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REVIEWER BOARD

From the Desk of the Chief Editor

Dear Readers,

As we conclude the final quarter of the year, I find it encouraging to see how research across our institution has begun to express a stronger awareness of context and consequence. In recent months, many scholars have shown a deeper appreciation for the intellectual responsibilities that accompany academic work. There is increasing recognition that research does not exist apart from the world, but is shaped by the uncertainties, aspirations, and ethical challenges that define our present moment. Discussions on technology, for example, are now less concerned with novelty and more attentive to how digital systems influence learning, memory, agency, and social relations. Likewise, studies in education and social sciences are beginning to examine how shifting cultural expectations, workplace demands, and emotional well-being shape the lived experiences of learners and teachers alike. These directions suggest a maturing research environment, one that values insight as much as information.

Within this evolving landscape, Omniscient continues to refine its purpose as a journal that supports research grounded in clarity, coherence, and intellectual sincerity. Our aim is not to accumulate publications, but to cultivate an environment where scholarship grows through thoughtful questioning and sustained engagement. We encourage authors to situate their research within ongoing conversations, to articulate why their work matters, and to write with an awareness that their contributions will be read by those who are themselves exploring difficult questions. This expectation is not merely academic; it is a reminder that scholarly writing becomes meaningful when it is connected to the concerns of a community that cares about the advancement of knowledge.

One observation from this quarter is worth sharing: many research manuscripts show strong ideas at their core, yet the ideas are not always developed with the attention they deserve. The journals that remain influential over time are those that publish work shaped not only by intellect but also by perseverance. I encourage researchers to resist the temptation to submit prematurely and instead allow their arguments to mature through revision and dialogue. When researchers choose to follow this path, their writing becomes more confident, their reasoning more precise, and their contribution more lasting. In this sense, our review process is not merely evaluative; it is formative, intended to strengthen the work rather than judge it hastily.

I extend my appreciation to every author who entrusted us with their research during this quarter and to our reviewers whose careful reading continues to uphold the journal's standards. I am equally grateful to our readers, whose engagement ensures that scholarship reaches beyond the page and becomes part of a wider conversation. As we step into a new year of research pursuits, I hope we carry forward the belief that progress in academia does not depend solely on what we discover, but also on how attentively we think, how responsibly we write, and how generously we learn from one another.

(Prof. K. P. Singh)

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Content

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Empowering Women's Education through National Digital University

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ABSTARCT

Human resource is very essential for the development of a country. The activities and economic development of the country depend on the human resources. India today is the most populous country in terms of such human resources. But it is very unfortunate that India is not among the best countries in the world either economically or educationally. Reports, data and research findings reveal that even when women make up half of India's population, we are still underutilizing their human resources. According to the Global Gender Gap Report 2023, India ranks 127 out of 146 countries surveyed overall. So, the government has taken various initiatives to bridge this gender gap. One of them is gender equality for women in higher education. According to the National Education Policy-2020, a National Digital University will be set up. A National Digital University about to launch with an aim to achieve 50 percent GER by 2030. So, the National Digital University will help immensely in increasing the percentage of female students' GER. This announcement is a huge boon for female students who want to pursue higher education in India. Because since the beginning of independent India, there has been a gap between male and female students who can enrol in higher education. Therefore, this paper seeks to examine the trends in enrolment of women in higher education institutions in India over the past five years and list out the reasons behind women's enrolment in higher education and how digital university online education can overcome these barriers in higher education. For this, the researcher followed descriptive methodology. Secondary data are obtained from various published and unpublished records, books, magazines and journals, both print and online and discussed how to increase the Gross Enrolment Ratio of female students in higher education through National Digital University.

Keywords: Gender Gab, Gross Enrolment Ratio, National Digital University.

INTRODUCTION

All the democratic countries of the world including India insist on gender equality especially in educational activities and do not accept any differences. Education is the mirage for many women those who are the backbone of the society. Women are excluded from various types of high-level activities due to decline or non-availability of academic knowledge. Various types

of data and reports show us that the position of women in higher education is very poor, especially comparing to men. The Kothari Commission recommended the National Education Policy, and the National Education Policy 2020 emphasize the education of girls and gives them importance. One of the suggestions of National Education Policy 2020 is, the online learning mode that can be offered through Digital University. It is true that National Digital University, the various women in India they can achieve higher education very easily in the upcoming future. Education improves the socio-economic status of women and gives them awareness in life (Azam, 1993). Women's empowerment and women's higher education are closely related. The reality is that opportunities must be given to the women in higher education to empower themselves. The contribution of men in society is as important as the contribution of women. If such importance is to be given to the society and not to stop only with the family housework and caring children, then women should be given proper higher education. Like men, women have critical thinking skills and analytical skills, so higher education system is very essential and necessary for women to improve and refine it. Also, higher education is necessary for women to manage their families, raise children, improve their economy and improve their social status in the family background and to get better job opportunities hence this article speaks about Empowering Women's Education through National Digital University.

GENDER INEQUALITY

Since independence, women have not equalled the number of men in economics, politics, leadership, and education in our country. Especially in India, the number of higher education institutions that can be led by women is very low. India's higher education institutions are led by an average of seven percent female leadership (Joseph & Joseph, 2022). This is due to the low percentage of women who can enrol in higher education. Although the percentage of female enrolment in higher education has gradually increased, it has not been equal to that of males. On the one hand, women have been facing social, family, and economic setbacks due to a lack of higher education. Similarly, there is a decrease in the Gross Domestic Income (GDI) by women. And it affects the overall development of India.

STATE WISE MALE AND FEMALE LITERACY RATE IN INDIA

In independent India, equality of education was provided for both male and female. But there exist a wide range of difference in the literacy rate between male and female from the beginning. According to 2011 census, we can see the differences in the literacy of male and female students in each state.

Table 3.1
State wise literacy rate of male and female in India

S.NO.	STATE	LITERACY	MALE	FEMALE	GENDER DIFFERENCE IN %
	India	**74.04**	**82.14**	**65.46**	**16.68**
1	Kerala	94.00	96.11	92.07	4.04
2	Lakshadweep	91.85	95.56	87.95	7.61
3	Mizoram	91.33	93.35	89.27	4.08
4	Goa	88.70	92.65	84.66	7.99
5	Tripura	87.22	91.53	82.73	8.8
6	Daman and Diu	87.10	91.54	79.55	11.99
7	Andaman and Nicobar Islands	86.63	90.27	82.43	7.84
8	Delhi	86.21	90.94	80.76	10.18
9	Chandigarh	86.05	89.99	81.19	8.8
10	Puducherry	85.85	91.26	80.67	10.59
11	Himachal Pradesh	82.80	89.53	75.93	13.6
12	Maharashtra	82.34	88.38	75.87	12.51
13	Sikkim	81.42	86.55	75.61	10.94
14	Tamil Nadu	80.09	86.77	73.44	13.33
15	Nagaland	79.55	82.75	76.11	6.64
16	Uttarakhand	78.82	87.40	70.01	17.39
17	Gujarat	78.03	85.75	69.68	16.07
18	Manipur	76.94	83.58	70.26	13.32
19	West Bengal	76.26	81.69	70.54	11.15
20	Dadra and Nagar Haveli	76.24	85.17	64.32	20.85
21	Punjab	75.84	80.44	70.73	9.71
22	Haryana	75.55	84.06	65.94	18.12
23	Karnataka	75.36	82.47	68.08	14.39
24	Meghalaya	74.43	75.95	72.89	3.06
25	Orissa	72.87	81.59	64.01	17.58
26	Assam	72.19	77.85	66.27	11.58
27	Chhattisgarh	70.28	80.27	60.24	20.03
28	Madhya Pradesh	69.32	78.73	59.24	19.49
29	Uttar Pradesh	67.68	77.28	57.18	20.1
30	Jammu and Kashmir	67.16	76.75	56.43	20.32
31	Andhra Pradesh	67.02	74.88	59.15	15.73
32	Jharkhand	66.41	76.84	55.42	21.42
33	Rajasthan	66.11	79.19	52.12	27.07
34	Arunachal Pradesh	65.38	72.55	57.70	14.85
35	Bihar	61.80	71.20	51.50	19.7

(Literacy Rate of India - Population Census 2011, n.d.)

From the table 3.1, the 2011 population statistics shows that none of the states the literacy rate of women matches with the men. In India, Kerala has the highest number of female literates at 92.07% and Bihar has the lowest number of female literates at 51.50%.

ENROLMENT OF WOMEN IN HIGHER EDUCATION

The enrolment details of the students are known through Unified District Information System for Education Plus (UDISE+) for Education which is conducted by the Government of India every year. It provides the state wise enrolment details of students in education across India. The details of the students who can enrol in higher secondary education are known through the All-India Survey on School Education (AISSE), which can be conducted by the Indian government every year.

Table 4.1
Difference between the enrolment of male and female in higher education

YEAR	MALE (In Thousands)	FEMALE (In Thousands)	TOTAL (In Thousands)	PERCENTAGE OF FEMALE
1950-1951	157	17	174	10
1955-1956	252	43	295	14.6
1960-1961	468	89	557	16
1965-1966	849	218	1067	20.4
1970-1971	1563	391	1954	20
1975-1976	2131	595	2426	24.5
1980-1981	2003	749	2752	27.2
1985-1986	2512	1059	3571	29.6
1990-1991	2986	1439	4425	32.5
1995-1996	4235	2191	6426	34.10
2000-2001	4988	3012	8001	37.6
2005-2006	6562	4466	11028	40.5
2010-2011	16173	13010	29184	45
2015-2016	18594	15990	34584	46
2016-2017	18995	16710	35705	46.8
2017-2018	19200	17442	36642	47.6
2018-2019	19200	18200	37400	48.6
2019-2020	15060	14485	29545	49.02
2020-2021	15969	15077	31046	48.6

(Ministry of Education, Educational Statistics at Glance 2020-21)

From the table 4.1, Enrolment of female students in higher education in India since independence till date has been lower than that of male students. While the enrolment of female students has steadily increased every year, it has not kept pace with that of male students. A maximum of 49.02% female enrolment in higher education reached in the year 2019-2020. The reality is that even though the Indian government has launched various schemes for higher education of women, the enrolment is still not match with men.

GROSS ENROLMENT RATIO IN HIGHER EDUCATION (GER)

All India Survey on Higher Education (AISHE) provides state wise enrolment details and Gross Enrolment Ratio of students in education across India. The details of the students who can enrol

in higher education are known through the All-India Survey on Higher Education, which can be conducted by the Indian government every year.

Table 5.1
GER of female students in Higher Secondary Education and Higher Education

S.NO.	YEAR	% OF FEMALE STUDENTS GER IN HIGHER SECONDARY EDUCATION	% OF FEMALE STUDENTS GER IN HIGHER EDUCATION	GENDER DIFFERENCE IN %
1	2016-2017	43%	23.8%	19.2%
2	2017-2018	48%	24.6%	23.4%
3	2018-2019	50%	25.5%	24.5%
4	2019-2020	50.8%	26.4%	24.4%
5	2020-2021	52.4%	27.9%	24.5%
				Average 23.20%

(Ministry of Education, Educational Statistics at Glance 2020-21 & *UDISE+2020_21_Booklet*, n.d.)

From table 5.1, shows the information about enrolment of female student in higher education in India based on various data and sources and how the actual situation varies from year to year. Also, it shows how the total enrolment ratio differs between higher secondary school education and higher education. In the last five years, the enrolment profile of female students in higher education's Gross Enrolment Rate shows us an average difference of 23.20%. Also, the Gross Enrolment Ratio of female students in each year shows that Higher Education Enrolment does not matching with Higher Secondary School Enrolment.

THE OBSTACLES TO WOMEN'S ENROLMENT IN HIGHER EDUCATION

We can understand that the female students have been facing many problems towards enrolling in the higher education in India through the various data, reports, and research conclusions. Barriers to higher education remain the same problems for women in India. Here, we can sort out generalizable reasons from a variety of data, but there are many specific reasons for women to enrol in higher education. It should also be noted that most of the girls are unable to join higher education due to these reasons.

Growth of population, Economic barriers, Interventions of religion, Caste background, Dowry problems, Lack of Accessibility, Limited employment opportunities, Gender inequality, Family responsibilities, Lack of support from the family, Cultural barriers, Fear of sexual harassment, Maternal barriers, Social cultural backgrounds, Lack of sanitary facilities, Discriminatory approach in education, Family restrictions, Conservative mind-set, False perceptions, Mobility restrictions, Psychological barriers like low self-esteem and feeling intimidated by male competitors (Shetty M., 2019) & (Janaki, 2013)

Apart from these, most of the women are prevented from pursuing higher education due to the lack of educational institutions nearby. Due to the misunderstandings of the parents, they refuse to agree to send girls alone to educational institutions, which is also the biggest obstacle for girls pursue higher education. Also, rural women are reluctant to join higher education due to lack of language skills (Shetty M., 2019).

NATIONAL DIGITAL UNIVERSITY - NDU

National Education Policy-2020, India has introduced changes in previous education activities and suggested new education systems. One such innovation is the national digital university. One of the objectives of the national Digital University is to provide the necessary facilities for easy access and education through the Internet. As a pioneer in the state of Kerala in India, Kerala Digital University was established in 2020 and providing online education to various students through it. National Digital University will begin its operations in collaboration with government and private universities operating in India. The National Digital University will operate on 'the hub' and 'the spoke' model. That means MOOC (Massive Open Online Course) portals act as hub and Universities act as spokes (Kundal, 2023).

National Digital University will conduct courses for students through SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds). Samarth, IT and other administrative services will assist National Digital University in implementing the government (Goreja & Goreja, 2023).

National Digital University plans to offers flexible online learning through an academy and credit system. An example of flexibility is that a student who earns 50 percent of the credits through a university and attends another institution of higher education with the remaining credits often has a greater chance of graduating from that university. This means that, if a student registers in University of Madras and gets 50 percent credit, the University of Madras will award her a degree. Also, when a student enrolls in the National Digital University and acquires cumulative credit from different universities, the National Digital University will award her a degree, thus increasing the female student's learning rate and learning freedom (Luxmi, 2023).

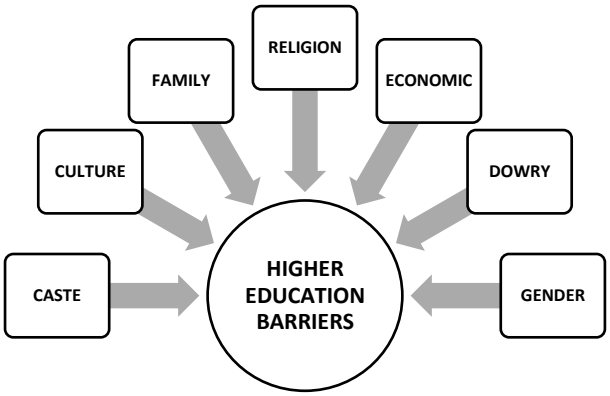
BENEFITS OF NATIONAL DIGITAL UNIVERSITY

- There are usually limited number of seats in private and government universities. But through National Digital University you can get unlimited seats from the same universities.

- National Digital University plans to provide various benefits to the students with the aim of increasing the overall employability of the country.
- It has fully contributed to the Digital India movement.
- The National Digital University allows full use of the online system for obtaining degrees in higher education. (Kundal, 2023)

EMPOWERING WOMEN'S EDUCATION THROUGH NATIONAL DIGITAL UNIVERSITY

The National Education Policy-2020 calls for the creation of India's first National Digital University (NDU) through the establishment of the Higher Education Commission of India (HECI). The Government of India has announced that the National Digital University will be established by late 2023. Students in India, especially female students, will be greatly benefited by this digital university based on digital with online learning in near future (Gohain, 2022).



Online learning can break down all the barriers to the enrolment of higher education for women in India. This is because the online learning that can be provided through a national digital university is highly flexible. Online learning is accessible to female students from anywhere, which helps to reduce barriers to enrol in the higher education to a great extent.

The digital university fills the gap between these barriers to access to higher education and other innovative initiatives that address these barriers. It is a fact that female students can get benefits through digital university that cannot be achieved through any other initiative. We should note that the Global Gender Gap Report 2022 indicates that gender gaps in online enrolment have narrowed considerably compared to traditional education.

The online education system that can be provided through National Digital University provides the following benefits to female students. Access to a wider range of programs and courses offering, Provide better and higher education opportunities, Better convenience, More flexibility, The ability to learn at their own pace, It is easier to concentrate and participate,

Learn new technical skills, Reduce stress, Learn practical skills for the real world, Provide gender inclusion, Getting more confidence, Learning from top universities and the top mentors, Getting global peer network, Choosing preferred learning methodology, It's more cost effective than traditional education, Provide virtual collaboration opportunities and Provide multiple modes of communication (Gautam, 2021).

There is no doubt that this digital university and the online learning offered through it will be of great help to female in improving their academic knowledge and integrating themselves in real life. Higher education is essential for women to remove social barriers, family barriers and other mental barriers, so it is a great opportunity for women to improve themselves by simply absorbing higher education provided through national digital university in the way of online platform.

CONCLUSION

Women should be given equal value and power in society. If equal power and value are given, then every woman can lead their home and the community towards the path of development. Education, especially for women from disadvantaged communities and tribal women have the power to transform their future lives to a great extent. But unfortunately, some women in urban areas and women living in rural and hilly areas face various obstacles to pursue higher education. All those barriers can be addressed through the National Digital University. Education system in various developed countries is turning to online education and succeeding in it. So, there is no doubt that online education will be a huge social change for women. And it is also believed that enrolment of women may matches with men or increases through the National Digital University.

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Study Habits and Attitudes among Higher Education Students in West Bengal in the context of Digital Era

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Abstract

In the digital era, the study habits of Higher Education Students (HESs) are undergoing significant transformations both globally and in India. The widespread availability of affordable smartphones, constant internet access and the rising of online learning platforms have reshaped students' academic practices and behaviors. This study aims to examine the study habits and learning attitudes of higher education students in West Bengal. This descriptive study was conducted on a sample of 350 higher education students studying in different colleges and universities in West Bengal. A standardized scale, the "*Test of Study Habits and Attitudes (TSHA)*" developed by Dr. C.P. Mathur, contains 60 items, was used. The study revealed that, except for gender, factors such as students' education level, locality, academic stream, marital status, medium of instruction, socio-cultural background, sibling status, and family type do not appear to have a strong influence on the study habits and attitudes of higher education students.

Keywords: Study Habits, Attitudes, College Students, Higher Education, West Bengal

Introduction

Study and habit are two different concepts in the field of education and psychology. The word 'study' means 'Application of the mind to the acquirement of knowledge' (Agarwal & Teotia, 2015) and the word 'habit' indicates the personality of an individual. In combination it is focused on personality in acquiring knowledge. "Study habits as external factors that assist the study process such as sound study routines that include how often a student engage in studying sessions, review the material, self-evaluate, rehears, explaining the material, and studying in a conducive environment" (Crede and Kuncel, 2008).

In educational psychology sometime it refers to learned behaviour rather than inborn capacities. It develops through practices and influenced by environment, motivation, discipline and personal attitude towards learning. Maintaining regularity, organizing proper study materials, proper planning, managing time, power of concentration and proper strategies are the key characteristics of study habit. Developing the skills of study habit are essential for every stage

of education. It is much more helpful for academic as well as non-academic development of the students. It is undoubtedly a part of lifelong learning.

In India, the history of study habit started its journey from ancient time and continues till date. There were no such facilities and advanced techniques for study during ancient time. There were three techniques of study habit followed by the students in ancient period like Sravana, Manana and Nididhyasana. "Students had the habit to learn and memorize all the things taught in the class, and teachers also helped them in memorizing" (Goudgeri, 2022).

In the Islamic tradition, education renders a significant contribution in leading to progression and enhancement of every individual, so that he can be successful in securing his future and living an efficient life (Biswas, 2016). In modern time the study habit among the students is little different rather than the ancient and medieval period. In the era of digitization, self-directed and flexible learning is essential in every stage of learning. Skill based learning is also important in modern time. In this era of technology, the student logs into the virtual classroom at scheduled times to see lectures or participate.

Study Habit Techniques in the Digital Age

Few modern techniques of study habits which are increasing rapidly among the higher education students.

i) **Digital Note taking**: Taking note instantly using various digital devices.
ii) **Dual Coding**: Taking verbal note with visualization (chart, graph, diagram etc.)
iii) **Online Study Platform**: Collaborative online study platform/ study environment.
iv) **YouTube-based Learning**: Collective information and study materials through YouTube videos, tutorials, and lectures.
v) **Self-explanation Technique:** Explaining the contents with self-paced and level of understanding.
vi) **Pomodoro Technique:** Taking short break (5 minutes) for increasing the power of concentration and reducing the fatigue.
vii) **Mind-mapping:** Creating a visual diagram of each content.

Factors Affecting Study Habits

Various factors which affect directly or indirectly to the study habits among the higher education students. Good study habits help a student in good academic achievement. **Hendricson and Kleffner (2002)** said that inappropriate study routines affect students' learning outcomes. Various studies have shown that multiple factors influence students' study habits, such as lack of proper time management, excessive use of social media etc (**Miranda**

et al. 2023). Students' home environment is also one of the important factors, which affect study habit to the students. Positive and good environment helps students to achieve the goal easily but in negative or forced environment reduces students' energy to their study habit.

Significance of the Study

The stage of higher education is very crucial for the students as it is the pillar of students' bright future. Another side study habits or the learning behaviours specially in the stage of higher education are most important for academic as well as non-academic development of the students. These habits help a student achieve academic excellence (**Bin, et al., 2021**). For increasing the level of self-awareness and developing the level of self-motivation study habits and attitude among the higher education students is much more essential. The poor study habits of the students affect the academic success of the students (**Laxmi & Kaur, 2017**). On basis of various previous studies, it was observed that study habits among the students have been changing since the very beginning period of the civilization. There are various types of study habits are seen in various time period of the society like ancient, medieval and modern time. In the era of digital advancement various modern techniques are now being used for the fulfilment of educational goals of the students.

Objectives of the Study

1. To determine the level of study habits and attitudes among Higher Education Students (HES) in West Bengal.
2. To find out the differences in study habits and attitudes among HES with respect to education level, gender, locality, stream, marital status and medium of instruction.
3. To examine the differences in study habits and attitudes among HES with respect to their socio-cultural background (General/OBC/SC/ST), sibling status and nature of the family.
4. To explore the concept of Study Habit in the context of digital era.

Hypotheses of the study

Keeping the above objectives in mind, the following hypotheses have been framed:

- **H_{01}:** There is no significant difference in study habits between undergraduate and postgraduate students.
- **H_{02}:** There is no significant difference in study habits between male and female students.
- **H_{03}:** There is no significant difference in study habits between rural and urban students of higher education.

- **H_{04}:** There is no significant difference in study habits between Arts, Commerce and Science students of higher education.
- **H_{05}:** There is no significant difference in study habits between single and married students of higher education.
- **H_{06}:** There is no significant difference in study habits among Bengali, Hindi and English medium students of higher education.
- **H_{07}:** There is no significant difference in study habits between General and Other Backward Classes (including SC and ST) students of higher education.
- **H_{08}:** There is no significant difference in study habits between students with siblings and those without siblings in higher education.
- **H_{09}:** There is no significant difference in study habits between students from joint families and those from nuclear families in higher education.

Methodology

Study Design, Setting and Respondents:

Higher Education Students' attitudes towards study habits were examined in this study using the Descriptive Survey Model (DSM). A sample of 350 students, including UG and PG, from different colleges and universities in West Bengal was chosen using the purposive sampling technique in order to gather pertinent data. Data collection took place between January and March 2025. Table 2 illustrates the demographic details of the students.

Study Instrument:

To explore the study habits of students in higher education, the standardized "**Test of Study Habits and Attitudes (TSHA)**" developed by Dr. C.P. Mathur was used. This test consists of 60 items categorized into nine major areas: Attitude Towards Teachers, Home Environment, Attitude Towards Education, Study Habits, Mental Conflict, Concentration, Home Assignment, Self-Confidence, and Examination (**see Table 1**). Each item requires one of three responses: '**Yes**', '**Doubtful**', or '**No**'. A high score on this test indicates well-developed study habits and positive attitudes, while a low score reflects poor study techniques (**see Table 2**).

Table 1: Item details by Major Areas

Sl. No.	Areas	No. of Items	Serial-wise Item No.	%
1.	Attitude Towards Teachers	5	2, 16, 21, 32, 39	8
2.	Home Environment	4	1, 30, 35, 46	7
3.	Attitude towards Education	3	28, 50, 53	5
4.	Study Habit	20	4, 5, 6, 7, 9, 11, 12, 15, 17, 19, 22, 25, 34, 38, 40, 44, 51, 52, 55, 58	33
5.	Mental Conflict	4	20, 33, 43, 45	7
6.	Concentration	9	8, 13, 18, 24, 26, 36, 41, 47, 49	15
7.	Home Assignment	4	14, 23, 42, 54	7
8.	Self Confidence	3	3, 29, 48	5
9.	Examination	8	10, 27, 31, 37, 56, 57, 59, 60	13
	Total	**60**	**Sixty**	**100**

Source: TSHA Manual

Reliability and Validity of the Instrument

The tool has been tested its reliability and validity by administering on 200 sample. The reliability co-efficient correlation value is +0.87 (for the age group 13 to 16) and +0.89 (for the age group 16 above).

For the purpose of establishing validity, the test was validated with two tests of study habits as well with Achievement Scores on a representative sample of 200 students. The coefficients were found as under:

Sl. No.	Tests	r	N
1.	Survey of Study Habits & Attitudes in English – By C.P. Mathur	+ 0.63	200
2.	Survey of Study Habits & Attitudes (General) by A. R. Purohit	+ 0.77	200
3.	Academic Achievement Scores	+ 0.65	200

Analysis and Interpretation

The total 350 higher education students participated in this study. The demographic data (refer to Table 2) of the students reveals that a predominantly consists of undergraduate students (78.28%), with postgraduates making up a smaller portion (21.71%). The majority are female (70.85%), and a significant proportion come from rural areas (76.28%), followed by semi-urban (17.42%) and urban regions (6.28%). Most students' responses came from Arts/Humanities/Social Sciences (94.85%) stream, while minimal representation from Science (4.28%) and Commerce (0.85%) streams. Nearly all participants are unmarried (98.28%). In terms of course medium, Bengali is most common (85.71%), with some opting for English (12%) and Hindi (2.28%). The social categories of the respondents are primarily composed of Scheduled Caste (SC) with 43.71%, followed by General (33.42%), OBC (19.14%), and a

small number of ST (3.71%). The majority of respondents have siblings (91.14%) and come from joint families (51.14%), with nuclear families accounting for 48.85%.

Table 2: Demographic Data of the Respondents

Variables	Categories	n (%)
Level	**UG**	274 (78.28%)
	PG	76 (21.71%)
Gender	**Male**	102 (29.14%)
	Female	248 (70.85%)
Location	**Rural**	267 (76.28%)
	Urban	22 (6.28%)
	Semi-urban	61 (17.42%)
Stream	**Arts/ Humanities/ Social Sciences**	332 (94.85%)
	Science	15 (4.28%)
	Commerce	3 (0.85%)
Marital Status	**Married**	6 (1.71%)
	Unmarried	344 (98.28%)
Course Medium	**Bengali**	300 (85.71%)
	English	42 (12%)
	Hindi	8 (2.28%)
Category	**General**	117 (33.42%)
	OBC	67 (19.14%)
	SC	153 (43.71%)
	ST	13 (3.71%)
Status of Siblings	**Having Siblings**	319 (91.14%)
	Not Having Siblings	31 (8.85%)
Family Type	**Joint Family**	179 (51.14%)
	Nuclear Family	171 (48.85%)

Overall, the sample is characterized by young, unmarried, rural, female undergraduate students, primarily studying in the Arts with Bengali as the medium of instruction, and with a notable representation of the SC category.

Objective 1: To determine the level of study habits and attitudes among Higher Education Students (HES) in West Bengal.

Level of Study Habits and Attitudes among the HES:

As shown in the Table 3, a majority of the students (46%) have shown satisfactory level of study habits and attitudes, while 32.28% students with poor. However, only 7.14% students identified with good level.

Table 3: Level of Study Habits and Attitudes among Higher Education Students

Sl. No.	Level of Study Habits and Attitude	Grade	Obtained Score	No. of Students	
				No	%
1.	**Excellent**	**A**	56 and above	0	-
2.	**Very Good**	**B**	49 – 55	0	-
3.	**Good**	**C**	42 – 48	25	7.14

4.	**Satisfactory**	**D**	33 – 41	161	46
5.	**Poor**	**E**	26 – 32	113	32.28
6.	**Very Poor**	**F**	19 – 25	40	11.42
7.	**Extremely Poor**	**G**	00 – 18	11	3.14
Total				**350**	**100**

Notably, there are no students in the "Excellent" or "Very Good" level of study habits, however, only a small fraction (7.14%) achieves a "Good" rating. Furthermore, a significant percentage of students are classified as having "Very Poor" (11.42%) or "Extremely Poor" (3.14%) study habits. This result indicates that most students are performing at or below average, with minimal representation at the higher levels of achievement. The data points to a possible systemic issue in academic motivation or support, emphasizing the urgent need for targeted interventions and programs to help students improve their study habits and overall academic attitudes, especially those in the lowest performing level.

Objective 2: To find out the differences in study habits and attitudes among HES with respect to education level, gender, locality, stream, marital status and medium of instruction.

H_{01}: There is no significant difference in study habits between undergraduate and postgraduate students.

Table 4: Mean Difference in Study Habits and Attitudes of HES with respect to Education level (UG and PG)

Sl. No.	Variable	N	Mean	SD	SEM	df	t-value	Remark
1.	UG	274	32.29	7.26	0.72	348	0.84	Not Significant
2.	PG	76	32.89	6.30				

Table 4 shows the mean scores between undergraduate and postgraduate students in their study habits and attitudes. The undergraduates' students have a mean value of 32.29 with a standard deviation (SD) of 7.26, while the postgraduates have a slightly higher i.e. 32.89 with a SD of 6.30. Despite this slight difference, the calculated t-value (0.84) is much lower than the critical value of 't' (1.97) at 0.05% level of significance. Therefore, the null hypothesis is retained as the result indicates that there is no statistically significant difference in the study habits and attitudes of UG and PG students. Hence, in terms of education level, it does not appear to have a meaningful impact on the students' study habits and attitudes in this sample.

H_{02}: There is no significant difference in study habits between male and female students.

Table 5: Mean Difference in Study Habits and Attitudes of HES with respect to Gender (Male and Female)

Sl. No.	Variable	N	Mean	SD	SEM	df	t-value	Remark
1.	Male	102	29.37	8.46	0.84	348	5.11	Significant

2.	Female	248	33.67	5.97				

Table 5 shows the mean scores of the male and female students of their study habits and attitudes. The mean value of the male students is 29.37, with SD value of 8.46, while the female students' mean value is 33.67 with SD value 5.67. However, this statistical analysis reveals that the obtained t-value (5.11) is much higher than the critical value of 't' (1.97) at 0.05 level of significance. Hence, the null hypothesis (H_{02}) cannot be retained. Hence, it indicates that there is a significant difference between male and female students in terms of their study habits and attitudes.

H_{03}: There is no significant difference in study habits between rural and urban students of higher education.

Table 6: Mean Difference in Study Habits and Attitudes of HES with respect to Locality (Rural and Urban)

Sl. No.	Variable	N	Mean	SD	SE	df	t-value	Remark
1.	Rural	267	32.41	6.81	0.90	348	0.03	Not Significant
2.	Urban	83	32.44	7.83				

Table 6 presents the comparison of study habits and attitudes between rural and urban Higher Education Students (HES). The mean scores are nearly identical, 32.41 for rural students and 32.44 for urban students. The obtained t-value (0.03) is considerably lower than the critical t-value (1.97) at the 0.05 significance level. Therefore, the null hypothesis (H03) is retained as it is found not significant. Hence, it can be said that rural and urban HESs have similar attitude towards study habits and attitudes.

H_{04}: There is no significant difference in study habits among Arts, Commerce and Science students of higher education.

Table 7: Mean Difference in Study Habits and Attitudes of HES with respect to Stream (Arts/Humanities, Science and Commerce)

Sl. No.	Variable	N	Mean	SD	SE	df	t-value	Remark
1.	Arts/Humanities	332	32.50	7.04	2.01	348	0.51	Not Significant
2.	Science	15	31.46	7.69				
Sl. No.	**Variable**	**N**	**Mean**	**SD**	**SE**	**df**	**t-value**	**Remark**
1.	Arts/Humanities	332	32.50	7.04	3.23	348	1.39	Not Significant
2.	Commerce	3	28	5.56				
Sl. No.	**Variable**	**N**	**Mean**	**SD**	**SEM**	**df**	**t-value**	**Remark**
1.	Science	15	31.46	7.69	3.77	348	0.91	Not Significant
2.	Commerce	3	28	5.56				

Table 7 compares the mean scores of students among Arts/Humanities, Science and Commerce streams. The calculated t-value for Arts/Humanities and Science students is 0.51, which does

not exceed the critical t-value of 1.97 at the 0.05 level of significance. Hence, this difference is statistically insignificant.

When comparing the means of Arts/Humanities and Commerce students, the obtained t-value (1.39) is also below the critical t-value (1.97), indicating that this difference is not significant. Similarly, the calculated t-value (0.39) for Science and Commerce students is much lower than the critical value (1.97), again showing no significant difference.

Consequently, the null hypothesis (H_{04}), which states that there is no significant difference in study habits among Arts, Commerce, and Science students in higher education, is retained. This result indicates that students' academic streams do not significantly influence their study habits or attitudes.

H_{05}: There is no significant difference in study habits between single and married students of higher education.

Table 8: Mean Difference in Study Habits and Attitudes of HES with respect to Marital Status (Single and Married)

Sl. No.	Variable	N	Mean	SD	SE	df	t-value	Remark
1.	Single	344	32.37	7.05	3.11	348	0.89	Not Significant
2.	Married	6	35.16	7.57				

The test statistics presented in Table 8 show the comparison of the mean, standard deviation, and t-value between single and married HESs in terms of study habits and attitudes. The obtained t-value (0.89) is much lower than the critical t-value (1.97) at the 0.05 level of significance. Therefore, the null hypothesis (H05) is retained, indicating that the difference is not statistically significant. The data suggest that study habits do not differ significantly based on marital status.

H_{06}: There is no significant difference in study habits among Bengali, Hindi and English medium students of higher education.

Table 9: Mean Difference in Study Habits and Attitudes of HES with respect to Medium of Instruction (Bengali, Hindi and English)

Sl. No.	Variable	N	Mean	SD	SE	df	t-value	Remark
1.	Bengali	300	32.49	6.99	1.28	348	0.14	Not Significant
2.	English	42	32.30	7.89				
Sl. No.	**Variable**	**N**	**Mean**	**SD**	**SE**	**df**	**t-value**	**Remark**
1.	Bengali	300	32.49	6.99	1.78	348	1.11	Not Significant
2.	Hindi	8	30.5	4.92				
Sl. No.	**Variable**	**N**	**Mean**	**SD**	**SE**	**df**	**t-value**	**Remark**
1.	Hindi	8	30.5	4.92	2.12	348	0.84	Not Significant
2.	English	42	32.30	7.89				

Regarding the medium of instruction (Bengali, English and Hindi), Table 9 is evident that there are no statistically significant differences in study habits and attitudes among higher education students. The calculated t-values for each group, 1.28 (for Bengali and English), 1.78 (for Bengali and Hindi) and 0.84 (for Hindi and English), are below the critical value of 't' (1.97) at 0.05 level of significance. Therefore, the null hypothesis (H_{06}) is retained in all cases, indicating that the medium of instruction does not significantly influence students' study habits and attitudes.

Objective 3: To examine the differences in study habits and attitudes among HES with respect to their socio-cultural background (General/OBC/SC/ST), sibling status and nature of the family.

H_{07}: There is no significant difference in study habits between General and Other Backward Classes (including SC and ST) students of higher education.

