategies, and resources across projects to increase impact and efficiency.

Source: OECD, Principles for Digital Development, 2018

Digitization in India

In order to enable the general public to benefit from a variety of services and to promote digital inclusion, India has taken the lead in developing creative digital projects and extensive programs (GOI, 2022). The establishment of the *Department of Electronics* in 1970 was the first significant step towards e-governance in India since it focused attention on *"information"* and how it is communicated. The *District Information System* initiative was started by the *National Informatics Center (NIC),* which was founded in 1977, to computerize every district office nationwide. The primary impetus for e-governance in India was the establishment of

NICNET, the National Satellite-Based Computer Network, in 1987 (Mondal, 2019). The *National e-Government Plan (NeGP)* was rolled out in 2006. The mission of this plan was to *'make all government services available to the common citizen in his locality through common service delivery outlets, and assure efficiency, transparency, and reliability of such services at affordable costs to realize the basic needs of the average person' is a significant step.*

India has the potential to become the world's fastest-growing digital economy with the help of public-private partnerships, supportive policies, and a startup ecosystem (IBEF, 2022). The Indian government's digital campaign and its follow-up initiatives, including the e-governance platform *UMANG, the accessible India campaign, Bharat Net, Digital Locker, the Agri Market app, the My Gov platform, the CPGRAMS* (online public grievance platform), *DIKSHA Portal (PM e-Vidya), e-SHRAM* (a national database for unorganized workers), *Jeevan Praman* (biometric enabled digital service for pensioners) and many more, attempt to close the digital divide among the Indian population. E-governance in India is evolving rapidly, particularly in the agricultural sector through initiatives like the *National E-governance Plan for Agriculture and Digital AgriStack* (Balkrishna et al., 2024). To promote e-government initiatives and improve digital government excellence, the *National e-Governance Service Delivery Assessment (NeSDA)* was established by the Department of Administrative Reforms and Public Grievances (DARPG) in 2019. So, governments across the country have placed a higher emphasis on integrated service delivery, increasing the number of e-services delivered through centralized portals. These portals also offer uniform access to services, which improves accessibility and usability (PIB, 2022).

The growth of digital governance in India has been driven by significant advancements in information technology, especially since the launch of the *Digital India* campaign in 2015. *Digital India* aims to strengthen nine key growth pillars, which include:

a) Broadband Highways
b) Universal Access to Mobile Connectivity
c) Public Internet Access Program
d) e-Governance: Using Technology to Transform Government
e) e-Kranti - Electronic Service Delivery
f) Information for Everyone
g) Electronics Manufacturing
h) Information Technology for Jobs
i) Early Harvest Programmes

Under the *Digital India* Initiative, the Ministry of Electronics, and Information Technology (MeitY) has established a network of *Common Services Centres (CSC)*. With one CSC in each of the country's 2.50 lakh Gram Panchayats (GPs) for the delivery of various Government-to-Citizen (G2C) and other citizen-centric e-services to citizens. It is a self-sustaining business concept run by Village Level Entrepreneurs (VLEs) (PIB, 2022).

The massive wave of digitization, increased smartphone penetration, and technological acceptance have offered openings for both traditional and new-age sectors. The rollout of 5G services has the potential to open new economic opportunities and help the country overcome traditional development barriers, promote innovation by start-ups and business enterprises, and advance the *'Digital India'* vision. A few of the many success stories include the *Aadhar program, Co-WIN portal, Digi Locker, Open Network for Digital Commerce (ONDC), Open Credit Enablement Network (OCEN), Goods and Services Tax (GST), Direct Benefit Transfer (DBT) and Government e-Marketplace (GeM) Sahay,* etc (Economic Survey, 2021-22*). Ayushman Bharat Health Account (ABHA)* centralized health information repository designed to improve healthcare access and support telehealth initiatives (ABDM, 2024). The Indian government deployed digital technology to control the flow of corruption in social welfare programmes. Government welfare programmes use biometric identification to link beneficiaries' bank accounts, which citizens receive services, subsidized food rations, pensions, and so on (Rao, 2023). In terms of land records, *Svamitva Yojana* provides digitized land records to legitimate owners by leveraging the power of drones and GIS technologies, and about 2.14 crore land have been digitized in India (GOI, 2021).

Digitization in Assam

Assam is the most developed state in Northeast India and is rapidly becoming a key economic and commercial hub for future business with Southeast Asian countries. With the Indian government's emphasis on the '*Act East Policy,'* the state's significance in business and trade is expected to grow even more. A large portion of the population in the age group of 15 to 30 years in the major towns of Assam are IT literate and skilled with good command of the English language (GOA, 2017). To fasten the digitization process in the State in 2017, Assam introduced a new IT and Electronics Policy to support 'SMART' governance through digital systems. This policy aimed to establish Assam as a leading ICT hub, make 25 lakh rural citizens digitally literate by 2022, and provide computer education in all government schools (GOA, 2017). Google collaborates with the Assam Government's *Skill, Employment, and Entrepreneurship Department* (SEED) to strengthen its school digitization efforts to drive digital-led learning and skill development for students and youth in the state (TOI, 2022).

Another remarkable project of the state government towards digitization is the implementation of an *e-district (The Sugam)* project in 2016. Before the launch of the Assam *e-district* project, citizens had to travel to block offices or tahsil offices and district headquarters to obtain basic services such as income, caste, birth and death certificates, and domicile certificates. But, with the execution of the *e-district* project, it becomes feasible to get e-delivery of the services and eliminates the necessity for an applicant to visit a public office. The Government of Assam's IT Department carried out *e- e-district* project. In Assam, a total of 53 citizen-centric services have been identified for service delivery via *e-district*.

The IT Department of the Government of Assam has introduced an initiative called *e-Prastuti*, aimed at standardizing websites. This project has been successful and received second place in the CM Awards for Excellence in Public Administration, 2017. At the introduction of the *Sadhbhavana* portal in Guwahati on February 1, 2022, Assam took a big step closer to digitization. The *Sadhbhavana* portal attempts to get rid of outdated documents that have been sitting at the Assam secretariat for a few decades, some dating back as far as the 1990s. The *Kritagyata portal* has been introduced to pensioners to enable pensioners to digitally apply for pensions, track sanctions, and monitor payments. Under the *Kritagyata portal* in 2022, Assam inaugurated 27 *Kritagyata Pension Seva Kendras (PSKs)* as facilitation centers to provide support to pensioners across the state. Assam's 'Darpan', developed by the provides a visual representation of data on Key Performance Indicators (KPIs) for the state's flagship schemes and projects. This helps in tracking progress, enhancing transparency, and improving decision-making. Another significant initiative is the *Smart Performance Appraisal Report Recording Online Window (SPARROW)*. This system has been adopted by the Assam Government to digitize and streamline the performance appraisal process for government employees, making it more efficient, transparent, and accessible.

The NIC has conceptualized, designed, and developed many other ICT-based applications for the State Government including digital platforms *like e-courts, e-Vahan, Sarathi, e-panchayat, e-counselling, e-prison, e-hospital, e-procurement, Solid Health Card, e-Gras, Swachh Bharat, e-Vidhan, Rural Employment, Jeevan Pranam, Scholarship, MyGov, e-Land Records, etc which has been discussed in detail in next section*.

Major Digital Reforms/Initiatives of The State

E-governance in Assam started in the late 1980s with the establishment of NIC Assam State Centre in 1986. NIC introduced ICT in government offices and connected them through NICNET for better communication and data sharing. The launch of Digital India in 2015 gave a significant boost to e-governance reforms in the state. Since then, Assam has implemented

various digital initiatives to improve service delivery, transparency, and efficiency in governance, which have been discussed below:

1. **Service Delivery Initiatives:** Standardization of state government websites used to convey information and services is one of the major service delivery initiatives. The e-services have been developed and connected with e-forms/applications and are made available to residents via a single portal as well as departmental portals. Integration of existing e-governance applications with the National Register of Citizens (NRC) and Aadhar is done in stages. For effective service delivery under the National e-Governance Plan, the existing *Community Information Centres (CICs) were combined with the Common Service Centers (CSC) Scheme* (PIB, 2011). The CSCs and CICs in Assam provide essential digital services, including internet access, email, computer literacy training, printing, word processing, and desktop publishing. CSCs also offer high-quality and cost-effective video, voice, and data services in areas such as e-governance, education, health, telemedicine, and entertainment. To improve government efficiency, the state has implemented the e-Office module, with *the File Management System (FMS)* as a key component, funded under the NeGP. Several initiatives have been introduced under the e-Panchayat program to enhance governance in rural Assam. The *National Panchayat Portal (NPP)* serves as a dynamic platform for Panchayats to share public information. Moreover, the Dristi web-based GIS application captures spatial data for assets created under schemes such as MGNREGA, PMAY, BRGF, and DDP. The Digital Gaon Panchayat program of the state aims to transform selected Panchayats into digital hubs by providing free Wi-Fi and digital literacy training, focusing on e-commerce and e-services. A significant step towards digital public service delivery, *Mission Bhumiputra*, launched in 2022, simplified the issuance of digital caste certificates to students. This initiative is implemented by the Tribal Affairs (Plain) and Social Justice Empowerment Departments, reinforcing the state's commitment to transparency and efficiency in governance (GOA, 2024).
2. **Transparency Initiatives:** As part of its transparency initiative, Assam has introduced a single unified electronic platform for procurement. The state government enacted the *Assam Public Procurement Act, 2017*, and enhanced the e-procurement system in collaboration with the *State Finance Department.* Another transparency initiative was the end-to-end computerization of the *Targeted Public Distribution System (TPDS)* which ensures system-generated food grain distribution to increase transparency up to the level of Fair Price Shops, digital records of beneficiary details, etc. To bring transparency to land records, *'Mission Basundhara 2.0'* was conceptualized to resolve issues/ disputes of land revenue services.

The mission intends to shorten the time it takes to update land records by using an online mode, which will help in the rapid disposal of services requested by residents. The following land-related services are going to be accessible through the Basundhara 2.0 portal (Khas settlement and surplus land ceiling, Occupancy Tenant Settlement, Special cultivator settlement, Tribal communities' hereditary land settlement, etc). To ensure transparency in governance, addressing public complaints is essential. The Government of Assam has taken a significant step in this direction by implementing the *Centralized Public Grievances Redressal and Monitoring System (CPGRAMS)* under the Administrative Reforms & Training Department. This initiative aims to expedite the resolution of public grievances, enhancing accountability and responsiveness in the administration. To enhance transparency in the judiciary, Assam has implemented the *E-Court Project,* which provides laptops and laser printers to judicial offices for better record-keeping and case management. An official website has also been introduced to improve accessibility to judicial information. To improve operations in the transport sector, *the "Vahan and Sarathi" Project* has been launched. This initiative, implemented in 26 out of 27 districts, aims to digitize vehicle registration and driving license issuance, making the services more efficient and accessible at District Transport Offices (DTOs) (GOA, 2024).

3. **Digital Empowerment Initiatives**: To empower citizens digitally, the Government of Assam has started the Digital Literacy Program in collaboration with the *National Digital Literacy Mission (NDLM) and DISHA*. The government paid particular attention to the implementation *of 'PMdisha'*, which aims to provide individuals in rural areas with free digital literacy instruction. To promote financial inclusion, the Government of Assam launched *the Orunodoi (Arunodoi)* Scheme on October 2, 2020. This initiative is a significant step toward socio-economic empowerment, benefiting 19.10 lakh families by providing ₹1000 per month directly into the bank accounts of the nominated woman in each household through the Direct Benefit Transfer (DBT) mode. In the healthcare sector, the *Niramay* initiative focuses on the digitalization of health services in Assam. It aims to strengthen digital infrastructure by enabling telemedicine interactions, rapid diagnostics, and digitized patient health records. The National Health Mission (NHM) has undertaken this project in collaboration with Piramal Swasthya, a non-profit health organization, and Cisco, a global IT company, to modernize and improve the state's public healthcare system (GOA, 2024).
4. **Business Initiatives:** To prosper business, the *Ease of Doing Business (EODB)* in Assam is designed to create a conducive business environment for both new and existing enterprises,

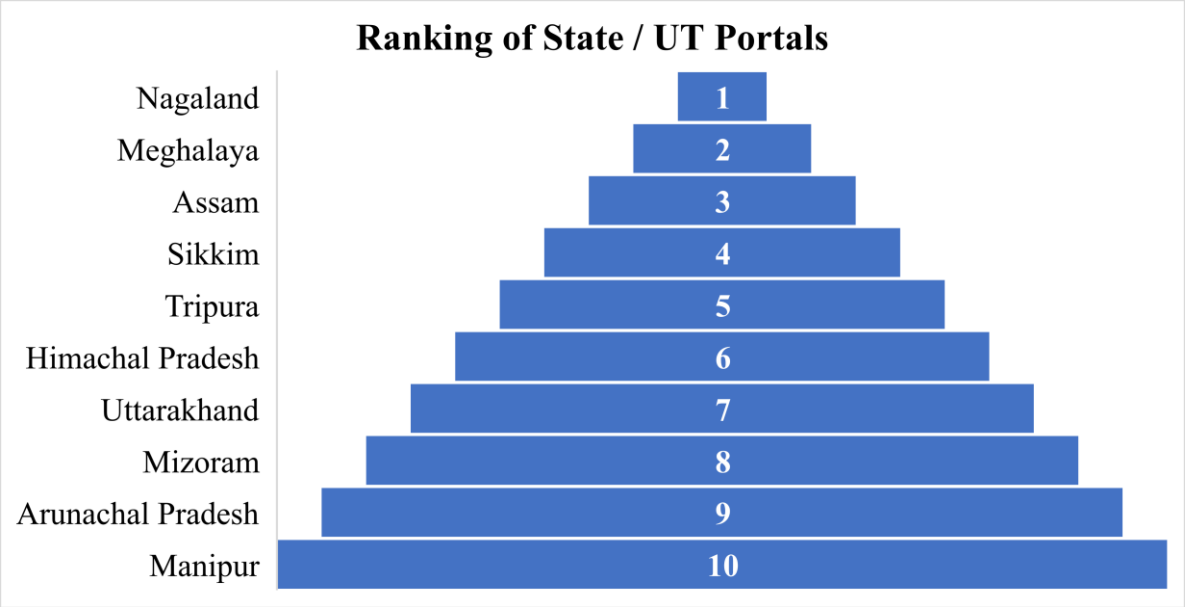
creating economic growth through technology, innovation, inclusivity, and sustainability. This initiative provides an objective assessment of business regulations, particularly for small and medium-sized enterprises (SMEs), by evaluating the regulatory challenges they encounter throughout their lifecycle. To implement the *Assam Ease of Doing Business Act, of 2016*, the *EODB Portal* was established, thereby enhancing transparency. The *Office of the Development Commissioner*, *MSME*, introduced *My MSME* (a web-based and mobile application that enables entrepreneurs to apply for various schemes, track application statuses, and access business support services directly from their smartphones).

5. **The New Technology Initiatives**: As a new technology initiative, the Assam government has developed a *100-acre IT park* near Lokpriya Gopinath Bordoloi International Airport, attracting significant investor interest and boosting the state's IT sector. To improve public service delivery and resource optimization, Assam is embracing advanced technologies such as IoT, AI, machine learning, cybersecurity, big data, virtual reality, and 5G communication. The *Assam Wide Area Network (ASWAN*) has strengthened communication by linking district, sub-divisional, circle, and block offices across the state. In disaster management, *the Jal Tarangini scheme* leverages IoT technology for automated river water level monitoring, replacing manual data collection with a scientific and energy-efficient system. This initiative enhances flood prediction, water resource management, and disaster preparedness, enabling Assam to respond more effectively to water-related challenges (NIC,2024).

An Analysis of Progress of Digital Assam

The *National e-Governance Service Delivery Assessment (NeSDA)* 2021 evaluated State and Union Territory (UT) portals based on their effectiveness in delivering digital services to citizens. This assessment aimed to enhance governance by ensuring seamless and accessible service delivery. Among the northeastern states, Nagaland secured the top rank, followed by Meghalaya and Assam in third place (See Figure 1). Assam's strong performance highlights effective e-governance reforms in the state. The state has made significant progress in improving online service delivery through initiatives like *Mission Bhumiputra* (digital caste certificates), *Mission Basundhara 2.0* (land record updates), and DBT schemes like the *Arunodoi Scheme*.

Figure 1: National e-Governance Service Delivery Assessment 2021



Source: Department of Administrative Reforms and Public Grievances, 2021

The NeSDA '*Way Forward Report' 2024*, published by the Department of Administrative Reforms and Public Grievances, highlights Assam's significant progress in e-governance. The key objective of the 'NeSDA Way Forward Report' was to promote the adoption of e-service delivery through a '*Single Unified Portal'* across States and UTs. Leading this initiative, Kerala, Assam, Odisha, and Jammu & Kashmir have successfully implemented 100% e-services through their respective unified portals. Jammu & Kashmir's e-UNNAT (1164 services), Kerala's e-Sevanam (938 services), Assam's Sewa Setu (725 services), and Odisha's Odisha One (404 services) are ensuring seamless digital service delivery (DARPG, 2024).

Table 2 indicates tremendous progress made by the State of Assam in terms of successfully implementing e-projects in the State. Initiatives like *eOffice and Project Sadbhavana* have facilitated the shift to paperless administration, ensuring quick file movement and eliminating bureaucratic delays. Platforms like *Assam Right to Public Services (ARTPS) and Ease of Doing Business (EoDB) Portal* provide citizen-centric service delivery, reducing manual intervention and improving turnaround times. *Jal Tarangini and eRupantor* ensure data-driven governance, helping policymakers monitor development projects and disaster management effectively. These initiatives collectively encourage a more accountable and responsive government.

Table 2: Assam's e-Projects Reports Till 2023

Initiative	Objective	Key Features & Achievements
Mission Basundhara	Digitization and integration of maps and land records. Secure land rights for indigenous and disadvantaged populations.	Phase 1 (2021-22): 672 non-cadastral villages surveyed, 18,789 cadastral villages re-surveyed, 8,13,981 applications received, 5,82,688 successfully processed.
Project Sadbhavana	Disposal of pending cases before May 10, 2021, and transition to e-Office.	Citizens submitted cases via the Sadbhavana Portal, closure of physical files, complete migration to e-Office.
e-Office	Digital file management system.	Fully implemented in Assam Secretariat (Oct 2, 2022) and Deputy Commissioner Offices (Jan 1, 2023), 100% electronic file movement targeted.
CM-TRANS (CM-Transport Randomized Allocation Networked System)	Online random allocation of transport services to prevent corruption.	Workload-based allocation across 35 District Transport Offices, eliminates local influence and manual intervention.
Kritagyata (Pension Management System)	Simplify pension disbursement.	10,348 pension cases processed, 7,166 Pension Payment Orders (PPOs) generated, integrated with Jeevan Pramaan till 2023.
Assam CM Dashboard	Real-time governance data monitoring.	Fetches data from 50 e-governance projects (22 more schemes in the pipeline).
Assam Right to Public Services (ARTPS) Platform	Time-bound citizen service delivery.	128 services across 20 departments, 3 autonomous councils, and 1 municipal

		corporation onboarded; to be renamed "Sewa Setu."
e-Rupantor	Monitoring state-funded projects.	₹1615.47 crores were sanctioned at the state level and ₹897.64 crores at the district level till 2022.
Public Distribution System (PDS) Assam	Transparent food grain distribution.	56 lakh ration cards benefiting 2.02 crore people, 98.68% transactions via ePoS, Aadhaar seeding at 98.6%, ONORC implemented.
Jal Tarangini	IoT-based flood monitoring.	Tested in Chirang (Aie River), deployed in Brahmaputra (Dibrugarh), funded by Assam State Disaster Management Authority (ASDMA).
e-Transport (Vahan & Sarathi, eChallan, e-Detailed Accident Report e-DAR)	Digitized transport services.	45 contactless services, the first state to implement e-DAR.
Integrated Land Revenue Management System (ILRMS)	Improve land revenue management.	Dharitree for land records, NOC for property transfers, and e-Panjeeyan for digital registration.
e-Prastuti	Website standardization framework.	212 departmental and 29 district websites standardized till 2023.
e-GRAS	Digital government revenue collection.	₹35,640 crore revenue collected via 48.56 lakh e-Challans till 2023.
National Data Centre – NER	Cloud infrastructure for governance.	Laid foundation in Feb 2021 by PM Modi, Tier-III Green Data Centre.

Employment Exchange Portal	Online job registration.	Aadhaar-seeded registration for job seekers.
ICT in Elections	Digital election management.	eNirvachan for election tracking, Eletraces for EVM monitoring, and Force Deployment Software used in the 2021 Assam Elections.
Niyukti	Digital recruitment portal for government jobs.	37 recruitment drives were conducted, and 74,476 applications were received.
State Public Procurement Portal (SPPP Assam)	Transparent e-procurement system.	Integrated with Government e-Marketplace (GeM) for state-wide procurement transparency.
eHospital	Digital healthcare service management.	Implemented across 24 hospitals, expanding to 14 more districts.
eCounselling	Online admissions for ITIs and professional courses.	Managed admissions for 128 institutions covering 1,56,905 seats.
Matsya Baibhav	Fisheries asset management through geo-tagging.	Tracks pond/tank locations for the *Ghare Ghare Maach* scheme.
Drugs free Assam	Public reporting system for drug-related offenses.	Citizens can report drug-related activities directly to authorities.
Geo-Rurban	Infrastructure tracking for rural development.	Monitors the progress of the Rurban scheme through geo-tagging.
e-Courts	All pleadings, evidence, orders, and judgments are electronic.	2.4 lakh court case entries from January 2022 to November 2022.
eGranthalaya	Digitization of Libraries	Implemented in 6 institutions

Source: Viswam, 2023 (Informatics Assam State)

The transformation of Assam from a poverty-ridden state to a digitally empowered one is a significant step toward inclusive growth and governance. Historically, SC/ST populations and other marginalized communities in Assam remained disconnected from the benefits of globalization. However, technology has now emerged as a powerful tool to bridge this divide, ensuring greater access to government services, financial inclusion, and social upliftment.