Table 10: Mean Difference in Study Habits and Attitudes of HES with respect to Socio-Cultural Background (General and OBC/SC/ST)

Sl. No.	Variable	N	Mean	SD	SE	df	t-value	Remark
1.	General	117	32.34	6.89	0.78	348	0.15	Not Significant
2.	OBC/SC/ST	233	32.46	7.15				

The above table (Table 10) illustrates the socio-cultural differences in the mean, standard deviation (SD), and t-value between General and OBC/SC/ST students regarding their study habits. The mean and SD for General category students are 32.34 and 6.89, respectively, while for OBC/SC/ST students, the mean and SD are 32.46 and 7.15, respectively. The calculated t-value between these two groups is 0.15, which is much less than the critical t-value of 1.97 (at the 5% significance level with 348 degrees of freedom). Since the calculated t-value is less than the critical value, the difference in mean scores is not statistically significant. Therefore, the null hypothesis (H_{07}) which states that there is no significant difference in study habits and attitudes between General and OBC/SC/ST students, is retained. From this analysis, it can be concluded that there is no significant socio-cultural difference in study habits and attitudes between the two groups.

H_{08}: There is no significant difference in study habits between students with siblings and those without siblings in higher education.

Table 11: Mean Difference in Study Habits and Attitudes of HES with respect to Sibling Status (Having and Not Having)

Sl. No.	Variable	N	Mean	SD	SE	df	t-value	Remark
1.	Having Siblings	319	32.36	7.12	1.20	348	0.1	Not Significant
2.	Not Having Siblings	31	32.96	6.37				

Table 11 shows the comparison of study habits and attitudes between students having siblings and those not having siblings. The mean scores for the two groups are quite similar, with no statistically significant difference observed. The calculated t-value of 0.1 is substantially lower than the critical value of t (1.97) at the 0.05 significance level. Consequently, the null hypothesis (H_{08}) is retained. This indicates that having siblings does not have a significant impact on students' study habits and attitudes.

H_{09}: There is no significant difference in study habits between students from joint families and those from nuclear families in higher education.

Table 12: Mean Difference in Study Habits and Attitudes of HES with respect to Family Type (Joint and Nuclear)

Sl. No.	Variable	N	Mean	SD	SE	df	t-value	Remark
1.	Joint Family	179	32.01	7.61	0.74	348	1.12	Not Significant
2.	Nuclear Family	171	32.84	6.42				

Table 12 shows that the t-value for comparing HESs from Joint Families and Nuclear Families is 1.12, which is less than the critical t-value at the 0.05 significant level. This means that the difference between the two groups is not statistically significant. So, the null hypothesis (H_{09}), which states that there is no significant difference between Joint Family and Nuclear Family students in study habits and attitudes. Therefore, it can be said that the type of family does not effect a significant impact on the study habits and attitudes of the HESs in West Bengal.

Discussion

The present study explored the study habits and attitudes of higher education students in West Bengal. Findings revealed that a moderate proportion of students have achieved a satisfactory level of study habits and attitudes. Similar trends were reported in the works of Joseph (2017), Jafari, Aghaei & Khatony (2019) and Tus (2020). It was also observed that postgraduate students exhibited slightly better study habits compared to undergraduate students. This aligns with Lalrintluangi (2018), who reported that undergraduate students generally demonstrate unsatisfactory study habits. This difference may be attributed to the fact that postgraduate students tend to be more focused and concerned about their academic performance.

The study also found a significant difference in study habits between male and female students, with females exhibiting better study habits than their male counterparts. Similar findings were

noted by Kalita and Gayary (2022), Kant et al. (2023) and Kumar (2023), who reported that female students often outperform male students in academic-related behaviors. However, Kishor (2021) presented a contrasting view, reporting no statistically significant gender differences in study habits.

Regarding locality, no significant difference was found between students from rural and urban areas in the present study. This is in contrast to the findings of Muktawat and Bharadwaj (2019) and Illahi and Khandai (2015), who reported that urban students possess better study habits than rural students. Muktawat and Bharadwaj (2019) further noted that rural students, particularly girls, often face additional responsibilities such as household chores, caregiving for younger siblings, and a lack of parental encouragement toward academics. These factors may hinder the development of effective study habits and positive attitudes, ultimately impacting classroom performance.

Conclusion

The study habits and attitudes of higher education students were explored in this study. To achieve its objectives, 350 students were selected and administered a standardized test. Based on the findings, it can be concluded that most demographic and socio-cultural factors, such as education level, locality, academic stream, marital status, medium of instruction, socio-cultural background, sibling status and family type, do not appear to have a strong influence on the study habits and attitudes of higher education students. However, the gender is the only factor which significantly influence the study habits among the students between male and female. This suggests that, apart from gender, the other factors examined are not strong determinants of how students approach their studies in the context of HESs in West Bengal. It is suggested that study habits are essential for students' overall development and therefore, teachers should encourage their students to develop such habits and attitudes. Additionally, further studies are recommended to examine students studying private institutions as well.

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Fintech Inclusion in Rural India: Adoption Gaps and Enabling Factors

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ABSTRACT

In its digital transformation, the Indian financial sector has advanced significantly because to government programs, technology advancements, and shifting consumer preferences. India is likely to continue prioritizing the promotion of digital use in its endeavours to modernize its banking system and promote economic development, transforming into one of the world's most vibrant fin tech markets. The development is not only confined to urban spaces but is gradually making its way to rural parts of India however there exists certain challenges due to infrastructure and socio-economic constraints. The way financial services are provided and used is being redefined by the government's support of digital infrastructure and Fintech innovation. This presents a number of difficulties, particularly in rural areas where widespread adoption is still hampered by low levels of digital literacy, erratic internet connectivity, and mistrust of online financial services. **Objectives:** To determine the current state of fintech adoption in rural India. To identify key gaps and enabling factors that promote fintech inclusion in rural regions. To suggest policy-based recommendations to accelerate fintech adoption in rural India. **Methodology:** The current research delivers an overview of the growing fintech ecosystem and elaborates on both the prospects of the continuously evolving fintech and dwells on the policy and other actions required to ensure that the results of these developments must be inclusive and must reach the bottom of the pyramid. The study is descriptive and exploratory in nature. **Results & Discussion:** In spite of various initiatives launched by the government of India, still the reach of financial reforms and technology is uneven and is inadequate. Additionally, there is a dire need of reforms in the areas of digital infrastructure and technological innovation. Financial awareness among the rural population needs to be improved through digital and financial literacy programs which is essential to achieve financial inclusion through digital finance.

Keywords: Digital Banking Adoption, Fintech Barriers, Financial Inclusion, Digital Literacy, Rural India

INTRODUCTION: The results of privatisation of commercial banks heralded the onset of fin tech revolution through comprehensive reforms in the area of digital finance and digital

technology. The private sector banks provided seamless banking experience by implementation of latest technology, utilising the digital infrastructure accordingly. With the advent of continuous reforms in latest technologies the private banks increased financial inclusion, accessibility and strength among Indian consumers irrespective of location and reach. The fruits of digitization of India's finance sector across all levels of income was further complemented by the rise of applications such as Bhim app, Google Pay, Paytm thereby streamlining money transfers, investments and microfinance. Rural India constitutes about 900 million people across all demography and contribute to 17% of India's GDP. As per RBI report the digital transactions in rural India surged recently. Further the ease of paying bills online for services such as electricity, railway booking and tax payments enhanced the further use of these applications. The shift in India's finance industry is clear in both urban and semi-urban areas, where banking is being replaced or supplemented by digital forms. Financial services have become ubiquitous with Google Pay, Phone, Paytm, and Razorpay streamlining bill payments, money transfers, managing investments, and micro-financing. Even government services, including railway reservations, electricity bill payments, and municipal tax payments, are increasingly being conducted through fintech. The governments push to enhance awareness among the citizens for safe and efficient transactions further expanded the country's digital financial services. There has been a remarkable transformation from a cash centric economy to digital payments landscape. The other significant factors that led to rise of digital finance is the use of smartphones with inexpensive internet data along with the initiatives such as ADHAAR, Prime Minister's Jan-Dhan Yojana and direct benefit transfer scheme by the government of India for various schemes. Regardless of much advancement in the digital landscape there exists several bottlenecks when it comes to implement the same across rural sectors. The rural India is devoid of weak internet penetration along with less digital literacy, cultural challenges leading to uneven fintech adoption. In order to achieve financial inclusion across all levels it is imperative for the government to take measures in order to close the urban-rural divide.

Research Problem: Regardless of tremendous reforms brought in by the government in the fintech ecosystem in India there exists gaps in fintech adoption in rural and semi-urban areas, the actual usage and trust among many potential users still lags behind. There is huge disparity in structural, technological and socio behavioural barriers that hinder rural populations from fully engaging with financial platforms.

LITERATURE REVIEW:

Mhlanga (2022) in his study stated that fin tech can play a great role in closing the socioeconomic gaps by providing financial services such as savings accounts, insurance and cheaper credit. Mhlanga (2022) asserted that the formerly unreachable financial goals of rural customers are now attainable due to availability of scalable and affordable fin tech solutions. Hasan and Babur (2022) stated that due to the continuous upgradation of digital financial platforms, female entrepreneurs can now easily obtain finance and scale their operations. Research by Alkaseasbeh and Alsamadi (2023) fintech not only improves banking accessibility but also helps informal sector entrepreneurs in obtaining credit easily. Regardless of so many advancements significant problem in transferring the latest technological advancements to rural India.

Priyadarshi (2024) in her research concluded that UPI, mobile wallets not only fulfils the financial holes but promotes accessory services such as insurance and credit thereby mediating the adoption of FinTech.

Maknickiene (2024) emphasizes the importance of an inclusive environment where even marginalised communities can participate and reap the benefits.c Even though one can notice the implications of a digitized financial sector , there exists serious gaps in attaining financial inclusion at grassroot level. Nanduri (202) asserts that steadfast internet and mobile connectivity are essential for the success of Fin Tech which are scanty in rural India.

Mulyono (2023) discusses that there are serious gaps and deficiencies in technology, infrastructure that stalls the advancement of FinTech Services. One of the serious problems with rural India is that the customer confidence along with low internet penetration and socio-cultural gaps according to research by Priyadarshi et all (2025) and Chandran (2022). Finally, as noted by Adeola (2021), regulatory barriers that are typified by erratic rules and unduly intricate frameworks make it even more difficult to integrate FinTech solutions into rural mark. The readiness of rural consumers to embrace FinTech solutions is significantly influenced by their level of digital financial literacy (DFL).

Higher DFL is highly linked to better financial results, according to Singh (2023). Aryan et a. (2024) support this idea by showing that consumers who are more techsavvy are better able t o use FinTech services.

However, studies by Mpofu (2023) and Priyadarshi et al. (2025) show that obstacles includin g a lack of understanding,trust, and infrastructure constraints can seriously impede adoption.

There is a huge gap in research of financial inclusion in terms of relationship between perceived risk and trust in rural India is not thoroughly studied. The most important variable of confidence of rural India on digital platforms is not thoroughly researched.

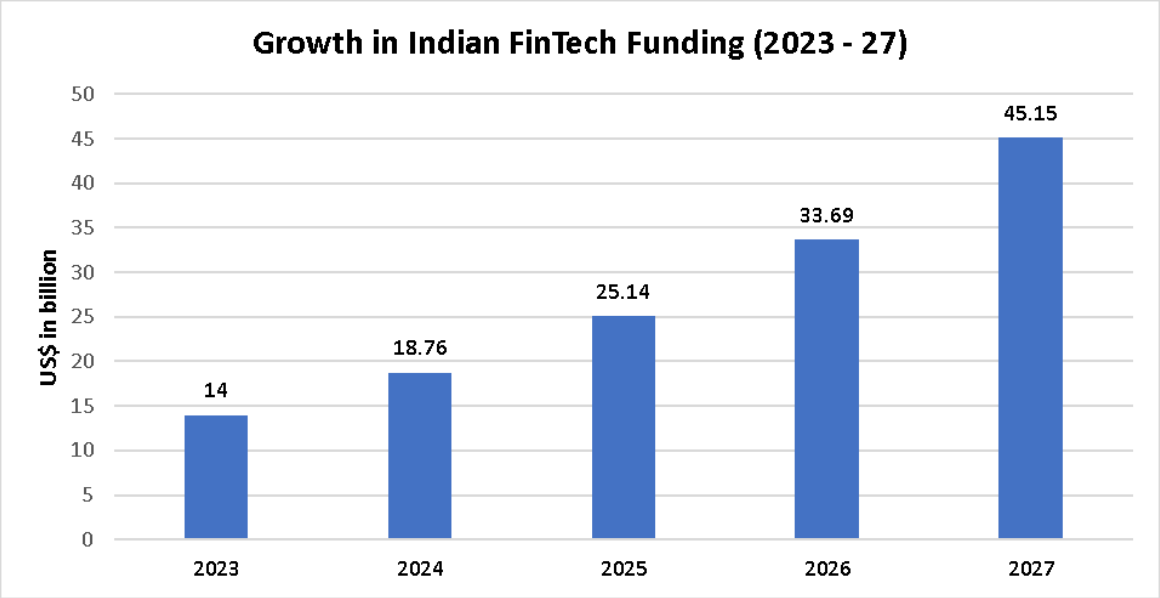
The critical topic of confidence in digital platforms is still not well explored, indicating a criti cal field for additional research, even if greater digital competency typically promotes utilisat ion.Further research is also necessary to understand how DFL interacts with elements like cul tural beliefs and past financial experiences.Thus, this analysis establishes the framework for i nvestigating the potential effects of these behavioural insights on more general economic resu lts in rural regions.

Financial behaviour in rural India depends on gender and socio-economic status of the individuals. Ech platforms. Mpofu (2023) in his research emphasized that lack of financial literacy and gender differences hinder rural women to utilise the FinTech Platforms. Miah (2023) asserts that gender inclusive financial literacy and mobile banking platforms may enable women advancement thereby contributing to their financial inclusion. Rahayu (2023) concluded that digital financial literacy will allow women to be more financially empowered and can participate across all financial platforms.

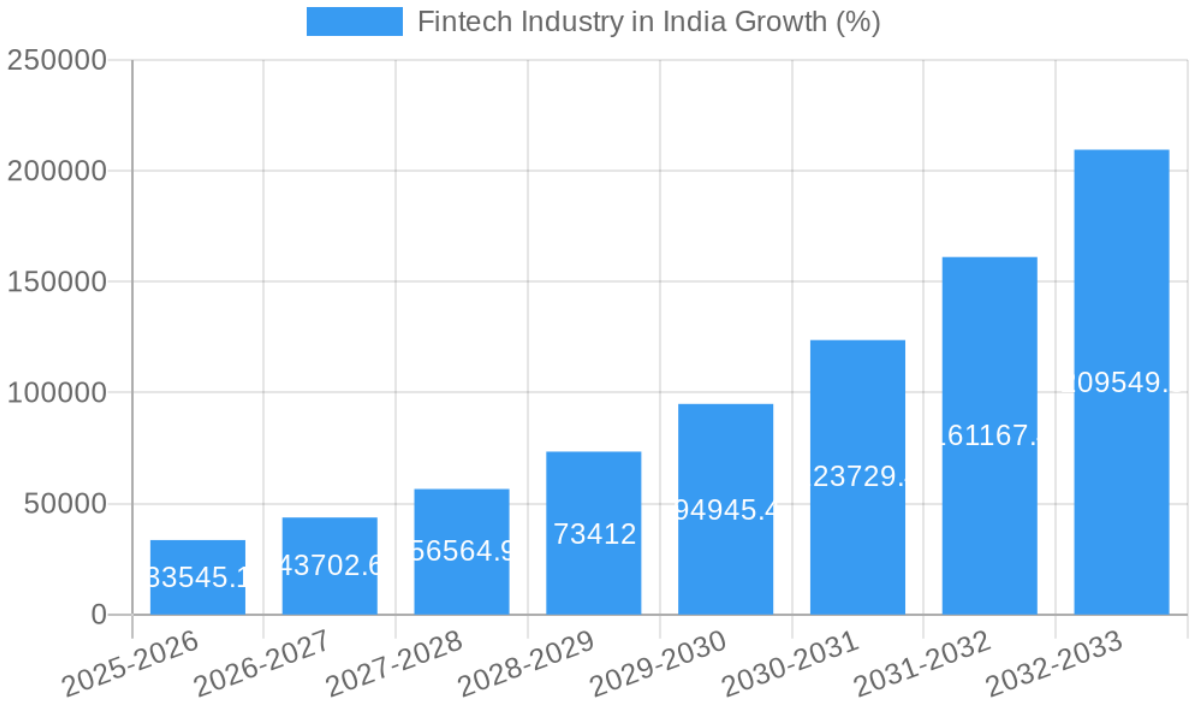
RESEARCH METHODOLOGY: The current study explores the current state of fintech adoption in rural India by following descriptive and qualitative research design where the data is gathered from secondary sources such as RBI, Niti Ayog, academic magazines and journals.

Growth of FinTech market in India:

The fintech industry in India is still growing quickly thanks to government initiatives, the confluence of technology and finance, and growing customer demand for digital solutions. A tech-savvy populace, rising smartphone penetration, and digital-first financial strategies are all contributing to India's extraordinary fintech acceptance, making it one of the world's fastest-growing fintech marketplaces. The India fintech market is anticipated to develop at a compound annual growth rate (CAGR) of 30.26% from 2024 to 2032, reaching a projected value of USD 155.67 billion in 2025 and USD 990.45 billion by 2032 thanks to its dynamic mix of start-ups and established businesses.



Source: DART Consulting



Source: Data insights Markets:

The foundation for fintech innovations has been established by the government's ongoing push for digitisation through projects like Digital India and the implementation of regulatory measures like UPI and Aadhaar-based e-KYC. Furthermore, when businesses and individuals looked for frictionless, flexible, and safe financial options, the COVID-19 epidemic sharply accelerated the digital adoption curve.

The Indian fintech market has grown significantly as a result of the middle class's quick rise. Fintech companies have successfully closed the gap in the market by providing new and easily accessible financial solutions to consumers with more disposable income. India has seen a significant digital revolution over time. The main drivers of the evolution include the RBI-approved fintech sandbox, the government-backed Digital India initiative, and the NPCI's introduction of UPI. As a result of Digital India project the digital maturity of the population increased significantly.

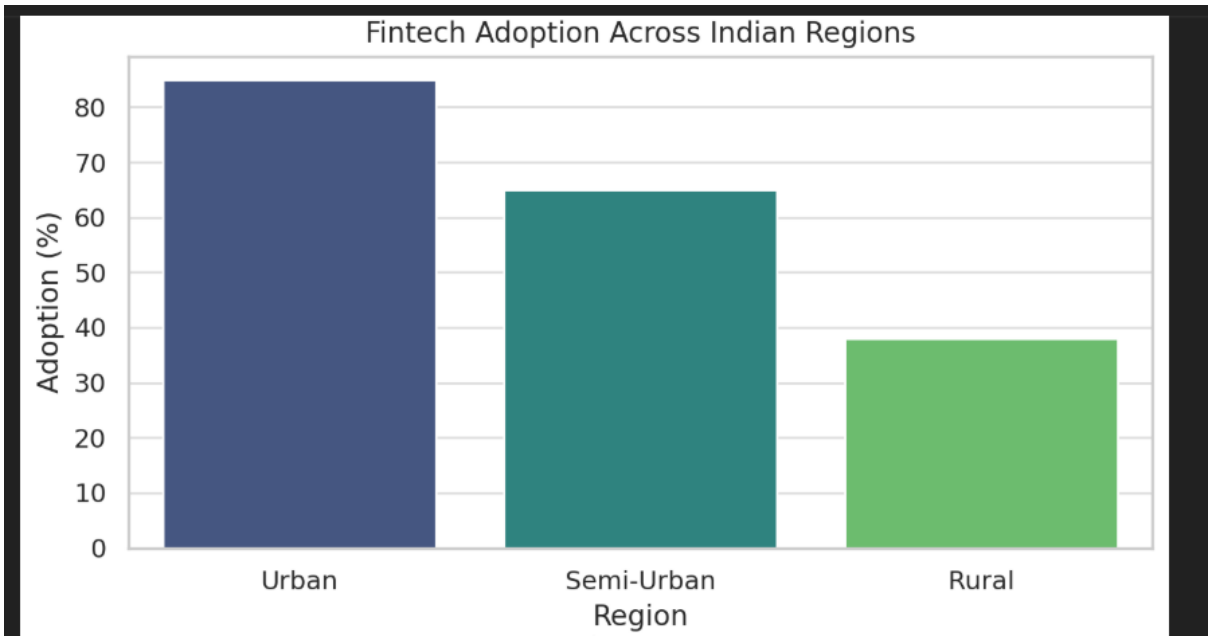
Digital Payments in India: The transaction volume of digital payments in India increased by 42% and is still rising. There exists multiple factors such as the rise of Fintech platforms as start-ups, Innovation ecosystem through incubation, continuously developing technology, rise in financial literacy and risk mitigation initiatives by the government of India in order to protect the interests of consumers. There is huge potential in the ever rising domestic Fintech market for various financial platforms.

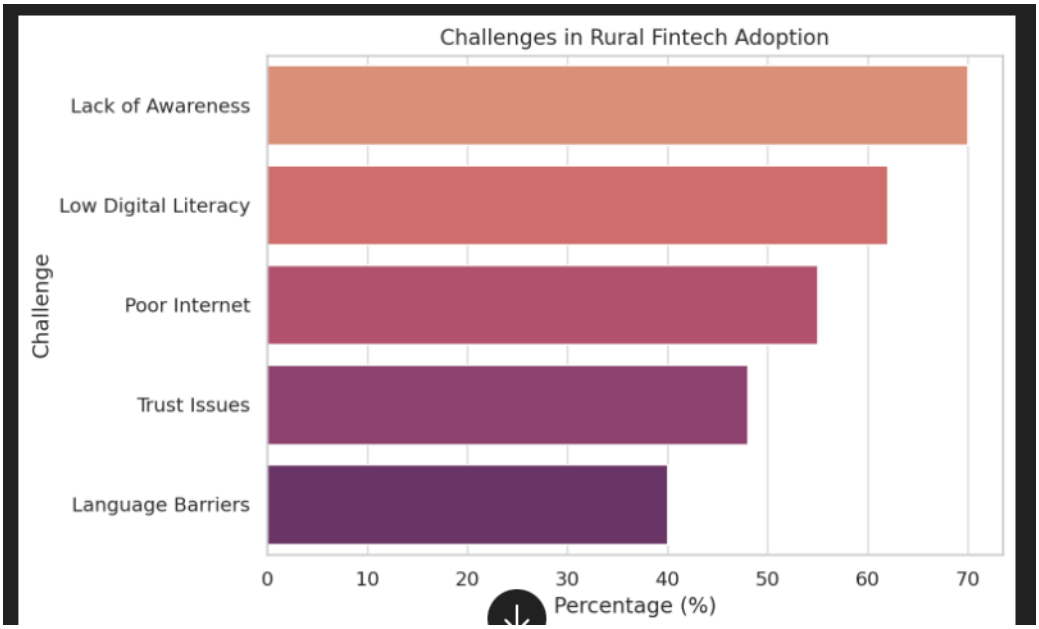
Source: NPCI

The unified payment interface launched by National Payments corporation in 2016 has revolutionised Indias digital payment landscape. Indian governments initiatives such as demonetisation digital India campaign gave the necessary boost to increase its use. Covid added fuel to the fire in spread of UPI during which the massive growth of UPI was noticed. It has been estimated that UPI accounts for more than 80% digital payments across all levels in India. In India it is just a matter of few years where a largely cash driven economy switched over to UPI, thereby achieving objectives of financial literacy and financial inclusion.

Digital Banking Adoption in Rural India:

In India the major push towards digital banking came through the government initiatiativs.es such as Pradhan Mantri Jan Dhan Yojana , providing millions with personal bank accounts marked the beginning of the growth of digital transactions across all levels. In addition to it low cost fina ncial platforms such as UPI and Aadhar enabled financial payment systems enable transactions swiftly. The most significant factor that lead to the rise of digital banking is the convenience it offers to transfer money, receive subsidies pay bills without the need of travelling to bank branches**.**





Source: Economic Survey

Challenges in Rural Fintech Adoption

Despite the vast expansion of technology in finance sector but the other side of rural India has got its challenges in social, educational and infrastructural issues when it comes to embracing the digital platforms. Without digitally literate population, improved 4G/5G internet connectivity, it would create a great digital divide for a sizeable population in rural India.

Technological Constraints:

The biggest challenge is adoption of fintech platforms as financial tools with variables such as accessibility, availability of power, real time data/internet. Infrastructure is one of the major contributors for illiteracy in rural India. Obsolete technology, language problems, and non-user-friendly designs contribute to the lack of adoption by the rural Indians. Latest technologies such as block chain based financial platforms can streamline payment operations, improve safety and increase the digital participation across all levels. For instance, farmers access to technology can be enhanced by employing offline functionality, localised services and user-friendly interface. More amount of investments is needed for infrastructure projects to improvise rural connectivity, security energy, sources and offline banking options**.**

Low Digital Literacy: The biggest divide in rural and urban India is predominantly due to inability of the rural population to comprehend and utilise digital platforms for real time transactions. A major chunk of rural India is not fully adept to handle a smartphone or computer for their day to day tasks. As per latest research 76% of India's adult population is financially illiterate in spite of reaching milestones on UPI transactions across the globe. Due to low literacy levels almost 48% of bank accounts are being dormant across all banks. Many rural Indians finds it difficult to obtain financial services as they lack the requisite knowledge and skills to perform the basic tasks. Low income is also one of the factors which discourages them from pursuing education. It is the duty of the government and financial institutions to impart financial literacy programs across all levels tailored and customised asper the regional languages. Banks and financial institutions must provide transparent information about various banking operations, schemes in order to make informed decisions by the rural population.

Language Barrier for Fin-Tech adoption: India is a land of multiple cultures and languages; language is one of the most significant factors in fintech adoption across all levels. Fintech platforms must customise languages as per their regions as there are more than 22 official languages. Many rural Indian users start utilising fintech applications only to abandon in the middle due to their inability to comprehend not able to find way to proceed further. Banks and financial institutions must at least set up vernacular helplines to offer regional dialect support.

Limited Internet Penetration: Internet technology is the most pressing problem that hinders adoption of fintech in rural India. For seamless banking operations real time internet is the major requisite. Many villages in rural India lack 4G/5G connectivity moreover forest and hilly areas are more challenging for connectivity.

Cybersecurity & Regulatory Constraints: Offering financial services requires great responsibility on the service provider where the trust of the client is very important. FinTech companies must invest more on using the black chain technology in order to secure financial transactions. They must follow all the strict client security regulations to protect their systems. Strong ICT protocols are very important for any security breach. The industry can benchmark the best practices and apply the same.

Trust Deficit and cultural resistance: India is multicultural patriarchal society where cultural norms are a major hindrance to financial inclusion. Women forms the most unrepresented group in financial inclusion across all levels. Patriarchal norms often restrict women to have control over their financial decisions and limit their mobility to banks or financial institutions. Government must take special measures to impart financial literacy to women in order to achieve financial inclusion across all levels. More female banking executives or field agents can be utilised in order to win the trust of women clients.

KEY ENABLERS:

Harnessing Government Policies: The government policies play a major role in bridging the urban vs rural gap in Fintech adoption. Targeted financial literacy programs in vernacular languages based on their regions can help people reap the benefits of digitization in finance, insurance benefits and credit facilities. Government backed platforms such as UPI payment interface, Aadhar enabled payment systems, Bharat Bill pay system provide low cost ways to transact. The government must focus on gender inclusive policies therby ensuring women have equal access to bank and credit.

Breaking through technological Barriers.: In order to achieve rural breakthrough in FinTech accessibility all the stakeholders such as government, banking and financial institutions, technology enablers, must work together to reach the bottom of the pyramid. UPI considered to be a game changer providing UPI access over offline or other phone friendly payment solutions can increase digital financial participation. By harnessing latest technology, it is better to equip local merchants with NFC enabled devices and adopt multilingual conversational interface. The government can provide more incentives for start-ups operating for fintech inclusion in rural India. In order to breakthrough FinTech adoption robust

infrastructure, local sociocultural changes and policy driven initiatives can achieve sustained and inclusive financial eco system.

Strengthening Gender Inclusiveness: The government must take initiatives to conduct women centric financial literacy programs starting from vernacular interfaces to voice support. There is a great need for low bandwidth adaptable financial apps along with robust cybersecurity and gaining more customer confidence and trust for cautious users. Enhancing FinTech adoption among women needs more than technology deployment by design, delivery and feedback economic empowerment can be achieved by women across rural India.

Revolution of Mobile Banking: Mobile banking has revolutionized digital banking in rural India, eliminating the need for long trips to bank branches. With user-friendly apps in local languages, rural residents can now access their accounts, transfer money, and pay bills easily. A 2022 study by Assocham and PwC found that mobile banking transactions in rural India have surged by over 200% in the past three years.

Fintech Partnerships: Digital banking is witnessing a surge in collaborations between traditional banks and fintech (financial technology) companies. Fintech startups are developing innovative solutions like micro-loans, micro-insurance, and USSD (Unstructured Supplementary Service Data) based banking for feature phones, catering specifically to the needs of the rural population.

Focus on Financial Literacy: Realizing the importance of financial literacy for successful adoption of digital banking services, various parties are implementing campaigns. These campaigns educate rural residents on topics such as good banking practices, fraud detection, and maximizing the value of digital financial tools. Persistent challenges in digital banking in rural areas:

Offline to Online Integration: A hybrid model that combines offline channels (such as postal banking) and online banking can bridge the digital divide. country. Leveraging AI and big data collection can streamline the digital banking experience for rural customers, offering them customized financial products and services.

Conclusion

This study demonstrates how FinTech is transforming the way financial services are accessed and used in rural communities along with the constraints. Fintech has been considered as a game changer to bridge the gap between haves and have nots. The study covers the numerous constraints at rural level such as use of applications such as google pay; phone pay reveals a note able disparity and creates a divide between rural and urban India. Illiterate population,

older people, women are found to be largely excluded from all these due to sociocultural constraints and lack of education and financial literacy.

Fintech across rural India has the capability to narrow the gap between rural and urban India by working on the reforms in order to serve the underserved. The current research highlights the existing barriers causing the divide and suggest ways to overcome them. The government must focus to address gaps in the implementation of reforms such as older people, women in rural *India* remains largely excluded due to sociocultural barriers and lack of financial education. As the world progresses as per the changing financial landscape it is important that there must not be any gaps for rural and urban areas in reaping the benefits of convenience, innovation and risk mitigation.

As per recent research there is great disparity among urban and rural India in order to obtain the benefits of Fintech revolution. The major hurdle lies with rural India wherein a great digital divide exists due to many factors such as poor connectivity and lack of digital literacy. The urban India is embracing the next step of FinTech revolution due to the rise of Buy now pay later services marking a new beginning in consumer behaviour with respect to FinTech. The other side of the coin is as it poses risks of financial mismanagement among the young generation and first-time credit users. The government must bring in the regulatory reforms to tackle these thereby raising concern over long-term financial health and avoid potential debt traps.

Digital banking in rural India holds immense potential to revolutionise the financial landscape thereby achieving the goals of financial inclusion, reducing economic disparities. education, connectivity, security, digital banking can be utilized as a powerful tool to empower rural citizens, connect them to more opportunities and integrating them with India's growth story.

The main focus must be making financial systems more inclusive and equitable. Care must be taken to address the gaps that stops the side-lined the rural groups in making them an integral part of the Fintech ecosystem. By increasing the reach across all levels, the nation can unlock the potential to drive economic growth and foster a more inclusive and equitable society.

Implications: In order to determine the crucial success criteria and another development driver for FinTech services, it provides empirical evidence. The study's findings give decision-makers—including payment institutions, mobile money partners, the government, and law enforcement—the information they need to create a plan to get over the current obstacles to inclusive financial growth. Based on the study's findings, policymakers and industry

participants can utilise mobile phone technology to develop new services and policies that will increase employment, income, and the general well-being of citizens.

The paper helps in the creation of a citizen dataset of financial technology beneficiaries. The results would help mobile service industry to discover an economy of scope in providing services at low cost and with maximum social benefits. Study will also provide insights to financial institutions offers banking services via mobile to handle cross-border transactions to low-income customers of remote areas. Finding of the study also add to the existing literature of financial inclusion interventions in developing countries. The study contributes to the development of a citizen dataset of people who have benefited from financial technology. The findings would assist the mobile service sector in finding a way to provide services at a cheap cost while maximising societal benefits. The study will also help financial institutions that provide mobile banking services to low-income clients in rural places so they can handle cross-border transactions. The study's findings also contribute to the body of knowledge regarding financial inclusion initiatives in underdeveloped nations.

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Silk Industry of Jammu & Kashmir and the SDGs: A Post-Development Perspective

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Abstract

This paper examines the silk industry of Jammu & Kashmir through the analytical lens of post-development theory, which challenges the epistemological and political foundations of mainstream development models while foregrounding plural, locally rooted knowledge systems (Escobar, 1995; Kothari et al., 2019). Rather than treating sericulture merely as an instrument for achieving Sustainable Development Goals (SDGs), the analysis inverts the evaluative frame: What do the SDGs look like when interpreted through the lived experiences, ecological practices, and cultural values of silk-producing communities in the region? Drawing on archival material, government reports, field interviews, and secondary literature, the study maps sericulture to selected SDGs — notably poverty reduction (SDG 1), zero hunger (SDG 2), gender equality (SDG 5), reduced inequalities (SDG 10), climate action (SDG 13), and life on land (SDG 15). It demonstrates how traditional sericultural systems integrate circular resource use, biodiversity conservation, and intergenerational knowledge transfer without relying on external sustainability frameworks. The findings highlight a paradox: while the silk industry of J&K embodies the ideals of the SDGs, these contributions often remain invisible to global metrics. By re-centering policy discourse on community-defined sustainability indicators, the paper argues for development strategies that learn from, rather than overwrite, indigenous and locally embedded practices. This approach offers a critical re-imagination of sustainability that moves beyond quantitative targets towards culturally grounded, ecologically attuned futures.

Keywords: Post-development, SDGs, sericulture, Jammu & Kashmir and local knowledge

1. Introduction

Sustainability has emerged as the dominant paradigm in 21st-century global development discourse, shaping international policy, research agendas, and funding priorities. Since the formal adoption of the 2030 Agenda for Sustainable Development at the United Nations Sustainable Development Summit in September 2015, 193 member states have committed to achieving 17 Sustainable Development Goals (SDGs) and 169 targets that together constitute a “plan of action for people, planet and prosperity” (United Nations, 2015). The SDGs seek to

integrate the economic, social, and environmental dimensions of development into a single, holistic framework — addressing interconnected challenges such as poverty eradication, gender equality, climate action, sustainable production and consumption, and biodiversity protection (Le Blanc, 2015; Sachs et al., 2019).

In the Indian context, this global agenda intersects with a diverse array of traditional livelihood systems that are simultaneously economically significant, ecologically sensitive, and culturally embedded. One such system is sericulture — the rearing of silkworms (Bombyx mori) and the production of silk fibre. India is the world's second-largest silk producer, but the Union Territory of Jammu & Kashmir (J&K) holds a distinctive place in the country's sericultural landscape. While J&K accounts for a modest share of national production volumes, it is renowned for its high-quality bivoltine silk, whose exceptional tensile strength, natural sheen, and uniform filament length make it highly valued in both domestic weaving clusters and international luxury textile markets (Central Silk Board, 2023; Greater Kashmir, 2023). The region's temperate climate, distinct altitudinal gradients, and long-standing cultivation of hardy mulberry varieties create optimal conditions for bivoltine cocoon rearing (Bhat et al., 2014).

For thousands of rural households in J&K sericulture remains a supplementary yet critical livelihood activity. It provides a seasonal cash income that complements agriculture, mitigates rural underemployment, and enables diversification of livelihood sources in areas with limited access to industrial labor markets (Dar et al., 2020). Importantly, sericulture in J&K has historically been organized around family-based, smallholder production units, where the knowledge of silkworm rearing, mulberry cultivation, and cocoon handling is transmitted orally and experientially across generations, embedding the activity in local social and cultural rhythms.

This paper examines the silk industry of J&K through the analytical lens of post-development theory, a perspective that interrogates the epistemological and political underpinnings of mainstream development models and foregrounds plural, locally rooted knowledge systems (Escobar, 1995; Kothari et al., 2019). Rather than framing sericulture simply as an instrument for achieving SDG targets, the analysis inverts the question: What do the SDGs look like when interpreted through the lived experiences, values, and ecological practices of silk-producing communities in J&K? This inversion shifts the epistemic center from global indicator frameworks to community-defined sustainability, thereby illuminating the ways in

which local sericultural practices predate, parallel, and enrich contemporary sustainability discourses.

By situating J&K's sericulture within both the historical evolution of global sustainability frameworks and the ongoing debates in post-development scholarship, this paper argues for a reframing of policy approaches — from measuring traditional industries against universal benchmarks to recognizing them as autonomous systems of sustainability. This approach is not merely academic; it carries implications for how India's rural development policy, SDG monitoring architecture, and sericulture sector strategies can be redesigned to foreground cultural resilience, ecological stewardship, and gendered knowledge systems.

2. Evolution of Sustainable Development and the SDGs

The concept of **sustainable development** did not emerge fully formed in 2015 with the SDGs; rather, it evolved through a series of interlinked global policy milestones, each shaped by prevailing environmental, economic, and political concerns. This genealogy is important because it reveals the **institutional logic** underlying the SDGs — a logic that post-development scholars have often critiqued for its reliance on **universalist, top-down frameworks** (Escobar, 1995; Esteva, 2010).

2.1 Early Roots: From Stockholm to Brundtland

The modern environmental agenda entered the international stage with the **United Nations Conference on the Human Environment**, held in **Stockholm in 1972**. This was the first major global summit to link environmental concerns with economic development, resulting in the **Stockholm Declaration** — a set of 26 principles affirming the interdependence of human well-being and environmental health (United Nations, 1972). While pioneering, the Stockholm framework reflected a tension: developing countries feared that environmental restrictions could constrain their industrial growth, while developed countries emphasized pollution control and conservation (Adams, 2009).

The next major milestone came with the **World Commission on Environment and Development (WCED)**, chaired by Gro Harlem Brundtland, which published *Our Common Future* in 1987. This report popularized the now-canonical definition of sustainable development as **"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"** (WCED, 1987, p. 43). It introduced two key concepts: **needs**, with priority given to the poor, and **limitations**, imposed by environmental carrying capacity. The Brundtland vision sought to reconcile economic growth with ecological limits — an attempt at what was later termed "weak sustainability"

(Neumayer, 2013) — but still assumed that modernisation and growth were compatible with environmental stewardship.

2.2 Rio 1992 and Agenda 21

The **1992 United Nations Conference on Environment and Development (UNCED)** in Rio de Janeiro, commonly known as the Rio Earth Summit, expanded the institutional framework for sustainability. Its major outcome, **Agenda 21**, was a comprehensive action plan promoting the integration of environment and development in decision-making at all levels (United Nations, 1992). The summit also adopted the **Rio Declaration on Environment and Development**, the **Convention on Biological Diversity (CBD)**, and the **United Nations Framework Convention on Climate Change (UNFCCC)**.

Agenda 21 introduced important procedural innovations — notably **participatory decision-making** and **local action plans** — anticipating the 'Local Agenda 21' movements of the late 1990s (Lafferty & Eckerberg, 2013). However, from a post-development perspective, Rio still operated within a **managerial, technocratic paradigm** in which local communities were seen primarily as **implementers** of sustainability policies rather than **originators** of alternative visions of well-being (Escobar, 1995).

2.3 Millennium Development Goals (2000–2015)

The adoption of the **Millennium Development Goals (MDGs)** in 2000 marked a shift towards **target-driven development**. The MDGs focused on eight global priorities, including poverty reduction, universal primary education, gender equality, and disease control (UN, 2000). Environmental concerns were largely confined to **Goal 7: Ensure environmental sustainability**, which emphasised access to safe drinking water, sanitation, and biodiversity protection.

While the MDGs achieved measurable progress in certain areas, critics argued that their narrow focus and **indicator-centric approach** neglected cultural, ecological, and structural dimensions of inequality (Fukuda-Parr, 2016; Saith, 2006). Moreover, the MDGs were primarily framed as obligations for the Global South, reinforcing a **North–South aid logic** rather than a universal sustainability compact.

2.4 Sustainable Development Goals (2015–2030)

In 2015, the **Sustainable Development Goals (SDGs)** replaced the MDGs, significantly expanding the scope to **17 goals** and **169 targets**, applicable to all countries regardless of income status (United Nations, 2015). The SDGs are characterized by three distinguishing features:

1. **Universality** — all member states, both developed and developing, are responsible for achieving the goals.
2. **Integration** — recognition of the interconnectedness of social, economic, and environmental dimensions.
3. **Participation** — calls for the involvement of civil society, the private sector, and local communities.

The SDGs include explicit commitments to **climate action (SDG 13)**, **life on land (SDG 15)**, and **inclusive economic growth (SDG 8)**, reflecting a more holistic framing than the MDGs (Sachs et al., 2019). Yet, they remain fundamentally **indicator-based**, which can obscure **qualitative, culturally embedded forms of sustainability**. For example, the contribution of traditional sericulture in Jammu & Kashmir — with its biodiversity conservation, low-carbon production, and gendered labor systems — is largely invisible in SDG monitoring frameworks that prioritize quantifiable outputs over local meanings and practices (Kothari et al., 2019).

From a post-development standpoint, the SDGs represent both a **progressive step** in expanding the sustainability agenda and a **continuation of the managerial logic** that situates local knowledge as data to be fitted into pre-existing global metrics. This tension becomes especially evident when examining rural livelihood systems like J&K's silk industry, which embody sustainability in practice without conforming neatly to SDG indicator sets.

3. Theoretical Framework

3.1 Post-Development Theory

Post-development theory emerged in the 1990s as a radical critique of the dominant development paradigm that had shaped policy discourse since the mid-20th century. Foundational works, such as Arturo Escobar's *Encountering Development* (1995), argued that "development" operates as a discourse rooted in Eurocentric modernity, imposing a singular vision of progress that marginalises alternative cultural, ecological, and economic logics. Rather than being a neutral, universal good, development is seen as a historically situated project tied to colonial legacies and the political economy of global capitalism (Escobar, 1995; Sachs, 1992).

Central to post-development thinking is the idea that communities possess their own forms of knowledge and ways of organising life that do not require validation through Western or state-centric metrics. This orientation resonates with the concept of **epistemic justice**, which calls for recognising the legitimacy of knowledge systems that have been historically

subordinated or silenced (Fricker, 2007; Santos, 2014). In practice, this means valuing locally embedded ecological practices, cultural traditions, and livelihood systems not merely as "resources" for development, but as autonomous systems of meaning and sustainability.

3.2 SDGs and the Problem of Universalism

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015, represent the most comprehensive global framework for integrating economic, social, and environmental priorities (United Nations, 2015). However, while the SDGs seek to be universally applicable, they often operationalise progress through **quantifiable indicators**—poverty headcounts, employment ratios, biodiversity indices—that can obscure the qualitative dimensions of local well-being (Fukuda-Parr & McNeill, 2019).

Critiques have noted that such universalism risks reproducing the same development orthodoxies that post-development theorists challenge, particularly when local priorities do not align neatly with global benchmarks (Kothari, Salleh, Escobar, Demaria, & Acosta, 2019). In the context of rural and indigenous livelihoods, the SDGs can inadvertently impose external priorities, reshaping local economies and ecologies in ways that undermine self-determination.

3.3 Bridging the Two: A Post-Development Reading of the SDGs

Applying a post-development lens to the SDGs does not necessarily entail rejecting them outright; rather, it involves **reframing the analytical question**. Instead of asking how local systems can be "brought into alignment" with SDG targets, the approach asks: *What do sustainability and well-being look like when defined from within these systems?* This inversion foregrounds lived experiences, community-defined values, and ecological relationships as the basis for interpreting the SDGs, rather than treating them as externally imposed yardsticks.

In the case of Jammu & Kashmir's silk industry, such a reframing brings into view dimensions of sustainability—intergenerational transmission of sericultural skills, seasonal reciprocity between agriculture and cocoon rearing, gendered labour organisation in household economies—that may not be fully captured by global metrics yet are central to the resilience and vitality of the industry.

Sericulture in Jammu & Kashmir has deep historical roots, with institutional foundations laid under the Dogra rulers in the late 19th century through state-managed mulberry plantation schemes and the establishment of industrial hubs such as the *Resham Ghar* in Jammu and the Government Silk Factory in Srinagar, which together created an integrated system of

mulberry cultivation, silkworm rearing, and reeling under strict state control (Kaul, 1929; Government of Jammu and Kashmir, 1919; Directorate of Sericulture J&K, 2021). The region's temperate climate and diverse agro-ecological zones made it uniquely suited for high-quality bivoltine silk production, a fact that distinguished J&K from other silk-producing states in India. Following independence, the state continued to dominate the sector, providing subsidised inputs, extension services, and assured cocoon procurement, until the liberalisation era of the late 1980s and 1990s, when the World Bank–funded National Sericulture Project (NSP) promoted privatisation, decentralisation of seed production, and market liberalisation (Government of India, 1995; Bhat & Dar, 2017). While these reforms were framed as measures to increase efficiency and global competitiveness, they simultaneously dismantled the state's protective role, leading to the closure of key institutions—most notably the Resham Ghar in Jammu—thereby exposing smallholder producers to price volatility, reduced institutional support, and dependence on private traders (Hussain & Bhat, 2019). Today, J&K contributes less than 1% of India's raw silk output, yet remains the country's only significant producer of high-quality bivoltine silk (Central Silk Board, 2023), with production concentrated in smallholder households across both divisions: in the Jammu region, lower-altitude districts such as Rajouri, Kathua, and Udhampur sustain spring and autumn crops, while in the Kashmir valley, cooler districts like Pulwama, Anantnag, and Budgam excel in premium bivoltine production. In tribal and border areas, including Pahari-speaking communities of Rajouri district, sericulture remains embedded within subsistence agriculture, gendered labour practices, and indigenous ecological knowledge of mulberry tree management—forms of socio-ecological resilience that predate contemporary sustainability frameworks and remain largely invisible to global development metrics. This trajectory from state-led industrial dominance to liberalised smallholder production underscores why a purely SDG-aligned evaluation of sericulture risks erasing the political economy of institutional change and the enduring role of local knowledge systems, thereby validating a post-development approach that re-centres sustainability on community-defined priorities rather than externally imposed indicators.

4. Local Knowledge Systems and Sustainability in Sericulture:

During the field work it was observed that the local sericultural practices in Jammu & Kashmir represent a complex knowledge system that combines ecological understanding, seasonal rhythms, and socially embedded labour organisation. Households maintain mulberry trees on field bunds and community grazing lands, pruning branches in accordance with

traditional calendars that align leaf maturity with silkworm feeding cycles, a timing refined over generations through empirical observation of local climatic patterns (Dar et al., 2018; Rashid & Sofi, 2020). Silkworm rearing spaces are typically prepared within the household where ventilation, humidity, and light are regulated using locally available materials such as jute screens, earthen floors, and manually operated fans, reflecting an intimate adaptation to microclimatic conditions without reliance on industrial infrastructure. Labour in this process is gendered: while men often prune and transport mulberry leaves, women take primary responsibility for feeding, cleaning, and disease management, drawing on a repository of indigenous techniques for identifying early signs of *grasserie* or *flacherie* through larval colour changes, odour, and feeding behaviour. Such practices operate alongside, and sometimes in resistance to, state-promoted "scientific" methods, producing a hybridised or syncretic knowledge regime (Agrawal, 1995; Kothari, 2021) in which local ecological ethics, such as non-wasteful leaf harvesting and careful cocoon boiling to preserve fibre quality, carry implicit sustainability logics. Yet these forms of knowledge are rarely documented in extension manuals or development reports, resulting in a form of epistemic marginalisation that mirrors post-development critiques of the SDG framework's emphasis on standardised metrics over locally defined well-being indicators. By situating these practices within a post-development reading of sustainability, it becomes possible to see sericulture not merely as an economic activity contributing to SDG targets such as poverty alleviation (SDG 1), gender equality (SDG 5), and sustainable production (SDG 12), but as a culturally grounded system whose resilience and environmental stewardship predate—and in some respects exceed—the scope of the global development agenda.

5. Reframing the SDGs through Local Sustainability Logics

Sericulture in Jammu & Kashmir embodies a locally grounded sustainability system whose contributions to the UN Sustainable Development Goals (SDGs) emerge not through external interventions, but through community-embedded practices that have evolved over generations. In terms of SDG 1 (No Poverty) and SDG 2 (Zero Hunger), mulberry-based sericulture offers a reliable supplementary income stream during agricultural lean periods: a hectare of mulberry can support multiple silkworm cycles annually, generating cash flow with minimal capital input while enhancing household food security (Mukherjee & Ghosh, 2012). By-products such as pupae and leaf waste supplement livestock feed, linking sericulture to nutritional resilience as well as income (Daily Excelsior, 2021). SDG 5 (Gender Equality) is enacted through women's central roles in rearing, disease detection, and

microclimatic regulation—tasks requiring embodied expertise in larval stage recognition, feeding intervals, and environmental adjustments (Kulsum Ahad et al., 2022). However, structural barriers such as lack of land titles, cooperative leadership roles, and credit access limit their formal recognition, underscoring the need for gender-sensitive policy reform. SDG 10 (Reduced Inequalities) is supported by the sector's accessibility to marginal and landless farmers, including borderland and tribal communities, as sericulture requires little land and minimal infrastructure, thereby lowering barriers to entry and fostering inclusive rural economies (Rashid & Sofi, 2020). At the ecological level, SDG 12 (Responsible Consumption and Production) and SDG 15 (Life on Land) are advanced through agroforestry systems in which mulberry trees conserve soil, enhance biodiversity, and maintain forest edge ecologies, while traditional rearing avoids heavy chemical inputs, thereby aligning with low-carbon farming goals also central to SDG 13 (Climate Action) (FAO, 1996; Extension Journal, 2024). A post-development lens reveals that these outcomes occur without reliance on global metrics: households practice circular resource flows (e.g., recycling pupae and leaf litter), define well-being in terms of household balance, ritual continuity, and ecological care, and embed production in cultural rhythms such as harvest festivals—all largely invisible to SDG monitoring frameworks (Agrawal, 1995; Kothari, 2021). This paradox—that the region's silk industry substantively fulfils SDG ideals without depending on SDG frameworks—underscores the need for policies that learn from and strengthen such endogenous systems, rather than imposing externally defined performance targets that risk erasing local epistemologies.

6. Political Economy Shifts and Knowledge Marginalisation

The transformation of Jammu & Kashmir's silk industry since the late twentieth century cannot be understood without situating it within the broader shifts in India's political economy, particularly the liberalisation and structural adjustment reforms of the late 1980s and early 1990s. The 1989 demonopolisation of the silk sector, coupled with the World Bank–funded National Sericulture Project (NSP, 1989–1996), marked a decisive turn towards privatisation, market liberalisation, and the adoption of "scientific" sericulture packages (Government of India, 1997; Bhat, 2014). While officially framed as interventions to enhance productivity and global competitiveness, these reforms restructured the institutional landscape: state-run reeling factories such as the Resham Ghar in Jammu were either closed or downsized, extension services were reoriented towards commercially viable units, and procurement systems were increasingly mediated by private traders. In practice, this shift

displaced many small-scale reelers and rearers from state-supported value chains, forcing them to adapt to volatile market prices without the protective buffer of guaranteed procurement (Harriss-White, 2003). More subtly — but with equal significance — the epistemic basis of sericulture governance changed. Localised knowledge systems, refined over generations through empirical engagement with climate, pests, and mulberry ecology, were increasingly devalued in favour of standardised "scientific" packages disseminated through top-down extension manuals. Practices such as staggered leaf pruning, indigenous disease identification, and low-input mulberry intercropping — once central to the resilience of household-based sericulture — were either omitted from official literature or dismissed as "unscientific" (Agrawal, 1995). This epistemic marginalisation mirrors a wider post-development critique of global development frameworks, including the SDGs, which privilege quantifiable indicators and externally validated best practices over context-specific definitions of well-being and sustainability (Escobar, 1995; Kothari et al., 2019). The closure of the Resham Ghar in Jammu further exemplifies how the dismantling of industrial infrastructure eroded not only economic livelihoods but also the institutional memory of sericulture, contributing to an archival and policy silence that obscures the sector's local heritage. As a result, the industry's current alignment with certain SDG principles — low-carbon production, gendered knowledge transmission, biodiversity-friendly agroforestry — is achieved largely *in spite of*, rather than because of, formal development interventions, underscoring the need to re-centre community epistemologies in policy design.

7. Conclusion: Rethinking Sustainability Through Local Epistemologies

The case of sericulture in Jammu & Kashmir reveals a fundamental disjuncture between the lived realities of silk-producing communities and the universalised frameworks of global development agendas. By foregrounding post-development perspectives, this paper has shown that local sericultural practices — embedded in ecological ethics, gendered cooperation, and cyclical resource use — constitute an autonomous sustainability system that predates the SDGs and, in many respects, exceeds their scope. While SDG mapping can make these contributions visible in policy discourse, it risks flattening complex cultural and ecological logics into discrete, measurable targets. The liberalisation-era restructuring of the silk industry further underscores how top-down interventions, framed as modernisation, can marginalise local knowledge and dismantle the institutional supports that once sustained community-based production. Yet, despite these disruptions, households continue to adapt and innovate within their own epistemic frameworks, maintaining biodiversity-friendly

mulberry agroforestry, low-carbon rearing methods, and equitable labour divisions shaped by tradition rather than market logic. Recognising this resilience demands a shift in policy thinking: from imposing external targets to co-producing strategies with communities as epistemic equals. In this reframing, sericulture is not merely an instrument for delivering on SDGs such as poverty alleviation, gender equality, and climate action, but a living example of how sustainability can be defined, practised, and measured from the ground up. For development policy, the challenge is not to retrofit these systems into pre-existing frameworks, but to allow such locally rooted knowledges to shape what "development" itself means.

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Samuelson's Theory of Business Cycle (Multiplier-Accelerator Model)

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Abstract

We arrive at the process of income generation through the working together of multiplier and accelerator principles. However, Paul Samuelson went further and stated that through the values of multiplier and accelerator, it is possible to explain the path of fluctuations in the pattern of income level and on that basis, he defined five cases of business cycle. Paul Samuelson stated that if we know autonomous consumption, autonomous investment, consumption for the current period and preceding period, we can determine the growth path of income and output for any period with the given values of marginal propensity to consume and capital-output ratio or accelerator by substituting these values in the equation of income (Y). In this paper, the author has examined the theory of business cycle by putting different values of marginal propensity to consume and accelerator in equation and arrived income is plotted on the graph to see if business cycle is formed in the same way as Paul Samuelson has stated. The figure of business cycle that arrived from the combination of marginal propensity to consume and accelerator is somewhat different from that of Samuelson's business cycle.

Keywords: multiplier, accelerator, business cycle, income, autonomous investment.

JEL: E32

Introduction

John Maynard Keynes in his book "The General Theory of Employment, Interest, and Money (1936)" argued that business cycles (Keynes used trade cycle for the term business cycles) are the result of investment changes generated by cyclical changes in the marginal efficiency of capital, a process often become more complicated and often reinforced by associated changes in other short period variables of the economic system (http://eslm.kkhsou.ac.in/ESLM). In his explanation of the business cycle, Keynes used multiplier to explain cyclical fluctuation and changes in income and output. For explanation of the business cycle, Keynes neither used accelerator nor cumulative nature of fluctuations in the economic activity. It was P.A. Samuelson who in his seminal paper "Interaction between the Multiplier Analysis and the Principle of

Acceleration" (1939) combined the newly arrived Keynesian multiplier analysis with the older principle of acceleration (Allen, RGD; 1959). Through interaction of multiplier and acceleration principles, Samuelson developed modern business cycle in 1939. The important point in the Samuelson model of business cycle is enumerated below:

1. An increase in autonomous investment leads to an amplified rise in income, which is determined by the value of the multiplier (k).
2. The instability in the economy is caused by fluctuations, which per se is determined by induced investment, which depends on private investment.
3. Increase in income increases aggregate demand for goods and services, which depends on multiplier.
4. Increase in aggregated demand for goods and services increases income demand for capital goods, which is required to produce consumption goods. Demand for capital goods is induced investment which depends on accelerator (i.e., capital-output ratio).
5. Without any external shocks accelerator and multiplier interactions can result in business cycles whose pattern is shaped by the magnitude of capital-output ratio and marginal propensity to consume.

Assumptions of the Samuelson's Business Cycle Theory

Samuelson's theory of business cycle is based on the following assumptions:

1. There is no excess capacity of production; i.e., production capacity is limited;
2. Combination of multiplier and accelerator causes economic fluctuation in the economy;
3. It is income of the preceding year that determines current period consumption spending;
4. Change in income with a lag of one period determine current period investment;
5. There is closed economy, i.e. no foreign trade;
6. There would be gap of one year between the increase in consumption and increase in demand for investment;
7. The exogenous spending, i.e., government spending is constant and no attempt is made to use government spending as an instrument for controlling the time path of income;
8. Marginal propensity to consume (c) is greater than zero but less than one. This may be written as $0 < c < 1$ and accelerator is greater than 1; and
9. This model neither considers the effects of public spending on the level of income and output not determinants of the government spending.

Explanation of Samuelson's Business Cycle Theory

According to Samuelson, multiplier per se is inefficient to explain cumulative and the cyclical nature of the economic fluctuations (http://www.economicsdiscussion). Samuelson believes that multiplier and accelerator interactions lead to cyclical fluctuations in economic activity. An increase in autonomous investment leads to an amplified rise in income, which is determined by the value of the multiplier (k) is the basic tenet of the Samuelson model. The multiplier (k) in the closed economy is written as

$$k = \frac{Change\ in\ Income}{Change\ in\ Investment} = \frac{\Delta Y}{\Delta I} = \frac{1}{Marginal\ Propensity\ to\ Save\ (MPS)}$$
$$= \frac{1}{1 - Marginal\ Propensity\ to\ Consume\ (MPC)}$$

Through accelerator effect an increase in autonomous investment (Ia) increase income level which in turn increases induced investment. The capital-output ratio is also known as accelerator (a) which is reverse of the multiplier. An increase in income level raises aggregate demand. The economy requires extra investment in capital goods to meet the increased aggregate demand. This induced investment is the result of extra investment taken by the government, and thus, induced income and autonomous investment mutually interact each other. This interaction between autonomous investment and induced investment affects the process of income and employment in a cyclical manner. This is what Samuelson model shows – combination of accelerator with the Keynesian multiplier results in an increase in income and output/ employment by even greater amount. This is shown in the Figure 1.

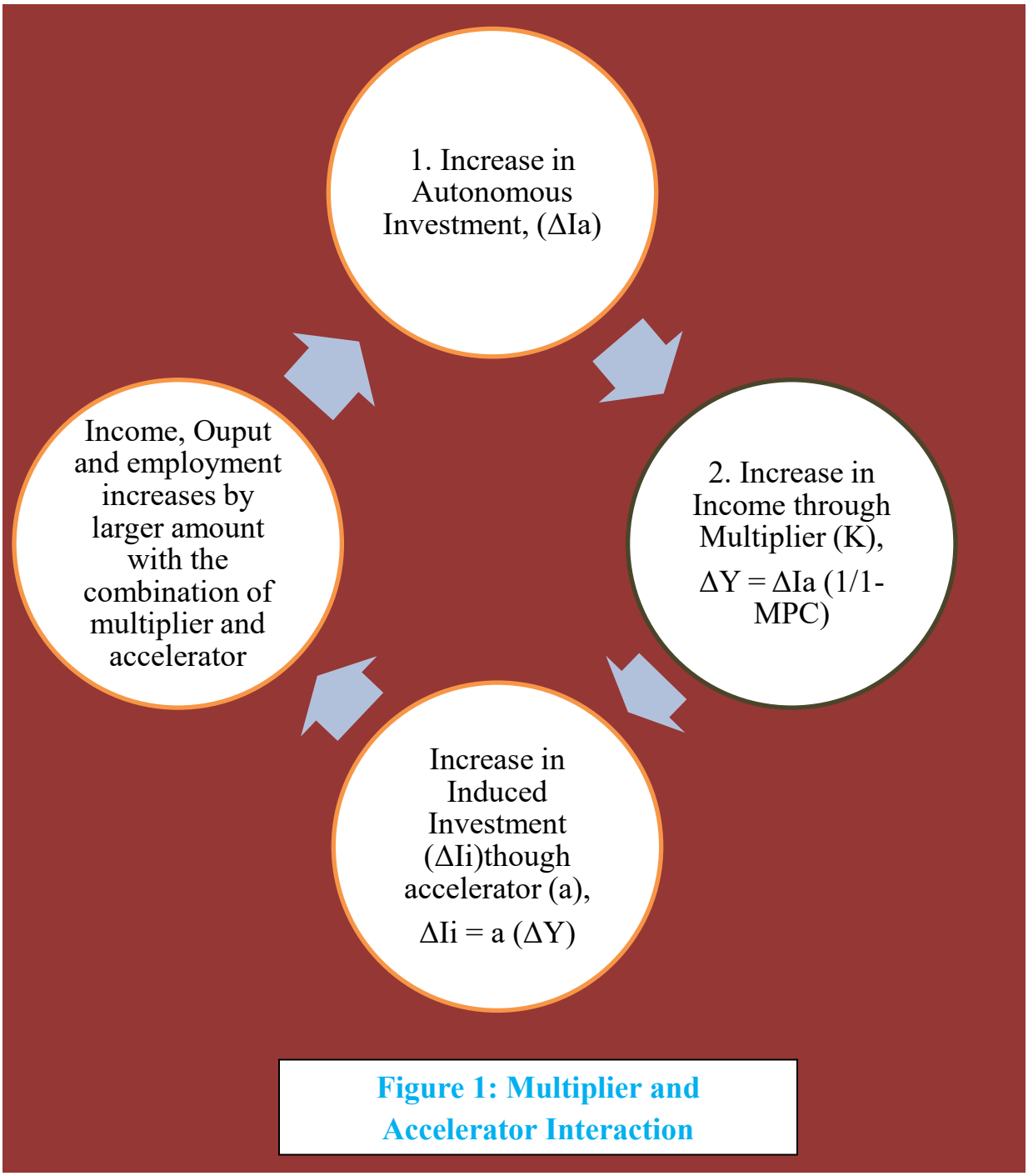

Figure 1: Multiplier and Accelerator Interaction

The accelerator and multiplier interaction model is mathematically represented as under:

$Y_t = C_t + I_t$ i
$C_t = C_a + c\ (Y_{t-1})$ ii
$I_t = I_a + a\ (Y_{t-1} - Y_{t-2})$ iii
$Y_t = C_a + c\ (Y_{t-1}) + I_a + a\ (Y_{t-1} - Y_{t-2})$ iv

Where, income, consumption and investment for a current period t, are shown by Y_t, C_t, and I_t respectively. Autonomous consumption is shown by C_a and autonomous investment is shown by

I_a. Capital-output ratio or accelerator is represented by a while c represents marginal propensity to consume. It must be noted here that government activity is not taken because Samuelson model neither considers the effects of public spending on income level and output level nor determinants of the public spending.

From above equation it is evident that:

1. **Equation i** shows that income in current period (Y_t) is the summation of Consumption in a current period (C_t) and investment in current period (I_t).
2. **Equation ii** shows that consumption in current period (C_t) is the summation of autonomous consumption (C_a) and function of previous year's income multiplied by marginal propensity to consume {c (Y_{t-1})}. This equation can also be written as $C_t = c\ (Y_{t-1})$. This shows that consumption in current period is a function of previous year's income. Equation ii shows that consumption is a linear function of the previous year, where marginal propensity to consume (c) is greater than zero but less than one, i.e., $0 < c < 1$.
3. **Equation iii** shows that induced investment in current period (I_t) is a summation of autonomous investment (I_a) and function of a change in income of the two previous years (i.e., $Y_{t-1} - Y_{t-2}$) multiplied by accelerator or capital- Output ratio, shown by a. Thus, induced investment is a product of change in income and accelerator, which is shown by $\{a(Y_{t-1} - Y_{t-2})\}$. Hence, $I_t = a(\Delta Y_{t-1})$ can also represent equation (iii). This shows that in current period induced investment is a function of change in income in the previous period. Put it differently, induced investment in current period depends on changes in income from two previous period. Equation iii indicates that investment is proportional to the change in the level of income/consumption between the previous and current period. In this equation iii a is accelerator or capital-output ratio, which is shown as,

$$Accelerator\ (a) = \frac{Investment}{Income/Consumption}.$$

Accelerator is assumed to be greater than zero, i.e., $a > 0$. It is assumed to be positive. Equation iii can also be written as,

$$I_t = I_a + a\ (C_t - C_{t-1}) \qquad \text{iii}$$

$$I_t = I_a + a\ (Y_{t-1} - Y_{t-2}) \qquad \text{since, } C_{t-1} = c\ (Y_{t-2}). \qquad \text{iii}$$

By replacing equations (ii) and (iii) in equation (i), we obtain the following equation iv,

$$Y_t = C_a + c\ (Y_{t-1}) + I_a + a\ (Y_{t-1} - Y_{t-2}) \qquad \text{iv}$$

Aggregate output or income in the current period (Yt) is determined by the sum of autonomous consumption (Ca), consumption based on the marginal propensity to consume (c) times previous year's income, autonomous investment (Ia), and the induced investment, which is given by the accelerator (a) multiplied by the change in income between the previous year and the year before that (Yt-1 – Yt-2), as equation (iv) shows. Hence, change in the level of income is determined by both capital-output ratio or accelerator (a) and the value of marginal propensity to consume (c), as equation (iv) indicates. Samuelson model states that if we know the value of marginal propensity to consume (c), accelerator (a), income of the current period (Y_t) and income of the previous period (Y_{t-1}); then the present and future income can be determined by putting the given values in the equation. It must be known here that, the level of income determined in the above equations show dynamic equilibrium. The determined level of income in static equilibrium will be

$$Y = C_a + c(Y) + I \qquad v$$

In static equilibrium, $Y_t = Y_{t-1} = Y_{t-2} = Y_{t-n.}$ This shows that in static equilibrium period lags have no influence and thus equilibrium level of income remains unchanged. Consequently, accelerator reduced to zero. In contrast, in a dynamic state change in autonomous investment takes economy either towards a final equilibrium or diverging from the equilibrium level, as equation (iv) describes this path. The capital-output ratio or accelerator (a) and the values of marginal propensity to consume (c) determine if the economy will remain at new equilibrium point or moves away from it.

Samuelson has described five different paths of business cycle with the different combination of given value of marginal propensity to consume (c) and capital- output ratio {(or accelerator (a)} as shown in Table 1. The magnitude of multiplier and accelerator is determined by various combinations of the values of marginal propensity to consume and capital-output ratio, which are shown in Table 1.

Table 1: Samuelson's Five Different Path of Cycle

Region	Marginal Propensity to Consume (c)	Multiplier (k) $k = \frac{1}{1-c}$	Accelerator (a)	Different Paths of Trade/Business cycle	Types of Oscillation
A	0.5	2	0	Smooth Convergence	No Oscillation/Stable
B	0.5	2	1	Damped Cycle	Stable Oscillation

E	0.5	2	2	Constant Cycle (special case)	Constant Oscillation
C	0.5	2	3	Anti-Damped Cycle/Explosive Cycle	Unstable Oscillation
D	0.5	2	4	Smooth Expansion (Explosive Growth)	Unstable No Oscillation

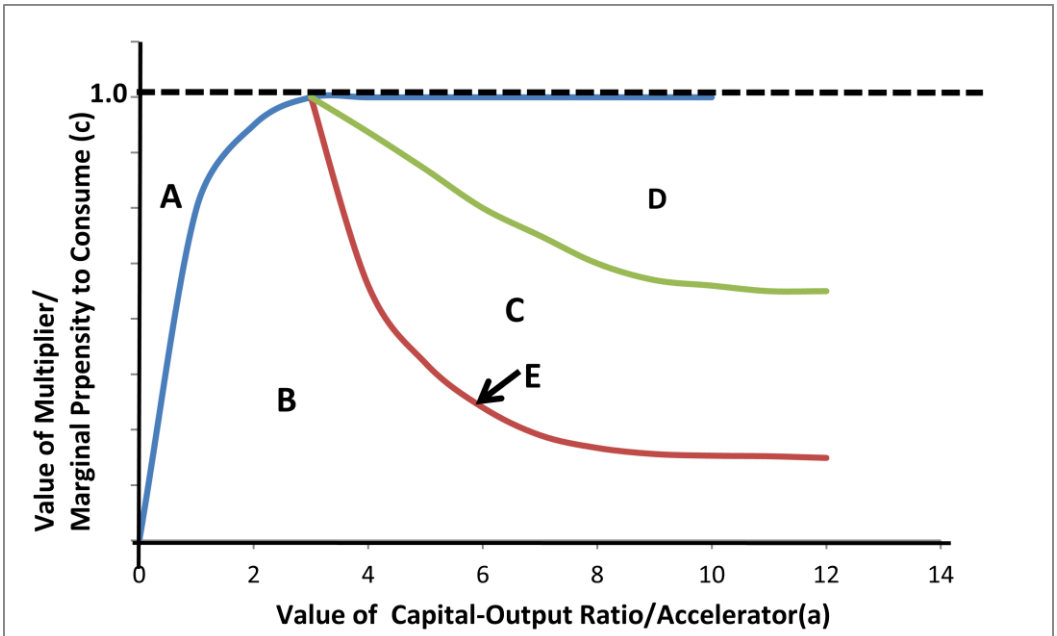

Figure 2: Samuelson Model of Business Cycle: Dynamic Income Path

Samuelson in his paper explained that movements in the economic activities depend on the values of marginal propensity to consume (c) and accelerator (a). With these given values, and given change in autonomous spending, he explained four cases of different dynamic income paths or five cases of dynamic income path if we include a special case, which is shown in Figure 2. Figure 2 shows five region of movement of income, viz., Region A, B, C, D, and E. Region A shows that when value of multiplier is 2 and accelerator is zero, with a change in autonomous investment or consumption, income or gross national product may move upward or downward with decreasing rate and reaches its new equilibrium point and become parallel to new equilibrium point as depicted in panel A of Figure 3. There is no oscillation in region A for new equilibrium is parallel to the initial equilibrium, and thus there in no cycle as shown in panel A of Figure 3.

With the change in autonomous consumption or investment, when values of accelerator increase to 1 and values of multiplier remain as before it generates fluctuation in the income and pattern of development in the income forms the shape of Region B as it is depicted in the Figure 2. With change in autonomous consumption or investment, values of multiplier and accelerator in region B cause income to fluctuate in the series of a damped cycles whose amplitudes gradually shrink until the cycles vanish, as depicted in panel B of Figure 3. In panel B of Figure 3, fluctuation in income generates stable oscillation as it disappeared on reaching the new equilibrium point.

In the region C of Figure 2 value of accelerator is greater than multiplier, consequently combination of marginal propensity to consume/ multiplier and accelerator or capital-output ratio generates fluctuation in income with successively greater and greater amplitude. This type of fluctuation in income is explosive in nature and with the passage of time its oscillation becomes unstable as multiplier become larger and larger. This is called anti-damped cycle or explosive cycle depicted in panel C of Figure 3. This explosive cycle must be restrained by ceiling and floor in case of expansion and contraction of business cycle respectively.