The state government and local bodies have played a significant role in implementing digital initiatives that target vulnerable populations. By leveraging ICT infrastructure, initiatives like Sewa Setu, e-Office, and ARTPS have simplified service delivery, making governance efficient, transparent, and corruption-free. These efforts have ensured that citizens, irrespective of their socio-economic background, can access public services digitally.

While making strategies for 'Digital Assam', the Assam CM Himanta Biswa Sharma stated that Assam's digital transformation coincides with the national Digital India initiative. The government has taken novel measures to incorporate technology into governance, emphasizing empowerment and public accessibility. With NIC Assam playing an important role, projects like CM Dashboard and eRupantor offer real-time data monitoring, enhancing accountability and data-driven decision-making.

Digital governance initiatives in India, particularly in Assam, aim to enhance efficiency, transparency, and citizen participation. The *MyGov* platforms promote citizen engagement in policy-making and governance. E-governance in Assam has reached the transactional stage, offering basic e-services, but citizen-government interactivity remains suboptimal. The Digital India initiative has promoted e-commerce and empowered the unorganized sector in Assam. E-governance and ICT are increasingly recognized as key development parameters in the region, highlighting the need for continued research and improvement in digital governance strategies. While significant progress has been made by the State, challenges remain in rural internet penetration, digital literacy, and last-mile connectivity. Continued investment in ICT infrastructure, AI-driven services, and blockchain technology can further consolidate Assam's position as a digital leader in the Northeast as well as in India.

Challenges of Implementation of Digital Governance

Assam faces significant challenges in adopting e-governance due to a combination of factors. The Oxford Poverty and Human Development Initiative (OPHI) Report 2021 ranked Assam fifth in the country in terms of multidimensional poverty, with nearly one-third of the State's population experiencing deprivation across various indicators such as health, education, and living standards (OPHI, 2021). The high cost of ICT devices and data plans, as well as the low incomes of the people and affordability, are important issues for a large population that is

disconnected from ICT projects. Assam and the northeastern states of India are connected to the rest of the country through a narrow corridor that passes through West Bengal. Assam is a multi-hazard state that is prone to floods, earthquakes, storms, and landslides besides manmade disasters. Lack of sufficient network coverage and insufficient infrastructure development due to geographical isolation are the major obstacles to internet adoption in the state. Also, existing operators do not spend on developing infrastructure in rural areas because they do not produce enough revenue there.

The COVID-19 pandemic highlighted the digital divide, as students in rural communities of Assam faced exclusion from online learning. Many schools lack basic infrastructure, computers, and internet access, making it difficult for students to attend online classes. Additionally, many teachers lack the digital skills needed to prepare lessons and effectively use technology in classrooms. Poor network connections further disconnect students from online education, especially in areas like Karunabri block, where villages suffer from persistent internet and voice network issues (Pegu, 2019). In Assam, many government offices lack proper ICT infrastructure, making it hard to provide online services, especially in villages where internet connectivity and electricity remain unreliable. Digital skill gaps further widen the divide, as many people lack the knowledge to use online platforms, and most digital content is not available in local languages, making access difficult for non-English speakers. Funding shortages also slow down progress, as the government does not allocate enough resources for e-governance initiatives, often treating technology as an operational cost rather than a strategic investment (Gupta, 2022). The inefficiency of government offices leads to delays in online services due to poor inter-departmental coordination and a lack of computer skills among officials, especially in rural areas. Government websites are another issue, as many are outdated, inconsistent, and difficult to use, lacking essential citizen-centric information (GOA, 2018). A traditional mindset also slows progress, as many organizations resist automation and struggle to adapt to new technologies.

In Assam, there are around 4348 Common Service Centres (CSC) that are operational and enhance rural living through technology (PIB, 2019). They are the most vocal supporters of those who are not digitally empowered or aware of government e-governance initiatives. In Assam, several CSCs are charged hefty fees from the citizens for online services as well as lack accountability. Even if a citizen decides to make a complaint against a CSC, there is no clear-cut official framework in place to ensure a fast response. Assam needs to improve its infrastructure, along with well-planned training programs, to enhance the accountability of the system if it wishes to succeed in implementing e-governance.

Recommendations

Major recommendations of the study may be listed as follows:

1. Better Access to Technology: To reduce the gap between cities and villages, the government should build more telecom and IT infrastructure in rural areas. A special budget should be set aside to improve digital access. Private companies and NGOs should also be encouraged to bring technology to remote areas. Women should get special support to overcome social barriers and access the internet and digital devices.

2. Digital Education for Everyone: To achieve the Digital India as well as Assam goal, everyone must learn how to use digital tools. Schools and colleges should focus on digital education. The National Digital Literacy Mission should introduce basic digital skills in government schools and advanced lessons in higher classes. State governments should also create online content in local languages for easy access to government services.

3. Encouraging Public Participation: Government websites and online services should be made easy to use and transparent so that more people can participate in governance. When citizens are aware of digital services and how to use them, e-governance can be more successful.

4. Dedicated Government Officials: Government employees should be more committed to using digital tools for faster and better service delivery. This will also help in the development of rural areas.

5. Public-Private Partnerships: The government should work with private companies to build ICT businesses and bring digital reforms to Assam. This partnership can help speed up the implementation of e-governance projects and improve rural development.

6. Strong Cybersecurity: The government must create a strong system to protect people's data and privacy to ensure trust and safety. The *Ministry of Electronics and IT (MeitY)* should set high standards for security, digital transactions, and complaint handling. Regular security checks should be done for all e-governance projects.

Conclusion

The progress of Digital Assam reflects a commitment to inclusive governance, transparency, and efficiency. Through technology-driven policies, the State is breaking historical barriers and ensuring that even the most marginalized communities have access to opportunities in the digital era. The government's proactive role, strong leadership, and partnership with NIC Assam can continue to shape a good future for digital Assam. By eliminating the digital access gap between rural and urban populations in Assam, the state can achieve progress more efficiently. However, for these digital initiatives to be fully effective, the government must

ensure proper onboarding, training, and technical support for both government employees and citizens. The digital access of services has empowered citizens by enhancing their awareness of rights and entitlements, thereby reducing their dependence on intermediaries and curtailing corruption. Assam's e-Governance initiatives, such as Sewa Setu, ARTPS, and Mission Basundhara, have played a crucial role in making government services more transparent and accessible. Locally developed cloud-based services in regional language, cybersecurity solutions, and AI-driven applications can enhance digital infrastructure without dependency on expensive foreign technologies**.** With these measures, Assam can bridge the digital divide, empower its people, and establish itself as a model for efficient and inclusive digital governance in India.

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Mapping Gender Equality in University Practices: An Exploratory Study of Delhi

Shabnam, Savita Kaushal

Department of Teacher Training and Non-Formal Education,
IASE, Faculty of Education, Jamia Millia Islamia, New Delhi
Corresponding author: shabnamnaaz00@gmail.com
Available at https://omniscientmjprujournal.com

Abstract

This study explores gender inequalities in higher education by examining the perceptions and experiences of 200 female postgraduate students from four prominent universities in Delhi— A purposive sampling technique was employed to select participants, and data were collected through semi-structured interviews and survey questionnaires consisting of both closed-ended and open-ended questions, the study focuses on the barrier to access, individual experiences, and awareness of government initiatives aimed at promoting the gender equality. Quantitative data from closed-ended responses were analysed by using percentage analysis, while the open-ended responses underwent thematic analysis to identify recurring themes related to gender disparity and challenges. The findings reveal significant obstacles female students face and highlight areas where policy can enhance gender equality in higher education institutions. This research contributes to the ongoing discourses on gender equity in Indian universities and offers practical recommendations for policy and institutional reforms.

Keywords: *Gender, Gender Equality, Higher Education, NEP 2020, Inequalities*

The concept of 'gender' refers to the social categorization of individuals as 'masculine' or 'feminine,' shaped by culturally established roles, expectations, and behaviours (Connell, 2009). Gender extends beyond biological differences, encompassing the social and psychological traits societies ascribe to individuals based on sex. Gender equality in education, as defined by UNESCO, ensures equal opportunities, resources, rights, and freedoms for both males and females to access and attain quality education, ensuring that no gender is disadvantaged in the process (UNESCO, 2015). Educating women is a crucial indicator of societal development, as educated women contribute significantly to overall progress (Mishra, 2022). Higher education serves as a powerful tool for the empowerment of women and the promotion of social change. Women's participation in higher education is vital for achieving gender equality in society (Ghosh & Kundu, 2021).

Universities have the potential to foster gender equality, diversity, and inclusion, thereby influencing both the higher education sector and society at large. However, as gendered organizations, they continue to shape and contribute to gender dynamics (Rosa, Drew, & Canavan, 2020). Achieving gender parity in educational institutions is not only a matter of equity but also a driver for economic and social advancement (Basant, Rakesh, & Sen, Gitanjali, 2010).

Delhi, the capital of India, is not only the nation's political hub but also a major centre for higher education, attracting students from across the country and the world. The city is home to numerous prestigious universities and research institutions that significantly contribute to India's educational landscape. Despite advancements in higher education, gender equality remains a pressing issue. Efforts to promote gender equality include the implementation of gender sensitization programs, scholarships for women in underrepresented fields, and the establishment of gender studies departments that critically examine the intersections of gender, caste, and class (National Commission for Women, 2020). Several universities in Delhi have been at the forefront of fostering gender discourse and research, with dedicated centers for women's studies, such as Jawaharlal Nehru University's Centre for Women's Studies (JNU, 2021). Additionally, universities have begun incorporating gender-sensitization workshops into student orientations to foster a culture of respect and inclusivity (Delhi University, 2022). Some institutions also promote mentorship programs for women, particularly in STEM fields, to reduce the gender gap. However, initiatives often face challenges in implementation. Misra (2022) highlighted the gap in policy documents and offered solutions. noting that effective implementation requires more than policies on paper. Despite the progressive image outlook associated with higher education institutions, issues of gender inequality persist within their structures, policies, and practices.

The objective of this study was to assess gender equality in practices within the universities in Delhi by examining key areas such as classroom practices, faculty behavior, the gendered nature of curricula and pedagogy, and concerns regarding campus safety and harassment. This study aimed not only to highlight the challenges but also to analyze the initiatives taken by these institutions to address gender-based disparities. Ultimately, it sought to offer insights into the complex dynamics shaping the experiences of female students, contributing to a deeper understanding of gender equality in Indian higher education.

Review of Literature

The researcher examined studies from 2019 to 2024 that highlight both the persistent obstacles and the progress made in promoting gender equality within Indian higher education. Supriya (2024) reported a notable rise in female enrolments in postgraduate and doctorate programs during 2019-20, However, this growth was inconsistent across disciplines, emphasizing the need for targeted efforts to promote women's participation in underrepresented sectors. Basantia and Devi (2022) demonstrated how cultural biases and infrastructural deficiencies continue to obstruct women's access to education in Northeast India, underscoring the need for specific targeted interventions in these underdeveloped regions. Misra (2022) critiqued the

National Education Policy 2020, noting that while it aims to promote fairness and inclusivity, its inconsistent implementation often overlooks the needs of marginalized groups. Sharma (2021) identified sociocultural barriers, including traditional gender norms, that hinder women's participation in universities. Singh (2020) stressed the importance of institutional policies in advancing gender equality, calling for strict monitoring to ensure effective execution. Bhattacharya and Gupta (2019) highlighted the need for gender-sensitive curricula to create an inclusive educational environment that supports female students. Collectively, this body of research reveals the multifaceted nature of gender equality challenges in higher education.

Objectives

1. To explore the perceptions of female students regarding gender equality practices in higher education institutions in Delhi.
2. To examine the experiences of female students concerning gender equality in higher education institutions in Delhi.

Need of the study

Universities in Delhi are known for their diversity, representing a wide range of disciplines, ideologies, and cultures. Historically, some institutions have played a central role in shaping India’s post-colonial intellectual landscape, while others are recognized for their progressive student politics and activism. However, these universities have also been sites of intense gender debates, particularly regarding safety, representation, structural inequalities, and violence. gender discrimination often takes subtler forms, such as unequal access to research opportunities, mentorship, and funding. Additionally, curricula and pedagogical practices frequently reflect gender biases, reinforcing stereotypes.

In this broader context, it is critical to examine how universities in Delhi navigate global trends and address (or fail to address) gender inequality. In recent years, numerous incidents of sexual harassment, discrimination, and violence have emerged from various educational institutions across India, understanding the challenges faced by women in these environments is crucial, as it provides valuable insights from their perspectives. This investigation is essential for developing effective strategies to promote gender equality and inclusivity within academic settings.

Methodology

This study adopted a mixed-methods approach to explore the issue of gender equality in higher education institutions in Delhi. The quantitative component employed a survey research design, while the qualitative component utilized a narrative research approach. Narrative inquiry

captures individuals' rich experiences and unique perspectives through recorded interviews, weaving them into a compelling narrative (Wells, 2011). This approach is particularly effective in revealing the complexities of gender equality in higher education.

Population and Sample

The study focused on final-year Master's students from various higher education institutions in Delhi. A purposive sampling method was used to select 200 female postgraduate students from four universities in Delhi using a purposive sampling method for this study.

Table 1: Sample Distribution

Universities	A	B	C	D	Total Sample
Number of Students	50	50	50	50	200

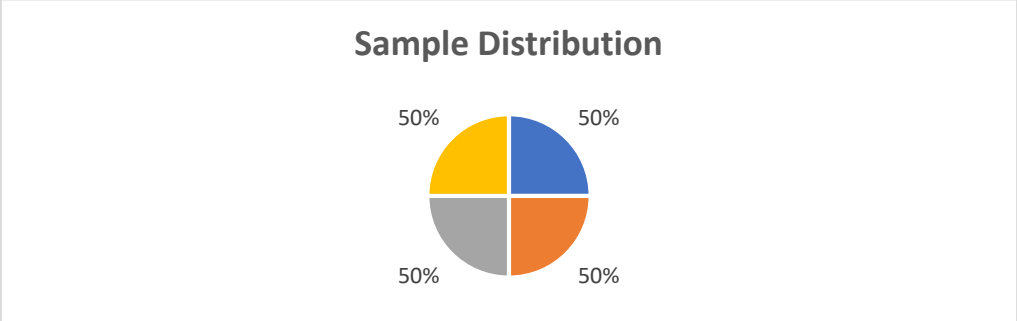

Figure-1

Data Collection Tool and Procedure

The investigator developed a structured survey questionnaire to achieve the first objective and a semi-structured interview schedule to meet the second objective. The development of the questionnaire followed several crucial steps. The researcher identified key dimensions of gender equality in education, such as Equal Educational Opportunities, Gender-based Discrimination, Classroom Dynamics, Faculty Mindset and Behaviors, Access to Academic Guidance, Gender-Sensitive Curriculum, Availability of Complaint and Counselling Services, and Harassment. Based on these dimensions, twenty specific items were carefully designed, including closed-ended questions to facilitate quantitative analysis.

Data Analysis

Quantitative data collected from the surveys were analyzed using percentage analysis to identify trends and patterns related to gender disparities in higher education. In Addition, qualitative data derived from interviews were subjected to thematic analysis to capture deeper insights into the participants' experiences.

Objective 1: **To explore female students' perceptions regarding gender equality practices in higher education institutions in Delhi.**

Table 2: Percentage of Agreeing Students on Practices of Gender Equality in Higher Education

S.No.	Gender Equality in Universities Practices (Statements)	Agreement of the University Students %
1.	Do you agree that all genders have equal educational opportunities in your institution?	78%
2.	Have you ever experienced gender-based discrimination in your Institution?	40%
3.	Do you agree that all genders are treated equally in your classroom?	80%
4.	Have you experienced any Discrimination and gender bias from faculty members in evaluations, feedback, or grading?	75%
5.	Do you agree your institution's curriculum adequately represents the perspectives and sensitivity towards all genders?	17%
6.	Do you agree that your institution is equally accessible to all genders?	70%
7.	Have you ever felt unsafe on campus because of your gender identity?	55%
8.	Do you know about any policies or support systems in place at your institution to report and address gender-based harassment or discrimination?	15%
9.	Have you ever experienced or witnessed gender-based harassment (e.g., sexual harassment, discriminatory comments) in the classroom, or in campus?	75%
10.	Do you agree that your institution includes sufficient representation of all genders in leadership positions (e.g., Dean, HoD)?	12%
11.	Do you agree that your institution is making efforts to promote gender equality through policies, and awareness campaigns?	30%
12.	Are counselling services, and complaint forums available in your campus?	25%
13.	Have you changed your academic plan or dream due to challenges	47%

	related to your gender?	

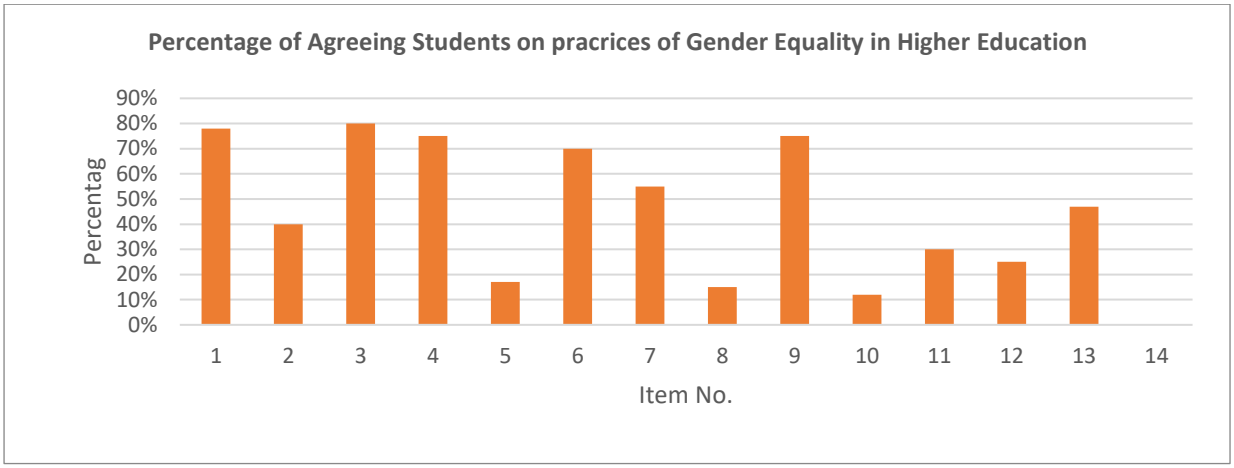

Figure 2

Result and Discussion

Equal Opportunities

A significant 78% of students believe that all genders have equal educational opportunities, reflecting a positive perception of institutional policies.

Experiences of Discrimination

However, 40% of respondents reported experiencing gender-based discrimination during admissions or scholarship applications, highlighting persistent barriers despite the perceived equality. Additionally, an alarming 75% of students reported experiencing or witnessing gender bias or discrimination from faculty in evaluations and feedback, underscoring a pervasive issue that demands urgent attention.

Classroom Dynamics

Encouragingly, 80% of respondents believe that all genders are treated equally in classroom discussions and group projects, indicating a positive academic environment.

Gender-Sensitive Curriculum and Representation

Only 17% of students perceive the curriculum as adequately representing contributions from all genders, exposing a critical gap in inclusivity and gender-sensitive education.

Safety Concerns

More than half of the respondents (55%) reported feeling unsafe on campus due to their gender identity, raising serious concerns about campus safety and the overall environment.

Awareness of Policies

Only 15% of students are aware of policies or support systems for reporting gender-based harassment and discrimination, indicating an urgent need for increased visibility of available

resources.

Representation in Leadership

Only 12% of respondents agreed that there is sufficient representation of all genders in leadership positions, highlighting a significant gendered disparity in institutional governance.

Active Promotion of Gender Equality

Only 30% of respondents believe that the institution is actively promoting gender equality, suggesting a need for more proactive and visible efforts on these issues.

It can be concluded that while the data indicate some progress, it also reveals significant challenges in achieving gender equality in higher education. These findings call for immediate and concerted efforts to address pervasive issues and create a truly inclusive academic environment.

Objective 2: To Explore the Experience of Gender Equality in Higher Education.

The semi-structured interviews with students revealed profound insights into their lived experiences, particularly regarding gender equality in higher education institutions.

Gender Bias in Educational Institutions

Most of the students reported they did not experience gender bias, but a few disagreed, and one respondent highlighted her encounters with discrimination stating:

"I have experienced various forms of discrimination that have significantly impacted my academic journey, I faced unequal treatment based on my minority and low socioeconomic status, even within a minority institution, minority professors perpetuated the perception that minority women are not competitive and do not belong in higher education, one professor advised me against pursuing a PhD, suggesting that job opportunities for minority women are predominantly limited to a few minority-serving institutions. He told me to seek employment in a school setting instead of committing to a doctoral program. This was disheartening".

Such narratives underscore the importance of thoroughly investigating the biases that persist in educational systems. Existing literature supports this perspective highlighting the subtle yet pervasive nature of gender bias. For instance, Singh et al. (2023) explored disparities in education expenditure based on gender in India, revealing how socioeconomic factors perpetuate gender inequalities. Additionally, Mardani et al. (2023) emphasized the systemic discrimination faced by underrepresented minority faculty, shaping students' perceptions of belonging and competitiveness. They advocate for policies fostering inclusivity and enhanced support, especially for marginalized students.