The values of multiplier or marginal propensity to consume (c) and accelerator (a) in the region D of Figure 2 generate high fluctuation in the income with successively greater and greater amplitude that cause the economic system to explode and diverge from the equilibrium state by an increasing amount. The value of multiplier and accelerator in this region may cause income to move upward or downward at an increasing rate. This depicts smooth expansion in the income with greater amplitude, which must be restrained by the factors determining ceiling and floor if the cyclical movements are to occur in the system. This is shown in panel D of Figure 3.

There is a special case of business cycle, which is shown by point E which lies between the boundary area of B and C. To understand this, you just draw a parallel curve to the curve marked by E. The value of multiplier and accelerator lies in area E generates fluctuation in income of constant amplitude as depicted in panel E of Figure 3.

It is worth noting here that all combinations of values of marginal propensity to consume (c) and accelerator (a) do not produce business cycle or cyclical fluctuation in the economy. Those combinations of marginal propensity to consume and accelerator lying in regions B, C, and E produce business cycle. In the region A and D of Figure 2, there is no business cycle because the combination of multiplier and accelerator in the region A are such that with changes in autonomous investment or autonomous consumption, income moves smoothly from initial

equilibrium to new equilibrium without producing any oscillations (see panel A of Figure 3) in the economy. Similarly, the values of multiplier and accelerator in the region D are such that with changes in autonomous investment or autonomous consumption, income moves explosively in upward direction without producing any oscillation in the economic system. There is smooth expansion in income of region D, thus there is no cyclical fluctuation in region D.

The value of multiplier and accelerator in region B with changes in autonomous investment/consumption produces damped cycle. The oscillation produces in the region B are called damped cycles because this fluctuation tends to disappear over time or die out over period of time. This indicates that amplitude of cycle shrinks to zero and formation of cycle dies out. Generally, business cycle observed in the post-war period was relatively damped cycles as compare to that of inter-war period. However, there is no historical evidence to support the view that the business cycles will completely die out or disappear over period of time (https://shishirshakya.blogspot.com). This may happen only when one time investment takes place in the economy. In other words, business cycle in the region B explains the impact of one-time autonomous investment. If no disturbance takes place in the economy, the impact of one-time autonomous investment goes on declining over period of time. However, advancement in technology, innovation, natural disaster, and man-made crisis like security scam in India during 1991-92 occur in the economy quite frequently and at random intervals (http://www.economicsdiscussion.net). Thus, the values of multiplier and accelerator with such disturbances that takes place on and off in the economy tends to produce irregular business cycle which does not die out or disappear over period of time as mentioned in the region B of Figure 2.

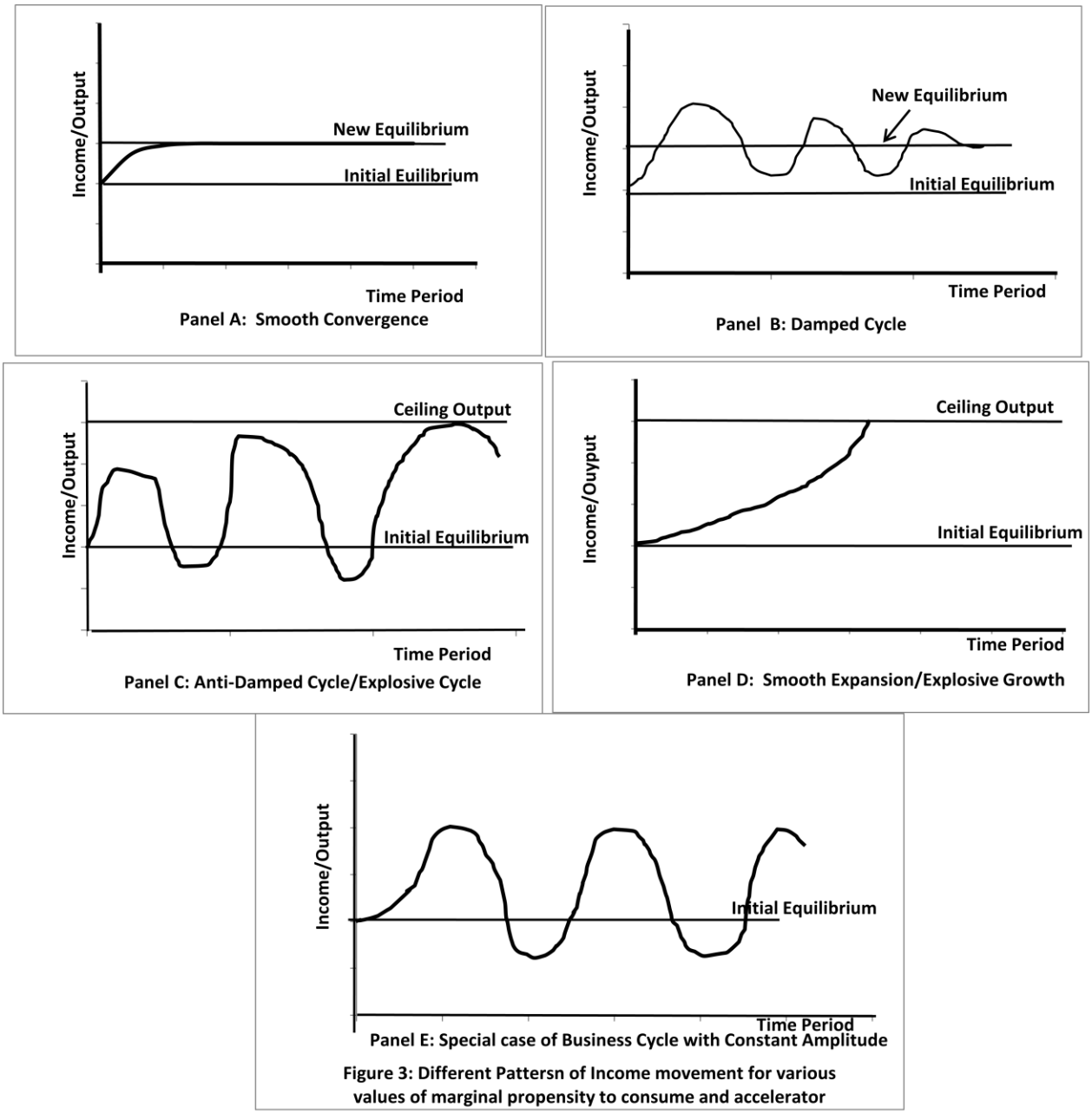

Figure 3: Different Pattersn of Income movement for various values of marginal propensity to consume and accelerator

The cycle generated by the value of multiplier and accelerator in the region C is of no doubt continued oscillation but this oscillation/cycle is explosive in nature, which is not in consistent with the real word situation where cycle does not become explosive. The government can make region C's explosive cycle consistent with the real world situation. By imposing ceiling or upper limit and floor or lower limit on the expansion and contraction of income and output respectively government may make explosive cycle in consistent with the real world situation

The region E produces such an oscillation or cycle which neither disappears nor explodes over period of time but goes on with constant amplitude, which does not fit in the real world.

Examination of Samuelson's Business Cycle

In Figure 2 and Figure 3, we have seen Samuelson's five cases of business cycle with the values of marginal propensity to consume, accelerator and autonomous investment. In this section, we observe some different business cycle after plotting the value of marginal propensity to consume, accelerator, and autonomous investment. The different income level is shown in Table 2. For calculation of income level see appendix. When we plot Figure 2 on the basis of Table 2, we get totally different figure, which is depicted in the Figure 4. Similarly, when we plot Figure 3, we get something different figure, which is depicted in Figure 5.

Table 2: Income/Output with the constant value of Marginal Propensity to Consume (c) and varying Capital-output Ratio or Accelerator (a)

Period	Income of Region A c = 0.5; a = 0	Income of Region B c = 0.5; a = 1	Income of Region E c = 0.5; a = 2	Income of Region C c = 0.5; a = 3	Income of Region D c = 0.5; a = 4
1	1	1	1	1	1
2	1.5	2	2.5	3.0	3.5
3	1.75	2.5	3.75	4.5	7.75
4	1.875	2.50	4.125	4.75	13.375
5	1.9375	2.25	3.4375	3.625	18.9375
6	1.9688	2.00	2.0314	1.6875	21.5938
7	1.9844	0.075	0.6095	-0.0939	17.1093
8	1.9922	0.975	-0.1171	-0.8282	0.5859
9	1.9961	1.5325	0.2147	-11.329	-31.754
10	1.9981	2.045	0.7755	-7.7115	-79.557

Note: Autonomous investment/ income of the period 1 is given as Rs.1.

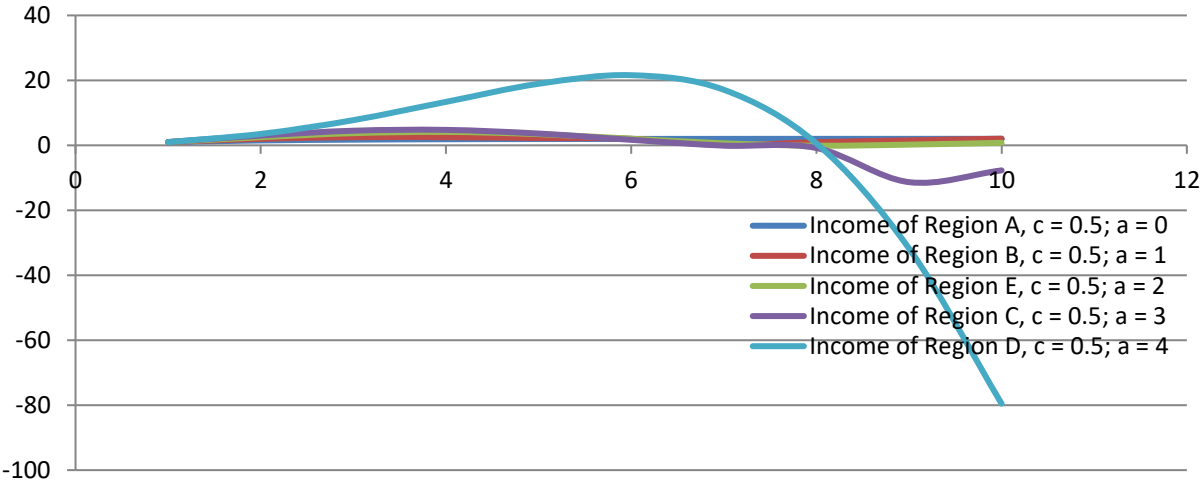

Figure 4: Business Cycle with the given value of marginal propensity to consume (c) and accelerator (a)

In Figure 5, business cycle shown in region A is similar to the business cycle of Samuelson shown in panel A of Figure 3. According to Samuelson region B of Figure 2 will form damped cycle that is the amplitude of fluctuation in income will shrink to zero as it is depicted in the panel B of Figure 3. However, damped cycle shown in region B is not damped as depicted by Samuelson as shown in panel B of Figure 3. Though, amplitude of fluctuation shrinks to zero but it starts moving from there in upward direction, thus, it cannot be named as damped cycle because the cycle does not disappear or die out after reaching to point zero as shown in region B of Figure 5.

Business cycle in Region E of Figure 5 matched with the business cycle of Samuelson as shown in panel E of Figure 3. The business cycle in both figures moves with constant amplitude. According to Samuelson business cycle in region C as shown in Figure 2 is explosive in nature. The oscillation in the region C is unstable and explosive and, thus, it requires ceiling in upward movement of business cycle as shown in panel C of Figure 3. However, when we plot the value of marginal propensity to consume and accelerator on the graph though we get explosive business cycle but it does not require ceiling as recommended by Samuelson because explosive business cycle declines over period of time as depicted in region C of Figure 5.

Region D shows smooth expansion in the level of income without any oscillation. Like region C, business cycle in region D is also explosive in nature and requires ceiling by the government. However, the cycle shown in region D of Figure 5 does not support the business cycle shown in

panel D of Figure 3 because business cycle in region D of Figure 5 reflects smooth expansion but does not require ceiling as suggested by Samuelson.

The business cycle of region A and region E of Figure 5 fully support business cycle theory of the Samuelson. However, region B, C, and D of Figure 5 partially matched with the business cycle of Samuelson.

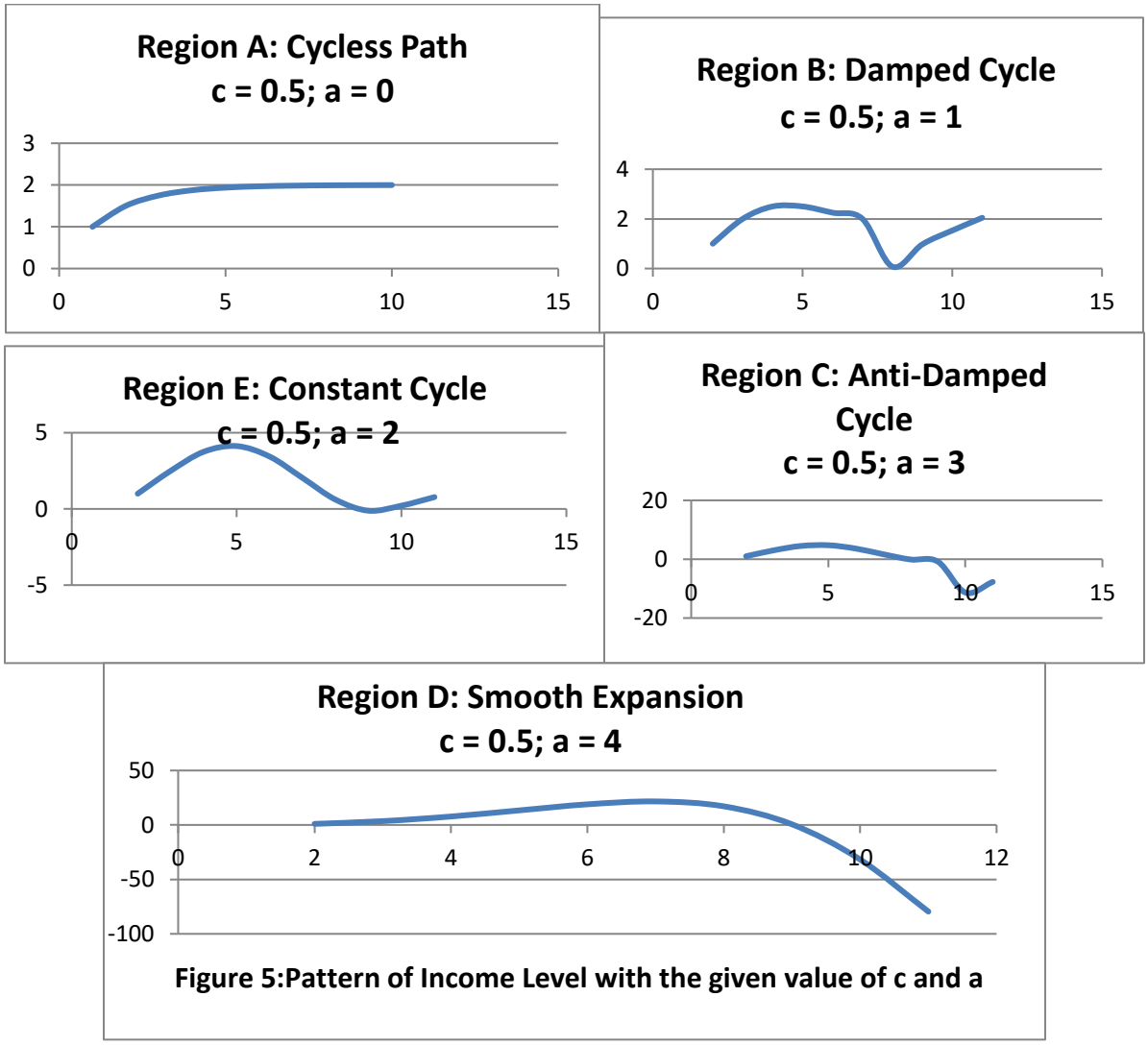

Figure 5:Pattern of Income Level with the given value of c and a

Table 3: Income/Output with the varying value of Marginal Propensity to Consume (c) and Capital-output Ratio or Accelerator (a)

Period	Income c = 0.5; a = 0	Income c = 0.5; a = 02	Income c = 0.6; a = 02	Income c = 0.8; a = 04
1	1	1	1	1
2	1.5	2.5	2.8	5
3	1.75	3.75	4.84	17.8

4	1.875	4.125	6.352	56.2
5	1.9375	3.4375	6.6256	169.84
6	1.9688	2.0313	5.3037	500.52
7	1.9844	0.9141	2.5959	1459.592
8	1.9922	0.1172	-0.6918	4227.704
9	1.9961	0.2148	-3.3603	12241.12

Source:http://www.economicsdiscussion.net/business-cycles/samuelsonsmodel/samuelsons-model-of-business-cycle-with-diagrams/10437.

Based on varying value of marginal propensity to consume and accelerator given in Table 3, we will get the business cycles as shown in Figure 6, which are more in consistent with the Samuelson model of business cycle explained in the Figure 3.

When marginal propensity to consume is 0.5 and accelerator is zero, income level will approach the peak. Since coefficient of accelerator is zero, this will be the case of multiplier effect only where income reaches asymptotic level as depicted in Figure 6.

When marginal propensity to consume is 0.5 and accelerator is 02, a regular cycle or continuous cycle with constant amplitude, i.e., the value of multiplier level is more or less unchanged repeating themselves indefinitely is arrived as depicted in Figure 6.

An explosive cycle is arrived with the value of marginal propensity to consume 0.6 and accelerator 02 as depicted in Figure 6. In this case variations in multiplier level becoming large and large over period of time, which result in explosive cycle.

The combination of marginal propensity to consume 0.8 and accelerator 04 will result in smooth expansion in income, where income gradually approaching a compound interest rate of growth as depicted in Figure 6.

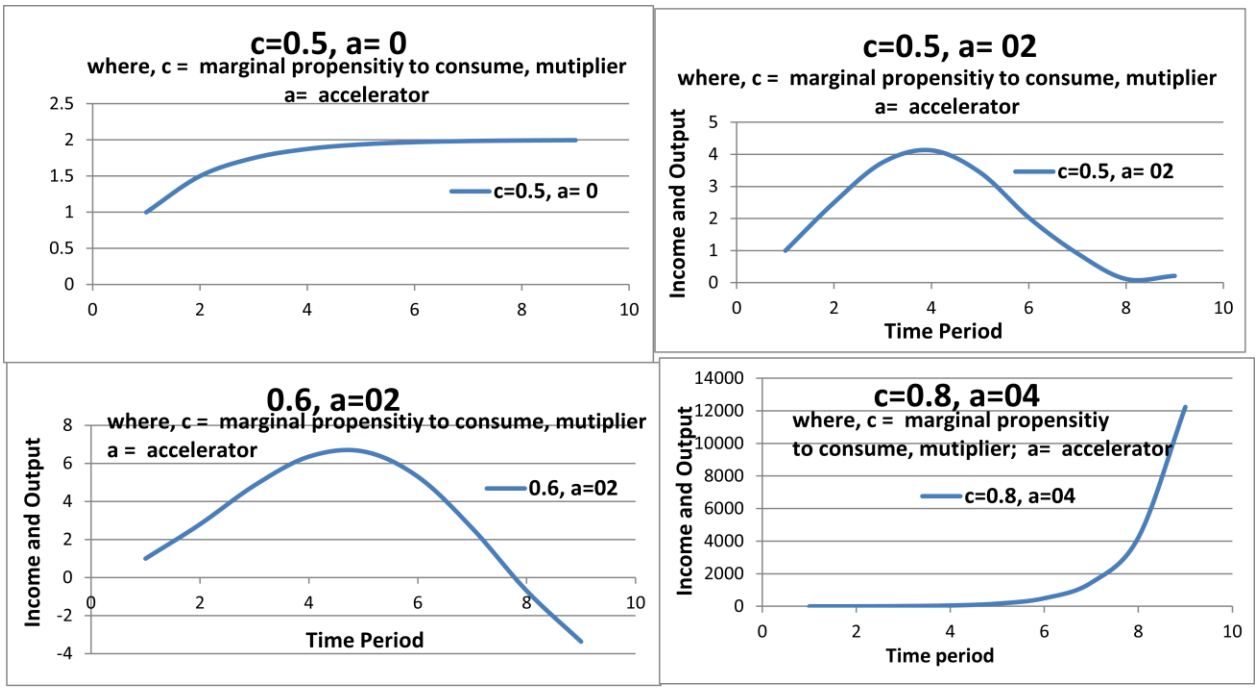

Figure 6: Different Pattern of Income Level with varying value of c and a

Multiplier-Accelerator Interaction

Paul Samuelson theory of business cycle is also known as multiplier-accelerator model of business cycle. Though many economists have tried to explain economic phenomenon including business cycle through multiplier-accelerator principles, Samuelson was pioneer among them (http://www.economicsdiscussion.net). Samuelson business cycle through multiplier-accelerator principles can be understood with the help of Table 4. In the formulation of Table 4, it is assumed that marginal propensity to consume (c) is equal to 0.5, and capital-output ratio or accelerator (a) is equal to 2. As we know that Samuelson model of business cycle is based on the assumption of one period time-lag, which states that an increase in consumption in next time period (t+1) is the result of an increase in income in one period (t). Initially it is assumed that in period t autonomous investment is Rs. 100. This autonomous investment will remain constant at Rs. 100 crores throughout the period. With this autonomous investment of Rs. 100 cores in period t, consumption in period t+1 will be increased by the value of marginal propensity to consume (c) which is 0.5. Thus, induced consumption in period t+1 = c (Y_{t-1}) = 0.5 (100) = Rs.50 as shown in column 3. Induced investment is the multiplication of accelerator with the previous consumption. Thus, induced investment in period t+1 = a (Ct - Ct-1) = 2 (50) = Rs. 100 as shown in column 4. Total income equals Rs. 250, which is the summation of autonomous investment, induced consumption, and induced investment. Similarly, in period t+2, induced

consumption = c (Y_{t-1}) = 0.5 (250) = 125. Induced investment in period t+2 = a (Ct - Ct-1) = 2 (75) = Rs.150. Previous year's consumption of t+2 is the difference between t+1 and t, i.e., 125 – 50 = 75. Similarly, total income for rest of the period will be calculated on the basis of equation. When total income of Table 4 is plotted on graph, business cycle will look like as shown in Figure 7.

Table 4: Multiplier-Accelerator Interaction Model
Rs. in Crore

Period (t) (1)	Initial/Autonomous Investment (2)	Induced Consumption $C = c(Y_{t-1})$ c = 0.5 (3)	Induced Investment I = a (Ct - Ct-1) a = 2 (4)	Total Income (Y) (5)
t	100	0	0	100
t+1	100	50	100	250
t+2	100	125	150	375
t+3	100	187.5	125	412.5
t+4	100	206.2	37.4	343.6
t+5	100	171.8	-68.8	203
t+6	100	101.5	-140.6	60.9
t+7	100	30.4	-142.2	-11.8
t+8	100	-5.9	-72.6	21.9
t+9	100	10.7	33.2	143.9

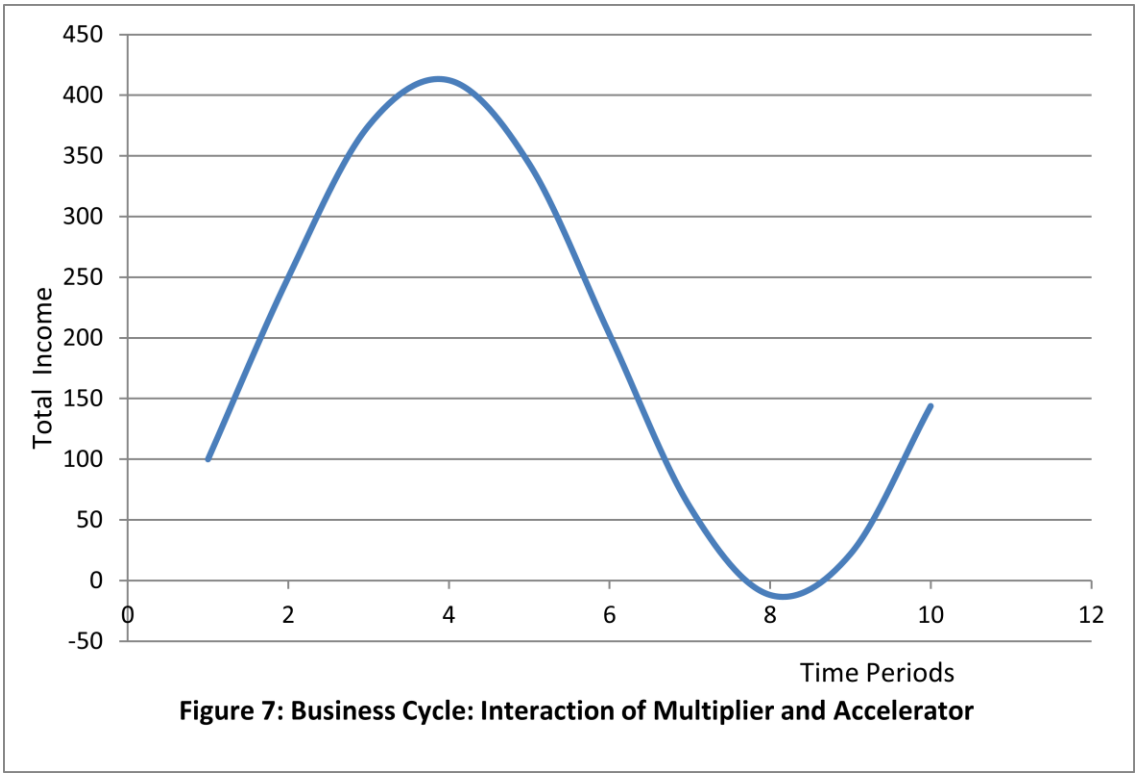

Figure 7: Business Cycle: Interaction of Multiplier and Accelerator

Limitation of Samuelson's Business Cycle

Samuelson model of business cycle is based on the assumption that interaction of multiplier and accelerator generates fluctuations in the pattern of income level and on that basis, he defined five cases of business cycle. With oscillation in region C and without oscillation in the region D (i.e., there is no business cycle in the region D because of smooth expansion in the pattern of income level), the values of multiplier and accelerator in the region C and D are such that they give rise to directly explosive upward or downward movement. The movements in the pattern of income level are restrained by ceiling in case of upward movements and by floor in case of downward movements (https://www.google.com/search). After reaching ceiling point, movements in the pattern of income level starts moving in the reverse direction. Samuelson's business cycle theory fails to explain this reverse direction. Business cycle theory of Hicks explained the causes for the movements in the pattern of income level in the reverse direction after reaching peak point/ceiling point.

The interaction of multiplier and accelerator principles no doubt plays an important role in the explanation of cyclical fluctuation in the pattern of income level. However, it does not go to raise the national income to higher and higher level because there are many practical difficulties in the calculation of total effects of interaction of multiplier and accelerator principles on the pattern of income level.

This model considers exogenous spending, i.e., government spending as constant and no attempt has been made to use government spending as an instrument for controlling the time path of income. In other words, this model ignores both the impact of changes in public spending on the level of income and determinants of the public spending (http://www.economicsdiscussion.net). Thus, this model is based on the structure of time-lag and coefficients of multiplier and accelerator which relate the variables in the equations.

Conclusion

We arrive at the process of income generation through the working together of multiplier and accelerator principles. However, Paul Samuelson went further and stated that through the values of multiplier and accelerator, it is possible to explain the path of fluctuations in the pattern of income level and on that basis, he defined five cases of business cycle. Paul Samuelson stated that if we know autonomous consumption, autonomous investment, consumption for the current period and preceding period, we can determine the growth path of income and output for any

period with the given values of marginal propensity to consume and capital-output ratio or accelerator by substituting these values in the equation of income (Y).

Appendix

Table 2: Explanation of Table 1

Income of Region A **When c = 0.5 and a = 0**	**Income of Region B** **When c = 0.5 and a = 1**
Period 2 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1) + 0 = 0.5$ $Y_t = 1 + 0.5 = 1.5$	Period 2 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1) + 1(0.5) = 1.0$ $Y_t = 1 + 1.0 = 2.0$
Period 3 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1.5) + 0 = 0.75$ $Y_t = 1 + 0.75 = 1.75$	Period 3 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (2) + 1(0.5)$ $Y_t = 1.0 + 0.5 = 1.5$ $Y_t = 1 + 1.5 = 2.5$ Note: $C_t - C_{t-1} = 1.0 - 0.5 = 0.5$
Period 4 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1.75) + 0 = 0.875$ $Y_t = 1 + 0.875 = 1.875$	Period 4 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (2.5) + 1(0.25)$ $Y_t = 1.25 + 0.25 = 1.50$ $Y_t = 1 + 1.50 = 2.50$ Note: $C_t - C_{t-1} = 1.25 - 1.0 = 0.25$
Period 5 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1.875) + 0 = 0.9375$ $Y_t = 1 + 0.9375 = 1.9375$	Period 5 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (2.5) + 1(0)$ $Y_t = 1.25 + 0 = 1.25$ $Y_t = 1 + 1.25 = 2.25$ Note: $C_t - C_{t-1} = 1.25 - 1.25 = 0$
Period 6 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1.9375) + 0 = 0.96875$ $Y_t = 1 + 0.96875 = 1.96875$	Period 6 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (2.25) + 1(-0.125)$ $Y_t = 1.125 - 0.125 = 1.00$ $Y_t = 1 + 1.00 = 2.00$ Note: $C_t - C_{t-1} = 1.125 - 1.25 = -0.125$
Period 7 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1.96875) + 0 = 0.984375$ $Y_t = 1 + 0.984375 = 1.984375 = 1.9844$	Period 7 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (2.00) + 1(-1.025)$ $Y_t = 0.1 - 1.025 = -0.925$ $Y_t = 1 + (-0.925) = 0.075$ Note: $C_t - C_{t-1} = 0.1 - 1.125 = -1.025$
Period 8 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1.9844) + 0 = 0.9922$ $Y_t = 1 + 0.9922 = 1.9922$	Period 8 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (0.075) + 1(-0.0625)$ $Y_t = 0.0375 - 0.0625 = -0.025$ $Y_t = 1 + (-0.025) = 0.975$ Note: $C_t - C_{t-1} = 0.0375 - 0.1 = -0.0625$
Period 9 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1.9922) + 0 = 0.9961$ $Y_t = 1 + 0.9961 = 1.9961$	Period 9 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (0.975) + 1(0.45)$ $Y_t = 0.4875 + 0.045 = 0.5325$ $Y_t = 1 + 0.5325 = 1.5325$ Note: $C_t - C_{t-1} = 0.4875 - 0.0375 = 0.45$
Period 10 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1.9961) + 0 = 0.9981$ $Y_t = 1 + 0.9981 = 1.9981$	Period 10 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1.5325) + 1(0.27875)$ $Y_t = 0.76625 + 0.27875 = 1.045$ $Y_t = 1 + 1.045 = 2.045$ Note: $C_t - C_{t-1} = 0.76625 - 0.4875 = 0.27875$
Income of Region E **When c = 0.5 and a = 2**	**Income of Region C** **When c = 0.5 and a = 3**

Period 2 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1) + 2(0.5)$ $Y_t = 0.5 + 1.0 = 1.5$ $Y_t = 1 + 1.5 = 2.5$	Period 2 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1) + 3(0.5)$ $Y_t = 0.5 + 1.5 = 2.0$ $Y_t = 1 + 2.0 = 3.0$
Period 3 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (2.5) + 2(0.75)$ $Y_t = 1.25 + 1.50 = 2.75$ $Y_t = 1 + 2.75 = 3.75$ Note: $C_t - C_{t-1} = 1.25 - 0.5 = 0.75$	Period 3 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (3) + 2(1.0)$ $Y_t = 1.5 + 2.0 = 3.5$ $Y_t = 1 + 3.5 = 4.5$ Note: $C_t - C_{t-1} = 1.5 - 0.5 = 1.0$
Period 4 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (3.75) + 2(0.625)$ $Y_t = 1.875 + 1.250 = 3.125$ $Y_t = 1 + 3.125 = 4.125$ Note: $C_t - C_{t-1} = 1.875 - 1.25 = 0.625$	Period 4 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (4.5) + 2(0.75)$ $Y_t = 2.25 + 1.50 = 3.75$ $Y_t = 1 + 3.75 = 4.75$ Note: $C_t - C_{t-1} = 2.25 - 1.5 = 0.75$
Period 5 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (4.125) + 2(0.1875)$ $Y_t = 2.0625 + 0.375 = 2.4375$ $Y_t = 1 + 2.4375 = 3.4375$ Note: $C_t - C_{t-1} = 2.0625 - 1.875 = 0.1875$	Period 5 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (4.75) + 2(0.125)$ $Y_t = 2.375 + 0.250 = 2.625$ $Y_t = 1 + 2.625 = 3.625$ Note: $C_t - C_{t-1} = 2.375 - 2.25 = 0.125$
Period 6 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (3.4375) + 2(-0.3437)$ $Y_t = 1.7188 - 0.6874 = 1.0314$ $Y_t = 1 + 1.0314 = 2.0314$ Note: $C_t - C_{t-1} = 1.7188 - 2.0625 = -0.3437$	Period 6 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (3.625) + 2(-0.5625)$ $Y_t = 1.8125 - 1.125 = 0.6875$ $Y_t = 1 + 0.6875 = 1.6875$ Note: $C_t - C_{t-1} = 1.8125 - 2.375 = -0.5625$
Period 7 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (2.0314) + 2(-0.7031)$ $Y_t = 1.0157 - 1.4062 = -0.3905$ $Y_t = 1 + (-0.3905) = 0.6095$ Note: $C_t - C_{t-1} = 1.0157 - 1.7188 = -0.7031$	Period 7 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1.6875) + 2(-0.9688)$ $Y_t = 0.8436 - 1.9375 = -1.0939$ $Y_t = 1 + (-1.0939) = -0.0939$ Note: $C_t - C_{t-1} = 0.8436 - 1.8125 = -0.9688$
Period 8 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (0.6095) + 2(-0.7110)$ $Y_t = 0.3048 - 1.4219 = -1.1171$ $Y_t = 1 + (-1.1171) = -0.1171$ Note: $C_t - C_{t-1} = 0.3048 - 1.0157 = -0.7110$	Period 8 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (-0.0939) + 2(-0.8906)$ $Y_t = -0.0470 - 1.7812 = -1.8282$ $Y_t = 1 + (-1.8282) = -0.8282$ Note: $C_t - C_{t-1} = -0.0470 - 0.8436 = -0.8906$
Period 9 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (-0.1171) + 2(-0.3634)$ $Y_t = -0.0586 - 0.7267 = -0.7853$ $Y_t = 1 + (-0.7853) = 0.2147$ Note: $C_t - C_{t-1} = -0.0586 - 0.3048 = -0.3634$	Period 9 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (-0.8282) + 2(-4.094)$ $Y_t = -4.141 - 8.188 = -12.329$ $Y_t = 1 + (-12.329) = -11.329$ Note: $C_t - C_{t-1} = -4.141 - (-0.0470) = -4.094$
Period 10 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (0.2147) + 2(0.1660)$ $Y_t = 0.1074 - 0.3319 = -0.2245$ $Y_t = 1 + (-0.2245) = 0.7755$ Note: $C_t - C_{t-1} = 0.1074 - (-0.0586) = 0.1660$	Period 10 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (-11.329) + 2(-1.5235)$ $Y_t = -5.6645 - 3.047 = -8.7115$ $Y_t = 1 + (-8.7115) = -7.7115$ Note: $C_t - C_{t-1} = -5.6645 - (-4.141) = -1.5235$
Region D, when c = 0.5 and, a = 4	
Period 2 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (1) + 4(0.5)$ $Y_t = 0.5 + 2.0 = 2.5$ $Y_t = 1 + 2.5 = 3.5$	Period 3 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (3.5) + 4(1.25)$ $Y_t = 1.75 + 5.00 = 6.75$ $Y_t = 1 + 6.75 = 7.75$ Note: $C_t - C_{t-1} = 1.75 - 0.5 = 1.25$
Period 4 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$	Period 5 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$

$Y_t = 0.5\ (7.75) + 4(2.125)$ $Y_t = 3.875 + 8.500 = 12.375$ $Y_t = 1 + 12.375 = 13.375$ Note: $C_t - C_{t-1} = 3.875 - 1.75 = 2.125$	$Y_t = 0.5\ (13.375) + 4(2.8125)$ $Y_t = 6.6875 + 11.25 = 17.9375$ $Y_t = 1 + 17.9375 = 18.9375$ Note: $C_t - C_{t-1} = 6.6875 - 3.875 = 2.8125$
Period 6 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (18.9375) + 4(2.7813)$ $Y_t = 9.4688 + 11.125 = 20.5938$ $Y_t = 1 + 20.5938 = 21.5938$ Note: $C_t - C_{t-1} = 9.4688 - 6.6875 = 2.7813$	Period 7 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (21.5938) + 4(1.3281)$ $Y_t = 10.7969 + 5{,}3124 = 16.1093$ $Y_t = 1 + 16.1093 = 17.1093$ Note: $C_t - C_{t-1} = 10.7969 - 9.4688 = 1.3281$
Period 8 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (17.1093) + 4(-2.2422)$ $Y_t = 8.5547 + (-8.9688) = -0.4141$ $Y_t = 1 + (-0.4141) = 0.5859$ Note: $C_t - C_{t-1} = 8.5547 - 10.7969 = -2.2422$	Period 9 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (0.5859) + 4(-8.2618)$ $Y_t = 0.2930 - 33.047 = -32.754$ $Y_t = 1 + (-32.754) = -31.754$ Note: $C_t - C_{t-1} = 0.2930 - 8.5547 =$ -8.2618
Period 10 $Y_t = c(Y_{t-1}) + a(C_t - C_{t-1})$ $Y_t = 0.5\ (-31.754) + 4(-16.17)$ $Y_t = -15.877 - 64.68 = -80.557$ $Y_t = 1 + (-80.557) = -79.557$ Note: $C_t - C_{t-1} = -15.877 - 0.2930 = -16.17$	

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Juvenile Education and Nation-Building through Advancing Inclusion and Skill Development for *Viksit Bharat*

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Abstract

Objectives: The primary objective of this research is to determine how education can improve the lives of Indian juveniles who are at risk. The purpose of the paper is to investigate how education that fosters inclusivity and imparts skills can enhance the social, emotional, and cognitive abilities of juveniles. It also examines how educational reforms and policies, such as the Right to Education (RTE) Act and National Education Policy (NEP) 2020, can promote social inclusion and reduce the gap. Methods: Utilising policy and previous research, this study examines current educational systems in detail, identifies the primary issues that juveniles face, and assesses new teaching strategies that assist them in getting back on their feet. It also integrates creative ideas from India and other nations and makes the case that collaboration between various entities, including the government, schools, non-governmental organisations (NGOs), and businesses, is crucial. Results: Research suggests that blending inclusive education with job training, emotional help, and web access can greatly lower youth crime and boost vocational skills and community involvement. Adaptable learning styles, online tools, and job programs that match Skill India standards seem to work well. Also, local learning hubs, charity mentoring, and business social responsibility projects improve the support system for young people's education and recovery. Conclusions: To achieve the *Viksit Bharat* vision, India needs an education system that is both inclusive and complete. This system must meet the educational, emotional, and career-related needs of juveniles from disadvantaged groups. Changes are needed in what is taught, how teachers are trained, digital resources, and cooperation across different sectors. By giving everyone fair access to good education, guidance, and job prospects, India can make sure every young person has the chance to contribute to the country's growth.

Keywords: Juvenile education, social inclusion, *Viksit Bharat*, skill development, inclusive policies.

Introduction

The *Viksit Bharat* plan envisions a Developed India by 2047 and serves as a detailed plan to turn India into a modern, independent, and fair country. The vision aims to ensure that all

citizens, regardless of socioeconomic background, have access to education, employment, and well-being. Inclusivity lies at its core, empowering marginalized groups through learning, social support, and skill development. This aligns with the UN's 2030 Agenda, which envisions a society where no one is left behind.

Juvenile education plays a key role in this vision. It promotes social inclusion, strengthens national foundations, and fosters equality. By providing knowledge, practical skills, and values, it supports financial independence while nurturing civic awareness and responsible participation in society (Jameel, 2025). Reversing social disadvantage and establishing a more egalitarian society depend heavily on this educational foundation (Hafzal et al., 2024). Building responsible citizenship, juvenile correctional education, addressing educational inequality, and improving social and economic participation are some of the ways that juvenile education is important for attaining social inclusion and national advancement (Upadhyay & Nigam, 2024). Even though juvenile education promotes national growth and social integration, India still faces more challenges before achieving *Viksit Bharat* by 2047. Structural problems, climate change, and unequal wealth distribution create difficulties that must be addressed for lasting growth (N. Kumar & Maiti, 2024). Additionally, using traditional knowledge to inform modern development approaches could create areas for continued growth and prosperity (Sharma, 2024). India can become a global role model for inclusive and sustainable growth by facilitating private sector, public sector and social non-profit sector convergence to rise everybody in to a better future (Dan, 2024).

The central objective of this article is to see how education can act as a 'catalyst' of change in transforming the youth into the 'citizens' of the kind that can wholeheartedly espouse a fair and progressive *Viksit Bharat*. In demonstrating how access to good educational opportunities may serve as a future way to reduce social disparities, prevent crime and grant adolescents the mandatory skills for a successful future, the present article will show the importance that top-quality education has in the fostering of social, emotional and cognitive development. The article focuses on the need for the education framework to include nurturing of the innate abilities in the child, in addition to being at par with society in a smooth manner through case studies, policy analysis and innovative approach.

Understanding Social Inclusion and Its Relevance to Juveniles

Social inclusion ensures that all individuals, regardless of socioeconomic background, can access education, employment, and social services. In India, disparities related to caste (Das & Lalitha, 2024), gender (Al-Ahmadi et al., 2024), economic status (Küçüksüleymanoğlu, 2025),

and geography often marginalize specific groups, including disadvantaged juveniles. At-risk youth frequently lack opportunities to rebuild their lives and contribute meaningfully to society. Education and social inclusion remain especially challenging for marginalized youth, school dropouts, and those with encounters with the law (Renner et al., 2024). Poverty and unemployment force many children into work instead of school, while failing schools, outdated teaching methods, and low motivation further perpetuate exclusion. Many adolescents in the juvenile system have also faced poverty, violence, or substance abuse, compounding their challenges.

It's tough to reintegrate with society and increases the likelihood that they will commit crimes again if they don't get the right rehabilitation, skill-building and emotional support. Limited internet access, combined with gender and mental health challenges, restricts educational and career opportunities for disadvantaged youth (Singh et al., 2023). Addressing these barriers requires strong education, practical skills training, inclusive policies, and effective rehabilitation programs. In an inclusive *Viksit Bharat*, every young person would have mentors, learning opportunities, and a chance to contribute to national development.

Education bridges social divides by offering marginalized youth, school dropouts, and juveniles in conflict with the law a pathway out of poverty and isolation. It promotes social mobility while building cognitive, emotional, and social skills alongside academic knowledge, enhancing critical thinking, problem-solving, and employability. Skills-based and vocational training reduces economic dependence and helps prevent youth crime.

Education also fosters a more cohesive society by challenging stereotypes and promoting tolerance, respect, and inclusivity (Küçüksüleymanoğlu, 2025). Scholarships, e-learning platforms, and preparatory programs further expand access, ensuring financial or geographic barriers do not limit learning. For juveniles, education can transform lives, support rehabilitation, and ease reintegration (Alves et al., 2024). Investing in equitable education not only reduces inequality and delinquency but also strengthens the foundation for an empowered, inclusive *Viksit Bharat*.

Role of Education in Juvenile Empowerment

Social skills, emotional intelligence (EI), and critical thinking are all developed through high-quality education and aid in personal growth and assimilation into *Viksit Bharat* society. Cognitive competence strengthens problem-solving, creativity, and adaptability, helping marginalized youth overcome disadvantages through experiential learning, digital literacy, and inquiry-based teaching (Hafzal et al., 2024). Emotional competence, developed through self-

awareness, regulation, and social-emotional learning (SEL), equips juveniles with resilience and coping mechanisms, aiding rehabilitation (Taha et al., 2025). Developing social competence through leadership, teamwork, and communication equips young people to navigate society more effectively. These skills enhance social mobility, cultural awareness, and can reduce delinquency and social isolation (Assefa, 2024). Education that emphasizes such competencies empowers juveniles to engage actively in national development and contribute meaningfully to their communities (Hafzal et al., 2024; Mehta et al., 2024).

Combining practical skills with moral reasoning through skill- and value-based education can curb delinquent behaviour. Vocational training in areas like digital literacy, carpentry, hospitality, and entrepreneurship improves employability while offering alternatives to economically driven crime (Kalita, 2024). At the same time, value-based education nurtures integrity, empathy, and discipline, strengthening ethical judgment, resilience, and social responsibility (Kaur & Kaur, 2024). Peer mentorship and community service initiatives reinforce these principles, encouraging self-control and accountability. By integrating skills and values, education provides juveniles with tools for successful reintegration.

Inclusive policies in both formal and non-formal education further expand opportunities, ensuring marginalized youth and juveniles in conflict with the law can access learning and development pathways. Formal legislation, including the RTE Act and NEP 2020, promotes free, flexible, and skill-based learning (Kalita, 2024). Scholarships, financial aid, and mental health support play a crucial role in preventing school dropouts and keeping students engaged (Guimarães et al., 2024; Panda, 2024). These resources help young people continue learning despite financial or emotional challenges.

Non-formal education models, such as open schooling, vocational training, and bridge courses, offer vital pathways for school dropouts and working children to re-join the education system (Gupta et al., 2024; Sardar et al., 2024). Government and NGO programs complement these efforts by providing skill development and rehabilitation initiatives, reducing the risk of re-offending among juveniles (Guimarães et al., 2024; Vaidya, 2024). Flexible options, including community-based projects, evening schools, and mobile learning units, ensure education reaches those with disrupted learning trajectories (Guimarães et al., 2024; Panda, 2024). By expanding and strengthening these programs, disadvantaged youth gain the skills and support they need, lifelong learning is encouraged, and India moves closer to realizing an inclusive, socially cohesive *Viksit Bharat*.

Challenges in Juvenile Education in India

The Indian government has implemented policies and initiatives to improve education, skill development, and social inclusion for marginalised young, promoting *Viksit Bharat*. The RTE Act of 2009 provides free schooling to learners aged 6-14 and mandates 25% reservations for economically disadvantaged students in private schools (Aneesh et al., 2024; Guimarães et al., 2024), while rural regions struggle with poor resources (Kumar et al., 2024) and teacher shortages (Bagla, 2025), widening disparities. Caste, gender, and social discrimination continue to limit educational opportunities, particularly for girls, who are often forced to leave school due to early marriage, safety concerns, or deeply entrenched societal norms (Agarwal, 2024; Vishvajeet & Sharma, 2023; Zheng, 2024).

Street-connected children, those displaced from their homes, and juveniles in conflict with the law face some of the greatest hurdles. Stigma and adverse life experiences often make social reintegration extremely difficult (Barker et al., 2024). The digital divide worsens these challenges, as limited internet access and low digital literacy prevent many students from fully benefiting from online learning (Chikwe et al., 2024). Tackling these issues requires more than policy alone. Inclusive laws, targeted financial support, and hands-on involvement from community organizations are essential. When coordinated effectively, these efforts can ensure equitable access to education and meaningful participation in India's social and economic development.

Juveniles in conflict with the law encounter additional barriers. Many lack adequate rehabilitation, face widespread stigma, and struggle to secure employment, all of which sharply increase the risk of re-offending and social exclusion (Atrey & Singh, 2024; Manohar et al., 2024). Rehabilitation centres often provide only basic education or vocational training, leaving critical issues such as trauma, substance abuse, and mental health unaddressed (Atrey & Singh, 2024). Economic hardships and negative societal perceptions further complicate reintegration (Karović, 2024).

Addressing these challenges requires a holistic approach. Strengthening career counselling, skill-focused training, mentorship, and psychological support is key to helping juveniles reintegrate successfully. Beyond institutional support, active community involvement, well-structured rehabilitation programs, and ongoing post-release assistance can help break the cycle of delinquency while fostering social inclusion and economic self-sufficiency (Manohar et al., 2024; Tuan et al., 2024).

Traditional education often emphasizes rote memorization, leaving life skills, employability, and vocational readiness underdeveloped. To create real pathways for inclusion, curricula should equip at-risk youth with critical competencies such as digital literacy, problem-solving, communication, and financial management. Equally important is fostering emotional intelligence, which builds resilience through self-awareness, empathy, and stress regulation – qualities essential for disadvantaged young people (Belfi & Borghans, 2025). Schools can support these capacities through socio-emotional learning programs and mindfulness practices, enhancing overall well-being (Guha, 2024).

Vocational education plays a complementary role. When linked with industry partnerships, professional certifications, and apprenticeships in areas like technology, healthcare, agriculture, and entrepreneurship, it improves employability and reduces the risk of re-offending (Vemula & Lalbiakfeli, 2024). Integrating academic instruction with life skills and vocational training helps India move toward an inclusive, skill-focused *Viksit Bharat*, empowering young people to contribute meaningfully to society.

Policy Initiatives and Government Efforts

Aligned with the vision of *Viksit Bharat*, the Government of India has launched a range of policies and initiatives aimed at broadening access to education, enhancing skill development, and promoting social inclusion for disadvantaged youth. The Right to Education (RTE) Act, 2009 guarantees free schooling for children aged 6 to 14 and requires private schools to reserve 25% of their seats for students from economically weaker sections (Vishvajeet & Sharma, 2023). Building on this, the National Education Policy (NEP) 2020 promotes multilingual education, vocational training, and experiential learning approaches that foster holistic development (Ghosh, 2023).

Skill development initiatives, including the *Pradhan Mantri Kaushal Vikas Yojana* (PMKVY) and the National Apprenticeship Promotion Scheme (NAPS) under the Skill India Mission, offer at-risk youth vocational training and pathways to employment (Siddaraju, 2024). Additional targeted programs include the National Child Labour Project (NCLP), which rehabilitates child labourers through formal education, *Beti Bachao Beti Padhao*, which promotes girls' education, and the Samagra Shiksha Abhiyan, which strengthens digital learning, teacher training, and school infrastructure (Hafzal et al., 2024). Expanding and reinforcing these initiatives not only improves access to quality education but also helps reduce educational disparities and addresses underlying factors contributing to juvenile delinquency.

India's juvenile justice laws focus on rehabilitation through education, ensuring reformative measures over punishment. The Juvenile Justice Act, 2015, mandates formal education, vocational training, and psychological support in observation homes to aid reintegration (Pooja & Dixit, 2023). The RTE Act, 2009, guarantees free education for juvenile offenders (Borkakoty, 2024), while NEP 2020 provides alternative schooling to equip them with academic and vocational skills (Mittal & Garg, 2024). However, infrastructure gaps (Chavan, 2024), lack of trained teachers (Deepa. D et al., 2024), and stigma (Park, 2024) hinder effective implementation. Strengthening community-based rehabilitation, enhancing coordination among agencies, and providing strong educational support are vital for reducing recidivism and promoting social inclusion.

Despite progress, structural barriers still limit access to education for marginalized youth. Economic, geographic, and digital inequalities remain major challenges. Expanding scholarships, mid-day meal programs, and financial incentives can lower dropout rates, while improving school infrastructure, transportation, and alternative learning centres ensures underserved students can attend school (Bagla, 2025; Guimarães et al., 2024). Bridging the digital divide through affordable internet, device distribution, and ICT-based learning is essential for meaningful participation in online education (Chikwe et al., 2024). Targeted interventions for girls, children with disabilities, and juveniles in conflict with the law – such as counselling, life skills training, and mentorship programs – can further support holistic development (Das & Alaknanda, 2024).

Public–private partnerships (PPPs) and joint ventures hold significant potential for advancing inclusive education (Qudsi, 2025). Expanding the focus on skill-based learning – particularly vocational training, professional certifications, and experiential approaches such as learning by doing – can greatly enhance employability prospects (Baxter et al., 2022). Building on initiatives like Skill India and the NAPS, the integration of financial literacy and digital competencies within school curricula will equip young people with the tools required for the 21st-century workforce. Such measures not only prepare youth for future employment but also strengthen education's role as a driver of social transformation in the vision of *Viksit Bharat*.

Innovative Approaches and Best Practices

Evidence from successful education models in India and abroad highlights the transformative impact of holistic, inclusive, and context-sensitive approaches in rehabilitating and reintegrating marginalized and at-risk youth into mainstream society. These models show that education, when paired with vocational training and emotional support, can provide a strong

foundation for personal growth. For juveniles from disadvantaged backgrounds or those involved with the juvenile justice system, inclusive and skills-based approaches can open pathways toward responsibility, productivity, and meaningful participation in society.

In India, several pioneering initiatives demonstrate the potential of such education models. For example, Bal Ashram, a rehabilitation centre for rescued child labourers, offers a comprehensive program that blends formal schooling with vocational training and psychological support. This integrated approach not only addresses immediate educational needs but also equips children with the skills, resilience, and confidence necessary for long-term reintegration. Similarly, the Telangana Open School Society (TOSS) provides a flexible alternative for school dropouts, working children, and juveniles in conflict with the law. By enabling learners to study at their own pace, TOSS accommodates diverse circumstances and learning styles, widening access to education for those who might otherwise be excluded.

Internationally, globally recognized models also offer valuable lessons. The Missouri Model in the United States, for instance, is celebrated for its therapeutic and rehabilitative approach. By combining formal education with individualized therapy and vocational training within small, community-based centres, this model has been highly effective in reducing recidivism among juveniles. Finland's JUMP Program includes career planning, mentoring, and custom education to help at-risk young people grow their confidence and find their path. Also, *Fundação* CASA in Brazil provides schooling, therapy, and training centres for young offenders to help them re-enter society and cut down on crime. These examples from around the world show that it's important to create systems that do more than just punish; they should also center on teaching life skills, supporting mental health, and providing flexible ways to learn.

These models often stress the need for a full educational system. This system should include standard school subjects, job training, mental health support, social skills, and computer skills. If we adapt this plan to India, as part of the *Viksit Bharat* goals, we can help make sure all children have real chances to learn and improve, no matter their origin or situation.

Technology plays a bigger role in this shift. Digital platforms are good ways to make education open, flexible, and suited to disadvantaged young people. Government initiatives such as DIKSHA, e-Pathshala, SWAYAM, and National Institute of Open Schooling (NIOS) provide free learning materials in multiple languages to students outside of traditional school settings, these platforms assist students in remote locations or whose education was interrupted, such as juveniles in correctional facilities; AI learning platforms, such as BYJU'S and Khan Academy, are revolutionising education by providing learning tailored to each individual; these tools

adapt content to various learning levels and styles, which benefit students who struggle or whose education was patchy; new technologies, such as AR and VR, create attention-grabbing learning environments that can truly help students comprehend, retain, and remain engaged.

Despite notable progress, several challenges continue to hinder equitable access to education. Limited digital literacy, inadequate access to devices, and unreliable internet connectivity remain major barriers, particularly for rural and marginalized communities. Addressing these issues requires targeted measures such as strengthening PPPs, expanding affordable digital infrastructure, and embedding digital skills within school curricula. Such interventions are crucial to ensuring that digital education functions as a means of inclusion rather than reinforcing existing inequalities.

The advancement of juvenile education and rehabilitation relies not only on government initiatives but also on the active involvement of NGOs, community-based programs, and corporate actors. Grassroots models such as Mohalla Schools and community learning centres provide localized, culturally responsive education that facilitates the reintegration of school dropouts. Prominent NGOs – including Pratham, Bachpan Bachao Andolan, and the Smile Foundation – have consistently pioneered efforts in offering educational services, vocational training, and psychological support to vulnerable children and adolescents.

Additionally, Corporate Social Responsibility (CSR) initiatives have further enriched this ecosystem, reinforcing the collective effort to strengthen juvenile education and rehabilitation. Google's Internet *Saathi* plan, which teaches computer skills to women and girls in the countryside, helps the families of kids who need help too. In a similar vein, Tata Trusts' STEM education programs seek to enhance science and technology instruction in marginalised areas while equipping young learners with essential 21st-century competencies.

However, the reliance on NGOs and CSR-driven interventions also raises concerns about sustainability and consistency. These initiatives, while impactful, often operate in fragmented ways, with uneven geographical coverage and dependence on external funding. Without strong coordination and long-term government support, their ability to address systemic inequalities remains limited. Thus, while community and corporate participation play a vital role, integrating these efforts into a coherent national framework is essential to ensure that all juveniles benefit equally from educational rehabilitation and reintegration opportunities.

A comprehensive, skill-based, and inclusive educational framework catered to juveniles and other marginalised youth could be the outcome of the combination of these governmental, non-governmental, and corporate efforts. Based on multi-sectoral collaboration, this framework not

only facilitates educational rehabilitation but also strengthens pathways for long-term social reintegration, in line with India's overall development goals under *Viksit Bharat*. Last but not least, by creating inclusive, flexible, and skill-oriented educational systems, India can empower its youth, particularly the most vulnerable, to actively contribute to the development of the country and shape their own future.

Roadmap for a More Inclusive and Progressive *Viksit Bharat*

The effective rehabilitation and reintegration of marginalised youth require systemic changes in curriculum design, teacher preparation, and cross-sector collaboration. Traditional education, with its focus on rote learning and standardized tests, is ill-suited for at-risk youth. Juveniles who have experienced trauma, interrupted schooling, or socioeconomic marginalization need more than academic instruction – they require a holistic, transformative approach. Education must address both immediate learning needs and the broader social and emotional challenges they face.

A redesigned curriculum should integrate life skills, digital literacy, EI, and vocational training. Competencies such as decision-making, communication, problem-solving, and emotional regulation are critical for youth who have faced abuse, neglect, or institutionalization. Strengthening EI helps build self-worth, resilience, and interpersonal understanding – qualities essential for successful reintegration into mainstream society.

Flexible learning options are essential for accommodating disrupted or diverse educational paths. Open schooling, blended learning, and modular curricula provide adaptive, self-paced opportunities, allowing children and adolescents excluded from traditional schools to re-engage meaningfully. Although state-level open school systems and the NIOS have made progress, their reach is limited, and local relevance is often lacking. Expanding these programs and adapting them to local contexts is crucial for meeting the complex needs of at-risk youth.

Vocational education and apprenticeships serve as vital bridges between learning and employment. When linked with initiatives such as Skill India, PMKVY, and NAPS, they offer hands-on training in fields like IT, agriculture, construction, tailoring, renewable energy, and entrepreneurship. These programs equip juveniles with marketable skills, foster self-reliance, and enhance economic mobility. They also reduce the risk of reoffending, supporting both individual rehabilitation and wider social stability.

Equally important is teacher training and capacity building, which must be founded on trauma-informed pedagogy, inclusive educational practices, and child-centred learning. Teachers and facilitators who work with juveniles, particularly in observation homes, special homes, and

aftercare centres, must be able to recognise behavioural issues, respond to emotional needs, and foster a non-judgmental, supportive classroom environment. Training modules should include topics such as mental health first aid, restorative practices, and gender sensitivity to ensure that every educator becomes a change agent.

Technology facilitates educational access and improves learning outcomes. Government-sponsored digital platforms such as DIKSHA, SWAYAM, and e-Pathshala offer free, multilingual, mobile-accessible learning resources that can be integrated into juvenile homes and alternative learning centres. These platforms, when combined with smart classrooms, low-cost tablets, and offline access solutions, can overcome geographic and infrastructure barriers to learning. AI-powered learning platforms, gamified content, and interactive simulations have the potential to engage students with limited academic motivation or prior educational exposure by catering to diverse learning styles.

Yet, for these innovations to translate into systemic reform, collaboration among government bodies, NGOs, the business sector, and local communities is indispensable. Policies such as the NEP 2020, the RTE Act, the Skill India Mission, and Digital India provide essential frameworks for inclusive, equitable, and high-quality education. Despite significant policy advances, implementation continues to be uneven, particularly within community-based vocational centres and juvenile justice institutions, where persistent challenges include inadequate funding, weak monitoring mechanisms, and limited contextual adaptation. Addressing these gaps requires increased financial investment, robust systems of accountability, and the promotion of locally responsive innovations.

NGOs play a critical role in bridging the divide between policy design and its practical execution. Through interventions in skill development, psychosocial rehabilitation, mentorship, and individualized educational support, organizations such as Pratham, Smile Foundation, Bachpan Bachao Andolan, and Aangan Trust ensure that educational and rehabilitative initiatives are linguistically, culturally, and socially relevant. Their embedded presence within communities enables them to deliver sustainable programs that are closely aligned with the lived realities of marginalized youth.

Corporate engagement further reinforces this ecosystem by facilitating the integration of technology, enhancing vocational training, and expanding pathways for employment through job placement initiatives. PPPs and CSR initiatives, such as Microsoft's Code *Unnati*, the Infosys Foundation's STEM learning programs, and Tata STRIVE, not only impart employable skills but also introduce at-risk youth to opportunities they may not have previously envisioned.

Training in areas such as digital literacy, coding, financial planning, and critical thinking expands both practical capacities and aspirations for future careers.

Structured mentorship and career counselling represent additional pillars of successful reintegration. Mentorship programs provide emotional support, role models, and a sense of belonging, all of which can significantly shape a juvenile's self-concept and life trajectory. Career counselling complements this by guiding young people toward realistic and interest-based educational, entrepreneurial, or employment pathways. Tools such as aptitude assessments, career mapping, and industry exposure visits create opportunities for informed decision-making and long-term stability. Together, these measures ensure that support extends beyond institutional settings into meaningful engagement with real-world opportunities.

The broader vision of *Viksit Bharat* can only be realized through an integrated education system that unites digital inclusion, trauma-sensitive pedagogy, vocational training, and curriculum reform. Such a system must aim not only to deliver academic knowledge and professional skills but also to cultivate social and emotional development, thereby preparing juveniles for dignified reintegration into society. Establishing a robust and inclusive framework, supported through sustained cooperation among government agencies, NGOs, community organizations, and private enterprises, will be essential to ensure that no child is left behind and that every juvenile is positioned as an active participant in shaping the nation's future.

Conclusion

Education serves as the foundation of an inclusive and progressive *Viksit Bharat*, offering every individual the opportunity to learn, grow, and contribute meaningfully to society. For disadvantaged youth in particular, access to cognitive, emotional, and social skills is central to empowerment, integration, and long-term financial independence. A comprehensive, skills-based approach – supported by mentorship, career guidance, and vocational training – can equip them to become responsible and engaged citizens.

Achieving equitable access to quality education, however, requires collaboration across multiple sectors. Government policies must be complemented by community-based initiatives and industry partnerships that expand digital learning and skill development opportunities. Schools, educators, and mentors together play a crucial role in creating supportive environments that foster resilience and ensure that young people can reintegrate successfully into mainstream society.

Sustained collective action – in the form of policy reform, resource allocation, and robust job training – has the potential to dismantle structural barriers and expand opportunities for all

juveniles. For this vision to succeed, policymakers, educators, and civil society must prioritize inclusive, skills-focused education as a national investment. The urgency is clear: the steps taken today in reimagining education will shape the foundations of a stronger, more equitable, and self-reliant *Viksit Bharat* tomorrow.

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Integrating Digital Tools in Uttar Pradesh Government Primary Schools: A Study on Teacher Readiness and Infrastructure Challenges

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Abstract

India's push toward digital learning has brought exciting new opportunities for classrooms, but it has also revealed some big challenges, specifically in government primary schools in Uttar Pradesh. While national programs like NEP 2020 and platforms such as DIKSHA have set the stage for using technology in teaching, the reality in schools is much more uneven. This paper looks at existing research and shares insights from a survey of 25 teachers in Uttar Pradesh to understand how ready they are to use digital tools and what's holding them back. The findings show that many teachers are willing, even eager, to use technology, but they often face the same hurdles: not enough practical training, unreliable infrastructure, and little ongoing technical support. Rural schools especially struggle with frequent power outages, slow or no internet, and devices that are either poorly maintained or just do not work. This paper gives recommendations focused on enhancing digital readiness in government schools by offering training that matches school's needs, making sure the infrastructure is stable, and creating ongoing support systems so teachers do not have to face these challenges alone

Keywords: Digital education, teacher readiness, primary schools, infrastructure, Uttar Pradesh, NEP 2020

1. Introduction

In recent years, digital learning has taken center stage in India's efforts to reform education. Initiatives like Digital India, DIKSHA, and the National Education Policy 2020 (NEP 2020) have made technology a focal point for transforming classrooms, hoping to boost both teaching and learning. The bigger goal is to modernize education for everyone, and to help close long-standing gaps in quality and access in government schools.

While the policies on paper are impressive, the day-to-day reality in government primary schools, particularly in big, diverse states like Uttar Pradesh, is more complex. Many schools are still working with limited resources, and a lot of teachers don't feel they have enough training or confidence to use digital tools effectively. This study set out to understand just how prepared

teachers in Uttar Pradesh are for this digital shift, and what structural obstacles stand in the way. By combining insights from existing research with survey responses from local teachers, it offers a real-world perspective on how digital transformation is actually happening in classrooms.

India has rolled out several big initiatives in recent years. DIKSHA, which launched in 2017, gives teachers access to curated digital resources and training materials. When the COVID-19 pandemic hit, PM eVIDYA stepped in to provide educational content via TV, radio, and online platforms. NEP 2020 went even further, calling for smart classrooms, virtual labs, and teachers who are comfortable using technology.

In Uttar Pradesh, local education agencies have tried to match these national efforts with their own programs. Some districts now have smart classrooms and digital libraries. Training courses offered through District Institutes of Education and Training (DIETs) have been updated to include digital teaching methods. But progress is uneven. Rural schools, in particular, still face frequent power cuts, unreliable internet, and a lack of ongoing support for teachers after their initial training.

Table: 1

Policy/Program	**Year**	**Objective**	**Relevance to UP Govt Schools**
DIKSHA	2017	Provide free digital content & training for teachers	Limited reach in rural UP
PM eVIDYA	2020	Multiplatform digital learning (TV, online, radio)	Limited access in low-resource areas
NEP 2020	2020	Emphasize tech-integrated pedagogy	Implementation is still uneven
Samagra Shiksha Abhiyan	2018	Merge all school-level programs with focus on equity	Infrastructure support varies

2. Literature Review

Past research paints a mixed picture when it comes to digital readiness in Indian schools. Bhardwaj (2025) found that while digital tools can make lessons more engaging, many teachers in Uttar Pradesh were hesitant to use them—mainly because they lacked sufficient training and ongoing support. Dubey & Bhardwaj (2025) reached a similar conclusion, noting that even though NEP 2020 promotes digital learning, rural schools often don't have the infrastructure to back it up.

Looking beyond Uttar Pradesh, Hassan and Mirza (2021) studied teacher digital literacy in Jammu and Kashmir and found that even when devices were available, many teachers didn't feel confident using them. Pareek & Parashar (2025) reported that secondary school teachers in northern India often faced outdated hardware, unreliable internet, and limited access to quality digital content.

Together, these studies highlight a clear gap between the government's ambitious policies and the everyday realities teachers face. While programs lay out a strong vision, success depends on schools getting the practical, on-the-ground support they need to turn these ideas into reality. This understanding shaped our study, which takes a closer look at these challenges in government primary schools in Uttar Pradesh.

3. Objectives of the Study

This study seeks to:

1. Assess the availability and condition of digital tools in UP government primary schools
2. Understand teachers' readiness and frequency of using digital tools
3. Identify the major challenges teachers face in using digital technology
4. Evaluate the impact of digital tools on student engagement and learning, based on teacher perception

4. Methodology

This study used a descriptive survey to collect information directly from teachers in government primary schools across Uttar Pradesh. Created a questionnaire using Google Forms and shared it online through teacher networks and WhatsApp groups. The survey included a mix of multiple-choice questions, focusing on topics like availability of digital tools, training received, how often they use these tools, and the challenges they face.

In total, received 25 valid responses. The teachers who responded came from both rural and urban schools and had different levels of teaching experience. After cleaning the data, analyzed it using Microsoft Excel to spot trends and draw meaningful insights. To make the findings easy to understand, used bar graphs and pie charts for visualization.

4.1 Research Design

A cross-sectional survey design was selected for its ability to quickly gather perspectives from a diverse group of teachers. The questionnaire was shared online, allowing us to reach respondents from urban, semi-urban, and rural schools across the state. The goal was to understand how digital tools are currently being used and what challenges teachers face in the process.

4.2 Participants

The survey targeted in-service teachers working in Uttar Pradesh's government primary schools under the Basic Education Department. In total, 25 valid responses were received.

- Sampling method: Purposive sampling, based on ease of school access and digital form circulation
- Inclusion criteria: Teachers currently working in government primary schools in Uttar Pradesh
- Exclusion criteria: Teachers from private institutions or those not involved in classroom instruction

4.3 Data Collection Tool

The primary tool used for data collection was a Google Form designed by the researcher. The questionnaire included a combination of multiple-choice, and open-ended questions, categorized into the following sections:

1. Demographics – Gender, teaching experience, school type
2. Access to Digital Infrastructure – Availability of devices, electricity, internet
3. Teacher Readiness – Digital confidence, training received, frequency of digital tool usage
4. Challenges and Support – Barriers to adoption, training needs, expected support
5. Perceptions of Impact – Observations on student interest and learning outcomes

4.4 Procedure

The Google Form was distributed through digital platforms such as WhatsApp and email networks to reach teachers across various districts. Participants were given about a week to respond.

- The first page of the form included a short overview of the study and a consent statement.
- No personally identifiable data was collected.
- Teachers could choose to skip questions they were not comfortable answering.
- Participation was entirely voluntary and anonymous.
- The data collected was used solely for academic purposes, with confidentiality fully maintained.

4.5 Data Analysis

Responses were exported to Microsoft Excel for cleaning and processing.

- Descriptive statistics (like percentages and averages) were used to summarize the data.
- Visual tools such as bar charts and pie charts were generated to present the results.
- Thematic analysis was applied to open-ended questions to extract key qualitative insights

5. Result

This section presents the findings of the survey conducted among 25 teachers from government primary schools in Uttar Pradesh. The responses offer insights into the current state of digital tool availability, usage, training, infrastructure conditions, and their effect on student engagement.

5.1 Teacher Profile and School Background

The participants in the survey represent a diverse group of teaching professionals currently serving in government schools across different districts of Uttar Pradesh.

- Age: Most teachers were between 30 to 45 years old, with the average age falling around 36 years.
- Experience: The majority had 6 to 15 years of teaching experience, indicating a relatively experienced group who have seen both pre- and post-digital transitions.
- School Type: Approximately 18 out of 25 respondents (72%) were teaching in rural schools, while the remaining worked in urban or semi-urban areas.
- Gender: The gender ratio was nearly balanced, though slightly more female respondents participated.

This demographic profile gives a representative picture of the teaching workforce in UP's public primary schools.

5.2 Availability of Digital Tools and Devices

Teachers were asked to indicate what types of digital tools were available at their schools. The options included projectors, smartboards, tablets, or desktop computers. Many respondents selected more than one tool.