Safety and Security Concerns and Sexual Harassment on Campus

Respondents indicated that these issues of safety and sexual harassment are often silenced or denied by the institution, discouraging open discussion or reporting. One participant stated:

"Sexual harassment has been a significant deterrent for me. Many Ph.D. scholars have abandoned their programs due to harassment by faculty members. Numerous cases have been reported, leading to the suspension of professors and even deans. I had dreamed of doing a PhD, but I have changed my plans."

This resonates with existing literature, highlighting how systemic issues contribute to a culture of silence. Rosenthal et al (2016) emphasize a gender-biased mindset creates barriers to women's educational attainment.

One respondent shared ***"A professor called me into his official chamber and touched me inappropriately, I was traumatized. Although I complained to the university, they did not take action. They said the professor had been suspended but he remained working confidently."***

Sexual harassment in higher education institutions in India has become a critical issue affecting student retention and academic progression, particularly among PhD scholars. Studies (Aina & Kulshreshta, 2017; Singh & Sharma, 2021) documented the detrimental impact of harassment on scholars discontinuing due to inappropriate faculty behaviour. The persistence of harassment creates a toxic environment that disrupts students' academic progress.

Gender-Sensitive Curriculum, Faculty and Classrooms

Most of the respondents agreed that the curriculum does not adequately address gender issues. one respondent shared:

"The curriculum lacks a gender-sensitive perspective, reinforcing stereotypes. topics relevant to women's contributions are often omitted, limiting critical thinking and inclusive learning opportunities."

The absence of a gender-sensitive approach reinforces harmful stereotypes and restricts engagement with women's achievements. Husain (2024) highlights the omission of women's contributions from curricula, which limits inclusivity. Another respondent noted:

"I've noticed favouritism in the classroom, with teachers. Offering preferential treatment in assessment based on perceived socioeconomic status and appearance rather than actual talent."

This reflects findings by Munir et al. (2023) who suggest that socioeconomic status and appearance biases overshadow genuine talent deepening inequalities.

Gender Stereotype

One respondent recounted facing gender stereotypes within the academic environment.

Sharing: A faculty member often remarked in the class

"Women occupy every position; even the Head of Department is a woman, yet at home, they remain weak, he regularly criticized the academic integrity of female faculty members."

This illustrates the pervasive bias that undermines women's authority and accomplishments. It reinforces outdated gender roles, suggesting that women's power is limited to professional domains while dismissing their contributions at home.

Research by Coley et al. (2023) similarly found that in efforts to increase STEM fields, gender stereotypes persist impeding progress.

Gender-Sensitive Policies and Support System

The majority of respondents reported that current policies and support systems are insufficient to tackle the issues and one respondent shared:

"Many girls are scared to complain about the harassment due to the fear of defamation, complaints are often ignored or action is delayed. my peers avoid certain faculty members' or extracurricular activities out of fear."

another respondent added:

"I had to withdraw from the course due to anxiety attacks and insomnia. When I filed a complaint, I was told no action would be taken against the professor because of his position.

Research indicates that many Indian universities have implemented gender-sensitive policies; their effectiveness is inconsistent. Roy et al. (2023) highlighted the sexual harassment and the inadequacies of institutional responses, while Alam et al. (2023) highlighted the support system for women in higher education. These findings underscore the need for stronger institutional efforts to address gender bias and insufficient policy enforcement.

Implications

Incorporating gender studies into the curricula is essential to raise awareness of gender-related issues. Regular gender sensitivity training for faculty and staff can create a more supportive atmosphere, reducing biases in teaching and assessment. Mentorship programs and support networks for underrepresented genders can address retention issues and promote academic success. Encouraging research on gender equality will also facilitate innovative solutions to existing barriers, and contribute to the broader discussion on equality in education.

Conclusion

Universities in Delhi have made strides in achieving gender parity in enrolment and implementing safety measures, but deeper institutional barriers to gender equality remain. Faculty representation, gender bias in curricula, and campus safety are areas in need of reform, Nonetheless, ongoing efforts to foster inclusivity reflect the potential of universities to lead by

example in the pursuits of gender equity.

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Adoption and Challenges of Content Management Systems in Contemporary Education: Opportunities and Barriers

Shraddha, Vinita S. Gopalakrishnan

Banasthali Vidyapith, Rajasthan
Corresponding author: shraddha28021993@gmail.com
Available at https://omniscientmjprujournal.com

Abstract

This qualitative study explores the adoption and impact of Content Management Systems (CMS) in education, focusing on inclusivity, sustainability, and teaching efficiency. Using content analysis, data from academic studies, policy documents, and reports highlight how CMS enhances personalized learning, resource accessibility, and digital sustainability by reducing reliance on physical materials. The study examines technical and pedagogical skills required for CMS adoption and its alignment with NEP 2020 in fostering flexible and technology-driven classrooms. Key challenges, including limited infrastructure, inadequate training, and resistance to digital adoption, are identified along with strategies for overcoming these barriers. Findings suggest best practices for optimizing CMS use to enhance collaboration, engagement, and learning outcomes. The study offers recommendations for effective CMS integration, contributing to a more innovative and technology-enhanced educational landscape.

Keywords: *Content Management Systems, digital learning, NEP 2020, teaching efficiency, educational technology, inclusive education.*

The rapid advancement of technology has significantly transformed the education sector, with Content Management Systems (CMS) emerging as essential tools for managing and delivering instructional content. Platforms such as Moodle, Blackboard, and Google Classroom provide educators with structured digital environments to organize learning materials, facilitate collaboration, and assess student progress. The importance of these platforms became especially evident during the rise of remote and hybrid learning models, particularly in response to the COVID-19 pandemic. This shift highlighted the need for a robust digital infrastructure that supports flexible and inclusive education. Research suggests that factors like ease of use and perceived usefulness significantly impact the successful adoption of CMS (Hwang & Tsai, 2021), emphasizing the importance of accessibility and effectiveness for educators and learners.

Despite their advantages, CMS adoption in educational institutions presents several challenges. Alharbi and Alshammari (2022) identify major obstacles such as insufficient IT support, inadequate infrastructure, and limited digital literacy among educators. Additionally, institutional resistance to digital transformation often slows down the adoption process, as many educators remain accustomed to traditional teaching methods. Overcoming these

barriers requires faculty training, administrative support, and well-defined digital strategies to facilitate the smooth integration of CMS into teaching practices.

On the other hand, CMS platforms provide significant opportunities for enhancing teaching and learning experiences. Attaran (2022) emphasizes that CMS centralizes educational resources, enabling structured content management and real-time tracking of student performance. These platforms also promote personalized learning experiences, catering to diverse learner needs. Moreover, blended learning models, which integrate online and in-person instruction, have been shown to improve student engagement, accessibility, and academic outcomes. CMS platforms also encourage collaborative learning through discussion forums, file sharing, and automated assessment tools, fostering an interactive and participatory learning environment.

To fully leverage the benefits of CMS, institutions must address technical, organizational, and pedagogical challenges while implementing effective digital strategies. A proactive approach that includes faculty training, institutional support, and continuous evaluation is crucial to ensuring sustainable CMS adoption. Given these considerations, this study seeks to explore the current adoption status of CMS, the key challenges faced by educators, and the strategies needed to overcome barriers. Additionally, it examines how CMS enhances teaching, learning, and innovation while contributing to digital transformation in education. To achieve these objectives, the following research questions are addressed:

Research Questions

1. **What is the current status of CMS adoption in educational institutions?**
2. **What key challenges hinder CMS adoption among educators and institutions?**
3. **How do CMS platforms enhance teaching, learning, and collaboration?**
4. **What impact does CMS have on teaching efficiency and student learning outcomes?**
5. **What strategies can help overcome barriers to CMS adoption?**
6. **How does CMS contribute to innovation and digital transformation in education?**
7. **What policy measures can support effective and sustainable CMS integration?**

This study aims to provide valuable insights into the opportunities, challenges, and future directions of CMS in education, offering recommendations for educators, administrators, and policymakers to maximize the potential of these platforms.

Review of Related Literature

The adoption of Content Management Systems (CMS) in education has been widely examined, with research focusing on factors influencing implementation, benefits, challenges, and strategies for effective integration. This review synthesizes findings from scholarly articles, books, and educational reports to provide a comprehensive understanding of CMS adoption in educational settings.

1. Factors Influencing CMS Adoption

The adoption of CMS depends on multiple factors, including technological readiness, institutional support, and educators' digital proficiency. Research suggests that perceived ease of use and usefulness significantly impact whether educators integrate CMS into their teaching (Hwang & Tsai, 2021).

Additionally, technological infrastructure, access to training, and institutional culture play a key role in CMS adoption (Gkrimpizi et al., 2023). Institutions with strong IT support and digital training programs see higher CMS integration, while those with limited resources, low digital literacy, and resistance to change face adoption barriers, particularly in under-resourced regions.

2. Benefits of CMS in Education

CMS platforms provide centralized access to learning resources, facilitate collaboration, and personalize learning experiences (Attaran, 2022). They enable blended and online learning, allowing students and educators to access materials remotely while using tools like real-time feedback, interactive assessments, and data analytics to track student progress (Alharbi & Alshammari, 2022).

Beyond instructional benefits, CMS also supports administrative efficiency, automating grading, attendance tracking, and assignment submissions. These features reduce faculty workload and contribute to more structured and organized teaching and learning environments.

3. Challenges in CMS Implementation

Despite its advantages, CMS adoption presents technical, institutional, and pedagogical challenges. Alharbi and Alshammari (2022) identify barriers such as limited technical support, unreliable infrastructure, and digital literacy gaps among educators.

Cultural resistance further slows CMS adoption, as traditional teaching methods often conflict with digital learning approaches **(**Gkrimpizi et al., 2023). Additionally, financial constraints, poor internet connectivity, and lack of ongoing technical support hinder CMS

implementation, especially in resource-limited institutions. Without continuous updates and faculty training, CMS platforms risk becoming underutilized and ineffective over time.

4. Strategies for Effective CMS Implementation

To address these challenges, institutions need to invest in teacher training, enhance technical support, and adopt a phased implementation approach (Attaran, 2022). Digital literacy programs can equip educators with the skills necessary to effectively integrate CMS into their teaching.

Additionally, institutions must develop robust IT infrastructure and involve stakeholders in decision-making processes. Gradual CMS adoption, paired with incentives for educators, can improve engagement and sustain long-term adoption**.**

Research Gap and Problem Statement Justification

While numerous studies examine CMS adoption, most research is concentrated in well-funded institutions with advanced technological infrastructure (Hwang & Tsai, 2021). Limited attention has been given to CMS implementation in under-resourced institutions, where factors like budget constraints, lack of faculty training, and infrastructural limitations significantly impact adoption.

Additionally, while existing studies highlight barriers like digital literacy gaps and institutional resistance, there is a lack of research on how administrative policies, faculty training, and strategic implementation plans influence CMS sustainability. Addressing these gaps is crucial for developing practical, scalable solutions that can be applied across diverse educational contexts.

This study aims to bridge these gaps by analysing CMS adoption across various institutional settings, identifying effective implementation strategies, and exploring how CMS can be optimized to enhance teaching efficiency and student learning outcomes. While CMS platforms hold immense potential for modernizing education, their successful integration requires addressing technical, institutional, and pedagogical challenges. Research must continue to explore inclusive and scalable strategies for CMS implementation, ensuring that these platforms are accessible, efficient, and sustainable across diverse educational settings.

Research Methodology: -

This study follows a qualitative research design, utilizing content analysis to examine the adoption and challenges of Content Management Systems (CMS) in education. The analysis is based on secondary data collected from peer-reviewed articles, academic books, and official reports, ensuring a comprehensive understanding of CMS integration.

The selected sources provide insights into key trends, barriers, and enabling factors affecting CMS adoption. By systematically analysing existing literature, this study explores how CMS influences teaching effectiveness and institutional digital transformation. The findings aim to inform best practices and strategic recommendations for improving CMS implementation in educational settings.

Objectives of the study:-

1. **To examine the current status of CMS adoption**
   Investigate how schools, colleges, and universities are utilizing CMS platforms (such as Moodle, Blackboard, and Google Classroom) and analyse the degree of integration across different educational levels.
2. **To identify challenges faced by educators and institutions**
   Explore the key obstacles, including limited digital skills, inadequate infrastructure, financial constraints, and resistance to adopting new technologies in educational settings.
3. **To explore the opportunities offered by CMS for teaching and learning**
   Evaluate how CMS platforms enhance online and blended learning models, foster collaboration between teachers and students, and improve access to educational resources.
4. **To assess the impact of CMS on teaching efficiency and learning outcomes**
   Analyse how CMS contributes to improving educator productivity, streamlining resource management, enhancing student engagement, and influencing learning performance.
5. **To investigate strategies for overcoming barriers in CMS adoption**
   Identify effective practices for building digital competency through training programs, strengthening technical support, and promoting positive attitudes toward CMS use among educators and learners.
6. **To analyse the role of CMS in promoting innovation and digital transformation**
   Study how CMS platforms enable personalized learning, encourage the use of innovative teaching methods, and support data-driven decision-making processes within educational institutions.
7. **To provide recommendations for policymakers and administrators**
   Develop practical strategies for institutional leaders to design policies, allocate resources, and implement frameworks that maximize the benefits of CMS adoption and ensure long-term success.

1- Current Status of CMS Adoption

The adoption of Content Management Systems (CMS) in educational institutions has become increasingly prevalent as technology continues to reshape learning environments. CMS platforms like Moodle, Blackboard, and Google Classroom are integrated into both primary and higher education institutions to streamline online and hybrid learning. According to research by OECD, CMS adoption rates surged due to the shift toward remote learning during the COVID-19 pandemic. These systems have proven essential for managing content, tracking student performance, and enhancing communication between educators and learners.

"CMS platforms allow universities to centralize resources, making it easier for faculty to manage digital content and monitor student engagement" states Hwang and Tsai (2021). They highlight that institutions are moving toward CMS platforms because of the flexibility and customization they offer in delivering educational content.

However, despite their advantages, CMS adoption faces several challenges. One of the key barriers, as noted by Alharbi and Alshammari (2022), is the **"lack of digital literacy among educators and students,"** which hinders the effective use of these platforms. In many institutions, educators struggle to fully exploit the advanced features of CMS due to limited technical skills. Another issue is the infrastructure gap, particularly in developing regions, where access to reliable internet and technological resources is still limited.

Moreover, resistance to change is a significant obstacle. Many educators are accustomed to traditional teaching methods and may be reluctant to adopt new digital tools. As Gkrimpizi et al. (2023) observe, **"Institutional resistance can slow down digital transformation, especially when faculty members are not adequately trained or supported in the transition."**

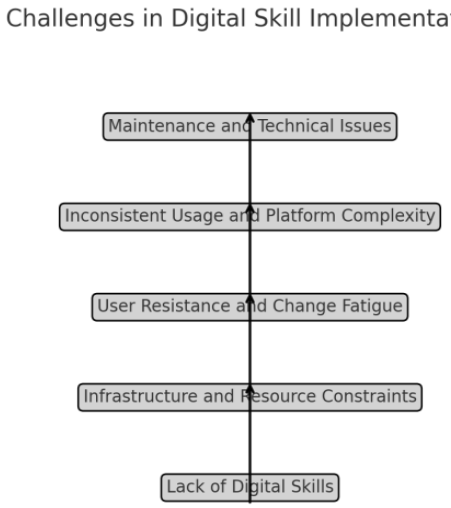
On the flip side, CMS platforms provide considerable opportunities. They support blended learning models, facilitate student-teacher collaboration, and enable personalized learning experiences. As Attaran (2022) points out, **"the ability of CMS platforms to integrate multimedia content and track individual student progress makes them invaluable in modern education."** Furthermore, CMS tools are helping educational institutions move towards data-driven decision-making, where analytics derived from student engagement help optimize learning strategies.

In conclusion, the current status of CMS adoption shows a promising yet uneven integration across educational institutions. While larger and better-funded universities have successfully implemented these systems, smaller institutions face challenges related to technical infrastructure and skill gaps. Overcoming these challenges requires focused efforts on digital

competency development and institutional support to fully harness the potential of CMS platforms

2- Challenges Faced by Educators and Institutions in CMS Adoption

Educators and institutions encounter several challenges in adopting CMS effectively. Key issues include limited digital literacy, inadequate training, and insufficient technical support, as outlined in the following points.



1. **Lack of Digital Skills**
   Many educators struggle with insufficient technical skills, making it difficult to effectively use CMS tools for teaching and learning activities.
2. **Infrastructure and Resource Constraints**
   Limited access to high-speed internet, out dated devices, or insufficient IT support hampers the seamless use of CMS platforms, especially in underfunded institutions.
3. **User Resistance and Change Fatigue**
   Educators accustomed to traditional teaching methods may resist adopting new technologies, fearing increased workload or unfamiliar workflows.
4. **Inconsistent Usage and Platform Complexity**
   Some institutions implement CMS platforms only partially, limiting their potential. In addition, the complexity of some systems creates a steep learning curve for users.
5. **Maintenance and Technical Issues**
   Frequent software updates, bugs, or downtime can disrupt teaching and learning, further discouraging educators and students from using CMS effectively.

Addressing these challenges requires targeted training, infrastructure upgrades, and change management strategies to ensure smooth adoption.

3- Opportunities Offered by CMS for Teaching and Learning

CMS platforms provide valuable opportunities for enhancing teaching and learning. They streamline content organization, support collaboration, and offer flexible learning options, as detailed in the following points.

1. **Flexible Learning Models**
   CMS platforms enable online, blended, and hybrid learning, offering students and educators greater flexibility in accessing materials anytime, anywhere.
2. **Enhanced Collaboration**
   Tools like discussion forums, group projects, and real-time file sharing promote teamwork and peer-to-peer learning, fostering a collaborative environment.
3. **Personalized Learning**
   CMS platforms support adaptive learning by tracking individual student progress, allowing instructors to offer targeted feedback and tailor content to learners' needs.
4. **Improved Teaching Efficiency**
   Automated features, such as assignment tracking and instant grading, save time for educators, allowing them to focus more on instruction.
5. **Centralized Resource Management**
   All course materials, assignments, and assessments are stored in one place, making it easy to organize and access resources.

By leveraging these opportunities, institutions can create more engaging, efficient, and personalized educational experiences.

4- Assessing the Impact of CMS on Teaching Efficiency and Learning Outcomes

Examining CMS impact is crucial for gauging its role in enhancing teaching efficiency and student learning outcomes. Key areas of impact are discussed in the following points.

1. **Improved Teaching Efficiency**

   CMS platforms streamline administrative tasks such as attendance tracking, grading, and assignment submission, giving educators more time to focus on instruction. Automation reduces repetitive tasks, enhancing productivity.

2. **Enhanced Student Engagement**

   Interactive tools like quizzes, discussion forums, and multimedia content increase student participation, leading to higher engagement and better comprehension of topics.

3. **Personalized Feedback and Support**

   CMS allows educators to track individual student performance and provide timely, customized feedback, improving learning outcomes through targeted interventions.

4. **Data-Driven Decision Making**

   Analytics features in CMS help educators identify learning patterns and adjust teaching strategies, ensuring more effective instruction.

5. **Scalable Access to learning**

   With centralized course materials accessible anytime, CMS supports both remote and self-paced learning, empowering students and improving academic performance.

These benefits show how CMS platforms positively impact both teaching efficiency and student learning outcomes, creating more effective and flexible education systems.

5- Strategies to Overcome Barriers in CMS Adoption

Effective strategies are essential to address the challenges in CMS adoption. The following points outline key approaches to support successful integration.

1. **Comprehensive Training Programs**
   Offer continuous professional development to educators, focusing on building digital literacy and practical skills in CMS usage. Peer mentoring can further accelerate learning.
2. **Infrastructure and Resource Upgrades**
   Improve internet access, hardware, and technical support. Institutions can also adopt cloud-based CMS platforms to minimize infrastructure demands.
3. **User Engagement through Change Management**
   Communicate the benefits of CMS adoption clearly, involve educators in decision-making, and recognize early adopters to reduce resistance and promote participation.
4. **Incentives and Support Systems**
   Provide incentives like certifications or professional credits for using CMS and ensure responsive technical support to resolve issues quickly.
5. **Data-Driven Improvement**
   Use feedback and analytics to refine implementation strategies and address challenges, ensuring continuous adoption and system optimization.

These strategies help institutions overcome technical, psychological, and infrastructural barriers, ensuring smoother CMS adoption and effective usage.

6- Role of CMS in Promoting Innovation and Digital Transformation

Content Management Systems (CMS) are central to promoting innovation and advancing digital transformation in the education sector. By offering a comprehensive platform for content creation, management, and distribution, CMS provide educators with the tools necessary to enhance teaching practices and foster a more engaging learning experience. The integration of multimedia, interactive content, and collaborative tools through CMS allows educators to move away from traditional methods of teaching, encouraging more innovative practices such as blended learning, flipped classrooms, and personalized learning. These methods cater to diverse student needs, making learning more dynamic and accessible.

Furthermore, CMS play a significant role in driving digital transformation by aligning education systems with the demands of the digital age. These systems support the integration of technology into classrooms, transforming the educational experience from a conventional, face-to-face model to one that is more flexible, collaborative, and data-driven. With CMS,

educational institutions can manage vast amounts of learning materials, from lecture notes and videos to assignments and exams, in a centralized digital environment. This makes content easily accessible to both educators and students, breaking down barriers to learning.

In terms of efficiency, CMS streamline administrative tasks, allowing educators to focus more on teaching rather than on logistical duties. These systems can automate grading, track student progress, and generate real-time performance data, empowering educators to make informed decisions and adapt their teaching methods accordingly. The use of CMS also facilitates effective communication between educators and students, enabling them to interact through discussion forums, emails, and instant messaging. This seamless communication enhances collaboration and creates a more interactive and engaging learning environment.