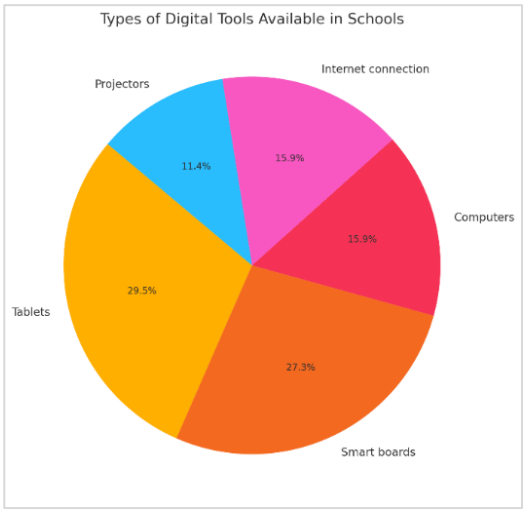


Figure: 1 Digital Tool Availability

- Projectors: Reported by 60% (15 teachers) as being available in their schools.
- Smartboards: Mentioned by 9 teachers (36%), mostly in semi-urban or pilot-model schools.
- Tablets/Computers: Available in only 6 schools (24%), reflecting a digital divide, especially in rural areas.
- Mobile Use: A few teachers noted that they rely on their personal smartphones for playing educational videos or showing content.

Despite some availability, only 11 teachers (44%) said there was a functional digital device in their classroom that they could use during teaching. Several reported that devices were either locked up, broken, or had no electricity supply. This shows a clear gap between the presence of devices and their practical usability.

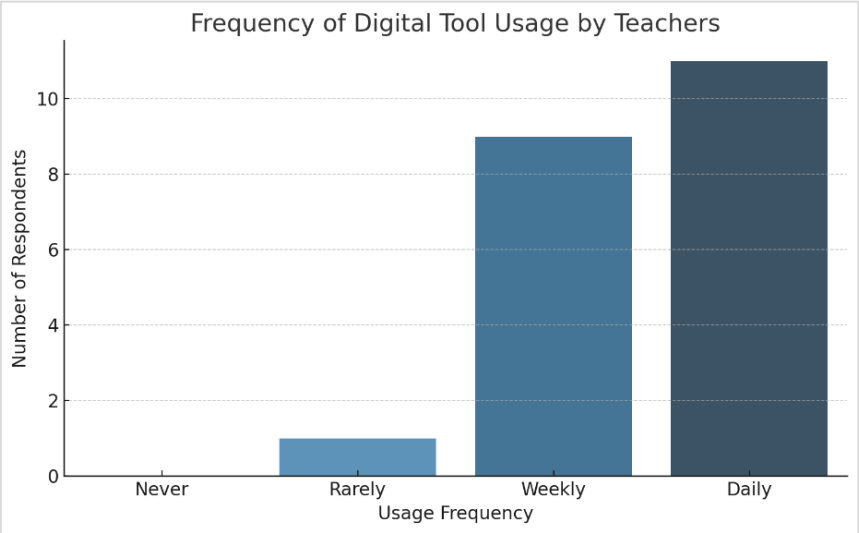
5.3 Frequency of Digital Tool Usage

Teachers were asked how often they use digital tools in classroom teaching. The responses were as follows:

Table: 2

Usage Frequency	No. of Teachers	Percentage
Daily	3	12%
Weekly	6	24%
Rarely	10	40%
Never	6	24%

Figure: 2 Frequency of Usage



The majority either used digital tools rarely or never. This suggests that even where tools are technically "available," there are barriers preventing regular classroom integration. These may include lack of confidence, insufficient training, or unreliable infrastructure.

5.4 Teacher Training and Digital Readiness

When asked if they had received any form of formal training on using digital tools, the responses were: Yes: 11 teachers (44%) and No: 14 teachers (56%)

Among the trained group:

- Many stated that the training was too short, more theory-focused, and lacked real classroom application.
- A few said the training was "just a formality," and they were never guided on how to implement it practically in low-resource classrooms.
- None reported receiving ongoing support, mentorship, or follow-ups after the training.

Among untrained teachers, several expressed willingness to learn but said they lacked access to sessions, time due to workload, or simply didn't know where to start. This shows that even when digital training is available, its design and delivery may need significant improvement to build actual readiness.

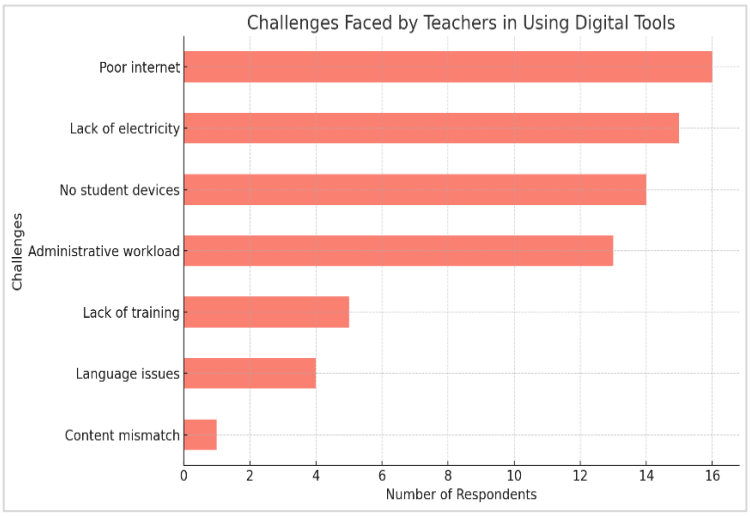
5.5 Infrastructure Challenges in Schools

Teachers were asked to select the major challenges they face in using digital tools. Multiple options could be selected.

Table: 3

Challenge	**No. of Teachers Reporting**	**% of Respondents**
Poor internet or electricity	16	64%
Lack of proper training	13	52%
Devices not working or outdated	11	44%
No technical support at school	9	36%
Difficulty in using English-language tools	6	24%

Figure 3: Infrastructure Challenges



It's clear that infrastructure-related problems especially electricity and internet are the most widespread. Many teachers also face a lack of confidence and technical help, making digital learning difficult to sustain, even when devices are present.

5.6 Student Engagement and Perceived Learning Impact

One of the key goals of digital education is to improve student engagement and learning outcomes. Teachers were asked whether they noticed any change in student interest when digital tools were used.

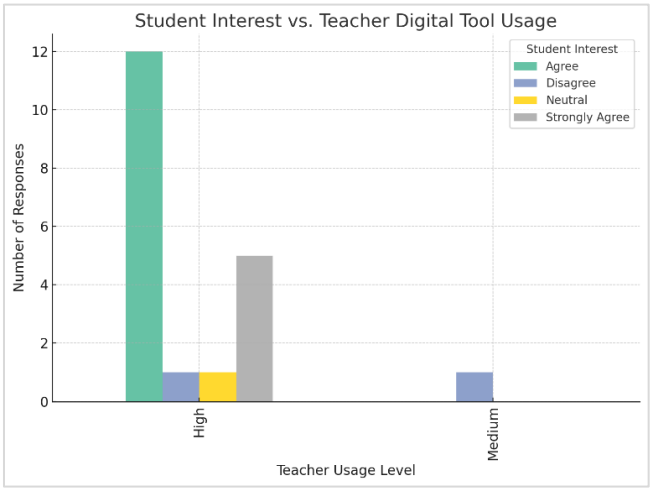


Figure 4 Student Interest by Usage Frequency

Their feedback, when compared with usage frequency, showed the following trend:

Table: 4

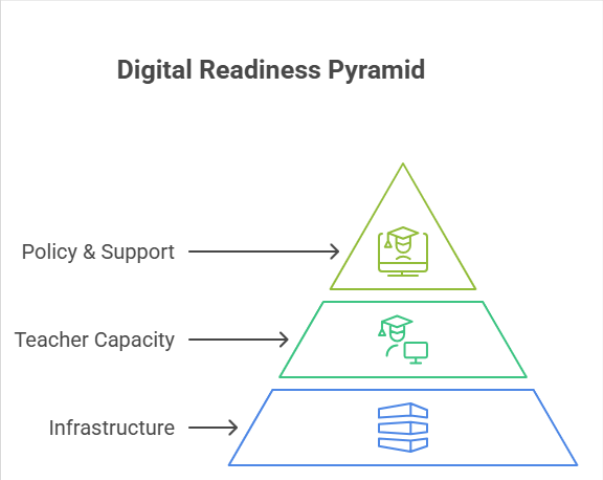
Teacher Usage Level	High Student Interest	Mixed Interest	Low/No Interest
Daily (3 teachers)	3	0	0
Weekly (6 teachers)	4	2	0
Rarely (10 teachers)	3	5	2
Never (6 teachers)	1	3	2

This indicates that students are more engaged when teachers use digital content regularly, even if the tools are basic. Videos, animations, or interactive lessons appear to spark curiosity more than traditional methods.

6. Discussion

The survey results provide a grounded and realistic view of the current state of digital education in government primary schools across Uttar Pradesh. Although there is policy-level momentum to integrate digital tools in classrooms, what is happening on the ground reflects a mix of optimism, gaps, and constraints.

Figure 5 Digital Readiness



6.1 Infrastructure exists, but is not aways functional

The survey results highlight a simple but telling gap: owning digital devices is not the same as using them. Projectors and smartboards are present in some schools, yet only 44% of classrooms had a device that was actually working at the time of the visit. Earlier studies by Dubey &

Bhardwaj (2025) and Rawal (2024) point to the same conclusion—installing technology is the first step, but keeping it reliable is what truly matters.

Teachers described projectors locked away in cupboards, equipment left unrepaired for months, and devices rendered useless by frequent power cuts or slow, unreliable internet. Without consistent maintenance and quick problem-solving, even well-stocked schools risk having technology that sits idle, turning potential tools for learning into little more than unused fixtures

6.2 Training alone is not enough without support

In the survey, 44% of teachers said they'd been through some form of digital training. But when asked how useful it was, many admitted it hadn't helped much. The common complaint was that sessions were too short, too theoretical, and not really linked to what happens in their classrooms each day. This lines up with what Hassan and Mirza (2021) found that you can complete a training course and still not feel ready to use technology with confidence.

What seems to be missing is the kind of support that sticks. Things like having a mentor to call when you get stuck, someone to help adapt lesson plans for digital tools, or even a simple helpline for troubleshooting. Without that sort of practical, ongoing backup, it's easy for whatever you learned in training to fade before you get a real chance to try it out.

6.3 Willingness exists, but barriers are systemic

What's encouraging is that many teachers genuinely want to use digital tools more often. In our conversations, several shared their enthusiasm for trying out videos, interactive lessons, and educational apps. But they're often held back by a lack of devices, limited training opportunities, or just not enough time in their busy day. This reflects findings from Pareek & Parashar (2025) and Naik & Shankaranarayanan (2024), who noted that teacher motivation isn't the main barrier—rather, it's the environment they're working in.

At the moment, teachers are frequently expected to drive digital integration without being given the right resources, adequate time, or strong institutional support. For digital learning to move from policy slogans to actual classroom impact, everyday conditions need to shift so teachers are set up for success.

6.4 Student response is a strong argument for change

One of the most encouraging takeaways from this study was simple but telling—whenever digital tools were used, even just once a week, teachers noticed students leaning in a little more. Videos,

animations, and interactive activities seemed to spark curiosity and hold attention longer, suggesting that these tools don't just deliver content; they make learning feel more alive.

That's a powerful reason to invest in better training and ongoing support for teachers. When they have the confidence and resources to use technology well, the benefits show up almost immediately in the classroom. The finding also echoes Bhardwaj's (2025) work on smartboard-led language lessons in Uttar Pradesh, which reported clear gains in both student engagement and comprehension.

6.5 Bridging the policy-practice divide

On paper, India's ambitions for digital education are impressive, with initiatives like NEP 2020, DIKSHA, and PM eVIDYA setting a clear direction. But on the ground, the story is more complicated. This study echoes what many earlier reports have found—the rollout is uneven, and the gap between vision and reality is hard to miss.

Policies often overlook the everyday realities of schools. Training sessions in English, for instance, fall flat when most teachers and students are more comfortable in Hindi. Similarly, a program that assumes steady internet access won't land well in places where nearly two-thirds of teachers say connectivity is unreliable.

Until policy design and local conditions speak the same language—literally and figuratively—the disconnect between what's envisioned and what's possible will remain one of the toughest hurdles in Indian education reform

7. Conclusion

In the beginning of this study, the aim was straightforward: to see how far digital tools have really made their way into government primary schools in Uttar Pradesh. I decided to focus on two big questions are teachers ready to use them, and what infrastructure stands in the way? What found was a picture that's neither bleak nor overly rosy. There's progress, yes, but there are also gaps that are hard to ignore.

On paper, both national and state policies champion digital learning. In reality, in many schools, it's still patchy. A few classrooms have devices, but in our survey, less than half had equipment that was working well and actually being used. Most teachers were open to the idea of teaching with technology some even enthusiastic but many admitted they did not feel confident. The reasons came up again and again: too little training, no one to turn to for help when something stopped working, and basic problems like power cuts or no internet for days.

Still, one finding stood out. In classrooms where teachers used digital tools even once or twice a week, students perked up. Lessons became livelier, and attention spans seemed to stretch. It's a reminder that change does not have to be dramatic to matter. With the right backup steady electricity, reliable devices, and some hands-on training small, steady steps could start to shift how children in these school's experience learning

8. Recommendations

Based on the survey findings and supporting literature, the following steps are recommended:

Upgrade and maintain infrastructure at the school level

- Ensure that every classroom has at least one working digital device, such as a projector or tablet.
- Prioritize reliable electricity and basic internet access in rural schools.
- Set up a local technical support mechanism (at block or cluster level) for repairs and troubleshooting.

Provide practical, ongoing teacher training

- Design training that includes hands-on demonstrations, not just theory.
- Use regional languages (like Hindi) to make content more accessible.
- Implement a follow-up or mentoring system where trained teachers can guide peers.

Align policy with local realities

- While digital programs like DIKSHA are useful, content should be contextualized for primary-level students in rural UP.
- Avoid one-size-fits-all policy designs; consider local conditions, like network availability and teacher comfort levels.
- Feedback from teachers should be regularly collected and integrated into policy refinements.

Promote peer learning and sharing

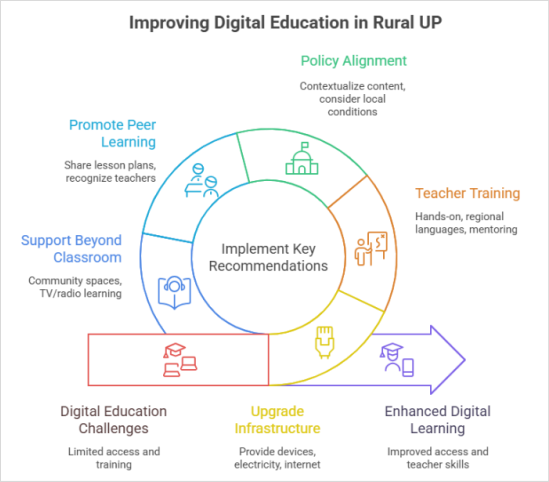
- Encourage teachers to share simple digital lesson plans, low-cost apps, and practical tips during cluster meetings.
- Recognize and reward schools or teachers who are making effective use of digital tools, even in low-resource settings.

Support digital learning beyond the classroom

- Where possible, provide access to community learning spaces where students can explore digital tools after school hours.

- Promote the use of television- or radio-based learning for students without devices at home.

Figure: 6



Digital education is not just about giving schools gadgets it's about building an environment where teachers are supported, classrooms are equipped, and students are engaged. With ground-level changes and sustained support, Uttar Pradesh can move closer to a future where technology is not a barrier but a bridge to quality education for all.

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Reimagining Teacher Education in the Age of Artificial Intelligence: A Conceptual and Policy Review

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Abstract

The rapid advancement of Artificial Intelligence (AI) is transforming all dimensions of life, including education. In this evolving scenario, teacher education programs must reimagine their purpose, structure, and delivery to prepare educators for AI-integrated learning ecosystems. This conceptual and policy review paper explores the urgent need to reframe teacher education in India and globally in the age of AI. It critically analyzes how AI is influencing pedagogical roles, redefining teacher competencies, and introducing new ethical and professional challenges. Drawing on policy documents such as NEP 2020, UNESCO's AI in Education framework, and OECD guidelines, the paper identifies significant gaps and opportunities in current teacher training curricula. It also synthesizes insights from international best practices, scholarly literature, and education technology reforms to propose a future-oriented framework for teacher education that aligns with digital fluency, critical thinking, data ethics, and human-AI collaboration.

The study adopts a purely conceptual and review-based methodology, focusing on qualitative content analysis of existing literature, frameworks, and government policy documents. No primary data is collected; rather, this work provides an integrative synthesis that connects theory with policy and practice. The findings emphasize the need for a transformative shift in both pre-service and in-service teacher education, moving beyond traditional content delivery to include AI ethics, adaptive learning design, and critical digital pedagogy. The paper concludes with recommendations for curriculum reform, capacity building, and policy realignment to empower educators as AI-aware facilitators of future learning. This research aims to contribute to the evolving discourse on education reform by positioning teachers at the center of sustainable and ethical AI integration in classrooms.

Keywords: Artificial Intelligence, Teacher Education, Digital Pedagogy, NEP 2020, Policy Review, Curriculum Transformation, Human-AI Collaboration, Educational Reform.

Introduction

In Present perspective Technology in education system is important part for Teachers and also students. In This time the most important thing in human life is Artificial Intelligence (AI). Its impact is clearly visible in education – how children study, how teachers teach and how schools and colleges teach – everything is change day by day and every one try to adopt this. At such a time, it is time to revise the old teacher teaching methods. It is even more important in a country like India, because here education reaches a very large scale and children from different backgrounds and different cultures also

The dream of the National Education Policy (NEP) 2020 is that our education takes everyone along, develops skills in children and uses technology properly. In fulfilling this dream, the role of the teacher is the most important and also more challenging than ever before. Economic Times **Education. (2023, July 29).** Digital Education: The game changer for NEP-2020 implementation. ET Education. Retrieved from https://education.economictimes.indiatimes.com/news/government-policies/digital-education-the-game-changer-for-nep-2020-implementation/102238310

The reality is that in present time teachers training programmes in India are not fully preparing teachers for the present time and also for upcoming world. where humans and machines will work together. Our teacher education overloaded with extra work like project expra curricular activities. Teachers are not fully able to perform perfectly in classroom. Although digital initiatives like **SWAYAM**, **NISHTHA** and **DIKSHA** have been launched in recent years, the true use of AI in teacher training has not yet been achieved.

Today there is a need to look at teacher education from a new perspective. This is not only due to the rapid development of AI technology, but also because student expectations are changing, teaching-learning methods are changing and policies are also showing new directions. The classroom is no longer limited to just four walls. It has now become an environment that includes AI-powered tools such as adaptive learning platforms, chatbots, virtual reality, smart tutor systems and data-based analytics. In these changing circumstances, we no longer need teachers who can only teach content, but teachers who can understand technology and use it correctly, guide children and at the same time keep them connected with moral values and human sensibilities. A real teacher will be the one who not only imparts knowledge but also becomes a guide, companion and protector of values for children.

The use of AI in education is not limited to machines only. It raises deep questions—like what will be the real role of a teacher in the era of AI? Are we able to ensure that human emotions and sensibilities remain even amidst technology? And when teachers use AI in teaching, evaluation or content delivery, what ethical rules and limits should they keep in mind? Such questions demand a conceptual, interdisciplinary, and forward-thinking approach in teacher education.

This paper, therefore, aims to fill a critical gap in educational scholarship by offering a conceptual and policy review of teacher education in the context of AI. It does not seek to evaluate existing programs quantitatively but rather to synthesize current literature, global policy insights, and theoretical frameworks to propose a visionary model for AI-ready teacher education. It focuses on rethinking pre-service and in-service teacher training to foster AI literacy, ethical responsibility, digital creativity, and learner-centered pedagogical innovation.

In doing so, the paper addresses a vital concern: If we do not reform our teacher education systems today, we risk producing a generation of educators who are ill-equipped to guide students through the complexities of AI-driven societies. As the boundary between human and machine intelligence continues to blur, the educator's role as a thoughtful, ethical, and emotionally intelligent professional becomes not less important, but more so. Hence, this research is both timely and necessary, contributing to the larger discourse on education reform, technological ethics, and sustainable human development in the AI era.

Theoretical Foundations of Teacher Education in the Age of AI

Teacher education, as both a practice and a field of study, has traditionally been grounded in several theoretical foundations that inform how teachers are prepared for the profession. These include behavioral theories, constructivist learning models, humanistic psychology, and sociocultural learning perspectives. However, in the age of Artificial Intelligence (AI), these foundational theories must be revisited, expanded, and partially reimagined to accommodate the dynamic transformations occurring in educational environments.

1.Constructivism and Personalized Learning

Constructivist theory states that children learn best when teacher experience, ask questions to children, and reflect understanding of all . This is what scholars like **Piaget and Vygotsky** define about AI and digital education techniques. This makes learning even more personalized and student-centered. But the role of the teacher has become even more important. They need to be not

just teachers, but guides who use AI wisely—to help children understand deeply, learn together, and develop new ideas.

2. Behaviorism and Algorithmic Instruction

Behaviorist learning theories, most notably advocated by **B.F. Skinner,** rely on stimulus-response patterns, reinforcement, and measurable outcomes. **Skinner, B. F. (1964). New methods and new aims in teaching. Phi Delta Kappan, 45(8), 421–426.** AI-and digital learning giving educational technologies such as mind tutoring systems and gamified learning platforms often operate on behaviorist principles, reinforcement of behavioral correct answers through fast feedback and rewards. Students must be fast learner and having creative thinking and it's good for future perspective. Thus, teacher education must prepare educators to balance in students and teacher's classroom behaviour and how both manage the digital learning in classroom environment.

3. Humanism and the Ethics of Technology

Humanistic educational theories, as championed by **Carl Rogers and Abraham Maslow,** place derived the emotional, social development, and psychological development of the learner.

Rogers, C. R. (1961). On becoming a person: A therapist's view of psychotherapy. Houghton Mifflin. These theories remind us that education is not about knowledge understanding, but about nurturing the whole person personality. **Maslow, A. H. (1954). Motivation and personality. Harper & Row.** In AI-enhanced learning environments, the risk of depersonalization and emotional disconnection becomes significant. **For example,** while AI can deliver curriculum content, it cannot replicate empathy, moral judgment, or nuanced understanding of learners' emotional states. Teacher education, therefore, must embed humanistic ethics into AI literacy, enabling educators to ensure that technological tools enhance rather than diminish human values in the classroom. (**Holmes et al., 2022; Selwyn, 2019; UNESCO, 2021).**

4. Sociocultural Theory and the Digital Divide

Vygotsky's sociocultural theory asserts that learning is inherently social and mediated by cultural tools and contexts. (**Vygotsky, 1978; Suresh & Kumar, 2022; UNESCO, 2021). This perspective is crucial when evaluating AI use in diverse Indian classrooms.** AI technologies, often designed in global contexts, may not align with the different linguistic, socio-economic, and cultural perspective of Indian learners and other countries also.

5. 21st Century Skills and Digital Pedagogy Frameworks

Global educational discourse now emphasizes the development of 21st-century competencies such as critical thinking, creativity, communication, and collaboration. Frameworks such as the **TPACK** (Technological Pedagogical Content Knowledge) model **(Koehler & Mishra, 2009; Voogt & Roblin, 2012; Trilling & Fadel, 2009)** and **SAMR** (Substitution, Augmentation, Modification, Redefinition) model provide structured ways for involving AI and technology into subject pedagogy. These models must be incorporated into teacher education curricula to help educators design meaningful learning experiences using AI, without losing sight of pedagogical depth. **(Puentedura, 2006; Hamilton, Rosenberg, & Akcaoglu, 2016; Trust, 2017).**

Review of Global and Indian Policies on Teacher Training and EdTech

1. Global Policy Frameworks

a) UNESCO: AI and the Futures of Learning (2021)

UNESCO's report underscores the ethical, cultural, and pedagogical implications of AI in education. It highlights the role of teachers as central to humanizing the learning process, even in highly automated environments. The policy stresses three key teacher competencies:

UNESCO. (2023). AI and education: Guidance for policy-makers. Paris: UNESCO Publishing. https://unesdoc.unesco.org

b) OECD: Teaching in the Digital Age (2020)

The OECD recognizes that digitalization is transforming not just classrooms but the professional identity of teachers. It proposes a competency framework that includes:

Pedagogical knowledge for blended and online learning

Ability to critically assess digital resources

OECD. (2020). Teaching in the digital age. OECD Publishing.

https://doi.org/10.1787/598f6f3f-en

c) European Commission: DigCompEdu Framework (2017)

This framework defines six areas of digital competence for educators, ranging from professional engagement to empowering learners using digital tools. It introduces progressive levels of competence—from "Newcomer" to "Pioneer"—and encourages modular training that can be adapted to individual teacher needs.

2. Indian Policies and Initiatives

a) National Education Policy (NEP) 2020

NEP 2020 is a landmark in India's education reform. It reimagines the teaching profession by emphasizing continuous learning, digital pedagogy, and experiential methods. Specific highlights related to teacher education include:

Revamping B.Ed. into a four-year integrated program

Focus on 21st-century skills, including digital and data literacy

Establishment of a National Mission for Mentoring (**NMM**)

Mandatory CPD programs via online platforms like **SWAYAM, DIKSHA, and NISHTHA**

b) NISHTHA (National Initiative for School Heads and Teachers Holistic Advancement)

Launched in 2019, this program aims to build competencies among teachers at the elementary level through face-to-face and online modes. It offers modules on ICT and digital pedagogy but is yet to introduce structured content on AI awareness, data ethics, or personalized learning systems. **Government of India**. (**2019**). NISHTHA: National Initiative for School Heads and Teachers' Holistic Advancement. Samagra Shiksha, India. Retrieved from **https://www.india.gov.in/spotlight/nishtha**

c) DIKSHA Platform

DIKSHA is a national digital infrastructure for teachers offering open educational resources (**OERs**). While it has successfully democratized access to digital content, its teacher training modules have limited engagement with AI or future-ready digital frameworks.

d) National Professional Standards for Teachers (NPST) Proposed under NEP, NPST aims to define clear performance standards for teachers. It emphasizes professional autonomy, knowledge of assessment tools, and use of EdTech. However, it does not yet provide specific guidelines on AI-based teaching tools or human-AI interaction models.

3. Policy Gaps and Challenges in the Indian Context

Despite policy advancements, several structural challenges remain:

a) Lack of Conceptual Understanding of AI

Most teacher training modules confuse AI with general ICT skills. AI is a subset of technology that includes machine learning, natural language processing, and predictive analytics—none of which are currently addressed in teacher education.

b) One-Size-Fits-All Approach

Indian teacher education programs are often highly standardized and theory-heavy. AI integration demands localized, flexible, and modular training based on teacher readiness levels and regional resource availability.

c) Digital Divide and Infrastructure

India's digital divide, especially in rural areas, undermines equitable access to AI tools in classrooms.

Challenges in Integrating AI into Pre-service and In-service Teacher Education

1. Lack of Conceptual Understanding of AI in Teacher Training

Most pre-service and in-service teacher education programs in India and other developing countries still view AI as a general digital tool, confusing it with ICT (Information and Communication Technology). AI is a distinct discipline involving machine learning, pattern recognition, data interpretation, and predictive analytics.

However, curricula often do not go beyond surface-level digital literacy. Teachers are rarely introduced to concepts such as:

How AI personalizes learning

The ethical implications of algorithmic decision-making

The difference between automation and global

Human creativity-AI collaboration in pedagogy

2. Outdated and Rigid Curriculum Frameworks

Teacher education institutions providing for teachers fixed syllabus. Nothing intresting like technology about Artificial intelligence.

3.Lack of Professional Development and Hands-on Training

In-service teachers required to do teachers training program for improving own knowledge and also students knowledg. In present time teacher must be techno friendly and also have knowledge about digital and Artificial intelligence.

1. Nature of Study: Conceptual and Review-Based

This study is non-empirical, meaning it does not involve the collection of new primary data such as surveys, interviews, or observations. Instead, it relies on existing knowledge repositories, policy documents, global frameworks, and academic literature to conceptualize a future-oriented teacher education model. This method is particularly appropriate when:

The research topic is nascent or evolving (AI in Indian teacher education).

Groundwork for empirical studies needs to be laid.

2. Sources of Data

The paper draws from four broad categories of secondary sources:

a) Academic Literature:

Peer-reviewed journals from Scopus, **ERIC**, and Google Scholar

Books on educational technology, AI, digital pedagogy, and teacher preparation

Meta-analyses and systematic reviews related to AI in education

b) Policy Documents:

National Education Policy (**NEP) 2020** – India

UNESCO's "AI in Education: Guidance for Policy-Makers"

OECD reports on digital transformation in education

UNICEF and Brookings Institution reports on teacher skill-building in digital contexts

c) EdTech and AI Platforms:

Case studies and white papers from platforms like Khan Academy, Coursera, ChatGPT, ClassDojo, ScribeSense, and Century Tech

Industry reports from IBM, Microsoft, and Google on AI in classrooms

d) Media Reviews and Think-Tank Reports:

Insights from The Brookings Institution, **NITI Aayog**, EdSurge, and World Economic Forum

News articles and expert columns on teacher training and AI policy debate

3. Data Analysis Method

Since the study is conceptual, thematic content analysis was used to identify patterns, arguments, contradictions, and proposals across the literature. The steps included:

Reviewing over 80 documents and narrowing down to the most relevant 50 for final synthesis

Identifying recurring themes such as curriculum gaps, AI-literacy needs, ethical dilemmas, teacher resistance, digital pedagogy tools, and policy recommendations

Coding themes manually and organizing them under conceptual headings

Cross-referencing national and international documents to validate contextual relevance (India vs. Global)

Synthesizing findings to propose an original, future-oriented framework

No software was used for this qualitative analysis; manual coding was preferred for depth and contextual sensitivity.

Literature Review

1. Global Perspectives on AI in Education

The UNESCO (2021) report, "AI and the Futures of Learning", emphasizes that AI is not merely a technological shift but a socio-cultural transformation in how knowledge is constructed and delivered. It highlights the need for teacher preparation systems to evolve rapidly to include AI literacy, algorithmic understanding, and ethical considerations.

Similarly, **Luckin et al. (2016)** argue that intelligent systems like chatbots, intelligent tutoring systems (ITS), and predictive analytics can support differentiated learning—but only when teachers are trained to understand and mediate their use. **Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016).** Intelligence Unleashed: An Argument for AI in Education. Open Ideas at Pearson. **https://oro.open.ac.uk/50104/** .

2.Academic Analyses of Teacher Education Gaps

A number of studies have critiqued traditional teacher education programs for being overly theoretical and disconnected from the realities of digital and AI-driven classrooms.

Korthagen (2017) calls for a shift from knowledge-based training to reflective, experiential models that integrate digital adaptability.

Darling-Hammond (2010) notes that pre-service teacher education globally is often designed around outdated instructional models that do not account for dynamic classroom technologies. **Darling-Hammond, L. (2010). The flat world and education: How America's commitment to equity will determine our future. Teachers College Press.**

Furthermore, research by **Zawacki-Richter et al. (2019)** identifies that the current literature largely overlooks the competencies teachers must develop to co-exist with intelligent machines—such as emotional intelligence, critical thinking, algorithmic understanding, and ethical judgment. **Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019).** Systematic review of research on artificial intelligence applications in higher education – Where are the educators? International Journal of Educational Technology in Higher Education, 16(1), Article 39. **https://doi.org/10.1186/s41239-019-0171-0**

3. Ethical, Emotional, and Philosophical Debates on AI in Teaching

The role of AI in human-centric professions such as teaching also raises deep philosophical and ethical questions. According to **Selwyn (2019),** while AI may enhance personalization and automation, it can never replicate human empathy, intuition, and moral reasoning—skills that are core to quality teaching.**Selwyn, N. (2019).** Should robots replace teachers? AI and the future of education. Polity Press. **https://politybooks.com/bookdetail/?isbn=9781509528967**

Therefore, teacher education must prepare educators to co-exist, not compete, with machines.

Eubanks (2018), in her work "Automating Inequality", warns of algorithmic biases that may creep into educational AI tools. Teachers need to be trained not just to use these tools, but to critically evaluate their fairness, transparency, and inclusivity. The concern is echoed by Williamson & **Piattoeva (2021)** who discuss the risks of "datafied classrooms" where teachers are reduced to facilitators of algorithmic decisions, unless they are empowered with AI governance skills.

Finally, **Salmon (2020)** highlights the need for socio-emotional learning (SEL) in teacher education as AI cannot address the emotional and psychological needs of students. Teachers must be trained to retain the human touch in increasingly AI-assisted environments.

4. Synthesis of Literature and Gaps Identified

The existing literature affirms the transformative potential of AI in education but reveals a major lacuna in teacher preparation. The key gaps include:

Absence of AI-specific modules in teacher training curricula

Minimal focus on ethics, empathy, and human-machine interaction

Lack of interdisciplinary integration of pedagogy with computational thinking

AI in Indian Education: Present Challenges and Missed Opportunities

India, as one of the largest education systems in the world, stands at a critical juncture where emerging technologies such as Artificial Intelligence (AI) can redefine learning paradigms. While government initiatives, EdTech platforms, and policy frameworks have made attempts to integrate digital tools, the incorporation of AI in teacher education and school ecosystems remains fragmented, underdeveloped, and often misdirected. This section explores the present challenges and missed opportunities in leveraging AI meaningfully within Indian education—particularly from a teacher-centric lens.

1. Digital Readiness vs AI Readiness

Over the past decade, India has made considerable investments in digital education through platforms like **DIKSHA**, **SWAYAM**, and **ePathshala**. However, these platforms primarily focus

on content digitization and access, not the transformative use of AI. There's a fundamental difference between digital readiness (access to devices and internet) and AI readiness (capacity to interpret, design, and ethically engage with intelligent systems). The latter is almost entirely absent in teacher preparation programs in India.

2. Policy-Implementation Gaps

While the National Education Policy (**NEP**) 2020 articulates a bold vision of digital empowerment and future-readiness, it does not sufficiently address the specifics of AI integration in teacher education. For instance, while the policy advocates for Continuous Professional Development (CPD), there is no concrete roadmap for upskilling teachers in areas like adaptive learning systems, intelligent tutoring, or data-driven decision-making.

3. Infrastructural Inequities

India's digital divide is well documented. However, when AI-based educational tools (like personalized learning apps or learning analytics platforms) are introduced in urban schools with infrastructure but without teacher preparedness, it results in dependency rather than agency. In contrast, rural and government school teachers—who may not even have basic ICT training—are left further behind.

4. Over-Reliance on EdTech Startups

Private EdTech companies in India like **Byju's**, **Vedantu**, **Embibe**, and **Toppr** have been the early adopters of AI-based personalization and learning analytics. However, these tools are student-centric and commercial in nature, often excluding teachers from the design, decision-making, and data interpretation process.

5. Lack of Indigenous AI-Pedagogy Research

How AI can adapt to multilingual classrooms

Use of AI in low-tech environments

Ethical concerns specific to Indian socio-cultural diversity

Indigenous knowledge integration in AI tools

Future-Oriented Framework for AI-Integrated Teacher Education

The growing influence of Artificial Intelligence (AI) in education demands a paradigm shift in how we train, support, and envision the role of teachers. Rather than being sidelined by technology, teachers must be empowered as co-designers, evaluators, and ethical guides in AI-enabled learning

environments. This section proposes a future-oriented, holistic, and contextual framework for integrating AI into teacher education in India and globally.

1. AI Literacy as a Core Teacher Competency

Pre-Service Training (B.Ed/M.Ed):

Core course titled "AI and Education: Tools, Ethics, and Integration"

Practical modules on machine learning basics, algorithmic thinking, and data interpretation

Simulations and case studies showcasing real-world AI classroom scenarios

In-Service Training (CPD):

Ongoing workshops on emerging AI trends in education

Self-paced courses via platforms like **DIKSHA**, **NISHTHA**, or **SWAYAM**

Hands-on experience with AI tools like adaptive learning software, automated assessments, and AI-assisted lesson planning.

2. Ethical and Humanistic Pedagogy with AI

AI education must go beyond technical know-how and embed ethical reasoning, socio-emotional intelligence, and equity concerns at its core. Teachers should be trained to critically evaluate AI tools using the following lenses:

Bias and Fairness:

Is the AI algorithm treating all students equally regardless of language, caste, or gender?