In addition to benefiting teaching and learning, CMS promote institutional-wide digital transformation by supporting the integration of digital resources into all aspects of the educational process. This includes facilitating virtual classrooms, online assessments, and digital libraries, which enhance accessibility and inclusivity. As a result, CMS not only support the shift towards more innovative teaching but also contribute to a broader transformation of educational systems, enabling them to meet the evolving needs of the digital era.

In summary, CMS play a critical role in transforming education by driving innovation in teaching methods, improving the accessibility of resources, streamlining administrative processes, and fostering a more interconnected learning environment. Through the use of CMS, educational institutions can embrace digital transformation, making education more flexible, efficient, and responsive to the needs of today's learners.

7- Recommendations for Policymakers and Administrators for Effective CMS Adoption

To ensure successful CMS adoption, policymakers and administrators should focus on providing adequate training, enhancing digital infrastructure, and offering on going technical support. The following points outline key recommendations for effective implementation.

1. **Invest in Infrastructure and Support Systems**

   Ensure institutions have access to high-speed internet, updated devices, and reliable technical support to facilitate smooth CMS implementation.

2. **Develop Clear Policies and Frameworks**

   Establish guidelines for CMS usage, data security, and role management to align the platform with institutional goals.

3. **Promote Digital Literacy and Continuous Training**
   Provide regular training programs to educators and staff, focusing on building technical skills and confidence in using CMS tools effectively.
4. **Encourage Collaboration and Stakeholder Involvement**
   Involve educators and administrators in decision-making processes and foster a culture of collaboration to reduce resistance to change.
5. **Use Incentives to Drive Adoption**
   Offer rewards such as professional development credits or certifications to motivate educators and encourage early adoption of CMS platforms.
6. **Leverage Analytics for Continuous Improvement**
   Utilize CMS data to monitor progress, evaluate teaching outcomes, and make informed decisions for further improvement.

By implementing these strategies, policymakers and administrators can ensure CMS adoption is effective, sustainable, and aligned with the goals of digital education transformation.

Conclusion

The adoption of Content Management Systems (CMS) across educational institutions presents both significant opportunities and notable challenges. Current investigations reveal that schools, colleges, and universities are increasingly utilizing platforms like Moodle, Blackboard, and Google Classroom. However, the extent of integration varies significantly among different educational levels, highlighting the need for tailored approaches to implementation.

Challenges such as limited digital skills, inadequate infrastructure, and financial constraints hinder the full potential of CMS in educational settings. Resistance to adopting new technologies remains a critical barrier, underscoring the importance of effective change management strategies.

Despite these challenges, CMS platforms offer considerable advantages, enhancing online and blended learning experiences. They foster collaboration, improve access to educational resources, and facilitate personalized learning, all of which contribute to better educational outcomes. Additionally, CMS can streamline teaching processes, improve educator productivity, and positively influence student engagement and performance.

To overcome barriers to CMS adoption, effective strategies must be developed. This includes providing robust training programs to build digital competencies, enhancing technical support, and promoting a culture of openness toward technology among educators and students. Moreover, CMS plays a pivotal role in driving innovation and digital transformation

within educational institutions, enabling data-driven decision-making and encouraging the adoption of innovative teaching methods.

In light of these findings, policymakers and administrators are encouraged to design comprehensive policies that support CMS adoption. Allocating resources effectively and implementing structured frameworks can maximize the benefits of CMS, ensuring long-term success in enhancing educational experiences. Continued research and adaptation will be essential to navigate the evolving landscape of digital education, ultimately leading to improved teaching and learning outcomes across all educational levels.

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Leveraging Social Media for Effective Nutrition Education and Communication: Strategies, Challenges, and Opportunities

Kuril Sanjeet, Sunita Mishra

Department of Food and Nutrition, Babasaheb Bhimrao Ambedkar University
(A Central University), Lucknow, UP
Corresponding author: sanjeetkuril123@gmail.com
Available at https://omniscientmjprujournal.com

Abstract

This Review article explores the ever-changing field of nutrition education and communication in the digital era, with a particular emphasis on the rapidly growing social media landscape. With the exponential growth and widespread adoption of social media globally, its potential as a powerful tool for disseminating accurate nutritional information and promoting healthy behaviors cannot be understated. This article explores various approaches employed by nutrition professionals, educators, and public health advocates to harness the power of social media in advancing nutrition education initiatives. Drawing on contemporary research and practical examples, the article elucidates the diverse ways in which social media platforms such as Facebook, Instagram, Twitter, and others can be utilized to engage audiences, demolish rumours, and cultivate positive dietary habits. It examines the role of influencers, organizations, and health practitioners in leveraging social media to amplify nutrition messaging, targeting diverse demographics and populations across different socioeconomic backgrounds. Furthermore, the article addresses the inherent challenges and ethical considerations associated with utilizing social media as a tool for nutrition education and communication. Issues such as misinformation, filter bubbles, and algorithmic biases are discussed, along with strategies to mitigate their impact and promote evidence-based content. This Review article underscores the transformative potential of social media in revolutionizing nutrition education and communication paradigms. By embracing innovative strategies, navigating challenges, and fostering collaboration, nutrition professionals can harness the power of social media to empower individuals, communities, and societies to make informed dietary choices and lead healthier lives.

Keywords*: Nutrition, Social Media, Public Health, Nutrition Literacy, Healthcare, Communication*

1. INTRODUCTION

In the modern digital era, social media has become a significant aspect of our daily lives, shaping our decisions, preferences, and actions. It has revolutionized communication and information sharing, establishing itself as a powerful medium for education and outreach across numerous fields. One area that has notably harnessed the potential of social media is nutrition. Effective nutrition education and communication are essential for encouraging healthy eating practices and reducing the prevalence of diet-related illnesses. With the extensive use of platforms like Facebook, Instagram, and Twitter, sharing credible nutritional insights and engaging with a broad audience has become more accessible than ever before [1].

The primary objective of nutrition education and communication is to enhance health by encouraging healthier food choices. Effective communication serves as the foundation of nutrition education. Health practitioners, educators, community leaders, and the public are urged to adopt evidence-based approaches and tools to foster improved knowledge, attitudes, skills, and behavioral changes related to food and nutrition. This process involves various methods, including one-on-one or group instruction, educational resources, mass media initiatives, and social marketing efforts. These strategies can focus on promoting a specific behavior, like increasing fruit and vegetable intake, or support broader dietary changes aimed at improving overall health [2].

Social media is an interaction between people inside virtual communities and networks where they produce, distribute, and share knowledge and ideas. As a rapidly growing field, it holds significant potential for engaging people in innovative ways. There is a growing demand for health professionals skilled in utilizing social media to contribute to policy-making, research, and practical applications, ensuring its benefits are maximized while its negative impacts on diet and nutrition are minimized. In addressing the obesity crisis and bridging the gap between prevention science and practical behavior change, social media offers remarkable opportunities. Research has shown that traditional lecture-based approaches are insufficient for altering dietary habits. This represents a significant departure from the 20th-century model, which emphasized nutrition education as a one-way transfer of information from professionals to individuals [1, 3].

Since the 1980s, various new educational theories and approaches have emerged to address evolving health needs and behaviours. These theories highlight that education is a dynamic, interactive process, not simply the delivery of information. However, the integration of outcome research into nutrition education has been gradual. This type of qualitative research often contrasts with the randomized controlled trial approach, which is more commonly used in traditional nutrition studies that focus on reductionist methods [4].

Social media plays a crucial role in the modern era of nutrition education and communication. The rise of Web 2.0 has made it easier for people to connect online, and with the development of smartphones and computer technology, interactive information sharing and collaboration are now more accessible than ever. Social media is increasingly being used to encourage health-related lifestyle changes, influence public policy, and serve as a tool in health research. To

effectively leverage social media, it is essential to understand its potential, possess the skills needed for its use, and have a flexible framework or strategy to guide decision-making and implementation. This article aims to provide such a framework for professionals involved in nutrition education and communication [5].

1.1 Importance of Nutrition Education and Communication

A widely recognized theory in nutrition education is grounded in the Theory of Planned Behavior. This theory extends beyond simply advocating for healthy eating by focusing on effective methods to support individuals in preparing for and maintaining dietary changes. By leveraging social media as a platform for delivering education, we can engage individuals at various stages of behavior change, meeting them where they are. This approach is facilitated through non-traditional educational methods. In a study exploring the use of computers as a tool for nutrition education, the researcher suggests that "interactive, personalized, computer-based interventions should be further explored as a complementary strategy to enhance public dietary behaviors." This concept is also relevant to social media, where the potential to customize education to the specific needs of the public is virtually limitless [6].

Nutrition education plays a critical role in shaping society's understanding of nutrition and wellness. Registered Dietitians are recognized as the experts in nutrition and should serve as the primary sources of reliable nutrition information. A joint position document by the American Dietetic Association (ADA), the Society for Nutrition Education (SNE), and the American School Health Association (ASHA) states that "education and schooling have been identified as key priorities in improving public health in the United States." The paper highlights that nutrition education from dietetics professionals is essential in guiding individuals and communities toward positive behavior changes. It also emphasizes that in order to alter dietary habits, it is crucial to provide both information and instruction to empower individuals with the knowledge and skills necessary for initiating and maintaining long-term behavior changes [3,7].

1.2 Social media in Promoting Healthy Eating Habits

Social media platforms have transformed how we share and access information about nutrition. With just a few clicks, people can tap into a wealth of resources on healthy eating. These platforms provide an interactive space where nutritionists, dietitians, and health advocates can engage with their audiences and offer valuable insights into proper nutrition. A key benefit of

social media in promoting healthy eating is its ability to reach a broad and varied audience. Unlike traditional educational methods, social media has a global reach, overcoming geographical limitations. This enables individuals from diverse cultures and backgrounds to access and benefit from nutrition-related content [8].

In addition, social media platforms offer a space where individuals can engage in conversations and share their personal experiences with nutrition. This helps build a sense of community and support, enabling people to learn from each other and make better-informed decisions about their diets. By fostering dialogue around nutrition, social media motivates individuals to take a more active role in managing their health. However, it's important to recognize that not all information on these platforms is reliable or scientifically grounded. Misinformation and pseudoscience can easily spread through viral content and popular influencers. As a result, nutrition professionals must actively participate in social media, providing evidence-based information and correcting misconceptions [4, 9].

2. Implications of Using Social Media in Nutrition Education

Social media offers several advantages in nutrition education that traditional methods may not be able to match. One key benefit is the ability for real-time interaction and feedback. Nutritionists and educators can directly engage with their audience through comments, private messages, and live videos, providing a more customized experience. This instant feedback allows nutrition professionals to address specific concerns and adjust their guidance to better meet individual needs [10].

Additionally, social media platforms offer the ability to reach a broader audience at a significantly lower cost. Unlike traditional education methods, such as workshops or seminars, which may be constrained by physical space and available resources, social media can scale effortlessly. This allows nutrition professionals to connect with thousands or even millions of people through a single post or video [10].

Furthermore, social media platforms offer a wide range of multimedia tools to enhance nutrition education. Nutrition professionals can employ visually appealing infographics, cooking videos, interactive quizzes, and challenges to produce content that is both educational and entertaining. This strategy not only grabs the audience's attention, but it also increases the likelihood that they will remember the material. Additionally, social media provides a space for networking and

collaboration among nutrition experts. By connecting with other professionals, nutritionists can share insights, exchange ideas, and stay informed about the latest research and trends. This collaborative effort ensures that the content being shared is current and based on solid evidence [5,10].

2.1 Challenges and Considerations in Using Social Media for Nutrition Communication

Although social media provides many advantages for nutrition education and communication, it also comes with its own set of challenges. A key issue is the vast amount of information circulating on these platforms. With millions of posts shared daily, it can be challenging for individuals to differentiate between credible and unreliable sources [11].

Additionally, the rapid pace of social media can result in the oversimplification of complex nutrition topics. In order to capture attention and boost engagement, nutrition professionals might feel pressured to break down detailed information into short, easily understandable content. While this approach may enhance reach and interaction, it can also risk oversimplifying nutrition advice, which may affect its accuracy and overlook important nuances [3,11].

Another important factor to consider when using social media for nutrition communication is the potential for harmful influence. With the growing presence of influencers and celebrities promoting different diets and products, it is crucial to assess the credibility and qualifications of these individuals. Nutrition professionals need to focus on sharing evidence-based information and actively challenge any misleading or detrimental advice that may be spreading on social media [12].

Moreover, privacy and ethical considerations are important when using social media for nutrition communication. Nutrition professionals must be cautious about the personal information shared by individuals in comments or direct messages, ensuring confidentiality and following professional standards. It is also essential to obtain consent before featuring individuals in case studies or success stories [12].

3. Strategies for Effective Social Media Campaigns in Nutrition Education

To optimize the influence of social media in nutrition education, it is necessary to establish successful tactics and campaigns. Here are some key strategies to consider:

Establish your target audience: Identifying your target audience's demographics, likes, and interests is crucial for creating content that will resonate with them. Surveys and social media analytics can help you understand your audience's demands and preferences [13].

Set goals and objectives: Before you launch a social media campaign, clarify your goals and objectives. Whether it's to raise awareness, promote behaviour change, or provide instructional resources, having clear objectives will drive your content creation and success evaluation [13].

Create engaging and informative content: Content is king on social media, so invest time and effort into crafting high-quality, visually appealing, and informative content. Use a mix of formats such as videos, images, infographics, and written posts to cater to different learning preferences [13].

Leverage influencers and partnerships: Collaborating with influencers or partnering with relevant organizations can amplify the reach and impact of your social media campaigns. Identify influencers or organizations that align with your values and target audience, and explore opportunities for collaboration [13].

Encourage user-generated content: In addition to increasing engagement, user-generated content fosters trust and a sense of community. Invite people in your audience to share their own success stories, recipes, and nutrition-related experiences. This gives your followers a sense of empowerment and ownership [13].

Utilize hashtags and trends: Keep up with the latest trends and hashtags related to nutrition and health. Because consumers actively seek out and participate in discussions around these themes, incorporating them into your content can increase visibility and engagement [13].

3.1 Creating Engaging and Informative Content for Social Media Platforms

When creating content for social media platforms, it is important to strike a balance between being engaging and informative. Here are some tips to help you create content that captivates your audience:

Use storytelling: Personal tales and narratives can help your content become memorable and relatable. Provide success stories, endorsements, or firsthand accounts that demonstrate how nutrition improves people's lives [14].

Break down complex information: Nutrition can be a complex topic, so break down information into bite-sized, understandable chunks. Use visuals, infographics, and simple language to convey key messages effectively [14].

Provide practical tips and advice: Consumers are more inclined to interact with content that provides useful hints and doable recommendations. Share simple recipes, meal planning ideas, or grocery shopping tips that can be easily implemented in everyday life [15].

Ask questions and encourage interaction: Pose questions to your audience and encourage them to share stories or experiences. This encourages participation and builds a feeling of community among your fans [15].

Stay updated with current trends and research: Nutrition is a constantly evolving field, so it is important to stay informed about the latest research and trends. Share evidence-based information and debunk myths or misconceptions that may be circulating on social media [15].

Use visuals and multimedia: On social media platforms, visual material typically performs better. To attract attention and provide information in an aesthetically pleasing manner, use top-notch photos, videos, and infographics. Remember that knowing your audience, comprehending their wants, and offering value through your content are the keys to producing interesting and educational material. By doing this, you may use these resources to position yourself on social media as a reliable source of nutrition-related knowledge [16].

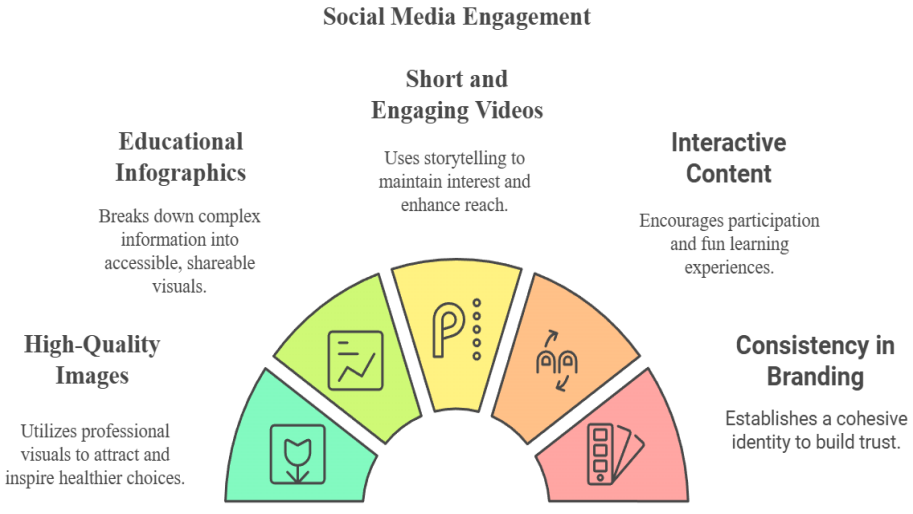

Figure 1: Social Media Engagement Aids

3.2 Using Influencers and Partnerships in Nutrition Communication on Social Media

Influencers and partnerships can play a vital role in expanding the reach and impact of your nutrition communication efforts on social media. Here's how you can leverage influencers and partnerships effectively:

Identify relevant influencers: Seek out people who share your beliefs and appeal to your target market. Think on things like their experience, reputation, and interaction with their fans. You may expand your audience and boost the legitimacy of your message by working with influencers that genuinely care about nutrition [17].

Establish mutually beneficial partnerships: Identify organizations or brands that share your mission and values. Explore opportunities for partnerships that can amplify the reach and impact of your nutrition communication efforts. For example, partnering with a fitness brand or a healthy food delivery service can help you reach individuals who are already interested in health and wellness [17].

Ensure authenticity and transparency: When working with influencers or partners, it is important to maintain authenticity and transparency. Clearly communicate your objectives and expectations, and ensure that the content created aligns with evidence-based nutrition principles. Disclose any sponsorship or partnership agreements to maintain transparency with your audience [18].

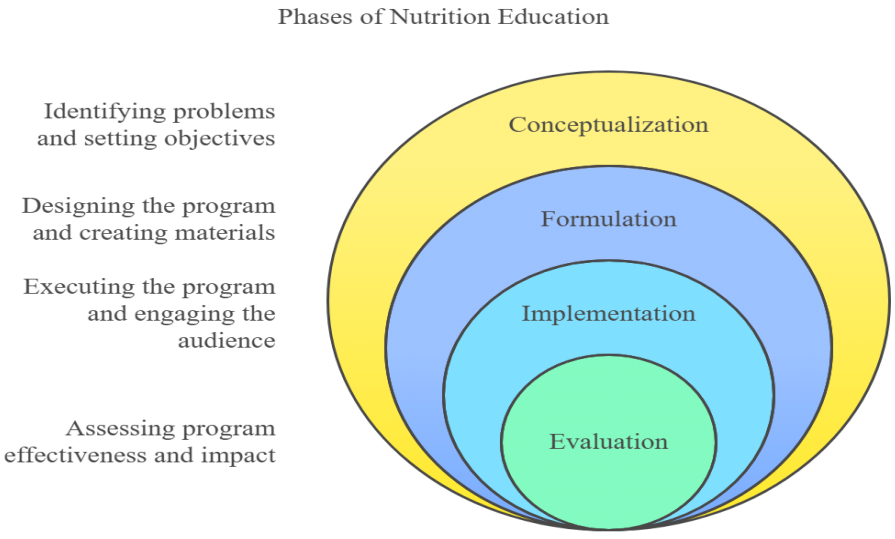

Figure 2: Phases of Nutrition Education

Monitor and measure the impact: Regularly monitor the performance of your collaborations with influencers and partners. Monitor Key Performance Indicators (KPIs) including reach, engagement, and conversion rates to gauge the effect of these connections. This will enable you to assess the effectiveness of your work and refine your plan for future collaboration. Recall that the objective of collaborating with partners and influencers is to use their influence and reach to advance factual, scientifically supported nutrition information. Your message's visibility and trustworthiness on social media can be raised by collaborating with reliable people and organizations [19, 20].

4. Discussion

The digital era has significantly transformed nutrition education and communication, positioning social media as a pivotal platform for disseminating information and promoting healthy behaviours. Platforms like Facebook, Instagram, and Twitter enable nutrition professionals, educators, and public health advocates to engage directly with diverse audiences through scalable, cost-effective mediums. Social media’s reach facilitates the sharing of evidence-based information and interactive content, addressing demographic-specific needs while countering misinformation. Influencers and organizations play a critical role in amplifying messages, creating relatable narratives that resonate with audiences across various socioeconomic backgrounds. Such efforts demonstrate the adaptability of social media as a tool for promoting positive dietary practices.

However, challenges such as misinformation, filter bubbles, and algorithmic biases pose risks to the credibility of nutrition education initiatives. The proliferation of unverified dietary trends highlights the need for digital literacy to empower individuals to evaluate online content critically. Collaborative efforts among nutrition professionals, technology platforms, and policymakers are essential to regulate content quality. Additionally, innovative strategies, such as culturally sensitive and engaging content, combined with robust monitoring and evaluation frameworks, can enhance the effectiveness of social media campaigns. By addressing these challenges, social media can be a transformative tool to empower communities to make informed dietary choices and foster healthier societies.

5. Conclusion and Future Directions

Social media has completely changed how we interact and obtain information, and it has enormous potential for use in nutrition education and communication. Nutritionists may reach a large and varied audience, have meaningful conversations with people, and enable them to make educated decisions regarding their food and general health by utilizing social media. The future of social media as a tool for nutrition education and communication is both promising and dynamic. By leveraging its global reach, interactivity, and multimedia capabilities, social media has the potential to transform the way nutrition knowledge is disseminated, fostering healthier communities worldwide. Strategies such as personalized content, influencer collaborations, and real-time engagement can enhance the effectiveness of nutrition campaigns, while data analytics can provide valuable insights for tailoring messages to specific audiences. However, challenges like misinformation, digital divides, and the need for ethical communication must be addressed to ensure equitable and impactful outcomes. Collaborative efforts among public health professionals, educators, policymakers, and technology platforms are crucial to overcoming these obstacles and maximizing opportunities.

As we move forward, a balanced approach that integrates innovative strategies with evidence-based practices will be key. By embracing social media's potential while addressing its challenges, we can create a future where nutrition education is more engaging, inclusive, and impactful than ever before.

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A Study of Mobile Phone Usage Pattern Among College Students and Its Relationship with Academic Achievement

Anjali Dubey, Sarah Basu

Department of B.Ed/M.Ed., Invertis University, Bareilly, Uttar Pradesh
Department of M.Ed., Bareilly College, Bareilly
Corresponding author: angel.261181@gmail.com
Available at https://omniscientmjprujournal.com

Abstract

Smartphone ownership among young adults, especially college-going students, has been consistently elevated. They use their cell phones as a persistent communication technology. In recent years, smartphones have become more powerful by including amazing features. Today's smartphones are providing their users a one-step solution to all their basic needs. Many devices such as watches, cameras, GPS, calculators, diaries, recorders, music players, etc. have been replaced by smartphones. Students use their smartphones as a tool of entertainment, health guide, knowledge hub, social lifeline, and much more. The impact of smartphones on the world is immense as they create another business arena—mobile commerce or m-commerce. Cell phones are an integral part of college life and culture. Even a casual observation of today's college students will reveal cell phones being used, both overtly and covertly, in every possible campus setting, including the classroom. As cell phone technology continues its rapid envelopment, the device appears capable of contributing to student learning and improved academic performance. For example, modern "smartphones" provide students with immediate, portable access to many of the same education-enhancing capabilities as an Internet-connected

Keywords: *Mobile Phone Usage Pattern, Academic Performance, College Students.*

Introduction

With the emergence of the fourth industrial revolution, educational reform utilizing information and communication technology devices has attracted more attention. The smartphone has arisen as one of the most prevalent devices. As smartphone technologies offer powerful functions that can be applied to diverse domains, they have been rapidly assimilated into daily life, including communication and learning.

The use of mobile or cell phones witnessed a quantum surge during the last decade. This was attributed not only to their ease of use and wide outreach, but also to the advanced technology continually adding to their versatile functions and applications. Now the mobile phone applications exceed the basic functions of communication by voice or texting, to a variety of added functions including educational as well as medical purposes.

Nowadays, cell phones have become an integral part of our daily life as well as school life and culture. Even a casual observation of today's school students will reveal the usage of cell phones

both overtly and covertly, in every possible campus setting including the classroom.

Senior Secondary school students frequently use their cell phones during class time despite rules against doing so. As cell phone technology continues its rapid development, the device appears capable of contributing to student learning and immediate, portable access to many of the same education enhancing capabilities as an internet connected computer, such as online information retrieval, file sharing and interacting with professors and fellow students.

Conversely, research suggests that many Senior secondary school students perceive the cell phone primarily as a leisure device and most commonly use cell phones for social networking, surfing the internet, watching videos and playing games in academic settings. (Levine, et al.; 2007. Thus, the potential relationship between cell phone use and academic performance is not clear.

Review of Related Literature

The GSM Association stated that 65% of the world's population uses a smartphone, with North America being in the lead (82%), followed by China (72%) and Europe (70%). Moreover, about 85% of the world's population will use smartphones by 2025 (GSMA, 2022). According to Harris et al. (2020) this scale is internationally used and is one of the most reliable scales regarding consistency (Harris et al., 2020).

Etxebarria et al. (2021) [5] carried out a study on the psychological state of teachers during the covid-19 crisis:the challenge of returning to face-to-face teaching

Statement of the Problem

The proposed investigation is titled as ***"A Study of mobile phone usage pattern among senior secondary students and its relationship with academic performance."***

Operational Definitions

Mobile Phone Usage Pattern: It may be defined as the activities involving using mobile services and includes surfing the Web, making voice calls, sending messages, emails, various downloads, or using mobile phones for gaming etc.

Academic Performance: It refers to the annual scores of the senior secondary students in their school examinations in the previous academic session.

Senior secondary students: It refers to all the students' pursuing arts and science courses at

undergraduate level in regular mode in school affiliated to CBSE BOARD and UP BOARD.

Objectives of the Study

- To compare the mobile phone usage pattern among male and female senior secondary students of arts and science courses.
- To compare the mobile phone usage pattern among English medium and Hindi medium senior secondary male and female students.
- To compare the academic performance of arts and science senior secondary English and Hindi medium students.
- To study the relationship between mobile phone usage pattern, academic performance of senior secondary CBSE board and UP board students.

Hypotheses of the Study

- There is no significant difference between the mobile phone usage pattern among male and female senior secondary arts and science students.
- There is no significant difference between the mobile phone usage pattern among male and female English medium and Hindi medium senior secondary students.
- There is no significant difference between academic performance arts and science senior secondary CBSE board and UP board students.
- There is no significant relationship between mobile phone pattern usage and academic performance of senior secondary students.

Delimitations of the Study

The present investigation will be delimited to the following areas due to constraints of time, manpower and resources:

- The study was delimited to only college students studying in government aided and private colleges of Bareilly district affiliated to M.J.P.Rohilkhand University.
- The study was delimited to only college students pursuing professional and non-professional courses at undergraduate level in regular mode in colleges.
- The study was delimited to around 120 college students (52 male, 68 Female) from government aided 48 (28 Male, 20Female) and private colleges 72 (30 male, 42 female) of Bareilly district affiliated to M.J.P. Rohilkhand University.

Research Method

The present study was based upon individual survey which is a part of the descriptive research method. Descriptive studies are designed to obtain pertinent and precise information concerning the current status of phenomena and whenever possible, to draw valid general conclusions from the facts discovered they are restricted not only to fact finding but many often result in the formulation of important principles of knowledge are solution of significant problems concerning local, state, national and international issues the survey method carried out by researcher gathered data from a relatively large number of cases at a particular time. A sample group was carefully selected from the total population.

Research Design

The present investigation adopted the quantitative research design. Quantitative methods emphasize objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data using computational techniques. Quantitative research focuses on gathering numerical data and generalizing it across groups of people or to explain a particular phenomenon.

A sampling technique was adopted to collect a sample of college students for the purpose of the present study. In the present study, gender and type of college (government and private) were the independent variables and mobile phone usage pattern college students were the dependent variable. For collecting requisite data, a self-developed questionnaire Mobile phone usage pattern scale was developed by the researcher under the guidance of the research guide, Dr.Sarah Basu. The data was analyzed using various statistical measures variables in MS –EXCEL.

Population

The population refers to any collection of specified groups of human beings or of non-human entities such as objects, educational institutions, time units and geographical areas; prices of wheat or salaries drown individuals. In the present study the population consists of male and female college students studying in colleges of Bareilly district, affiliated to M.J.P.Rohilkhand University.

Sample and Sampling techniques

The selection of suitable sampling technique is vital to the successful completion of a research investigation though no perfect or universally adequate sampling design has yet been desired yet considering limitations of time, and resources, the researcher decided to opt for **stratified random sampling technique**.

Sample Selection

Details of sampling have been provided in Table 3.1

DETAILS	NUMBER OF STUDENTS	PERCENTAGE
MALE	52	45.33
FEMALE	68	56.67
GOVERNMENT	48	40.00
PRIVATE	72	60.00
B.A.	46	38.30
B.SC	33	27.50
BCA	05	04.16
BBA	07	05.83
B.COM	29	24.10

Procedure

The present study was based upon an individual survey carried out by the investigator. The purpose of the study was to assess the ***mobile phone usage pattern among college students and its relationship with academic achievement".***

Since the COVID 19 pandemic has been prevalent across the country since March 2020, the researcher decided to opt for online mode of data collection using GOOGLE FORMS APP. The researcher carried out a digital survey and created the survey using Google Forms App and shared it with all concerned students through WhatsApp to collect their response. The response collected from the students was analysed to complete the survey.

Tool Used

For the present study the researcher decided to utilize the online SNS platform of Whatsapp by

floating the online Google Form in various WhatsApp groups of graduate students. The researcher asked for personal details (name, gender, type of college, and type of course) in addition to various items pertaining to mobile phone usage pattern among college students. The tool Mobile Phone Usage Pattern Questionnaire (MPUPQ) consists of 10 items with multiple options for each item and the respondents have to select any one option.

Data Collection

The researcher used a digital platform to carry out the survey. Survey was created on the Google Forms app and shared to target students through WhatsApp. The survey was opened for response from 25 Feb 2021 to 02 Mar 2021. A total of 128 responses were collected, out of which 8 responses were validated out due to some reason or the other. 120 responses were used for completing the survey. The carefully chosen data response sheets (as received in online mode) were then utilized to fulfill the study objectives.

Interpretation of Data

After collection of data the researcher has to present the collected and statistically treated data in an orderly fashion. In the current chapter, the researcher has presented the findings of the present study in a tabulated form along with the relevant explanations and graphical representation.

Table 4.1

DEMOGRAPHIC PROFILE OF MOBILE USING PATTERNAMONG COLLEGE STUDENTS

DETAILS	NUMBER OF STUDENTS	PERCENTAGE
MALE	52	45.33
FEMALE	68	56.67
GOVERNMENT	48	40.00
PRIVATE	72	60.00
B.A.	46	38.30
B.SC	33	27.50
BCA	05	04.16

BBA	07	05.83
B.COM	29	24.10

Graphically the data presented in Table 4.1 may be depicted as:

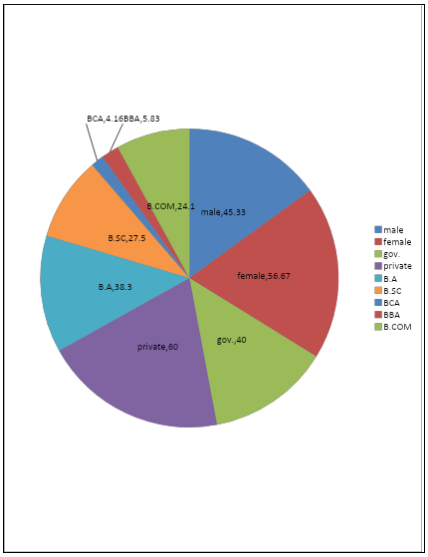

Figure 4.1: Level of mobile phone usage college students

Table 4.2

BUYING PATTERN OF MOBILE PHONE (PURPOSE)

DETAILS	ENTERTAINMENT	STUDY	CONNECTING WITH OTHERS
MALE	21	09	16
FEMALE	17	34	24
GOVERNMENT	02	18	16
PRIVATE	02	26	25
B.A.	01	17	19
B.SC	01	16	08
BCA	01	03	01
BBA	01	07	03
B.COM	03	06	10

The Data presented in Table 4.2 shows that on the question related to **-BUYING PATTERN OF MOBILE PHONE (PURPOSE)**

Graphically the data presented in Table 4.2 may be depicted as:

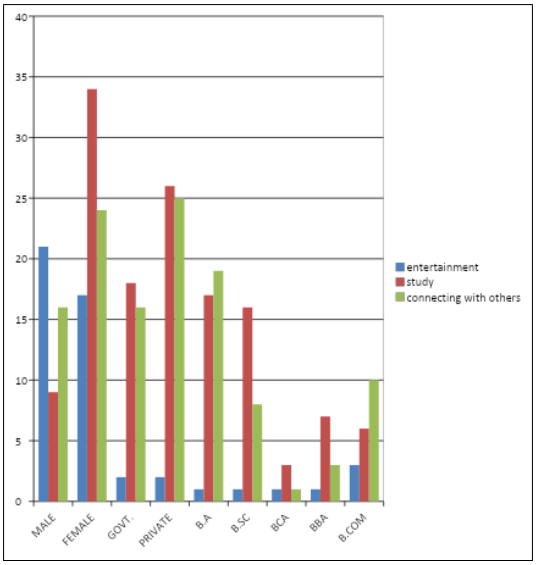

Table 4.3

KEY USAGE PATTERN OF MOBILE PHONE

DETAILS	CONNECTING WITH FRIENDS	ONLINE STUDIES	ENTERTAINMENT
MALE	09	10	05
FEMALE	17	29	09
GOVERNMENT	08	18	05
PRIVATE	18	21	09
B.A.	13	14	06
B.SC	05	11	03
BCA	01	03	00
BBA	02	01	01
B.COM	05	09	04

The Data presented in Table 4.3 shows that on the question related to **KEY USAGE PATTERN OF MOBILE PHONE.**

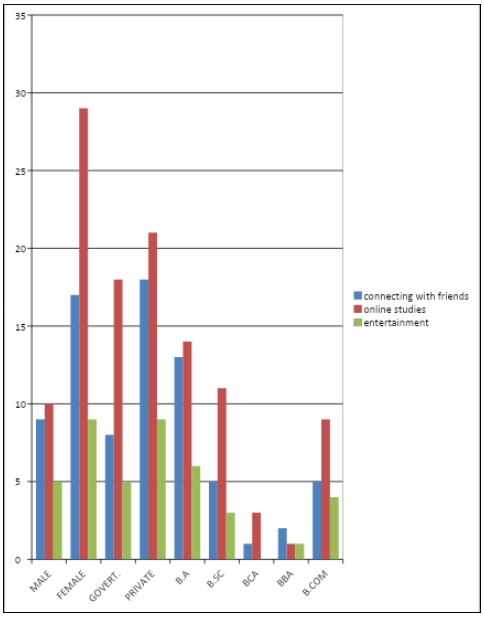

Figure 4.3: Key usage pattern of mobile phone

Table 4.4

DIFFERENT USAGE PATTERN OF MOBILE PHONE

DETAILS	ONLINE SHOPPING	CHECKING BANK ACCOUNTS	FINANCIAL TRANSACTION	PAYING BILLS
MALE	04	05	06	13
FEMALE	28	10	08	14
GOVERNMENT	12	07	03	02
PRIVATE	20	08	11	12
B.A.	14	07	06	05
B.SC	10	03	07	05
BCA	00	00	03	00
BBA	00	00	01	02
B.COM	08	05	01	02

The Data presented in Table 4.4 shows that on the question related to **-DIFFERENT USAGE PATTERN OF MOBILE PHONE.**

Graphically the data presented in Table 4.4 may be depicted as

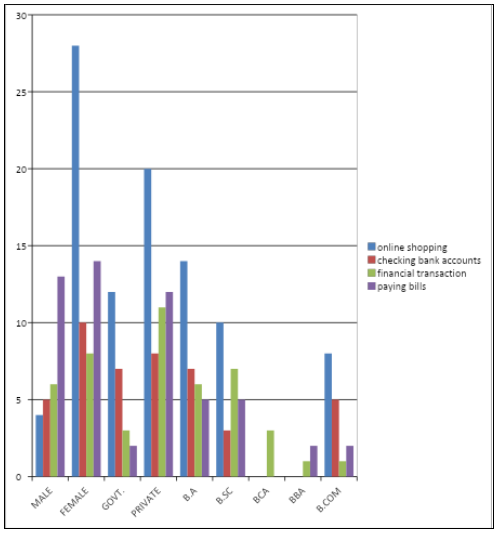

Figure 4.4: Different usage pattern of mobile phone

Table 4.5 STUDENT FEEL MOBILE PHONE USE HAS LED TO ACADEMIC PERFORMANCE

DETAILS	BETTER ACADEMIC PERFORMANCE	POOR ACADEMIC PERFORMANCE
MALE	38	9
FEMALE	64	11
GOVERNMENT	46	6
PRIVATE	56	14
B.A	43	5
B.SC	34	4
BCA	3	1
BBA	4	3
B.COM	17	7

The Data presented in Table 4.5 shows that on the question related to **STUDENT FEEL MOBILE PHONE USE HAS LED TO ACADEMIC PERFORMANCE.**

Graphically the data presented in Table 4.5 may be depicted as

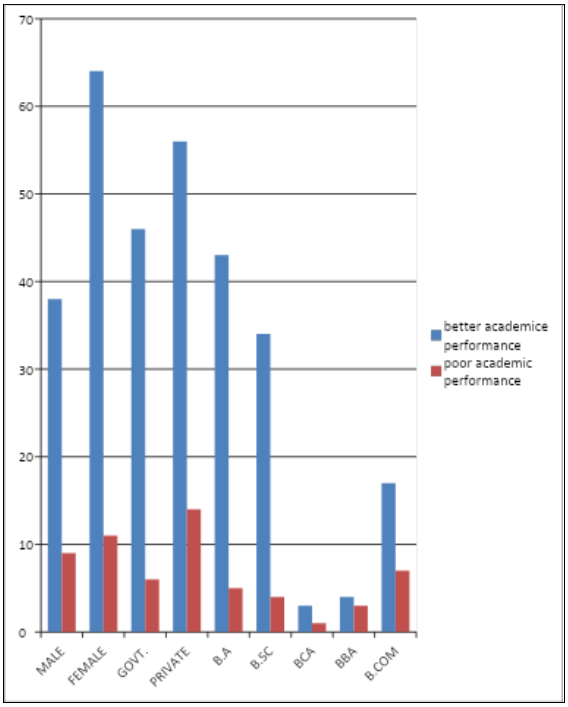

Figure 4.5: Students feel mobile phone use has led to academic performance

Discussion of Findings

We find that the present study has yielded some interesting and educationally significant results regarding the mobile phone usage pattern among college students. The findings of the present investigation may be summarized as follows:

- The majority of college students have above average levels of mobile phone usage (in hours). This indicates that most of the college students, irrespective of the type of college or course, are good in academics.
- There exists a majority difference between the Mobile Phone Usage Pattern considerably higher levels of Mobile Phone Usage Pattern. Hence the first null hypothesis is rejected. The higher mobile phone usage pattern of female high college students could possibly be due to the hard-working and diligent nature of girls as compared to boys.
- There exists no majority difference between the Mobile Phone Usage Pattern of

college students studying in government-aided and private colleges. Hence the second null hypothesis is accepted. One possible reason for this could be that these days, irrespective of the type of college and courses, most college students are opting for mobile phone usage and extra learning for better performance in Mobile Phone Usage since it is considered to be a high scoring subject.

- There exists no majority difference between the Mobile Phone Usage Pattern of College students. Hence the second null hypothesis is accepted. Nowadays, the Mobile Phone Usage Pattern of government college students and private college students is not very different, and this, along with the adoption of Mobile Phone Usage Pattern, could be a factor in almost similar performance of government college students and private college students in Mobile Phone Usage Pattern Scale.
    - There exists a majority difference between the Mobile Phone Usage Pattern of college students from types of courses (B.A, B.SC, BCA, B.COM, and BBA) college students exhibiting considerably higher levels of Mobile Phone Usage Pattern as compared to the type of courses college students. Hence the fourth null hypothesis is rejected. This kind of disparity in the performance of college students from type courses(B.A, B.SC, BCA, B.COM, and BBA) in Mobile Phone Usage Pattern could be due to better learning of college students
    - The Mobile Phone Usage College students are above average. The college students exhibit high levels of fear of the various courses, Mobile Pattern Usage as indicated by scores on the concerned aspect of the Mobile Phone Usage Pattern Questionnaire (MPUPQ), with their performance anxiety a far second.
    - The Mobile Phone Usage Pattern of college school female students is significantly more than that of their male counterparts. The female as well as male college students exhibit high levels of fear of the various courses of college students, Mobile Phone Usage Pattern as indicated by scores on the concerned aspect of the Mobile Phone Usage Pattern questionnaire (MPUPQ), with their anxiety a far second.
    - The Mobile Phone Usage Patterns of College students studying in government-aided and private college students do not differ significantly. The college students perform almost

similarly on both the aspects of the Mobile Phone Usage Pattern questionnaire. (MPUPQ),

- The Mobile Phone Usage Pattern of college students studying in government colleges and private college students does not differ significantly. The college students perform almost similarly on both the aspects of the Mobile Phone Usage Pattern questionnaire (MPUPQ)
- The Mobile Phone Usage Pattern of college students from types of courses is significantly higher than that of the college students from various courses.
- There exists a significant negative correlation between the levels of Mobile Phone Usage Pattern Mobile Phone Usage Pattern Questionnaire. (MPUPQ) among college students.,.

Educational Implications

The rationale for the study was to fill a gap in current knowledge concerning the way that students use smartphones to participate in online courses and to interact with the LMS. Because of the gap in knowledge, which is explained more in Chapter 2, colleges and universities do not have sufficient information to inform the development of approaches to improve accessibility to online courses with smartphones. Consequently, this study may help instructors and information technology staff at colleges and universities by providing information about smartphone use that can lead to improvements or usability changes in the LMS. The findings of the study may also have significance for a more general understanding of the technological factors as well as the specific devices that affect student concentration and commitment to learning. The information may be useful for expanding the role of the smartphone as well as other mobile technologies in online education.

College students are especially heavy users of cell phones and this has implications for learning outcomes at the tertiary level. Institutions will have to place greater importance on using mobile technology resources efficiently to support learning. Research cites a number of common recurring themes regarding students' positive perception of their devices' capabilities in their educational pursuits. They offer more appeal to students with respect to the ease of access to search for information.

Internet connection enables students to use mobile phones as modern tools to collect and acquire

knowledge, which creates further opportunities for learning while attending lectures. Primary benefits are enhanced communication and collaboration, along with greater interaction and increased learning irrespective of time or location.