Privacy and Surveillance:

How is student data collected, stored, and used by AI systems?

Emotional Intelligence:

Can the teacher use AI insights (e.g., student attention tracking) to enhance care rather than control?

3. Blended Teaching Models and Co-Creation

Rather than viewing AI as a threat, teachers should be equipped to co-create learning environments where AI supports human-led pedagogy. This requires skill-building in blended models such as:

AI-assisted lesson planning: Teachers use data from intelligent tutoring systems to modify instruction

Flipped classrooms with AI tutors: Students learn core content from AI-based tools; classroom time is for discussion and clarification

Personalized feedback loops: AI identifies struggling learners; teachers provide emotional support and alternate strategies

Global Best Practices and Case Studies of AI in Teacher Education

As nations prepare for an AI-driven educational future, several global initiatives have already laid promising foundations in teacher education. These programs reflect a blend of technological integration, pedagogical innovation, and ethical sensitivity. Understanding these best practices and case studies helps India—and other developing countries—design context-specific, scalable, and inclusive models.

1. United Kingdom: The AI Horizon in Initial Teacher Training (ITT)

The UK has incorporated AI in teacher training through initiatives such as:

The National Centre for Computing Education (NCCE):

Offers modules on AI and data science for teachers of all subjects, not just computer science.

AI in Schools Toolkit (by The Alan Turing Institute):

Equips educators to evaluate and responsibly use AI tools in classrooms.

Impact:

UK's focus on AI ethics, algorithmic literacy, and data privacy ensures that teachers are not only tool users but informed evaluators.

SG 2. Singapore: Future-Ready Educators through NIE and EdTech Masterplans

Singapore's National Institute of Education (NIE) embeds digital fluency, including AI applications, into all teacher preparation programs.

Key Features:

Use of AI-powered platforms like MySkillsFuture for career counselling in teacher training

Simulation-based learning using intelligent tutoring systems

National EdTech Masterplans integrate AI use in lesson planning and student support

Outcome:

Teachers graduate with a future-ready mindset and the ability to use AI for differentiation and learner profiling.

3. China: AI-Powered Personalized Learning Systems for Teachers and Students

China is a global leader in EdTech and has deployed AI systems for both students and teacher development:

Squirrel AI and TAL Education Group:

Use intelligent adaptive learning to train teachers on how to interpret student learning patterns through AI dashboards.

Shanghai AI Education Alliance:

4. Canada: Centering Ethics and Equity in AI Education

Canada emphasizes Indian Traditional knowledge, and spirituality in education

AI for Teachers (University of Toronto & CIFAR):

MOOC introduces teachers to AI's social implications and inclusive curriculum design to helps students.

Digital Human Rights Framework (Ontario):

5. Finland: AI Education for All Teachers through National Curriculum

Finland's using morden technology friendly knowledge system for students for future perspective

Key Initiatives:

Teachers complete the course related to Digital pedagogy.

Teachers learn about inclusive education just because students need digital technology-based knowledge for present scenario.

Cross-Cutting Themes from Global Practices

ThemeDescription

Early Integration	Embedding AI in pre-service training ensures foundational literacy
Ethical Literacy	Almost all models include AI ethics, data bias, and student rights
Blended Learning	Teacher educators model AI-assisted flipped or hybrid models
Localized Content	Use of culturally and linguistically appropriate AI content
Teacher Autonomy	Successful models empower rather than automate teachers

Cross-Disciplinary Design Teachers collaborate with technologists, designers, and psychologists

Key Findings

AI Is Reshaping Educational Roles

Artificial Intelligence is not replacing teachers but redefining their roles—from content transmitters to learning facilitators, critical analysts, and digital mentors. Teachers must be equipped to handle adaptive technologies, AI-powered assessments, and data-driven instruction.

2. Policy-Implementation Gap in India

While NEP 2020 emphasizes digital education, including AI, most Indian teacher education institutions (TEIs) have yet to integrate AI in a meaningful way. There is a significant gap between policy articulation and institutional preparedness.

3. Lack of Ethical Training

Most pre-service and in-service training modules lack structured guidance on AI ethics, data privacy, algorithmic bias, and digital rights, leaving teachers vulnerable to misuse of technology.

4. Infrastructure and Faculty Gaps

Many TEIs suffer from inadequate digital infrastructure and faculty members with limited exposure to emerging technologies. Without capacity building, AI integration will remain superficial.

5. Missed Opportunity for Equity

AI, if not properly localized and inclusively designed, can widen the digital divide. Most AI tools are English-centric, urban-focused, and culturally neutral, which can disadvantage rural and marginalized communities.

6. Global Models Are Adaptable

Global practices in countries like Finland, Singapore, and Canada offer modular, ethical, and inclusive frameworks that can be contextualized in India with the right policy support and public-private collaboration.

Summary of Recommendations

Focus Area	**Action Item**
Curriculum Reform	AI, ethics, and pedagogy integration
Institutional Readiness	Infrastructure + Faculty training
Policy Alignment	AITCF and NEP implementation

Equity and Inclusion	Localized tools, multilingual resources
Ethics and Data Privacy	Mandatory certification and legal safeguards

Conclusion

The intersection of Artificial Intelligence (AI) and teacher education marks a pivotal juncture in the evolution of educational systems. As India envisions a technologically enriched, inclusive, and equitable future through its National Education Policy (NEP) 2020, the readiness of its teachers to adapt and lead in AI-driven classrooms becomes non-negotiable. This paper has explored, from a conceptual and review-based lens, how integrating AI into teacher education can transform pedagogy, learning outcomes, and the very role of teachers.

The findings clearly establish that while India's policies are progressive, the ground realities at most Teacher Education Institutions (TEIs) reflect gaps in infrastructure, faculty training, curriculum innovation, and ethical sensitization. Moreover, a techno-centric model without cultural localization risks widening the digital divide, especially for rural, tribal, and disadvantaged groups. Yet, India holds the demographic and technological advantage to leapfrog into a leadership position—provided teacher preparation is proactive, inclusive, and AI-literate.

The study reaffirms that teachers must be repositioned as AI mediators—professionals who not only deploy digital tools but do so with an understanding of pedagogy, context, and ethics. Emphasizing conceptual clarity, skill-based modules, and interdisciplinary collaboration, the paper provides strategic recommendations such as AI curriculum integration, ethical training, AI literacy, simulation-based practicum, and public-private partnerships. These form the backbone of a teacher education model that is not only responsive to the AI wave but also grounded in India's socio-cultural diversity.

Future Perspectives

As we move forward into an increasingly digital and data-driven society, teacher education must evolve from a reactive to a proactive paradigm. The following future-oriented insights outline pathways for academic, policy, and implementation advancement:

1. National AI Teacher Academy (NATA)

2. Micro-credentialing and AI Certification Pathways

3. AI for Inclusive Education

4. AI-Ethics Labs in TEIs

5. Interdisciplinary Teacher Preparation

6. Global Collaborations and Exchange Programs

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Digital Competence: A Pathway to Mitigating the Digital Divide

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Introduction

Teachers at this level are expected to possess advanced digital competencies to effectively implement innovative teaching practices and address the diverse needs of students. Moreover, faculty members must develop strong digital competence to effectively use educational technologies. Digital pedagogical competence ensures the effective delivery of appropriate e-content and supports curriculum design through the integration of suitable technologies and instructional methodologies. It also addresses ethical considerations in digital environments (Kirkwood & Price, 2020). To achieve these goals, higher education institutions must prioritise faculty training in innovative teaching methods and digital tools. Partnerships with industry can provide students with practical engagement, internships, and certifications that align with market needs (Anderson & Johnson, 2019). Additionally, digital equality can be achieved by investing in vigorous smart edtech infrastructure for each level of socioeconomic background, and they can also get a smart, quality education

Objectives of the Study

- To study the conceptual background of digital competence and digital divide.
- To explore the meaning of digital equity and its relevance in a globally interlinked society.
- To explore how far digital competence can mitigate the digital divide in the world.
- To know the association between social digital inclusion and digital competence, which makes it possible to improve digital equity.

Conceptual Perspective of Digital Competence

Digital competence, as defined in the previous section, consists of a set of knowledge, skills, attitudes and behaviours required by individual to engage, navigate and create in a digital world. Digital competence expressed as a construct is built beyond just the technical side of using tools, it involves not only the capacity to use and make sense of digital tools but the cognitive, social, and ethical dimensions of using them. The development of digital competence is essential to fostering equitable ways to participate in a digitally mediated society (Ferrari, 2013; Voogt et al., 2017).

Concept and Scope of Digital Competence

Digital competence is essentially perceived as: an individual's capacity to use digital technologies to access, evaluate, create, and communicate information. Digital competence requires many abilities, from technical skills like using a computer or smartphone, to cognitive and critical skills that allow individuals to analyse and interact with digital content. The European Commission's DigComp framework (Ferrari, 2013) describes digital competence across five (5) key areas.:

- Information and Data Literacy
- Communication and Collaboration
- Digital Content Creation
- Safety
- Problem-Solving

Fig.1.1 European Commission's DigComp framework (Ferrari, 2013)

(i). Information and Data Literacy

This area defines the ability to locate, evaluate, use and manage digital information in order to enable access to a sufficient body of information to be able to make informed decisions and evaluate the quality of online content (Ferrari, 2013).

(ii). Communication and Collaboration

This area is about how digital technologies are used to communicate, share information and collaborate, whether professionally or socially (Voogt et al., 2017).

(iii). Digital Content Creation

Digital content creation must be broadly defined; the digital society demands a person to know how to create, edit and share content, whether it be text, photography, video, and websites. This also includes awareness of intellectual property rights and copyright (Ferrari, 2013).

(iv). Safety

This area refers to having the wit to manage your digital technologies safely, whether it be issues surrounding privacy and data protection, or assuring online safety for your self and the community, particularly in the face of cyber threats (Ferrari, 2013; Helsper, 2021).

(v). Problem Solving

This area entails the ability to use digital tools to recognize and solve problems, which can include troubleshooting individual devices, adapting to new technologies, or finding solutions to particular digital challenges (Voogt et al., 2017).

Each of these five areas related to digital competence points to the number of different skills required to be able to operate in current digital society in which users must engage with content in a critical way, communicate in ways that promoted collaboration, create digital content that represents their ideas, navigate ethical and safety issues, and problem solve in very complex environments.

The Value of Digital Competence for Educators

Digital competence applies to education in the 21st century. While it means that educators not only use technology as a part of their teaching practice, but use requisite digital skills to support students in developing their digital skills. Sary, Dudija, and Moslem, (2023) claim that teachers who have a high level of digital competence engage in and enact more innovative teaching strategies, promote more innovative learning environments, and provide opportunities for critical thinking.

Digital competence is also an important part of a student's cognitive skill set for employment in today’s workforce. OECD (2019) Digital competence is now a requirement for participation in the global economy and no longer an option. Technology continues to change how we work across industries, and students need to develop competencies to make sense of digital environments, solve problems, and communicate effectively in a technological world.

Barriers and Challenges to Digital Competence

Digital competence is increasingly seen as necessary; however, there are considerable barriers to achieving it, especially in situations where there is limited access to digital technology and limited ability to learn how to use it. The digital divide, which can mean having no access to technology or your location not having access, is a key barrier to achieving digital competence (Helsper, 2021). In many areas, especially rural or impoverished areas, people have limited access to digital tools and the internet; limited access is a substantial barrier to developing digital skills.

Even in environments where people do have access to technology, there will be limited ability to access appropriate learning already structured to enable people to develop digital competencies; for instance, many places may have a few devices, but not enough to go around, with no training; therefore, despite technology being present, access to learning and knowing how to use it could be limited, and consequently not effective. Educators are no different when it comes to increasing their competence using technology, there may be limited professional development, limited digital infrastructure, and generally unwillingness to change motor habits (Zhao et al., 2020). The idea of digital competence is broad and multi-dimensional. It includes technical, cognitive, and ethical skills necessary to operate in a digital context. Digital competence has changed from basic computer literacy to a more urban understanding of when and how to critically engage, communicate and collaborate digitally, create digital media, stay safe, and problem-solve with technology. Digital competence is a criterion for all constituents of a digital society, and a transitory process that involves lifelong learning and an ever-evolving landscape of digital tools and practices.

Digital Divide: Meaning and Definitions

In the early 21st century, the concept of digital divide related to access and availability of the internet and digital devices. In the new phenomenon aspect of the digital divide, this concept is known as the multifaceted (Gorski, 2005) and multilevel (Van Deursen et al., 2017) in its nature and is recognised by cutting-edge societies. The digital divide occurs due to various factors like digital skills, digital competence, educational status, and socio-economic status, etc.

Here are several definitions of the *digital divide*, along with their references:

Graham (2019): The digital divide describes the disparities in access to digital technologies, particularly between the rich and poor, urban and rural areas, and between different regions of the world, leading to unequal opportunities in education, healthcare, and employment.

United Nations (2018): The digital divide refers to the gap between those who have or can afford access to modern information technologies and those who cannot due to economic, social, or other barriers. Further, in 2001, the OECD defined the digital divide as the differences between individuals, societies, communities, and occupations and countries in relation to the availability of ICT, access to these tools, uses of or knowledge and understanding of ICT.

OECD (2001): The digital divide refers to the disparity between individuals, communities, businesses, and countries in terms of their access to, use of, or knowledge of ICT. This divide hinders the potential to take full advantage of digital technologies for economic and social

development.

Digital Divide as a Reflection of Social Inequality

Newhagen and Bucy in 2004 outlined social inequalities between individuals who derive benefit from Internet access and those who are deprived of Internet availability and excluded from accessing advances in knowledge across the world. Digital divide is a relative term that has been developed as the knowledge base in relation to other inequalities that have been implicated in other divides has expanded. It includes access as well as the level of digital skill, motivation, and the way to use someone using internet to interact and develop digital content (Hargittai, 2001; Chen and Wellman, 2004; Goldfarb and Prince,2008). Van Dijk (2005), Selwyn (2006), and Willis and Tranter (2006) studied the digital divide produced by the internet, and other innovations have followed the existing division that lies among gender, class, and race. Witte and Mannon (2010) reflect in their study that the internet users' online behaviour is associated with the users' social, economic, and cultural aspects of personality, which they reflect in offline reality. In 2013, Pearce and Rice exhibited about the internet applications that differences found in personal attributes and social groups. Zhao, 2006 said about digital divide that it has multilevel dimensions, along with an endemic approach that conceptualizes the Internet as a magnifier of pre-existing social stratification. Thus, when equality in society disturb, the internet tries to amplify this approach (DiMaggio and Garip, 2012).

Digital Competence, Equity, and Social Inclusion

Report of Internet and Society (2023) revealed that 2.7 billion people remain deprived of being online; in other words, one-third of people are still not able to access internet facilities. This indicates that only about two-thirds of the population were able to benefit from the financial, educational, political, social, and health-related opportunities enabled by digital connectivity. Internet connectivity has diversified uses and functions that are transforming practices of inter-personal relations, social interaction and collective participation, and at the same time generating digital inequalities and exclusions that are the causes to generate digital social inequalities. Hence, it seems imperative to understand the factors related to the digital divide and increasing digital social inclusion. To enhance digital equality, need the spread digital skills among all the different socio-economic sectors of society. To meet the needs of an ever-changing society, various online education modes are ready to serve need-based educational facilities to the people who cannot go to school. The main purpose of this type of online learning material is to reduce the digital divide.

Challenges and Implications

Despite the advantages, the implementation of digital competence and innovations in educational systems can be challenged by elements within education, such as the digital divide, limited training, and resistance to change. To help address the challenges for innovations in education, systemic solutions must be put in place, including investment in infrastructural resources, professional development for educators and policies aimed at enabling equitable access to technology (Redecker, 2017).

Strategies to Mitigate the Digital Divide and Improve Digital Equity & Social Inclusion

- Long-term Infrastructure Advances with internet connectivity
- Community-Based Digital Literacy Short-Term Program
- Collaborative Program with affiliated colleges
- Partnership with Industry and academia to develop resources and connectivity
- Develop short-term need-based digital skill programs

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An Analytical Study on the Effect of Price Changes in Gold on Investment

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ABSTRACT

Gold is the most valuable asset and preferred investment by individuals as it preserves and protects wealth. It is considered as a safe haven investment as price of gold is usually negatively correlated to the stock markets and gold often rises when other markets fall. There are different metals of which gold is placed in high regard as an investment and is one of the most preferred investments in India which can be purchased in a variety of ways, including jewelry, coins, bars, gold exchange-traded funds, gold funds, and sovereign gold bond schemes. Gold represents a versatile investment proposition due to its dual nature as both a consumer good and an investment asset which allows it to provide effective diversification in times of financial turmoil. Gold is often considered to act as a hedge against market volatility as it has low correlation with equity. and introducing gold into one's portfolio can potentially reduce overall volatility, providing a more stable path towards achieving your financial objectives. It cannot be printed like currency or created out of thin air. Its scarcity and permanence have made it a hedge against currency devaluation or inflation and economic instability. Gold is tangible, highly liquidity across global markets and is universally recognized as valuable regardless of political or economic conditions. Its value tends to rise when confidence in other financial assets declines, particularly during periods of high inflation, economic uncertainty, or geopolitical instability. The year 2025 has witnessed upsurge due to economic conditions, geopolitical tensions, inflation rate, weakening of the currency and Central bank monetary policies. The paper focuses on identifying patterns & indicators that precede short term price movements, short term fluctuations in gold price which will provide insights for short term investors and traders on gold. The fluctuations in gold price has an impact on the middle class in their perceptions of their social status, savings decisions, investment decisions and wealth ownership. Traditionally gold is viewed as a safe financial asset and saving tool which provides pride especially in rituals, marriages, child birth occasions in families and dowries which has led to continuous demand even in the face of rising prices.

KEY WORDS: Asset, Diversification, Hedge, Liquidity and Wealth.

INTRODUCTION

In Indian culture, gold has been regarded with great respect and represents riches, prosperity and tradition in addition to its practical uses. With its timeless appeal firmly established in society. Gold plays a significant role in Indian culture and the country's economy through customs and religious ceremonies. However, there has been a noticeable price increase in the Indian gold market recently, drawing attention and raising concerns. From individual consumers to investors and governments, this spike in gold prices has important decision for all parties involved. Navigating this phenomenon's ramifications successfully requires an understanding of the fundamental causes.

LITERATURE REVIEW

Baur and McDermott (2010)[1] demonstrated that gold tends to maintain or increase its value during periods of market turmoil. Their study revealed a consistent negative correlation between gold and equity markets during times of financial stress, highlighting gold's role as a safe-haven asset. As such, gold provides diversification benefits and contributes to the reduction of overall portfolio risk in volatile market conditions.

Baur and Lucey (2010)[2] highlighted gold's distinct investment characteristics by differentiating between a hedge and a safe haven. According to their definition, a hedge maintains a consistently negative correlation with other assets under normal market conditions, whereas a safe haven exhibits this negative correlation specifically during periods of extreme market stress.

Shafiee and Topal (2010)[3] looked at the long-term factors that has an impact on gold prices, they discovered that inflation, interest rates, oil prices, and currency fluctuations had a big impact on how much gold was worth. According to their findings, gold prices increase when actual Interest rates decline as investors look for yield-preserving options, and they also serve as a hedge against currency devaluation when inflation is predicted to rise.

According to the World Gold Council (2022)[4], the middle class's desire for gold has significantly decreased due to dramatic rise in prices over the previous ten years, particularly in semi-urban and rural areas. An approach towards priced financial assets, including regular deposits, modest savings plans, or even digital gold investments when they become available, frequently coincides with this fall.

Kapoor and Aggarwal (2020)[5] demonstrated that urban middle-income households in India possess a disproportionately large portion of their wealth in gold and real estate, frequently at the cost of more liquid and productive assets such as equity mutual funds. This tendency is indicative

of both a lack of trust in formal financial systems and a cultural inclination towards physical assets. Additionally, financial literacy is a vital factor and households with financial literacy are generally better at diversifying their investments, utilizing options like gold ETFs or sovereign gold bonds instead of physical gold.

OBJECTIVES

1.To understand the importance of gold as an investment avenue

2.To identify reasons for changes in gold prices

3.To analyse the impact of gold price fluctuations on customers buying behaviour

4.To provide an insight for short term investors and traders on gold

5.To assess the value of gold which is important for availing loans

RESEARCH METHODOLOGY

Data is collected from primary and secondary sources.

Primary Data is collected through a well-structured questionnaire which is administered to 50 respondents

Secondary Data is collected from research articles and websites.

HYPOTHESIS

H0: There is a rapid change in Gold Price

H0: Customers are interested to invest in gold

H0: Customers are getting loans on gold

RESEARCH DESIGN

The study is descriptive and analytical in nature.

SAMPLING TECHNIQUE

A simple random technique is used for collecting data and is analysed using SPSS using correlation analysis.

SAMPLE SIZE

Responses are collected from 50 respondents.

FACTORS INFLUENCING GOLD PRICE MOVEMENTS

1.EXCHANGE RATE:

The price of a country's currency in relation to another currency is known as the exchange rate. It is observed that dollar's value rises in relation to other global currencies, the price of gold tends to decline in terms of US dollars, as a result of gold's increased value in foreign currencies. The US

dollar's exchange rate has a significant impact on the price of gold in India. The price of gold fluctuates in response to changes in the value of the US dollar.

2.Interest Rate

There is a negative correlation between real interest rates and the valuation of gold where cost of incorporating gold into an investment portfolio is comparatively elevated when real interest rates are high, and conversely, it becomes relatively inexpensive when real interest rates are low. Consequently, as interest rates ascend, so too do the associated carrying costs. Nevertheless, the nature of this relationship is not linear. The prices of gold tend to exhibit significant increases predominantly during periods characterized by negative real interest rates.

3.**Silver Prices**

The prices of gold and silver exhibit a correlation with various commodity prices, including the global oil benchmark and the overarching trend of global inflation. The valuation of silver tends to increase in response to trade and growth disparities relative to the United States. Furthermore, the prices of silver ascend concomitantly with declining real interest rates. The prices of both precious metals increasetandem with economic advancements observed within emerging markets. Consequently, a direct relationship is established between the prices of silver and gold.

4.**Economic Implications**

Rise in gold prices has extensive consequences for numerous segments of the Indian economy, encompassing jewelry, retail, and exports. Mishra and Das (2020) evaluate the broader economic ramifications of escalating gold prices, underlining its impact on consumer expenditure, inflation rates, and trade balances. Furthermore, Chopra et al. (2020) investigate the sectoral repercussions of gold price variations, emphasizing the difficulties encountered by industries dependent on gold as a fundamental material.

5.Market Speculation

Investor behavior and speculative trading often create fluctuations in the price of the gold market. Dutta and Bose (2020) Analyze the impact of market speculation on gold prices. Highlighting the role of investor sentiment and collective behavior in improving modifications in cost. Furthermore, Agarwal and Jain (2021) discuss the prevalence of speculative trading techniques. in gold trading and how they influence the efficiency of the market.

DATA ANALYSIS AND INTERPRETATION

H01: There is a rapid change in Gold Price

Correlations			
		position	fastchanges
position	Pearson Correlation	1	.846
	Sig. (2-tailed)		.051
	N	50	50
fastchanges	Pearson Correlation	.846	1
	Sig. (2-tailed)	.051	
	N	50	50

In the above table position indicates gold prices, fast changes indicate rapid changes

CORRELATION VALUE r=0.846 is close to 1 it means that there is a strong correlation between gold prices and fast changes.

sig. (2-tailed value) =0.051 is equals to 0.5 then we can conclude that there is no significant difference between gold price and fast changes.

Hence null hypothesis is accepted

H02: Customers are interested to invest in gold

Correlations			
		position	investing
position	Pearson Correlation	1	.802*
	Sig. (2-tailed)		.049
	N	50	50
investing	Pearson Correlation	.802*	1
	Sig. (2-tailed)	.049	
	N	50	50
*. Correlation is significant at the 0.05 level (2-tailed).			

In the above table, position=gold prices, investing=funding in gold

CORRELATION VALUE r=0.802 is close to 1 it means that there is a strong correlation between gold prices and investment.

sig. (2-tailed value) =0.049 is less than 0.5 then we can conclude that there is no significant difference between gold price and investment.

Hence null hypothesis is accepted

H03: Customers are getting loans on gold

Correlations

		position	loan
position	Pearson Correlation	1	.985*
	Sig. (2-tailed)		.052
	N	50	50
loan	Pearson Correlation	.985*	1
	Sig. (2-tailed)	.052	
	N	50	50

*. Correlation is significant at the 0.05 level (2-tailed).

In the above table, position = gold prices, loan = amount on gold for interest

CORRELATION VALUE, r=0.985 is close to 1 it means that there is a strong correlation between gold prices and gold loan.

sig. (2-tailed value) =0.49 is less than or equals to 0.5 then we can conclude that there is no significant difference between gold price and gold loans

Hence null hypothesis is accepted

FINDINGS

From the study carried the finding are as follows

- 40% of the respondents are females and 60% respondents are males aged between 21-35 years who are private employees and businessmen.
- Most of them have opined that they monitor changes in gold prices occasionally.
- 84% respondents have opined that rapid change in gold price influences investment decision.
- It is found from the study that inflation is the main reason behind fluctuations in gold prices
- 78% of the respondents have opined that rapid changes in gold has created positive impact in gold as an investment
- Most of the have opined that investment in gold is for long period of time

- The major factor influencing the decision to invest in gold is because of market trends, i.e. 72% responded for the same
- 73% have opined that they prefer a gold loan over a personal loan in times of urgent needs.

CONCLUSION

The surge in gold prices in India is a multifaceted phenomenon shaped by economic, geopolitical, and socio-cultural factors. India's financial environment still depends heavily on gold both commercially and culturally. The study demonstrates that a variety of national factors influence changes in gold prices. A better grasp of the factors influencing gold prices is essential as India shifts to more formal and digital investing channels. From the study we conclude that irrespective of rapid changes in gold prices, there is a huge demand for investing in gold, which is considered as a valuable investment opportunity.

SUGGESTIONS

It is suggested that gold is a safe liquid asset that yields profits for future savings and it's easy to obtain loan on gold during an emergency.

SCOPE FOR FUTURE RESEARCH

- Further study can be done on the impact of interest rate announcements, inflation reports and geopolitical tensions that influence short-term movements.
- An analysis of intraday volatility patterns in gold prices can be done
- Investor sentiment analytics by applying social media and news sentiment mining to predict hourly or daily gold price changes.

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Predicting Online News Reader Satisfaction: The Role of Age and Education – A Review

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Abstract

Objectives: The shift to digital news platforms has transformed news consumption, necessitating an understanding of the factors that influence reader satisfaction. With the rapid advancement of digital media, readers are increasingly accessing news through various online platforms, each offering unique formats and experiences. Among the many factors shaping this behaviour, age and education have emerged as critical determinants. Younger readers tend to prefer visually rich, fast-paced content, while older audiences value credibility and structured reporting. Similarly, highly educated individuals seek in-depth, fact-based news, whereas those with lower educational attainment Favor concise and easily digestible formats. This review aims to provide a comprehensive overview of how age and educational background affect online news satisfaction. Methods: This paper synthesizes findings from existing research examining the relationship between age, education, and online news consumption habits. It draws on studies that investigate demographic influences on reader preferences, content engagement, and satisfaction, focusing specifically on how different segments of the population interact with and respond to digital news formats. Results: The review identifies clear patterns in preferences. Younger readers Favor interactive, visually engaging formats, while older readers prefer depth, reliability, and traditional reporting structures. Higher education levels are associated with a preference for detailed, fact-based content, whereas lower education levels align with the demand for clear, concise, and accessible news. Conclusions: By highlighting these patterns, the study underscores the need for personalised and inclusive digital news strategies that cater to the varied requirements of diverse audience segments, thereby enhancing overall engagement and satisfaction.

Keywords: Online News Consumption, Reader Satisfaction, Age, Education, Digital Media, News Platforms

1. INTRODUCTION

1.1 Background

The evolution of news consumption has been significantly influenced by advancements in technology. From traditional newspapers to mobile apps and social media, the way readers access news has transformed over the decades. Understanding the definition, and eras of online news consumption provides a clearer perspective on how the digital age has reshaped information dissemination.

DEFINITION

Online news consumption refers to the act of accessing news content through internet-enabled platforms such as websites, mobile applications, and social media channels. It allows real-time updates, interactive features, and diverse viewpoints, enhancing reader engagement beyond the limitations of traditional print media.

The transition from traditional to online news consumption marks a significant transformation in media consumption patterns. With the proliferation of smartphones and internet accessibility, online platforms have become the primary source of news for diverse audiences. Online news consumption has transformed how audiences' access and engage with information.

1.2 Purpose

This study investigates how age and education serve as predictors of news reader satisfaction in the digital landscape. Age and education are pivotal demographic factors influencing how individuals engage with and derive satisfaction from online news. These predictors shape varying user needs and preferences in their interactions with digital platforms. They also influence the choice of news sources, the format in which information is consumed, and the level of trust placed in different media outlets. Understanding these relationships is essential for developing strategies that effectively address the expectations of diverse audience segments.

1.3 Outline-

The following sections examine age-related differences, the influence of education, technological fluency, personalization in news consumption, and implications for digital media strategies.

1.3.1 Era of Online News Consumption

- Emergence of Desktop Websites (1990s - Early 2000s): Newspapers launched their online editions; readers started shifting to desktop-based news consumption.

- Mobile Revolution (Late 2000s - 2010s): Rise of smartphones and dedicated news apps enabled instant, portable news access anytime, anywhere.
- Social media (2010s - Present): Platforms like Facebook, Twitter (X), Instagram, and YouTube became prominent sources of news, allowing real-time sharing, audience participation and reach.

The evolution of news consumption has undergone substantial changes in recent years, largely driven by the rapid advancements in digital technologies and the rise of social media platforms. These developments have not only altered the speed at which information is shared but have also reshaped the formats, styles, and channels through which audiences access news. Several studies have examined how these technological shifts are reshaping the landscape of news consumption, particularly in terms of audience preferences, engagement, and satisfaction. With digital tools enabling instant updates and multimedia-rich formats, audiences now expect content that is timely, visually appealing, and easy to navigate. Research by Ihlstrom Eriksson (2007) underscores that younger audiences, particularly those under the age of 35, show a preference for visually rich formats such as videos and interactive infographics. Such formats significantly enhance engagement and accessibility, catering to the habits of a generation accustomed to consuming information quickly and in a visually stimulating manner. In contrast, older generations tend to value traditional journalistic practices, emphasizing credibility, structure, and in-depth reporting, as highlighted by Shah (2010). For them, the reliability of the source and the thoroughness of the reporting remain primary factors in their news consumption choices.

The role of education in shaping news consumption habits has been extensively studied. Zhang, Ko, and Carpenter (2016) found that highly educated individuals gravitate toward fact-based, detailed news content that satisfies their intellectual curiosity. They often prefer long-form articles and analytical reporting that provide comprehensive coverage. On the other hand, Tewari (2016) noted that less-educated audiences prefer concise, easily digestible news formats, often relying on short summaries or brief updates that deliver essential facts without excessive detail. These insights reveal that age and education are key determinants of satisfaction in online news consumption, with digital literacy playing a significant role in shaping preferences for content format, complexity, and platform choice.

Education not only influences the type of content preferred but also affects the level of critical engagement readers bring to news consumption. Highly educated individuals tend to seek out multiple sources to verify information and appreciate nuanced perspectives that challenge

simplistic narratives. They are more likely to question biases and demand transparency from news outlets. Conversely, less-educated audiences may prioritize accessibility and clarity over depth, favoring straightforward language and visually engaging elements such as infographics and bullet points. Recognizing these varied needs is essential for news platforms aiming to design content that appeals to a diverse audience, ensuring both inclusivity and satisfaction across educational backgrounds.

1.3.2 Age and Its Impact on News Consumption Habits

Age plays a crucial role in determining the way individuals consume news. Differences in exposure to technology, comfort with digital tools, and preferences for content presentation often align closely with generational divides. Younger generations, particularly Millennials and Gen Z, are digital natives who have grown up with technology and the internet forming an integral part of their daily lives. From an early age, they have been accustomed to accessing information on multiple devices, switching seamlessly between platforms, and engaging with content in interactive formats. As Ihlstrom Eriksson (2007) found, these younger audiences are more likely to engage with visually rich formats such as videos, interactive infographics, and other multimedia elements that make the information more dynamic and appealing. They are accustomed to fast-paced information delivery and expect content that is not only accessible but also engaging, entertaining, and visually stimulating. Lesitaokana (2014) noted that social media has become a primary news source for this demographic, offering immediacy, convenience, and a highly personalized experience that traditional news platforms often struggle to provide. Social media also allows for a two-way interaction, enabling younger readers to comment, share, and respond instantly, making news consumption more participatory.

On the other hand, older generations tend to Favor traditional news formats that emphasize credibility, structure, and depth. Shah (2010) observed that older news consumers place high value on the journalistic integrity of established media outlets, preferring in-depth, structured reporting that provides comprehensive coverage. This preference is partly rooted in the trust they have developed in traditional news organizations over many years. Older consumers also prioritize stability and reliability in the content they consume, often choosing platforms that offer these qualities over the more dynamic, sometimes unverified content available on social media. Furthermore, age is often correlated with digital literacy, which influences how individuals navigate and assess online news platforms. Research has shown that younger, more digitally literate individuals are more adept at using online platforms to access news efficiently

and critically, while older, less tech-savvy users may find it challenging to adapt to the complexities of modern digital news outlets.

This generational divide in digital literacy highlights the need for news platforms to adapt their content delivery, design, and user interface to cater to the needs of a broad spectrum of age groups. This gap in digital literacy also affects the ways in which different age groups evaluate the credibility of news sources. Older adults, relying on their experience with traditional media, tend to trust established news brands and are more cautious about unfamiliar or user-generated content. In contrast, younger users, though more comfortable navigating digital platforms, often face challenges in distinguishing between reliable information and misinformation, given the vast amount of content available online. Therefore, it becomes essential for news platforms to implement clear verification markers, intuitive layouts, and educational tools that assist users across age groups in making informed judgments. By addressing these usability and trust factors, platforms can bridge the generational divide and foster a more inclusive news environment.

1.3.3 Education and Its Influence on News Consumption

Education is another significant factor shaping news consumption habits, as it often determines the depth of content preferred, the level of analysis sought, and the trust placed in various sources. Zhang, Ko, and Carpenter (2016) found that individuals with higher levels of education tend to prioritize detailed, fact-based news reporting that presents well-researched information and avoids unnecessary sensationalism. These individuals often seek out news that satisfies their intellectual curiosity, preferring content that offers in-depth analysis, multiple perspectives, and supporting evidence. They value reporting that explains context and background, enabling them to form informed opinions about complex issues. This preference for intellectual content is reflected in the types of news platforms they choose, which often include online versions of traditional newspapers and established digital outlets that uphold high journalistic standards. Such platforms typically deliver comprehensive coverage, factual accuracy, and clear sourcing, which align with the expectations of this audience. In contrast, less-educated audiences may prefer simpler, more digestible news formats that prioritize clarity, brevity, and ease of understanding. Tewari (2016) found that individuals with lower levels of education tend to Favor concise news articles that provide straightforward, easily accessible information without requiring extensive prior knowledge of the topic. These audiences are less likely to engage with long-form content or detailed investigative pieces and are instead drawn to short summaries, headlines, or brief reports that quickly convey the

essential points. Visual aids such as infographics, charts, and images are also highly valued in this segment, as they simplify complex information and make it easier to interpret.

Educational attainment also plays a decisive role in how individuals assess the credibility of news sources. As higher-educated individuals are more likely to critically evaluate the information they encounter, they demand content that is fact-checked, sourced from reputable outlets, and free from overt bias. They are often sceptical of unverified information found on social media or lesser-known online platforms. This emphasis on credibility can directly influence their overall satisfaction with online news, as they are more likely to abandon platforms that fail to meet their standards of journalistic integrity and reliability.