The rationale for the study was to fill a gap in current knowledge concerning the way that students use smartphones to participate in online courses and to interact with the LMS. Because of the gap in knowledge, which is explained more in, colleges and universities do not have sufficient information to inform the development of approaches to improve accessibility to online courses with smartphones. Consequently, this study may help instructors and information technology staff at colleges and universities by providing information about smartphone use that can lead to improvements or usability changes in the LMS. The findings of the study may also have significance for a more general understanding of the technological factors as well as the specific devices that affect student concentration and commitment to learning. The information may be useful for expanding the role of the smartphone as well as other mobile technologies in online education.

The smartphone has the potential to provide a variety of benefits for learners taking courses online, such as the ability to engage in independent and collaborative learning experiences, the ability to obtain rapid feedback from instructors, and the ability to engage in informal learning at any time.

Moreover, the mere presence of a smartphone (turned off) has been found to have a negative impact on working memory capacity, fluid intelligence, and attentional processes. It has been proposed that this "cognitive interference effect" impairs the ability to voluntarily inhibit high-priority yet task-irrelevant habits such as checking a smartphone.

The present study aimed to contribute to the emerging field of personality characteristics by testing whether individual differences in emotion-related impulsivity traits (positive urgency and negative urgency) moderate the cognitive interference effect of smartphone availability.

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Artificial Intelligence in School Education: A Challenge or an Opportunity?

Harsh Shukla, Avichal Dixit

Department of B.Ed./M.Ed., Mahatma Jyotiba Phule Rohilkhand University, Bareilly
Housing and Finance Loans, Life Insurance Corporation of India, Prayagraj
Corresponding author: harsh.shukla.bh@gmail.com
Available at https://omniscientmjprujournal.com

Abstract

Artificial Intelligence (AI) is reshaping education, offering personalized learning, skill development, and enhanced problem-solving. In Indian schools, AI holds immense potential to foster creativity, support special education, and prepare students for future careers. However, challenges such as teacher training, ethical concerns, resource constraints, and over-reliance on technology must be addressed. This research examines the potential benefits and obstacles of integrating AI into Indian school education, highlighting its capacity to enhance learning while maintaining the importance of traditional teaching methods. It highlights key areas like personalized learning, career readiness, and ethical AI usage while addressing concerns about assessment and accessibility. The research provides insights for educators, policymakers, and developers, offering recommendations to ensure AI enhances, rather than disrupts, holistic education.

Keywords: *Artificial Intelligence, AI Literacy, School Education, Personalized Learning, Teacher Training, Education Technology, Digital Divide, Ethical Concerns, Policy Recommendations*

1. Introduction

The swift progress of Artificial Intelligence (AI) is transforming industries across the globe, and the field of education is no different. Seeing its potential, governments, educators, and policymakers are actively investigating methods to incorporate AI into educational programs to prepare students with vital AI literacy skills for the future. The National Education Policy (NEP) 2020 in India emphasizes the significance of digital literacy and AI-based education, stressing the necessity of equipping students for a world increasingly influenced by artificial intelligence. However, this raises a critical question: Is AI in school education an opportunity or a challenge?

This study explores the potential benefits and challenges of integrating AI into India's educational framework and investigates methods for its successful adoption. India's extensive and varied student body is poised to benefit greatly from AI-powered personalized education, the streamlining of administrative duties, and enhanced analysis of student performance **(Ahmad, 2022)**. To effectively incorporate AI, it is essential to tackle various challenges, such as infrastructure limitations, resource constraints, regulatory issues, and data privacy concerns **(Agarwal, 2024).**

Taking a balanced approach, this study draws upon existing literature and expert insights to critically analyse the evolving role of AI in Indian schools. This research aims to provide

actionable guidance for educators, policymakers, and other stakeholders by investigating whether artificial intelligence (AI) offers more opportunities or challenges. The objective is to address the complexities of integrating AI into educational environments and work towards a more inclusive, effective, and future-oriented education system.

2. Research Questions

Artificial Intelligence (AI) is rapidly transforming education, presenting exciting opportunities and significant challenges. This study seeks to enhance the understanding of the role of artificial intelligence in the context of Indian school education by investigating the following key questions:

1. How can AI be effectively integrated into Indian school education while balancing its opportunities and challenges?
2. What impact does AI have on personalized learning, the role of teachers, and ethical considerations in education?
3. What policy recommendations and practical strategies can ensure AI is integrated into schools equitably and effectively?

3. Research Objectives

As artificial intelligence continues to influence the future of education, it is imperative to critically evaluate its impact and identify strategies for its effective integration. This study seeks to address the disparity between the potential of artificial intelligence and its practical application within Indian educational institutions. The objectives outlined below focus on understanding AI's evolving role, addressing challenges, and ensuring that its adoption benefits all stakeholders in the education system.

1. To critically analyse the evolving role of AI in Indian schools, investigating whether AI is more of an opportunity or a challenge.
2. To offer practical recommendations for educators, policymakers, and other stakeholders on effectively navigating the complexities associated with the adoption of artificial intelligence in educational settings.
3. To explore strategies for effective AI implementation in the Indian education system, aiming to strive to develop an education system that is more inclusive, efficient, and prepared for future challenges.

4. Literature Review

Artificial Intelligence (AI) is gradually transforming Indian classrooms, bringing both exciting possibilities and significant challenges. On one hand, Artificial intelligence possesses the capacity to transform education by enhancing the personalization and efficiency of learning processes. On the other, issues such as limited infrastructure, resource constraints, regulatory hurdles, and concerns over data privacy make widespread adoption a complex task **(Agarwal, 2024)**. Here we are exploring AI's growing role in Indian schools, focusing on its impact on personalized learning, the evolving role of teachers, and the ethical concerns surrounding its implementation.

AI and Personalized Learning

One of the most promising contributions of artificial intelligence to education is its capacity to tailor learning experiences to individual needs. Conventional pedagogical approaches frequently encounter challenges in addressing the varied learning requirements of students within a single classroom setting. AI-driven smart learning environments, however, can analyse each student's progress and adapt teaching methods accordingly **(Peng, 2019)**. This ensures that students receive content suited to their pace and learning style, making education more engaging and effective.

Many EdTech companies in India have already embraced AI to provide customized learning experiences. By offering tailored content, adaptive feedback, and even translation services, these platforms help bridge learning gaps and ensure inclusivity **(Jaiswal, 2020) (Delgado, 2020)**. AI-powered tools make learning more interactive, giving students greater control over their education and allowing them to progress at their own speed **(Kem, 2022)**.

The Changing Role of Teachers

As artificial intelligence becomes increasingly integral to the educational landscape, the role of educators is undergoing a transformation. While AI can automate certain tasks, teaching is fundamentally a human-driven process that requires empathy, critical thinking, and adaptability. Researchers caution against viewing AI as a simple tool to reduce teachers' workload, emphasizing that human involvement remains essential in maintaining the quality of education **(Rensfeldt, 2022)**.

In this evolving landscape, teachers are no longer just providers of information. Instead, they take on the role of facilitators, helping students assess the credibility of information and develop critical thinking skills **(Amin, 2016)**. Additionally, educators must serve as mentors, motivators, and

guides, ensuring that students remain engaged and supported in an AI-driven learning environment **(Fitria, 2020)**.

However, teachers' perceptions of AI play a crucial role in its adoption. Those who have positive experiences with AI-enhanced tools are more likely to use them effectively **(Kim, 2022)**. At the same time, concerns about transparency in AI-driven decisions and shifts in teacher autonomy highlight the need for careful and thoughtful implementation.

Ethical Considerations and Data Privacy

The increasing integration of artificial intelligence in educational settings raises significant ethical and privacy-related concerns. Artificial intelligence systems necessitate the utilization of extensive datasets, thereby prompting inquiries regarding the methods by which student information is collected, stored, and utilized. Researchers emphasize the need for transparent AI models that eliminate biases and ensure fair treatment of all students **(Bahroun, 2023)**.

One of the biggest challenges is maintaining academic integrity. AI-powered tools like ChatGPT, while useful for research and learning, also present risks related to plagiarism and dishonest practices **(Cotton, 2023)**. Over-reliance on AI could also weaken students' critical thinking abilities if not carefully monitored **(Liu, 2023)**. To ensure responsible AI use in schools, strong ethical guidelines and clear policies must be in place.

Making AI Work in Indian Schools

For AI to truly benefit Indian education, its implementation needs to be thoughtful and inclusive. Access to AI-powered resources should be equitable, ensuring that students from all backgrounds can benefit from these advancements **(Gottschalk, 2023)**. A key aspect of this process is teacher training—It is imperative that educators possess the requisite skills and confidence to effectively incorporate artificial intelligence into their instructional environments.

Attitudes towards AI adoption vary widely, influenced by factors like region, gender, and teaching experience. Addressing these differences through targeted training programs can ensure smoother and more effective implementation **(Woodruff, 2023)**. Furthermore, artificial intelligence should be regarded as an auxiliary tool rather than a substitute for educators. Studies show that AI can significantly enhance lesson planning and instructional design, making teaching more efficient while keeping human expertise at the centre of learning **(Hashem, 2023)**.

5. Opportunities of AI in School Environment

Artificial intelligence possesses the capacity to revolutionize educational practices in schools by enhancing student engagement and optimizing instructional methodologies for educators. It opens exciting opportunities across various areas, including personalized learning, fostering creativity, supporting special education, and preparing students for future careers. By utilizing artificial intelligence, educational institutions can develop more inclusive and adaptive learning environments, thereby ensuring that educational practices address the diverse needs of all students.

5.1 Personalized and Adaptive Learning

AI-powered educational tools are transforming the way students learn by adapting to their unique abilities, pace, and interests. Intelligent tutoring systems (ITS) and AI-driven learning management systems (LMS) are at the forefront of this change, offering customized feedback and tailored learning paths that enhance student engagement and improve academic outcomes. One of the most promising applications of artificial intelligence in the field of education is the development of personalized and adaptive learning systems. Through the analysis of student data, artificial intelligence can discern individual learning styles, strengths, and weaknesses. This capability enables educators to modify the curriculum and teaching methodologies to more effectively address each student's specific needs **(Peng, 2019)**. This personalized approach not only fosters better learning outcomes but also makes education more engaging and effective. Research by **(Delgado, 2020)** highlights how AI is being applied to English language teaching. Their study found that AI tools provide more inclusive learning opportunities, helping students by tailoring instruction to meet their individual needs. Furthermore, these tools enable students to assume greater responsibility for their own learning, thereby promoting independence and self-regulation. In the Indian education landscape, it was observed that personalized learning is a key innovation introduced by educational technology firms. Their research found that AI-driven systems can customize content, pacing, and feedback, ensuring that students receive appropriate challenges while getting the necessary support in their weaker areas. Similarly, **(Peng, 2019)** introduced a new teaching method based on a smart learning environment, which incorporates personalized adaptive learning. Their framework encompasses learner profiles, competency-based progression, and adaptable learning environments, demonstrating how AI can dynamically modify teaching strategies through real-time monitoring of student's progress and individual differences **(Peng, 2019)**. **(Kem, 2022)** explored various personalized e-learning platforms that enhance learning

experiences through AI-driven approaches. These platforms provide translation services and unique learning pathways, ensuring that each student receives a personalized and engaging educational experience. AI-powered adaptive tools facilitate learners in cultivating a more profound interest in their academic subjects. making it easier to grasp complex concepts while maintaining enthusiasm for learning. Overall, these studies emphasize the growing impact of AI on personalized learning. By offering tailored content, adaptive assessments, and real-time feedback, AI is making education more student-centred, accessible, and engaging. To fully capitalize on these advantages, it is imperative to address challenges such as equitable access to technology, teacher training, and ethical considerations in AI-driven education.

5.2 Enhancing Creativity and Problem-Solving Skills

AI has the potential to nurture creativity by encouraging students to explore new ideas through AI-generated content, simulations, and interactive learning environments. Gamified educational tools and AI-driven coding platforms are facilitating the development of computational thinking and problem-solving skills among students from an early age. By granting access to extensive information and promoting collaborative learning experiences, AI tools have the potential to stimulate students' creativity and enhance their critical thinking skills **(Spector, 2019)**. **(Afari, 2016)** highlighted how robotics can challenge students to think innovatively while developing higher-order learning skills. The study investigated the integration of Lego Mindstorms kits into the curriculum and determined that these tools can substantially enhance students' interest in STEM-related subjects by facilitating a more hands-on and engaging learning experience. **(Spector, 2019)** emphasized the importance of critical thinking as a fundamental 21st-century skill. Their research provided a broad definition of critical thinking, covering aspects such as observation, inquiry, argumentation, and reflection. They proposed a structured approach to help children develop strong reasoning and problem-solving abilities from an early stage. AI-powered tools are also transforming the way teachers design creative and engaging learning activities. **(Hashem, 2023)** explored the role of ChatGPT as a teacher assistant. Their research indicates that ChatGPT can effectively alleviate teachers' workload by assisting in lesson planning and content development, thereby enabling educators to concentrate more on student engagement and personalized instruction. By integrating AI into education, both students and teachers can benefit from new opportunities for creative exploration and critical thinking. However, ensuring that AI

is used effectively requires a thoughtful approach that balances technology with human-centered teaching strategies.

5.3 AI for Special Education and Inclusion

AI-powered applications like speech-to-text, text-to-speech, and assistive tools are playing a vital role in making education more inclusive for students with disabilities. These technologies help students with diverse learning needs by adapting to their individual styles and providing personalized support. AI-based language translation tools are also helping bridge communication gaps in multilingual classrooms, making learning more accessible to all **(Gottschalk, 2023)**. Research by **(Chaidi, 2021)** highlights the growing importance of educational robotics in both formal and informal learning environments. Their study found that robotics can be especially beneficial for students with learning disabilities, ADHD, and autism, promoting greater inclusion and engagement in the classroom. Similarly, **(Gottschalk, 2023)** explored how digital technologies can support students from diverse backgrounds by improving access to educational content, enabling personalized learning, and expanding opportunities for remote education. Their research emphasized that for these technologies to be effective, proper teacher training and adequate resources must be in place to ensure successful implementation. Artificial intelligence is increasingly recognized as a valuable resource for educators in the identification of students who may be experiencing academic difficulties. By analysing student data and performance trends, AI can detect learning difficulties at an early stage and suggest targeted support strategies **(Ahmad, 2022)**. This proactive approach ensures that students receive timely assistance, helping them stay on track and succeed academically. With its ability to personalize learning and support diverse educational needs, AI is reshaping special education and making classrooms more inclusive. However, to maximize its potential, there is a need for careful planning, proper training for educators, and a strong focus on ethical and accessibility considerations.

5.4 Career Readiness for the AI-Driven Future

Integrating artificial intelligence into school curricula is essential for fostering AI literacy among students, thereby equipping them with the necessary skills for prospective careers in AI, data science, and other technology-driven sectors. Learning about AI not only enhances digital fluency but also strengthens critical thinking and analytical abilities—key competencies required in the 21st-century job market. As artificial intelligence continues to revolutionize various industries, it is imperative to equip students for a future dominated by AI by integrating AI education into the

academic curriculum. This can facilitate their comprehension of artificial intelligence technologies, enable the development of pertinent skills, and allow for the exploration of the ethical and societal implications associated with artificial intelligence. It emphasized the importance of designing education and training programs that complement AI rather than being replaced by it. They highlighted the need to understand AI's current capabilities and anticipate its future development to effectively integrate it into instructional systems, deliver educational content, and support teacher training. **(Lee, 2021)** examined how AI can be applied in physical education, demonstrating that AI can provide valuable support by predicting academic sustainability or the likelihood of students discontinuing their education. They also emphasized the need for future educators to develop expertise in AI applications to enhance teaching and learning outcomes. By introducing AI-related knowledge and skills in schools, students can be better prepared to enter a workforce increasingly shaped by AI-driven technologies. This encompasses not only technical competencies such as data analysis and machine learning but also a robust grounding in AI ethics, creativity, critical thinking, and problem-solving skills **(Spector, 2019)**. Facilitating students' acquisition of a comprehensive understanding of artificial intelligence will enable them to navigate the evolving employment landscape with confidence and adaptability.

6. Challenges of AI Integration in Schools

While artificial intelligence presents promising opportunities for enhancing educational practices, its integration into educational institutions also poses substantial challenges that must be meticulously addressed to ensure equitable and effective implementation. Key concerns include the evolving role of teachers, the availability of necessary resources, ethical considerations, and the complexities of assessing student learning in an AI-driven environment. Overcoming these hurdles is essential to harness AI's full potential while maintaining a balanced and inclusive education system.

6.1 Role of Teachers: AI as an Assistant or a Replacement?

A primary concern regarding the integration of artificial intelligence in education pertains to its influence on the role of educators. Some fear that AI could eventually replace educators, leading to job insecurity and a decline in the quality of learning experiences **(Rensfeldt, 2022)**. Scholars predominantly concur that artificial intelligence should be regarded as a tool to augment the efforts of educators rather than supplant them. While AI is capable of managing routine tasks such as grading and administrative duties, providing supplementary instruction, and personalizing learning

experiences, it is unable to replicate the empathy, mentorship, and human connection that educators inherently offer. The primary challenge is to equip educators with the competencies necessary to effectively integrate artificial intelligence while preserving their fundamental role in the educational process. **Rahm (2022)** examined the long-standing debate on automation in education, pointing out that while labour-saving technologies have often been promoted, research consistently highlights the indispensable role of human educators. They emphasized the need for a critical analysis of AI's role in public education to fully understand its implications. **Amin (2016)** argued that teachers in the digital age should function as facilitators, helping students evaluate the quality and credibility of information sources. Instead of merely delivering knowledge, educators should adopt roles as open-minded, critical thinkers who collaborate with students and guide them through the learning process. **Suminah (2020)** stressed that modern teachers must develop expertise in navigating digital tools and adapting to technological advancements. The authors emphasized the critical role of teachers not only as disseminators of knowledge but also as motivators and mentors who possess strong ethical and social awareness. **Kim (2022)** found that teachers who had positive experiences with AI-powered scaffolding systems were more likely to embrace them in their teaching. However, they also pointed out concerns regarding the transparency of AI decision-making and how it might alter the traditional role of educators. **Peeters et al. (2014)** highlighted the significance of teachers' capacity for self-regulation in their instructional methods as a pivotal factor in the effectiveness of AI-driven learning environments. Educators who understand student learning processes and can tailor their teaching accordingly are more effective in fostering independent and self-regulated learners. For AI to be truly beneficial in schools, teachers need adequate training and support. This encompasses practical experience with AI tools, guidance on the integration of AI into educational curricula, and deliberations regarding the ethical and pedagogical challenges associated with the integration of AI in educational contexts **(Kim, 2022)**. Ensuring that educators are well-equipped to work alongside AI will allow them to enhance their teaching practices while preserving their irreplaceable role in the learning process.

6.2 Resource Availability and Digital Divide

One of the primary challenges in the integration of artificial intelligence into educational systems is the digital divide—the unequal distribution of technological resources and access to digital tools. Many schools, particularly in rural areas of India, lack the necessary infrastructure, such as reliable

internet connectivity, smart devices, and AI-powered tools, making it difficult to implement AI-based learning solutions **(Agarwal, 2024)**. Without targeted policies and strategic investments in technology, these disparities can hinder students from benefiting equally from AI in education. **Arnone (2023)** explored educators' perceptions of AI in K-12 education across the United States. Their research found that while teachers generally had a positive outlook on AI integration, disparities existed across regions, genders, and age groups. This highlights the need for tailored approaches to ensure equitable access to AI tools in education. **Hassan and Mirza (2021)** studied the ICT infrastructure available in schools in Rajouri (J&K, India) and found that despite having access to digital tools, many schools were unable to use them effectively due to the digital incompetence of teachers. Their findings highlighted the critical need to equip educators with the requisite skills for the effective integration of technology into the classroom.

Gottschalk and Weise (2023) pointed out that persistent digital inequalities continue to undermine educational equity, particularly for students from disadvantaged backgrounds. They stressed that addressing these challenges requires not just better access to technology but also investment in teacher training and capacity building to ensure meaningful implementation. To bridge the digital divide, a comprehensive approach is needed. This necessitates investment in technological infrastructure, the reduction of costs associated with digital tools, and the assurance that all educational institutions, irrespective of their geographical location, possess the requisite resources to effectively integrate artificial intelligence into educational practices. Government initiatives, public-private partnerships, and community-driven programs are instrumental in ensuring the accessibility of AI education for all students, thereby guaranteeing that no child is excluded from the digital revolution **(Agarwal, 2024)**.

6.3 Ethical and Data Privacy Concerns

The incorporation of artificial intelligence in educational settings presents significant opportunities; however, it simultaneously engenders critical ethical and privacy concerns. Artificial intelligence systems necessitate extensive datasets to operate effectively. However, if these datasets are biased or incomplete, they may result in inequitable or discriminatory outcomes. Furthermore, the collection and storage of student information present significant concerns regarding data security and privacy, necessitating the implementation of responsible AI policies by educational institutions **(Bahroun, 2023)**. **Shipway (2023)** conducted an examination of the advantages and potential risks associated with the use of artificial intelligence tools, such as

ChatGPT, within the context of higher education. Their research highlighted the challenges institutions face in maintaining academic integrity and preventing dishonesty. It was proposed that universities formulate strategies to ensure the ethical and responsible utilization of AI-powered tools. **Rasul et al. (2023)** identified concerns related to academic integrity, reliability, and biases in AI applications like ChatGPT. They emphasized the need for both educators and students to use AI cautiously, ensuring its application remains ethical and trustworthy. **Liu et al. (2023)** examined perspectives from Chinese scholars on the implementation of generative AI in education. Their research highlighted concerns regarding the influence of artificial intelligence on students' critical thinking abilities and academic integrity, emphasizing the necessity of a balanced approach to AI integration. To ensure the ethical application of AI in educational settings, it is imperative to establish clear policies and guidelines. These should cover data collection, storage, and usage while ensuring that AI algorithms are transparent and accountable **(Bahroun, 2023)**. Schools should also actively inform students and parents about how AI is being utilized and the measures in place to protect their data. By prioritizing ethical considerations and privacy safeguards, educational institutions can harness AI's benefits while minimizing risks.

6.4 Challenges in AI-Based Assessment and Evaluation

AI-driven assessment tools possess the capability to automate the grading process, deliver immediate feedback, and pinpoint areas where students require additional support. These technologies can enhance the efficiency of evaluation processes, but concerns remain about their reliability and fairness **(Ahmad, 2022)**. **Spector (2019)** observed that artificial intelligence may encounter difficulties in evaluating complex skills, including creativity, critical thinking, and problem-solving. These abilities often require human judgment, which AI lacks. While AI can process large amounts of data quickly, it may not fully capture the depth of student responses or the nuances of their thought processes. Additionally, there is a risk of bias in AI-driven assessments, leading to unfair or inaccurate evaluations **(Rasul, 2023)**. **Cotton et al. (2023)** expressed concerns regarding the security and integrity of AI-based assessment systems. If students find ways to exploit or manipulate these tools, the accuracy and credibility of evaluations may be compromised. To prevent such issues, continuous monitoring and improvements in assessment design are necessary. **Kim (2022)** emphasized that developing effective AI-based assessment tools requires careful planning and validation. Educators and assessment experts should be involved in their design to ensure fairness and accuracy. Using diverse and

representative datasets can help minimize bias, and regular performance evaluations can improve the reliability of AI assessments. Importantly, AI should complement traditional assessment methods rather than replace them, ensuring a balanced and holistic approach to evaluating student learning.

6. Findings and Discussion

This study examines the integration of Artificial Intelligence (AI) into the Indian school education system, highlighting both the promising opportunities it presents and the challenges it entails. AI is gradually reshaping the learning experience, but for it to truly make a difference, schools must navigate some key obstacles.

Opportunities of AI in Education

AI-driven tools are revolutionizing education by tailoring lessons to individual students' needs. These tools monitor students' progress and adapt instructional methods accordingly, thereby enhancing the engagement and effectiveness of the learning process. Through the implementation of adaptive learning technologies, students are able to advance at their own pace, which contributes to improved academic outcomes. Furthermore, artificial intelligence plays a pivotal role in fostering creativity and enhancing problem-solving skills by rendering education more interactive and dynamic. Another promising aspect of AI is its contribution to special education. Tools like speech-to-text, assistive technologies, and personalized learning platforms are helping make classrooms more inclusive. Students with diverse learning needs can benefit from AI's ability to customize instruction and provide additional support. However, to fully realize AI's potential, schools must ensure that teachers receive proper training and that the necessary infrastructure is in place. AI is also shaping the future workforce by equipping students with essential digital skills. As industries continue to embrace AI, students need to develop AI literacy to stay competitive. Schools must integrate AI education into their curriculum, not just to teach technical skills but also to foster critical thinking and ethical awareness. Furthermore, artificial intelligence has the potential to alleviate educators' workloads by managing administrative tasks such as grading and lesson planning. This enables educators to devote more time to mentoring and guiding students.

Challenges in AI Integration

Despite its benefits, AI adoption in Indian schools is not without its difficulties. One major hurdle is the digital divide—while schools in urban areas often have access to AI technologies, many rural and underprivileged schools struggle with inadequate resources. Without investments in

digital infrastructure and teacher training, the advantages of AI may not reach all students equally. Data privacy and security are also critical concerns. Artificial intelligence systems necessitate the utilization of substantial volumes of student data, prompting inquiries regarding the methods of data collection, storage, and utilization. Furthermore, biases inherent in AI algorithms may result in inequitable evaluations, underscoring the imperative for policymakers to formulate explicit guidelines to ensure the ethical, secure, and transparent application of AI in educational settings.

Redefining the Role of Educators

The role of teachers is evolving alongside AI. Instead of simply delivering knowledge, educators are now guiding students in critical thinking, problem-solving, and evaluating AI-generated content. However, AI cannot replace the human aspects of teaching—students still need motivation, mentorship, and emotional support, which only a teacher can provide. AI should be viewed as a tool that enhances education rather than replacing teachers. To make this transition successful, schools must invest in professional development programs that help teachers integrate AI effectively into their teaching methods.

Way Forward

Artificial intelligence holds significant potential to revolutionize education by enhancing inclusivity, personalization, and future-readiness. Nonetheless, to achieve its full efficacy, it is imperative to address challenges such as infrastructure limitations, digital inequality, ethical considerations, and the preparedness of educators. A strategic approach involving investment in resources, the establishment of robust policies, and the provision of necessary skills to educators can ensure that AI augments learning while maintaining the essential human connection that characterizes quality education.

7. Policy Recommendations and Future Directions

To fully leverage AI in education while addressing its challenges, a well-structured approach is essential. The following recommendations can help integrate AI into schools in a way that enhances learning while ensuring fairness, accessibility, and ethical use.

Agarwal (2024) emphasized the need for a national AI in education strategy, where the Indian government outlines clear goals, priorities, and strategies for AI adoption in schools. This strategy should be formulated in collaboration with educators, technology specialists, and other relevant stakeholders to ensure its efficacy.

Gottschalk (2023) highlighted the importance of teacher training and professional development as the foundation of AI integration in classrooms. Educators must possess the requisite knowledge and skills to effectively utilize AI tools while preserving their instructional autonomy. Training programs should cover AI basics, curriculum integration, ethical considerations, and assessment practices to ensure educators feel confident in using AI technologies.

Agarwal (2024) pointed out that addressing the digital divide is crucial to ensuring equal access to AI-powered education. Many schools, particularly in rural areas, lack the necessary infrastructure, hardware, and software. The government should invest in digital infrastructure through subsidies, public-private partnerships, and community-driven initiatives to bridge this gap.

Bahroun (2023) The necessity for ethical guidelines and data privacy regulations to ensure the responsible use of artificial intelligence in educational settings has been emphasized. These guidelines should encompass the processes of data collection, storage, and utilization, while also fostering transparency and accountability in AI-driven decision-making. Schools must also educate students and parents about data privacy to foster trust in AI systems.

Escueta (2017) suggested that promoting research and innovation in AI for education is essential. Governments and educational institutions should support AI-driven research projects, fund startups developing AI-based learning tools, and establish centers of excellence that focus on advancing AI applications in education.

OECD (2021) emphasized the value of collaboration and knowledge sharing among educators, policymakers, and technology experts. Conferences, workshops, and online forums can serve as platforms for sharing best practices, discussing emerging challenges, and developing innovative AI-based solutions.

Kim (2022) proposed the development of AI-based assessment frameworks to ensure fair, valid, and reliable AI-driven evaluations. These frameworks should involve educators and assessment experts in the design process, with continuous improvements based on technological advancements. AI assessments should complement traditional methods rather than replace them, ensuring a balanced approach to student evaluation.

In addition to these primary recommendations, several further measures should be implemented to ensure the responsible and effective integration of AI in educational contexts:

1. Encouraging AI Literacy for Students: Schools should introduce AI literacy programs to help students understand AI concepts, applications, and ethical implications. This will enable them to engage with AI technologies responsibly and critically.
2. Establishing AI Ethics Committees: Schools and educational institutions should form ethics committees to monitor AI applications in education. These committees can contribute to the formulation of policies, address ethical considerations, and ensure that artificial intelligence is utilized for the benefit of both students and educators.
3. Promoting AI as a Supportive Tool: AI should be integrated as a supplement to human instruction rather than as a replacement for teachers. The goal should be to enhance teaching and learning experiences while preserving the essential human connection in education.
4. Continuous Evaluation of AI Tools: AI-based educational tools should be regularly reviewed to ensure they align with educational goals and ethical standards. Feedback from teachers and students should be used to refine and improve these tools.

Spector (2019) It has been suggested that future research should investigate the long-term effects of artificial intelligence on student learning and development. Studies should examine not only academic performance but also how AI influences creativity, critical thinking, and social-emotional skills. Additionally, AI's potential in addressing challenges unique to Indian education—such as improving literacy rates, reducing dropout rates, and fostering inclusive education—should be further investigated **(Gottschalk, 2023).** By adopting these recommendations, educational institutions and policymakers can ensure that artificial intelligence functions as an effective instrument for advancing education, while simultaneously addressing the ethical, technical, and pedagogical challenges associated with its implementation.

8. Conclusion

Agarwal (2024) noted that artificial intelligence brings both opportunities and challenges to school education in India. Although there are concerns regarding the evolving role of educators, the availability of resources, ethical considerations, and challenges in assessment, the potential of artificial intelligence in education is too substantial to disregard. AI has the power to personalize learning, foster creativity, support students with special needs, and equip learners with skills essential for an AI-driven world. **Jauhiainen (2023)** highlighted how AI can transform Indian schools by tailoring educational experiences to individual students, making learning more engaging and effective. Its ability to enhance accessibility and inclusion ensures that students with

diverse learning needs receive the support they require to succeed in the 21st century. However, for AI to truly benefit school education, it must be integrated thoughtfully—enhancing, rather than replacing, the human elements of teaching and learning. **Gottschalk (2023)** emphasized that to harness AI's full potential, a balanced and well-planned approach is necessary. This means establishing clear policies and guidelines, investing in teacher training programs, bridging the digital divide, and fostering continuous research and innovation. AI should be viewed as an empowering tool for educators, helping them create more interactive and personalized learning experiences while maintaining their crucial role as mentors and facilitators.

Drawing from the findings of this research, it is evident that AI's success in education depends on strategic implementation, ethical considerations, and equitable access to resources. The real challenge lies not in AI itself but in how we choose to integrate it into the education system. It is imperative for policymakers, educators, and technology developers to collaborate in addressing these challenges, thereby ensuring that artificial intelligence functions as a catalyst for innovation rather than a contributor to inequality. **Agarwal (2024)** emphasized that artificial intelligence should not be perceived as a substitute for traditional pedagogical methods but rather as a facilitator of more profound and meaningful educational experiences. Future research should concentrate on evaluating the long-term effects of AI on student learning, social-emotional development, and critical thinking skills. With careful planning and responsible implementation, AI can transform school education into a more inclusive, efficient, and student-centred system, empowering the next generation to thrive in an increasingly digital world.

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माध्यमिक विद्यालयों में अध्ययनरत विद्यार्थियों के विद्यालयी वातावरण तथा तकनीकी ज्ञान के मध्य सह-संबंध का अध्ययन

प्रगुन वर्मा, मोहम्मद इमरान

शिक्षक शिक्षा विभाग, ए०एन०डी० टीचर्स ट्रेनिंग (पी०जी०) कॉलेज, सीतापुर (उ०प्र०)
Corresponding author: meetimran1989@gmail.com
Available at https://omniscientmjprujournal.com

सारांश

प्रस्तुत अध्ययन के अंतर्गत माध्यमिक स्तर के विद्यालयों में अध्ययनरत् विद्यार्थियों के विद्यालयी वातावरण तथा तकनीकी ज्ञान के मध्य सह-सम्बन्ध का अवलोकन किया गया है। अध्ययन में माध्यमिक स्तर के यू0पी0 बोर्ड व सी0बी0एस0ई0 बोर्ड के पुरूष व महिला विद्यार्थियों के विद्यालयी वातावरण व तकनीकी ज्ञान के मध्य अध्ययन किया गया है। अध्ययन में समग्र के रूप में जनपद लखीमपुर में स्थित सभी यू0पी0 बोर्ड व सी0बी0एस0ई0 बोर्ड के माध्यमिक स्तर के छात्र-छात्राओं को शामिल किया गया है। शोध कार्य में लखीमपुर जनपद के 4 विद्यालयों का चयन किया गया (3 यू0पी0 बोर्ड 1 सी0बी0एस0ई0 बोर्ड) है। प्रत्येक विद्यालय से 20 छात्र और 20 छात्राओं का शामिल किया गया है। कुल 160 छात्र-छात्राओं का चयन किया गया है। शोध में विद्यालयी वातावरण हेतु डॉ0 मोहम्मद इमरान द्वारा निर्मित व मानकीकृत 'विद्यालय परिवेश मापनी' और तकनीकी ज्ञान परीक्षण हेतु शोधार्थीयों द्वारा स्वनिर्मित 'तकनीकी ज्ञान परीक्षण' प्रश्नावली का प्रयोग किया गया है। आँकड़ों के विश्लेषण एवं व्याख्यान हेतु मध्यमान, मानक विचलन, टी-टेस्ट और सह-सम्बन्ध सांख्यिकी विधियों का प्रयोग किया गया है। अध्यन के निष्कर्ष में पाया गया कि माध्यमिक विद्यालयों में अध्ययनरत् पुरूष व महिला विद्यार्थियों के तकनीकी ज्ञान में कोई अन्तर नहीं है। यह इस बात को इंगित करता है कि पुरूष व महिला विद्यार्थियों द्वारा तकनीकी उपकरणों का प्रयोग समान रूप से किया गया है।

मुख्य शब्द- *माध्यमिक स्तर, यू0पी0 बोर्ड, सी0बी0एस0ई0 बोर्ड, तकनीकी, विद्यालय, वातावरण, सह-सम्बन्ध।*

'शिक्षा' का अर्थ है सीखना और सिखाना (लाल एवम् पलोद, 2021) । अतः शिक्षा ज्ञान, उचित आचरण, तकनीकी दक्षता, विद्या आदि को प्राप्त करना अथवा सीखने की प्रक्रिया को कहते हैं। वर्तमान समय तकनीकी का युग है जिसमें मनुष्य जीवन के प्रत्येक क्षेत्र में तकनीकी का प्रयोग करता है। विद्यालय में मनुष्य अपने विकास को सुनिश्चित करने के लिये जाता है। विद्यालय के वातावरण में बालक का विकास होता है (T. Raymont, 2021) ।

विद्यालय का वातावरण के वातावरण के अंतर्गत भौतिक, सामाजिक और सीखने के वातावरण का सम्मिलित होता है। यह स्कूल द्वारा प्रदान की जाने वाली सुविधाओं के समूह को संदर्भित करता है। सुविधाओं में कक्षाएं, बुनियादी ढांचा, स्वास्थ्य, सफाई, शिक्षक-छात्र संबंध, नैतिक या सामाजिक मूल्य आदि शामिल हैं Haynes, Emmons & Corner (1994) । यह एक सकारात्मक माहौल है जो एक स्कूल बनाता है जिसमें बच्चा पढ़ता है। विद्यालय वातावरण के व्यापक मूल्यांकन में स्कूली जीवन के प्रमुख क्षेत्र जैसे सुरक्षा, रिश्ते, शिक्षण और सीखना, और पर्यावरण के साथ जैसे खंडित से) साथ बड़े संगठनात्मक पैटर्न-साझा; स्वस्थ या अस्वस्थ शामिल हैं.। हम विद्यालय में होने के बारे में कैसा महसूस करते हैं और ये बड़े समूह के रुझान सीखने और छात्र विकास को आकार देते हैं। सहकर्मी समीक्षित शोध ने लगातर प्रदर्शित किया है कि विद्यालय का माहौल अकादमिक उपलब्धि, प्रभावी जोखिम निवारण प्रयासों और सकारात्मक युवा विकास से जुड़ा हुआ है (Roeser et al. 2000) । और यह एक महत्वपूर्ण कारक है जिसे माता-पिता बच्चे के प्रदर्शन का मूल्यांकन करते समय ध्यान में रखते हैं।

विद्यालय वातावरण का बालकों पर प्रभाव:-

हेन्स, एमन्स और कॉर्नर (1994) ने विद्यालय वातावरण के बारे में कहा कि "सद्गुण और स्कूल की सीमाओं के अंदर परस्पर बातचीत जो सीधे बालक के भावनात्मक, सामाजिक और व्यावहारिक पहलुओं पर प्रभाव डालती है, उसे विद्यालय वातावरण माना जाता है।" विद्यालय वातावरण, विद्यालय जीवन की गुणवत्ता और चरित्र को दर्शाता है। स्कूल का माहौल छात्रों, अभिभावकों और स्कूल कर्मियों के स्कूली जीवन के अनुभव के पैटर्न पर आधारित होता है और मानदंडों, लक्ष्यों, मूल्यों, पारस्परिक संबंधों, शिक्षण और सीखने के तरीकों और संगठनात्मक संरचनाओं को दर्शाता है|

सीखने का माहौल छात्रों के सीखने के परिणामों को नाटकीय रूप से प्रभावित करता है। स्कूलों की खुली जगह और शोर, अनुपयुक्त तापमान, अपर्याप्त रोशनी, भीड़भाड़ वाली कक्षाएँ, गलत जगह पर रखे गए बोर्ड और अनुपयुक्त कक्षा लेआउट सभी ऐसे कारक हैं जो कक्षा में छात्रों का ध्यान भटकाने वाले कारक हो सकते हैं। (Simons, E ; Hwang, S.A ; Fitzgerald, E.F ; Kielb, C., & Lin, S. 2001) | इसके अतिरिक्त छात्र शिक्षक संबन्ध, शिक्षक शिक्षक संबन्ध, शिक्षक प्रधानाचार्य संबंधों का भी छात्रों पर प्रभाव पड़ता है।

तकनीकी ज्ञान:-

तकनीक मानव समस्याओ का समाधान करने मे मदद करने वाले औज़ारो, मशीनो, और प्रक्रिया का विकास और प्रयोग है । तकनीकी शब्द ग्रीक शब्द technologia से उद्रहत है जिसका तात्पर्य व्यवस्थित कला कर्य करने का ढंग (Wheelwright, 1966)। एक मानव क्रिया के रूप मे ये विज्ञान और अभियांत्रिकी से पुरातन है। तकनीकी ज्ञान विशिष्ट कार्य करने और वास्तविक दुनिया की स्थितियों में विशिष्ट उपकरणों और कार्यक्रमों का उपयोग करने के लिए आवश्यक विशेष ज्ञान और विशेषज्ञता है (Landies, 1980)| आईटी और व्यवसाय प्रशासन से लेकर स्वास्थ्य देखभाल और शिक्षा तक, लगभग हर क्षेत्र और उद्योग में विविध तकनीकी ज्ञान की आवश्यकता होती है। कार्यस्थल ज्ञान के विपरीत, जिसे सॉफ्ट स्किल भी कहा जाता है, जैसे संचार और समय प्रबंधन, तकनीकी ज्ञान को हासिल करने के लिए अक्सर विशिष्ट शिक्षा और प्रशिक्षण की आवश्यकता होती है।

समस्या का स्वरूप:-

माध्यमिक स्तर पर विद्यालय के वातावरण का सही आकलन करना अतिआवश्यक है। ऐसे विद्यालय जहाँ सीखने के उचित अवसर हों बालकों का समुचित विकास होने की प्रबल संभावना होती है। इसके विपरीत स्थिति में बालकों का विकास प्रभावित होता है। वर्तमान समय में तकनीकी ज्ञान विद्यार्थियों के लिये बहुत आवश्यक है। इस प्रकार आवश्यक है कि विद्यालय का वातावरण इस प्रकार हो जो बालकों को तकनीकी ज्ञान में सहायता प्रदान करे। इसलिये वर्तमान शोध अध्ययन आवश्यक है।

समस्या कथन:-

"माध्यमिक विद्यालयों में अध्ययनरत विद्यार्थियों के विद्यालयी वातावरण तथा तकनीकी ज्ञान के मध्य सह-संबंध का अध्ययन।"

प्रमुख पदों का परिभाषीकरण:-

जनपद लखीमपुर खीरी-

जनपद लखीमपुर उत्तर प्रदेश का सबसे बड़ा जिला है जिसकी सीमाएं सीतापुर ,शाहजहांपुर बहराइच ,पीलीभीत ,हरदोई आदि जिलों की सीमाओं से लगती है, इसे चीनी का कटोरा भी कहा जाता है।

माध्यमिक विद्यालय-

माध्यमिक **विद्यालय** या **उच्च विद्यालय** एक संस्था है जो माध्यमिक शिक्षा प्रदान करती है । कुछ माध्यमिक विद्यालय *निम्न माध्यमिक शिक्षा* (11 से 14 वर्ष की आयुऔर (*उच्च माध्यमिक शिक्षा* (14 से 18 वर्ष की आयुदोनों प्रदान करते हैं ((Wikipedia, the free encyclopedia)। वर्तमान शोध में माध्यमिक विद्यालयो से तात्पर्य यू0पी0 बोर्ड तथा सी0बी0एस0ई0 बोर्ड द्वारा मान्यता प्राप्त विद्यालय जिनमें कक्षा 9 से 12 तक की कक्षाएं संचालित होती हैं।

विद्यालय वातावरण-

विद्यालयी वातावरण का सम्बन्ध विद्यालय के उस सारे वातावरण से जुड़ा है जिसके अन्तर्गत केवल सुरक्षित एवं स्वच्छ सुविधाएं ही नहीं, अपितु अध्ययन, क्रीड़ा, छात्र, अध्यापक सम्बन्ध भी इसमें शामिल हैं। स्कूली बच्चों के विकास और शिक्षा के लिए स्कूली वातावरण एक आवश्यक उपचार और अपरिहार्य अंग है। मूस (1979) ने विद्यालयी वातावरण को "सामाजिक मानदंड या सीखने के माहौल के रूप में निर्धारित किया है जिसमें विद्यार्थियों ने शिक्षकों और आयोजकों द्वारा बनाए गए प्रोटोकॉल के आधार पर कुछ पाठ या उद्देश्य प्राप्त किए हैं।"

तकनीकी ज्ञान:-

ब्लैक और हैरिसन (1985) तकनीकी क्षमता को 'कार्य करने, आरंभ करने, कार्य करवाने, निर्णय लेने और उन पर कायम रहने' में सक्षम होने के रूप में परिभाषित करते हैं|

Landies (1980) तकनीकी ज्ञान विशिष्ट कार्य करने और वास्तविक दुनिया की स्थितियों में विशिष्ट उपकरणों और कार्यक्रमों का उपयोग करने के लिए आवश्यक विशेष ज्ञान और विशेषज्ञता है। आईटी और व्यवसाय प्रशासन से लेकर स्वास्थ्य देखभाल और शिक्षा तक, लगभग हर क्षेत्र और उद्योग में विविध तकनीकी ज्ञान की आवश्यकता होती है।

अध्ययन के उद्देश्य:-

1. जनपद लखीमपुर के माध्यमिक विद्यालयों में अध्यनरत विद्यार्थियों के विद्यालयी वातावरण तथा तकनीकी ज्ञान का अध्ययन करना।

2. जनपद लखीमपुर के माध्यमिक विद्यालय में अध्यनरत विद्यार्थियों के विद्यालयी वातावरण और तकनीकी ज्ञान के मध्य सहसंबंध का अध्ययन करना।

शोध अध्ययन की परिकल्पनाएं:-

1. माध्यमिक विद्यालयों में अध्यनरत पुरुष तथा महिला विद्यार्थियों के तकनीकी ज्ञान में कोई सार्थक अंतर नहीं है ।

2. माध्यमिक विद्यालयों के विद्यालयी वातावरण और तकनीकी ज्ञान के मध्य कोई सार्थक सह सम्बंध नही है।

सम्बन्धित साहित्य का सर्वेक्षण:-

ज़नोवा गुडलक (2019) ने अरुशा जिला, तंजानिया में माध्यमिक विद्यालयों के बीच शैक्षणिक उपलब्धि के रूप में कक्षा के वातावरण और भाषा की योग्यता के बीच संबंध का अध्ययन किया। इसमें सर्वेक्षण डिजाइन के माध्यम से 180 छात्रों के एक नमूने से प्रश्नावली भरवाई गई शामिल डाटा का विश्लेषण वर्णनात्मक सांख्यिकी टी टेस्ट और पियर्सन सहसंबंध से इसका अध्ययन किया गया। अध्ययन में पाया गया कि छात्राओं द्वारा छात्रों की अपेक्षा भाषा योग्यता में अधिक अंक प्राप्त किए गए।

कौसर ए. तथा कियानी ए. (2017) ने पाकिस्तान के रावलपिंडी जिले में छात्रों की शैक्षणिक उपलब्धि पर कक्षा के माहौल के प्रभाव की जांच के लिए अध्ययन की आबादी का गठन किया गया। अध्ययन को दसवीं कक्षा के छात्रों तक ही सीमित किया गया था। शैक्षिक उपलब्धि की जांच करने के लिए उपलब्धि परीक्षण विकसित किया गया था। प्रीटेस्ट और पोस्ट टेस्ट तकनीकों के माध्यम से डाटा एकत्र किया गया। सांख्यिकी के माध्यम से स्वतंत्र टी-टेस्ट से पता चला कि एक अच्छी तरह से प्रतिबंधित जीवंत कक्षा के माहौल का माध्यमिक स्तर पर छात्रों की शैक्षणिक उपलब्धि पर सकारात्मक प्रभाव पड़ता है।

तिवारी तथा राव (2021) द्वारा अपने अध्ययन उच्च माध्यमिक विद्यालयों के विद्यालय वातावरण व विद्यार्थियों के शैक्षिक तनाव का अध्ययन में निष्कर्ष प्राप्त किया कि उच्च माध्यमिक विद्यालयों के विद्यालय वातावरण व विद्यार्थियों के शैक्षिक तनाव के मध्य अत्यंत निम्न धनात्मक व छात्रों के शैक्षिक तनाव के मध्य निम्न धनात्मक वह छात्राओं के शैक्षिक तनाव के मध्य अत्यंत निम्न धनात्मक से संबंध है अतः विद्यार्थियों में विद्यालय वातावरण की वजह से विद्यार्थियों के शैक्षिक तनाव पर प्रभाव पड़ता है।

अग्रवाल, सत्तार तथा जैन (2017) द्वारा अपने शोध अध्ययन उच्चतर विद्यालयों के विद्यार्थियों में संस्थागत वातावरण का उनके शैक्षिक उपलब्धि पर पड़ने वाले प्रभाव का अध्ययन में देखा कि विद्यार्थियों की शैक्षिक उपलब्धि तथा विद्यालयी परिवेश के मध्य धनात्मक सम्बन्ध पाया गया।

बलवान सिंह (2018) द्वारा अपने शोध अध्ययन माध्यमिक स्तर के विद्यार्थियों के विद्यालय वातावरण का शैक्षिक निष्पति पर प्रभाव का अध्ययन में निष्कर्ष प्राप्त किया कि माध्यमिक स्तर के विद्यार्थियों के विद्यालय वातावरण का शैक्षिक निष्पति पर सार्थक प्रभाव पड़ता है। लिंगभेद के आधार पर माध्यमिक स्तर के विद्यार्थियों के विद्यालय वातावरण का उनकी शैक्षिक निष्पति पर सार्थक प्रभाव नहीं पड़ता है।

शोध अंतराल: उपर्युक्त शोध अध्ययनों में विद्यार्थियों के विद्यालयी वातावरण तथा शैक्षिक उपलब्धि ,शैक्षिक तनाव ,भाषा योग्यता आदि के बीच अध्ययन किया गया है। उपरोक्त सभी अध्ययनों में विद्यालय वातावरण एवं तकनीकी ज्ञान के मध्य संबंध का अध्ययन नहीं किया गया है ।अतः वर्तमान अध्ययन हेतु इस समस्या का चयन किया गया है। इस अध्ययन के फलस्वरूप माध्यमिक विद्यालय के विद्यालय वातावरण तथा तकनीकी ज्ञान में मध्य संबंध की जांच एवं उसके अनुसार विद्यालय वातावरण में सुधार के सम्बन्ध में सुझाव दिए जा सकते हैं।

प्रस्तुत शोध में प्रयुक्त विधि:-

प्रस्तुत शोध में शोधार्थी ने शोध की प्रकृति के अनुसार 'वर्णनात्मक सर्वेक्षण विधि' का प्रयोग किया है।

प्रयुक्त चर:-

1. विद्यालय वातावरण

2. तकनीकी ज्ञान

जनसंख्या:-

वर्तमान अध्ययन की जनसंख्या लखीमपुर जनपद में संचालित समस्त माध्यमिक विद्यालयों में अध्ययनरत कक्षा-9 से 12 तक के विद्यार्थी हैं।

न्यादर्श

प्रस्तुत शोध अध्ययन में जनपद लखीमपुर माध्यमिक विद्यालयों के कक्षा 10 के 160 विद्यार्थियों को न्यादर्श के रूप में चयन किया गया है। प्रत्येक विद्यालय से 20 छात्र तथा 20 छात्राओं को चयनित किया गया है।

न्यादर्श चयन की विधि

प्रस्तुत शोध अध्ययन हेतु शोधार्थियों द्वारा यादृच्छिक चयन विधि का प्रयोग किया गया है इसमें सर्वप्रथम जनपद लखीमपुर के समस्त माध्यमिक विद्यालयों की सूची प्राप्त कर उसमे से 4 माध्यमिक विद्यालयों (3 UP बोर्ड तथा 1 CBSE बोर्ड) का चयन यादृच्छिक चयन विधि द्वारा किया गया है|

क्रमांक	**विद्यालय का नाम**	**बोर्ड**	**विद्यार्थियों की संख्या**
1	केदार सिंह मेमोरियल इण्टर कॉलेज मितौली	UP बोर्ड	40 (20 छात्र+20 छात्राएँ)
2	लखीमपुर अकादमी लखीमपुर खीरी	UP बोर्ड	40 20 छात्र+20 छात्राएँ)
3	जी आई सी ढाकिआ लखीमपुर खीरी	UP बोर्ड	40 20 छात्र+20 छात्राएँ)
4	दून इंटरनेशनल स्कूल लखीमपुर खीरी	CBSE बोर्ड	40 20 छात्र+20 छात्राएँ)
		Total	160

अध्ययन में प्रयुक्त उपकरण:-

विद्यालय परिवेश मापनी

विद्यालय वातावरण के मापन लिए विद्यालय परिवेश मापनी का प्रयोग किया गया है। इस मापनी का निर्माण डॉ0 मोहम्मद इमरान (2021) द्वारा किया गया है। इस इस मापनी में कुल 30 कथन हैं। जिनमें 15 सकारात्मक और 15 नकारात्मक हैं।

इस मापनी में 5 विमाओं भौतिक वातावरण, प्रशासनिक वातावरण, शैक्षिक वातावरण, सहयोगी वातावरण तथा सामुदायिक वातावरण से सम्बंधित पक्षों से कथनों को सम्मिलित किया गया है

अंकन विधि

कथन	**अधिक सहमत**	**सहमत**	**अनिश्चित**	**असहमत**	**अधिक असहमत**
सकारात्मक	5	4	3	2	1
नकारात्मक	1	2	3	4	5

इस मापनी की विश्वसनीयता स्प्लिट हाफ विधि द्वारा 0. 57 है तथा वैधता हेतु विषयवस्तु वैधता विधि का प्रयोग किया गया है

तकनीकी ज्ञान परीक्षण

तकनीकी ज्ञान मापन हेतु शोधर्थियों द्वारा तकनीकी ज्ञान परिक्षण का प्रयोग एवं विकास स्वयं किया गया है| इसमें कुल 25 प्रश्न सम्मिलित हैं जो कि तकनीकी ज्ञान, प्रयोग, व्यवस्था, रख रखाव से सम्बंधित हैं| प्रत्येक प्रश्न के 4 विकल्प दिए गए हैं| इस परिक्षण की आंतरिक एवं बाह्य वैधता एवं विश्वसनीयता विषय विशेषज्ञों द्वारा संतोषजनक पायी गयी है | इसे विषय विशेषज्ञों द्वारा सुझाव लेकर एवं पद विश्लेषण द्वारा जांच कर उपयुक्त रूप से प्रयोग किया गया है|

अंकन विधि

अंकन के लिए प्रत्येक सही विकल्प के चयन हेतु 1 अंक और गलत विकल्प के चयन पर 0 अंक प्रदान किया गया है|

अध्ययन में प्रयुक्त सांख्यकी:-

प्रस्तुत अध्ययन में आंकड़ों के विश्लेषण एवं व्याख्यान हेतु मध्यमान, मानक विचलन एवं टी-टेस्ट और सह-सम्बन्ध सांख्यिकी विधियों का प्रयोग किया गया है।

आँकड़ों का विश्लेषण एवं व्याख्या:-

H01: माध्यमिक विद्यालयों में अध्ययनरत पुरूष और महिला विद्यार्थियों के तकनीकी ज्ञान में कोई सार्थक अन्तर नहीं है।

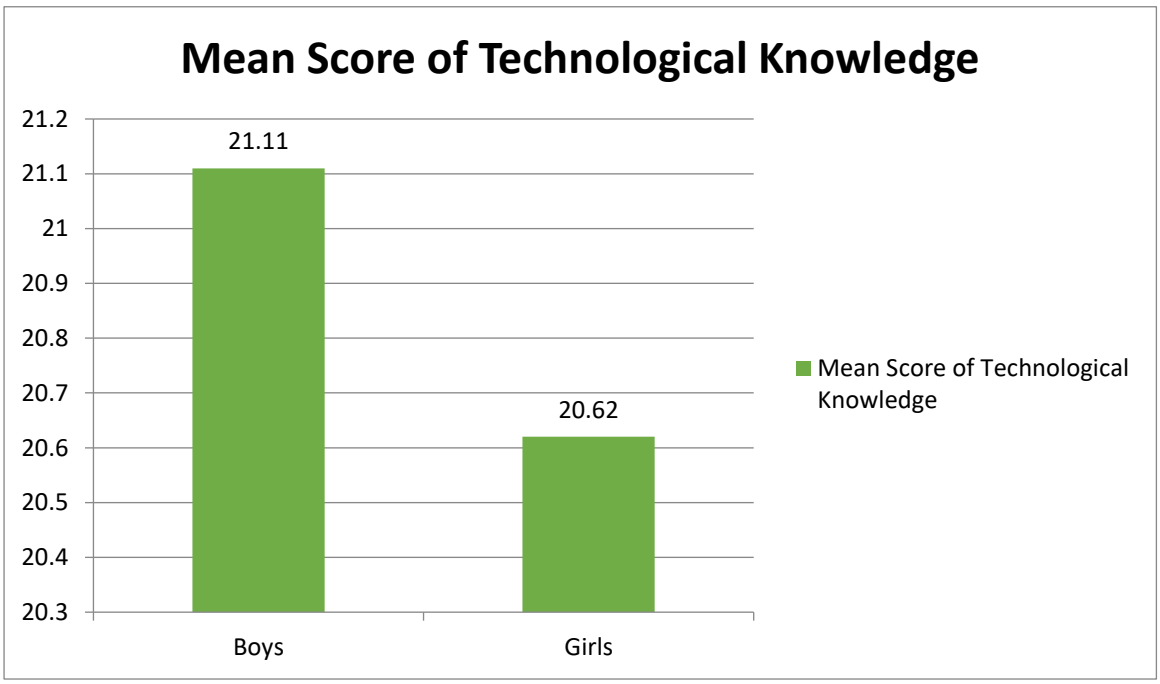
सारणी सं. 01

क्र. सं.	लिंग	संख्या (N)	मध्यमान (M)	मानक विचलन (s.d.)	परिकलित (t) मान	सारणी मान 0.05 स्तर पर	टिप्पणी
1.	छात्र	80	21.11	2.27	0.131	1.96	असार्थक
2.	छात्राएँ	80	20.62	2.85			

परिणाम: सारणी सं. 01 में पुरुष विद्यार्थियों और महिला विद्यार्थियों के मध्य तकनीकी ज्ञान का परिकलित t मान 0.131 है। 158 स्वतंत्रता की कोटि व 0.05 सार्थकता स्तर पर t का सारणीय मान 1.96 है। परिकलित t (0. 131) मान सारणीय t (1.96, 0.05) मान से कम है। अतः हमारी शून्य परिकल्पना, माध्यमिक विद्यालयों में अध्ययनरत पुरूष और महिला विद्यार्थियों के तकनीकी ज्ञान में कोई सार्थक अन्तर नहीं है, स्वीकृत होती है।

विवेचना: उपरोक्त सारणी में प्रस्तुत शोध आंकड़ों को प्रथम उद्देश्य, जनपद लखीमपुर के माध्यमिक विद्यालयों में अध्यनरत विद्यार्थियों के विद्यालयी वातावरण तथा तकनीकी ज्ञान का अध्ययन करना, के सन्दर्भ में देखने पर पता चलता है कि पुरुष विद्यार्थियों के तकनीकी ज्ञान पर प्राप्त प्राप्तांकों का माध्य 21.11 है जो कि महिला विद्यार्थियों के तकनीकी ज्ञान पर प्राप्त प्राप्तांकों का माध्य 20.62 से अपेक्षाकृत अधिक है| उपरोक्त परिणाम का संभावित कारण पुरुष विद्यार्थियों का तकनीकी ज्ञान तथा कैशल के प्रति अधिक रूचि होना हो सकता है| इसके अतिरिक्त महिला विद्यार्थियों द्वारा तकनीकी ज्ञान की अपेक्षा अन्य विषयों में अधिक रुचि होना एवं माता पिता द्वारा तकनीकी के अतिरिक्त अन्य साहित्यिक विषयों को पढ़ने के लिए प्रेरित करना भी इसका एक प्रमुख कारण हो सकता है|

जनपद लखीमपुर के माध्यमिक विद्यालयों में अध्ययनरत छात्र-छात्राओं का तकनीकी ज्ञान के माध्य अंकों का रेखाचित्र-



उपरोक्त रेखा चित्र से स्पष्ट है कि छात्रों द्वारा तकनीकी ज्ञान परीक्षण पर प्राप्त अंकों का माध्य छात्राओं की अपेक्षा कुछ अधिक है।

H02. माध्यमिक विद्यालयों के विद्यालयी वातावरण और तकनीकी ज्ञान के मध्य कोई सार्थक सह सम्बंध नही है।

सारणी सं. 02

क्र. सं.	चर	संख्या (N)	सहसम्बन्ध गुणांक (r)	सारणी मान 0.05 स्तर पर	टिप्पणी
1.	विद्यालय वातावरण	80	0.2429	0.159	सार्थक
2.	तकनीकी ज्ञान	80			

परिणाम: सारणी सं. 02 माध्यमिक विद्यालयों अध्ययनरत विद्यार्थियों के विद्यालयी वातावरण व तकनीकी ज्ञान के मध्य सह-सम्बन्ध से सम्बन्धित आंकड़ों को दर्शाती है। विद्यालयी वातावरण व तकनीकी ज्ञान के मध्य सह-सम्बन्ध गुणांक का मान 0.2429 है जो 158 स्वतंत्रता की कोटि पर 0.05 सार्थकता स्तर पर सारणी मान 0.159 से अधिक है। अतः विद्यालयी वातावरण व तकनीकी ज्ञान के मध्य सह-सम्बन्ध का मान सार्थक है अथवा शून्य नहीं है। अतः हमारी शून्य परिकल्पना, माध्यमिक विद्यालयों के विद्यालयी वातावरण और तकनीकी ज्ञान के मध्य कोई सार्थक सह सम्बंध नही है, अस्वीकृत होती है।

विवेचना: उपरोक्त सारणी (02) में प्रस्तुत शोध आंकड़ों को द्वितीय उद्देश्य, जनपद लखीमपुर के माध्यमिक विद्यालय में अध्यनरत विद्यार्थियों के विद्यालयी वातावरण और तकनीकी ज्ञान के मध्य सहसंबंध का अध्ययन करना, के सन्दर्भ में देखने से पता चलता है कि विद्यालयी वातावरण तथा तकनीकी ज्ञान के मध्य सहबंध गुणांक का मान (0.2429) सकारात्मक है| इसका संभावित कारण वर्तमानं परिदृश्य में विद्यालयों में तकनीकी ज्ञान का विकास एवं प्रसार प्रमुख है| साथ ही साथ विद्यार्थियों में तकनीकी उपकरणों की बढ़ती पहुँच एवं उपलब्धता भी इस परिणाम का एक कारण हो सकता है| सकारात्मक विद्यालयी वातावरण का प्रभाव तकनीकी ज्ञान पर भी सकारात्मक होता है| इसी प्रकार विद्यालयी वातावरण का प्रभाव विद्यार्थियों की शैक्षिक उपलब्धि पर भी सार्थक रूप से पड़ता है **(अग्रवाल, सत्तर तथा जैन, 2017)** और यदि विद्यालय वातावरण में किसी प्रकार का असहयोग या शैक्षिक रूप से समस्या है तो इसका नकारात्मक प्रभाव विद्यार्थियों के तकनीकी ज्ञान एवं कौशल पड़ता है| इसी प्रकार के परिणाम **राव तथा तिवारी (2021)** द्वारा में दिखाए गये हैं जहाँ विद्यालय वातावरण का नकारात्मक प्रभाव विद्यार्थियों के तनाव को भी बढ़ाता है अर्थात जैसा विद्यालय का वातावरण होता है वैसा ही प्रभाव विद्यार्थियों पर पड़ता है|

निष्कर्ष: प्रस्तुत शोध के परिणामों से स्पष्ट होता है कि माध्यमिक विद्यालयों में अध्ययनरत विद्यार्थियों के तकनीकी ज्ञान के मध्य लिंग के सापेक्ष कोई सार्थक अंतर नहीं है। माध्यमिक विद्यालयों के विद्यालयी वातावरण तथा तकनीकी के ज्ञान के मध्य सार्थक तथा सकारात्मक सहसंबंध है। अतः कह सकते हैं कि विद्यालयी वातावरण का विद्यार्थियों के तकनीकी ज्ञान, कौशल तथा अन्य पक्षों पर प्रभाव पड़ता है।

वर्तमान परिदृश्य में तकनीकी ज्ञान होना विद्यार्थियों के लिए अतिआवश्यक है| उपरोक्त शोध निष्कर्षों से पता चलता है कि तकनीकी ज्ञान विद्यालयी वातावरण से सम्बंधित होता है| अर्थात तकनीकी ज्ञान को विद्यालयी वातावरण में यदि उपलब्ध कराया जाए तो यह और भी अधिक प्रभावी होगा| विद्यालय वातावरण तकनीकी को जितना अधिक बढ़ावा देगा उतना ही अधिक विद्यार्थियों की तकनीकी के क्षेत्र में सफलता की संभावना बढ़ेगी|

शिक्षिक निहितार्थ :

प्रस्तुत शोध अध्ययन के परिणामों के आधार पर विद्यालयी वातावरण और तकनीकी सुविधाओं में सुधार किया जा सकता है|

प्रस्तुत शोध अध्ययन के परिणामों के आधार पर विद्यालयी वातावरण एवं उससे सम्बंधित समस्याओं का आकलन कर शिक्षक उसमे आवश्यक सुझाव प्रदान कर सकते हैं |

प्रस्तुत शोध अध्ययन के परिणामों के आधार पर अभिभावकों को भी विद्यालयी वातावरण एवं इसका उनके बच्चों के तकनीकी ज्ञान के मध्य सम्बन्ध की जानकारी प्राप्त हो सकेगी और वह उसमे आवश्यक सहयोग प्रदान कर सकेंगे

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