Audiences with lower educational attainment may rely more heavily on familiar or easily accessible news sources, placing trust in platforms that present information clearly and without complexity. This group may also be more susceptible to misinformation if the content appears convincing or emotionally appealing, highlighting the importance of media literacy initiatives tailored to their needs. News platforms that recognize these differences can enhance satisfaction by offering diverse formats and trust-building features, such as transparent sourcing and fact-checking indicators. Ultimately, understanding the interplay between education and news consumption habits allows media organizations to better serve their audiences through targeted content strategies and thoughtful design.

1.3.4 Technological Fluency and Its Role in News Consumption

Technological fluency, or digital literacy, is a key factor influencing how individuals consume news in the digital age. It refers to the ability to effectively use digital tools, navigate online platforms, evaluate the credibility of information, and adapt to new technological changes. The rise of social media platforms, mobile applications, and personalized news feeds has created a new paradigm for news consumption, where information is no longer accessed solely through fixed schedules or traditional outlets but is available instantly, in multiple formats, and across a variety of devices. Younger, more digitally literate individuals are adept at navigating these platforms with ease. They understand how to use algorithms, search functions, and filters to find news that aligns with their interests and preferences. This group is also comfortable managing multiple sources at once, often switching between apps, websites, and social feeds within a short period of time. They are more likely to engage with multimedia content such as videos, podcasts, and interactive infographics, which offer a more dynamic and immersive news experience compared to text-only reporting. Such formats allow them to consume

complex information quickly and in a visually engaging manner, fitting well with their fast-paced information habits.

Yadamsuren (2011) highlighted that social media is a primary news source for younger readers, offering immediacy and convenience that traditional platforms cannot match. These platforms provide users with a constant stream of news updates, ensuring they can stay informed in real time. Furthermore, social media enables active participation by allowing users to interact with news content through likes, shares, and comments, as well as join discussions and debates. This interactivity fosters a sense of involvement and personal connection to the news, which is a key feature appealing to younger generations. Older individuals who are less familiar with digital technologies may have difficulty navigating these modern platforms. Many in this demographic rely on traditional news outlets such as television, newspapers, and radio as their primary sources of information. These channels tend to offer a more passive news consumption experience, where audiences receive the information as it is presented without opportunities for customization or interaction. This lack of interactivity can contribute to lower satisfaction levels among older consumers, who may feel disconnected from the rapidly evolving digital news environment. The gap in digital literacy between younger and older generations highlights the importance for news platforms to create accessible, user-friendly designs and provide clear guidance, so that people across all age groups can engage meaningfully with online news content.

1.3.5 The Role of Personalization in News Consumption

Personalization is an increasingly important aspect of news consumption in the digital age, reflecting a significant shift from the one-size-fits-all approach of traditional media toward more individualized content delivery. With the advent of algorithms that track user behaviour, browsing patterns, and preferences, news platforms can now deliver content tailored to each user's specific interests. These algorithms analyse a range of data points including the types of articles clicked, the amount of time spent on certain topics, and even the engagement patterns on social media to curate a news feed that feels directly relevant to the individual reader. This level of personalization has become a key driver of user engagement, particularly for younger, tech-savvy audiences who have grown up with customized online experiences. For these users, having news content that aligns closely with their preferences is not just a convenience but an expectation. Ihlstrom Eriksson (2007) emphasized that younger audiences are particularly drawn to platforms offering personalized content, as these platforms provide a more relevant

and engaging news experience, often increasing the likelihood of repeat visits and longer interaction times.

However, the growing influence of personalization also raises concerns about the potential creation of "filter bubbles." In such scenarios, users are primarily exposed to news that reinforces their existing beliefs and opinions, limiting exposure to alternative viewpoints. This narrowing of perspectives can lead to the polarization of news consumption, where individuals become more entrenched in their current views and less open to differing opinions. Bennett (2013) found that older individuals, who tend to prefer more traditional and broad-based news formats, may be less inclined to engage with heavily personalized content. Instead, they may prioritize platforms that offer a more objective and comprehensive view of the news, ensuring they are exposed to a wider range of topics and perspectives.

The impact of personalization on news consumption satisfaction is multifaceted and can be both positive and negative. On one hand, personalized content can significantly enhance user satisfaction by delivering stories that resonate with personal interests, hobbies, professional fields, or social concerns. This relevance often encourages deeper engagement, as readers feel the content is directly speaking to their needs and preferences. On the other hand, if personalization becomes too narrow or overly reliant on predictive algorithms, it may lead to repetitive content, reduced exposure to new ideas, and even a perception of bias.

Such perceptions can undermine trust in the news source, especially if audiences begin to feel that important stories are being omitted or that their news feed is being manipulated for engagement rather than informed discourse. Therefore, news platforms must strike a delicate balance between personalization and objectivity. Offering customization options such as the ability to adjust topics of interest, include opposing viewpoints, or access broader coverage can help maintain user trust. Ultimately, while personalization can be a powerful tool for improving satisfaction and loyalty, its success depends on maintaining editorial integrity and ensuring that audiences continue to receive a balanced, diverse, and trustworthy flow of information.

2. Discussion - Summary, Comparison and Synthesis

The consumption of online news is influenced by a variety of demographic and technological factors. Among these, age and education stand out as key predictors shaping how readers engage with digital content. Understanding these influences is crucial for news platforms aiming to improve user satisfaction and maintain long-term engagement. This discussion explores the role of these factors in shaping news consumption behaviours and preferences.

To systematically analyse these findings, the discussion is divided into three parts: Summary, Comparison, and Synthesis. The Summary section reviews the primary observations about how different age and education groups consume news online. The Comparison section contrasts the behaviours and expectations of these groups, highlighting the challenges faced by online news platforms. Finally, the Synthesis section integrates insights from technological advancements and trust-building strategies to propose directions for future online news delivery.

2.1 Summary

By understanding the critical factors influencing online news consumption, platforms can develop more effective strategies to engage readers and enhance satisfaction. Among these factors, age and education stand out as central predictors of the preferences and behaviours of online news readers. Younger audiences, who are more digitally fluent, tend to gravitate towards interactive and visually rich content, such as videos and infographics. These formats enhance the overall user experience by catering to their preference for fast-paced, dynamic, and personalized news. Young readers are used to immediate access and rich multimedia, which aligns well with their consumption habits shaped by social media and mobile platforms. On the other hand, older, more educated readers often place a higher value on credibility and in-depth content. For this group, the reliability and trustworthiness of the news source are paramount, and they prefer well-researched articles that offer detailed insights into current affairs and complex issues. The interplay between age and education further shapes reader expectations, creating distinct patterns: younger readers tend to be driven by social media as a primary news source due to its immediacy and convenience, whereas older generations continue to rely on traditional news outlets that provide factual accuracy and comprehensive coverage.

These demographic differences highlight the importance of audience segmentation. Platforms need to recognize that a one-size-fits-all approach may no longer suffice. Instead, news platforms must adapt to the diverse needs of their audiences, tailoring their offerings to match the preferences of different groups. This can include offering both quick, visually engaging content to attract younger, digitally savvy users, while simultaneously providing more comprehensive, fact-checked articles to satisfy older, more educated readers. The ability to successfully cater to both groups is crucial for ensuring user satisfaction and fostering long-term engagement.

2.2 Comparison

For online news platforms, the role of education in shaping news consumption is particularly significant. Educated readers tend to have higher expectations regarding the depth and accuracy of news content. They generally prefer articles that are well-researched, provide comprehensive analysis of issues, and present multiple perspectives to allow for critical evaluation. For these readers, the credibility of the news platform plays a critical role in determining satisfaction. Platforms that emphasize fact-checking, transparent reporting, and in-depth coverage are more likely to retain a loyal following among this group.

In contrast, less-educated readers often look for news that is concise and easily digestible, presenting essential facts in a clear and simple format. These readers prioritize accessibility and simplicity, and platforms that deliver content in an easy-to-understand manner, supported by visual aids such as infographics and summaries, tend to achieve higher engagement levels with this segment. The use of simplified language, bullet points, and visually appealing elements enhances the reading experience for these individuals, making news consumption more engaging and satisfying.

Comparing these two groups shows the challenge news platforms face: they must strike a balance between depth and accessibility, catering to a spectrum of educational backgrounds. Younger, educated readers may desire both dynamic presentation and thorough content, while older or less-educated audiences may prioritize clarity and trustworthiness over interactivity. Therefore, platforms must avoid a uniform approach and instead develop flexible strategies that accommodate varying preferences. By doing so, they can create a more inclusive environment that maximizes reach and engagement across demographics.

2.3 Synthesis

The advancements in technology also play a significant role in shaping the future of online news. As more platforms embrace artificial intelligence (AI), machine learning, and big data analytics, they will be better equipped to understand the preferences of their audiences and tailor content accordingly. AI technologies can help predict the types of news that resonate with different segments of readers, allowing for deeper personalization of the user experience. This level of customization not only improves reader satisfaction but also increases engagement and retention rates, as users are more likely to return to platforms that consistently deliver relevant content. The integration of multimedia elements such as podcasts, interactive articles, and live streams is becoming increasingly important. These features cater to the growing demand for diverse content formats, allowing platforms to appeal to a broader audience. Younger generations, in particular, expect more dynamic and engaging news

experiences, and platforms that incorporate such multimedia elements are more likely to stay ahead of competitors and retain user interest.

In addition to content customization, platforms must also prioritize User Interface (UI) and User Experience (UX) design**.** The ease of navigation, loading speed, and visual appeal of a platform significantly impact reader satisfaction. Platforms that are intuitive, easy to navigate, and optimized for mobile devices will likely retain users for longer periods. Considering that most online news consumption now occurs on mobile devices, ensuring a seamless experience across different screen sizes and devices is crucial for maintaining engagement. The role of trust in online news consumption cannot be overstated**.** In an age where misinformation and fake news proliferate across digital platforms, readers are becoming more cautious about the sources they trust. Building a reputation for credibility and reliability is essential for news platforms seeking to retain their audiences. This involves producing accurate and well-researched content while being transparent about sources and methodologies. News outlets that foster a sense of trust with their readers are more likely to see increased loyalty and engagement, which ultimately supports sustainable growth.

The intersection of demographic factors like age and education with technological advancements and user-centered design principles shapes the evolving landscape of online news consumption. Platforms that successfully combine trustworthiness, customization, and user-friendly design will be best positioned to meet the diverse needs of their audiences and ensure a thriving future in digital journalism.

3. Conclusion

The rapidly evolving media landscape demands that online news platforms continuously adapt to the changing behaviours and preferences of their readers. As digital consumption grows, platforms face the challenge of catering to a diverse audience segmented by age, education, and digital literacy. This study highlights that long-term success in online news delivery hinges on the ability to provide personalized, credible, and engaging content that meets the distinct needs of various demographic groups. Personalization is no longer a luxury but a necessity, enabling platforms to connect meaningfully with readers by offering tailored content that aligns with their preferences and expectations.

Credibility remains a cornerstone of user satisfaction. In an environment saturated with misinformation and fake news, readers place immense value on trustworthy sources and transparent reporting. Platforms that maintain high journalistic standards and foster user trust will likely retain loyal audiences. Moreover, the integration of multimedia content and

interactive features is becoming increasingly important in capturing the attention of digitally fluent users, particularly younger audiences who seek dynamic and diverse news formats. Advancements in artificial intelligence and machine learning offer unprecedented opportunities for platforms to refine content delivery and enhance the user experience. By leveraging these technologies, news outlets can anticipate reader needs, optimize engagement, and maintain a competitive edge. To thrive in this digital era, platforms must balance innovation with integrity, continuously evolving while upholding the principles that sustain reader trust and satisfaction.

3.1 Findings

The findings of this study underscore the complex relationship between demographic factors primarily age and education and online news consumption habits. Age significantly influences the formats and platforms preferred by news readers. Younger audiences, typically more digitally fluent, gravitate toward interactive and multimedia-rich content, favouring video segments, infographics, and social media updates. This preference reflects their desire for fast-paced, engaging, and easily accessible information. Conversely, older readers often value traditional news formats that emphasize credibility, detailed reporting, and comprehensive coverage. Their long-standing trust in established news outlets shapes their expectations for news content that is reliable and well-researched.

Education emerges as another critical determinant in shaping consumption patterns. Highly educated individuals tend to prefer in-depth articles, analytical reporting, and content that stimulates intellectual engagement. Their critical approach to news consumption drives a demand for accuracy, transparency, and diversity of perspectives. Less-educated readers, on the other hand, Favor concise and straightforward content presented in easily digestible formats. Visual aids such as bullet points, infographics, and summaries enhance the accessibility and appeal of news for this group. These contrasting preferences illustrate the necessity for news platforms to offer diversified content strategies that accommodate varying levels of knowledge and cognitive engagement.

Digital literacy also plays a pivotal role, intersecting with both age and education. Younger, tech-savvy readers navigate news platforms with ease, often using multiple sources to triangulate information. Older or less digitally literate users may struggle with complex interfaces and are more susceptible to misinformation, underscoring the importance of user-friendly design and trustworthy content verification. Overall, these findings highlight that a “one-size-fits-all” approach is no longer viable in digital journalism. Platforms that segment

their audience and tailor content accordingly are better positioned to enhance user satisfaction, build trust, and maintain engagement over time.

3.2 Implications

The implications of these findings for the future of online news platforms are multifaceted. Firstly, the growing demand for personalization reflects a fundamental shift in how audiences interact with news. Platforms must harness data analytics and artificial intelligence to deliver content that resonates with individual users based on their demographic profiles, interests, and consumption history. Personalization improves user experience by reducing information overload and presenting relevant stories, thereby increasing engagement and loyalty.

Secondly, the prominence of multimedia content and interactive features signals the need for platforms to innovate beyond traditional text-based articles. Younger readers especially expect dynamic formats such as podcasts, videos, and live streams. Integrating these elements can attract broader audiences and diversify revenue streams through advertising and subscriptions. However, platforms must balance innovation with accessibility, ensuring that multimedia content is inclusive and comprehensible to users across all education levels and age groups. Trust and credibility remain paramount. As misinformation proliferates, platforms must prioritize transparent editorial policies, fact-checking mechanisms, and clear sourcing. Building and maintaining trust requires consistent demonstration of journalistic integrity. Platforms that fail to do so risk alienating discerning readers, particularly those with higher education who are critical of biased or unreliable content.

Finally, the rise of mobile news consumption necessitates seamless user experience across devices. Optimizing UI/UX design for mobile platforms ensures accessibility and convenience, catering to the habits of modern readers who consume news on-the-go. This approach also supports inclusivity by accommodating users with varying levels of digital literacy. The future of online news depends on the strategic integration of personalization, multimedia innovation, credibility, and user-centric design. Platforms that embrace these elements thoughtfully will foster deeper engagement and cultivate enduring reader relationships.

3.3 Recommendations

To remain relevant and successful in the rapidly evolving digital news environment, online news platforms must focus on several key strategies. First, investing in advanced personalization technologies such as artificial intelligence and machine learning is essential. These tools allow platforms to analyse reader behaviour and preferences, enabling the delivery of tailored news content that resonates with individual users. Personalization not only

enhances user engagement but also helps reduce information overload by presenting relevant stories suited to each reader's interests. However, platforms should be cautious to maintain diversity in content and avoid reinforcing echo chambers by encouraging exposure to multiple perspectives.

In addition to personalization, diversifying content formats is vital to attract and retain a broad audience. Moving beyond traditional text-based articles to include videos, podcasts, infographics, and interactive features can make news consumption more dynamic and accessible. Multimedia content especially appeals to younger, digitally native audiences, but it must be designed thoughtfully to ensure clarity and ease of understanding for all users, including those with lower digital literacy.

Building and maintaining trust is another critical area. News platforms should uphold transparent editorial standards and implement rigorous fact-checking processes to ensure accuracy and reliability. Clearly citing sources and providing context around news stories helps readers evaluate credibility and develop confidence in the platform. Given the increasing spread of misinformation, actively combating false content and promoting media literacy among audiences will strengthen the relationship between platforms and their users.

Furthermore, prioritizing seamless mobile experiences is necessary as the majority of news consumption now occurs on smartphones. Platforms must optimize site speed, navigation, and visual design to create intuitive interfaces that work well across various devices. This focus on accessibility will accommodate users with varying levels of technical proficiency and support convenient on-the-go news access.

Finally, platforms should continuously engage with their audiences through feedback mechanisms such as surveys and usage analytics to monitor evolving preferences and satisfaction. This ongoing dialogue enables platforms to adapt their content strategies and technological features in response to user needs. By combining these approaches personalization, multimedia innovation, credibility, mobile optimization, and user engagement online news outlets can build lasting reader loyalty and thrive in an increasingly competitive digital media landscape.

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A Study on Students' Attitude Towards Science and Ability to Apply Science in Daily Life

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Abstract

Science education is a crucial component to shape the students' cognitive abilities, problem-solving skills, and capacity to apply scientific concepts in real-life situations. However, students' attitudes toward science significantly influence their learning outcomes and ability to transfer theoretical knowledge into practice. This paper investigates the correlation between secondary school students' attitudes toward science and their ability to apply scientific principles in daily life. Conducted at Government Senior Secondary School, Kiltan, Lakshadweep, the research employs a descriptive survey method, utilizing Science Attitude Scale and a Science Ability Test to assess the variables. Data analysis using Pearson's correlation coefficient reveals a strong positive relationship among students' attitudes and their practical application of science. This study findings highlight the need for an engaging curriculum, interactive teaching methodologies, and real-world applications to enhance scientific literacy. The study underscores the importance of fostering positive attitudes toward science to improve students' practical competency and recommends reforms in science education to facilitate the real–life application of the theoretical learning.

Keywords: Science Education, Students' Attitude, Secondary Education, learning Outcomes. Scientific Application

Introduction In the modern age science has emerged as a fundamental aspect of humankind, influencing multiple aspects of society, including education, technology, and industry. The relevance of science is particularly pronounced in modern educational curricula, where it is expected to enhance critical thinking, scientific literacy and problem-solving skills among students. The Kothari Commission emphasized that science education should not only impart knowledge but also enable students to apply scientific principles in practical contexts. The National Curriculum Framework-2023 also stresses the importance of linking science education with real-world applications. The importance of science has led it to be an important subject in school education also. To understand about the science education in schools, it is crucial to comprehend both the meaning and nature of science.

Science as a School Subject

From a utility aspect of science has made it to be an important subject in the school education. In education, for everybody, it is inevitable to teach science. There are specific definite values which can only be inculcated by science and not by any other school subject. Children by nature are curious to know more about everything they come across. They possess the innate urge to know more about the things around them and the whole universe also. Such an urge can be fulfilled when science is taught in a proper way in schools. Besides answering the curious questions of children, science education aims to develop the mental powers such as inquiry, experimenting, observing, hypothesizing, problem solving, critical thinking etc. among children. These will help children to improve knowledge, skills, good habits so that they can lead a secure, happy and progressive life. Teaching of science also helps to provide training in scientific methodology and helps to encourage scientific temperament among learners (Vinod Kumar Singh, Ajay Kumar Singh, Anita Giri, 2016). Most of the goals of general education can be attained by the teaching of science. By learning science, the students will acquire the knowledge of fundamental concepts of science. They will acquire the ability to apply this knowledge to new situations and to resolve the common problems of life. NCF-2023 emphasized on engaging the students in learning science as a composite discipline. systematically discovering and verifying the theoretical principles and analysing the issues surrounding the environment after their primary stage of schooling. This clearly highlights the practical application of theoretical knowledge of science in everyday scenario. Thus, Application of knowledge is one the main objectives of the pedagogy of science.

Meaning and Nature of Science

The word Science is derived from the Latin word “Scientia”, meaning knowledge. The implied meaning is that science is the body of knowledge (T. Sharon Raju, S. Vinil Kumar, 2023). But these theories, laws, principles and other knowledge given by science give us only a partial picture of science. The body of knowledge given by science helps in the process of comprehending our surroundings and the environment around us, which in turns leads to the updated expansion of knowledge in the field. Thus, knowledge keeps on going through refinement. According to Fitzpatrick (1960) "Science is a cumulative and endless series of observations which result in the formulation of concepts and theories being subjected to modification in the light of further empirical observations (Nisha Prajapati, 2021). Science is both a body of knowledge and a process of acquiring and refining knowledge". It can be summarized that science is a systematized body of knowledge, truth and organized common

sense, and a process of inquiry which undergoes continuous self-evaluation. The meaning of science implies science as both the process and product. The idea of science as a product insinuates that science encompasses all, the established facts, concepts, generalizations, principles, theories etc (T. Sharon Raju, S. Vinil Kumar, 2023). The products of science include the logical and technical outcomes of science. Science, when viewed as a process indicates that it derives the inferences from the interaction with experiences. Science as a process involves the methods and techniques used by scientists to conduct investigations and pursue knowledge (MUSTAFA CANSIZ, 2014). The procedures such as observation, collection of data, classification, analysis, synthesis and evaluation of data and their application to new situations, all comes under scientific process. Thus, the two aspects of science are interdependent and complementary to each other. They are the two sides of the same coin. While teaching science in schools both aspects should be given equal importance and consideration.

Objectives of Teaching Science

In school, Science education is expected to serve multiple purposes at secondary level. Teaching science includes the following key objectives (GULISTAN AHMED MOHAMMED ARTOSH, 2016):

- Development of Process Skills – Science helps in developing essential process skills such as observation, division, statement, measurement, estimation, and prediction. These skills enable students to analyse and understand the natural world systematically.
- Ability to establish Experiment based conclusions. – One of the main aims of science education is to encourage students to conduct experiments and draw logical conclusions from observations, fostering critical thinking.
- Development of a Scientific Attitude – Science education aims to develop a scientific attitude among students, enabling them to think logically, question assumptions, and make decisions based on evidence rather than beliefs or superstitions.
- Acquisition and Understanding of Knowledge – Teaching science ensures that students acquire fundamental scientific knowledge, allowing them to understand and explain natural phenomena.
- Development of Problem-Resolving and Investigation Competences –Science education enhances the students' ability to apply knowledge, find appropriate solution to problems and carry out investigations using scientific methods.

- Ability to Reach Generalizations and Apply Them in Daily Life –Through scientific learning, students develop the ability to generalize based on observations and then utilize their acquired knowledge to solve everyday life problems.
- Understanding the Interrelationship Between Science and Society – Science education highlights how scientific advancements impact society and human life, promoting awareness of how science contributes to progress and development.
- Fostering Creativity Leading to Innovations in Learning – One of the important goals is to encourage creativity among students, leading to innovations and discoveries in various fields of science.

The ability and the extent to which a student can develop these skills and attitudes determine the efficacy of science education. The goal is to enable students to apply scientific knowledge in their daily lives. All these objectives will be met only when the children possess a positive outlook towards the subject of science. Therefore, studying children's attitude towards science also becomes.

Attitude Towards Science

The primary aim of education is to mould the child's behaviour in accordance with the societal needs and expectations. Behaviour comprises of many aspects and attitude is one of the most important_aspects. One's attitude towards other persons, ideas, things, or objects in his environment largely determine one's behaviour. Attitude means the perspective to view psychological objects. Psychological objects refer to any person, symbol, phrase, ideal, idea or institution towards which people can have varying notions based on their positive and negative effects. There is always an inclination to favour or disfavour certain types of objects. Thurstone defined attitude as, "The sum total of man's inclinations, feelings, prejudice or bias, preconceived notions, ideas, fears, threats and convictions about any specific topic." (LALMUANZUALI, 2019) Attitudes are not inborn traits. The attitude develops gradually over time. The attitudes vary in duration, with some being lasting and others being transient. Various factors influence the formation of attitude. These are within an individual or external to the individual. The factors within the individual are physical growth and development, intellectual development, ethical and moral development. External are home, family and social environment. Attitudes appear as the vital components of the education system. Children have favourable and unfavourable attitude towards different subjects. It may be far or against the subject. This shows that attitude of students differs according to their liking or disliking for the subject. The pupils who have more liking for the subject have favourable attitude towards it,

while pupils dislike the subject will have unfavourable attitude towards it. We can say that children's attitude towards science is their degree of positive or negative feelings towards the science subject. Since attitudes are not inborn, the child can develop his/her own attitude towards science subject upon learning it and can develop a willingness to approve or dismiss the science subject. Since attitudes develop over time through a gradual process at secondary stage, teachers as external can develop an optimistic perspective on science among the children. The various ways of teaching science used by the teachers, the methods they employ for teaching the science subject, their interaction style in the classroom may influence to a greater extent to develop an attitude towards science among the children. As far as possible the teachers should make the science learning interesting in the classrooms by employing various strategies so that the children develop a favourable attitude towards science. "Practically all knowledge can be found in books and libraries. Unlike other animals that must start a new with each generation, man builds upon the accumulated and researched knowledge of the past."-John W. Best.

Need and Significance of the Study

- It examines whether students can apply their science education in practical situations.
- It assesses the influence of attitude on scientific ability.
- It provides insights into improving the secondary level science education.

Statement of the Problem

It was found in review that very few studies were done on the students' ability to apply science in everyday life, although attitude to science was a major variable in several studies. The application of science in everyday life is an important outcome of learning science which needs a lot of studies. By the review, the investigator found out that there were studies on the problem-solving ability of children in science. But the investigator could find hardly few studies about daily life application of science. There seemed to be a gap in the research. Hence it was decided that this important outcome of science should be studied together with another important variable, attitude towards science. The review of the previous literatures gave the investigator an idea how to carry out the present study. The knowledge gained by those studies helped the investigator in carrying out further study. It also helped the investigator to decide the tools to facilitate the study.

Research Question

1. What is the relationship between the attitude of students toward science and their competency in the application of science in real life?

Research Objective

1. To find out the relation between the attitude of students toward science and their ability to apply science in daily life.

Hypothesis

- The attitudes of students towards science and their ability to employ science showcase a significant relation.

Operational Definitions

- **Ability to apply science in daily life**- refers to application of classroom theoretical knowledge in their real life to avoid misconceptions and to solve problems in a scientific manner.
- **Attitude towards science**- refers to students' psychological likes and dislikes, feeling, hope towards learning and usefulness of science.

Delimitations

- The area of the study is bounded by the secondary school students at Government Senior Secondary School, Kiltan, Lakshadweep.

2 Review of Literature

(Abd-El-Khalick, Lederman, 2000) The study examined that the application of science as well as the students' understanding of the nature of science have been influenced by the history of science courses. It found that incorporating historical perspectives in science education assists students to acquire a more accurate and comprehensive understanding of scientific knowledge, its development, and its application. The study emphasizes the importance of historical context in fostering the ability to apply science.

(R Justi & Gilbert, 2002) This study explored the outlook of teachers towards the nature of scientific modelling and its effect on education of science. Modelling involves the construction of representations to describe and give prediction of the scientific phenomenon, which is a key aspect of applying science. The study provides insights into teachers' understanding of modelling and offers implications for developing students' modelling skills, thereby enhancing their ability to apply science.

(Hofstein, V N Lunetta, 2004) This study examined the function of laboratory experiences in education of science and their contribution to the competency to apply science. It discussed the importance of designing laboratory activities that promote inquiry, critical thinking, and problem-solving skills. The study provides recommendations to optimize the ability of the student for the effective application of science.

(Ahmed, 2007)This was a descriptive study, and it was conducted in Bangalore. He found out that the academic success of students is highly influenced by the scientific aptitude and scientific attitude.

(D F Treagust, Duit, 2008) This study examined conceptual change in science education, which involves students revising their existing understandings and developing new conceptions. It discusses the challenges and implications of conceptual change for the ability to apply science. The study emphasizes the need for instructional approaches that address students' preconceptions and support the development of scientifically accurate and applicable knowledge.

(UÇAR, 2024) This study focused on developing the ability of applying the concepts of science through project-based learning among Indian Secondary school students. It implemented a project-based learning intervention and assessed students' performance in applying science concepts. This study findings revealed that project-based learning substantially improved students' ability to apply science concepts and fostered their critical thinking, problem-resolving and collaboration skills.

(Ramesh, 2014) In this paper explored the relationship between science procedure skills such as observing, reasoning, and predicting in addition scientific reasoning skills such as analysing data, making inferences, and drawing conclusions among university students. The findings demonstrated a positive linkage between science process skills and scientific reasoning skills, indicating that a strong foundation in science process skills contributes to the enhanced ability in effective application of science.

(Saxena, 1985) This cross-sectional study examined the ability of Indian secondary school students to apply science concepts. It assessed students' performance in applying science concepts through multiple-choice questions and open-unrestricted tasks. The findings revealed that applying science concepts in real-life situations is a challenge for students and further identified that factors such as prior knowledge, problem-solving skills, and conceptual understanding influence their ability to apply science.

Shinde, N. V., & Chougule, S. N. (2018). Enhancing the ability to apply science concepts through concept cartoons: A study with Indian primary school students. This study examined the effectiveness of concept cartoons in enhancing the ability to apply science concepts among Indian primary school students. It implemented concept cartoons as a teaching strategy and assessed students' performance in applying science concepts. The Findings indicated that

concept cartoons significantly improved students' ability to apply science concepts and facilitated their understanding of complex scientific ideas.

(Maya El Chaabi, Rayya Younes, 2025) This study explores the impact of science learning through digital storytelling on students' attitudes towards science. It implements digital storytelling activities in science classes and measures how the attitudes of students towards science change. The findings prove that digital storytelling has created a positive effect on the attitudes of students, indicating its potential as an engaging and effective instructional strategy.

Singh, R., Talwar, S., Sharma, A., & Sharma, N. (2020). Investigating student attitudes towards science learning in Indian schools. This study investigates student attitudes towards science learning in Indian schools. It examines the factors influencing students' attitudes, including teaching practices, curriculum design, and student-teacher interactions. The findings highlight the need for more student-centred and inquiry-based approaches to foster positive attitudes towards science learning.

Sharan, S., & Shukla, A. (2021). This study investigates the factors influencing students' attitude towards science in the Indian context. It explores factors such as teacher effectiveness, teaching methods, and classroom environment that impact students' attitudes. The findings provide insights into the significant role of these factors in shaping students' attitudes towards science.

Research Gaps

- Limited studies on Indian students’ real-life application of science.
- Few investigations on the interrelationship between attitude and scientific application.

Methodology

Research Design: The study employs a descriptive survey method to analyse students' attitudes and abilities.

Population and Sample

- Population: Secondary school students at Government Senior Secondary School, Kiltan.
- Sample: A representative sample of students from various sections.

Table 1 showcases the standard-wise population distribution in the school.

No. of Secondary students in GSSS. KILTAN

Standard	No of students
9th	34
10th	41
11th	42
12th	30
Total	147

Tools for Data Collection

The accuracy and reliability of the data collected significantly determines the success of any research paper. In this study, two essential tools were used to gather data: the Science Ability Experiment and the Science Attitude Scales. These essential tools are designed for measuring two key variables which are, the ability of students to use and employ scientific knowledge and their attitude toward science as a subject.

Science Ability Test

The Science Ability Test was structured to evaluate students' capability to apply their theoretical scientific knowledge in practical, real-world situations. The test was meticulously developed following a blueprint-based approach, ensuring systematic coverage of different areas of science, including physics, chemistry, and biology. The weightage and mark for each topic is shown in the table 2 below.

Weightage of Items for Topics

	TOPIC	NO. OF ITEMS	WEIGHTAGE (%)
PHYSICS	HEAT	2	6.66
	SPECIFIC HEAT	1	3.33
	LIGHT	1	3.33
	RELATIVE DENSITY	1	3.33
	FORCE	2	6.66
	ELECTRICITY AND MAGNETISM	2	6.66
	GRAVITY	1	3.33
	MOTION	1	3.33
CHEMISTRY	MATTER	3	10
	SEPERATION	4	13.33
	WATER	1	3.33
	ENERGY RESOURCES	2	6.66
BIOLOGY	PLANTS	2	6.66
	FOOD	1	3.33
	SAFETY MEASURES	2	6.66
	HUMAN BODY	4	13.33

The test items were aligned with curriculum objectives and framed in a way that would assess students' cognitive skills such as examination, classification, assessment, and problem-solving. Each question in the test was designed to analyse specific skills, such as:

- The ability to draw conclusions based on scientific experiments.
- The capability to apply scientific principles to solve everyday problems.
- Logical reasoning and critical thinking in the context of scientific knowledge.

The scoring system of the test was pre-determined to maintain objectivity, allowing for a fair assessment of students' science application abilities. The test was administered in a controlled environment, ensuring minimal external influences.

Science Attitude Scale

The Science Attitude Scale used for the purpose of measuring the attitude of students towards science was prepared and standardized by Dr. Avinash Grewal in 2000. This tool contains 20 statements, ten of them are positive and ten are negative statements. The students' reactions are to be marked against each statement on Likert's' scale of five points which includes the options as strongly agree, agree, undecided, disagree and strongly disagree. A time duration of 15 minutes is to be given for answering the scale.

Administration of Tools

Both tools were administered in a structured manner to ensure reliability and consistency in data collection. The test was conducted in a supervised classroom setting to avoid biases, while the attitude scale was distributed with clear instructions to ensure honest and unbiased responses.

Analysis and Interpretation

Testing the Hypothesis: Data analysis revealed a strong positive correlation between students' attitudes towards science and their competence to employ concepts of science in everyday situations.

Interpretation

The two variables are strongly positively correlated as denoted by the obtained Pearson correlation coefficient of 0. 73. These correlations significance at the 0. 01 level attests to the outcome's statistical significance. As a result, the alternative hypothesis is thus approved, and the null hypothesis is denied. Hence it can be concluded that students who demonstrate a greater capacity to apply science in practical settings also typically hold a more positive outlook towards science. This result emphasizes the mutual impact of affective disposition and cognitive application. A cheerful disposition probably increases interest and motivation in

studying science which in turn promotes real-world application. On the other hand, the capacity to perceive the practical application of science may cultivate more positive attitudes.

Major Findings

- It is evident that students' attitudes are closely related to their ability to apply science.
- Teaching methods have a pivotal role in modifying students' attitudes.

Educational Implications

- Integrating real-life applications in the curriculum can enhance learning.
- Inquiry-based and activity-oriented teaching methods should be adopted.

Suggestions

- A longitudinal study to track changes in attitudes over time.
- Expanding research to include different demographic and socio-economic groups.

Conclusion

The study confirms that a positive attitude towards science enhances students' ability to apply scientific concepts in daily life. Educational reforms focusing on practical applications and engaging teaching strategies are necessary to facilitate the_linking of theoretical to applied science education.

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Ancient Education System: A Critical Thinking on the Major Educational Revolutionary Movements From 1835 To 1946

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Abstract

The history of the education system in India has been rich and diverse since ancient times. The Gurukul system or Vedic system, Buddhist education and Madrasa education were prominent among them. The arrival of Lord Macaulay in India in 1835 brought a revolutionary change in the Indian education system, which greatly influenced the traditional system of India and promoted a modern education or British/English education system. This research paper critically reflects upon all-important the educational reform movements that happened between 1835 to 1946 (Macaulay's Declaration in 1835, Auckland's Declaration in 1837, Adams Report in 1838, Wood's Dispatch in 1854 in major educational reforms, Wood's Declaration in 1864, Hunter Commission in 1882, Indian University Commission in 1902-04, Curzon Policy (Rally Commission), Gokhale Bill in 1911, Kolkata University Commission or Sadler Commission in 1917, Hartang Commission in 1829, Wood Award Report in 1935, Indian Renaissance, Wardha Education Conference/Basic Education Policy/Basic Talim/Zakir Hussain Committee in 1937, Sargent Plan in 1944, etc) or all the major educational reform movements that happened before independence. It is based on secondary data of a qualitative method, which focuses on an analytical study on government reports, views of social reformers, historical documents, books, magazines, dissertations, university news, views of experts. The main objective of this study is to study the major reform movements in the Indian education system between 1835 and 1946-47. Under which we will try to understand the impact of British education policy on Indian society, and to do an analytical study of major educationists and the movement. Along with understanding its relevance in the current education system and how these movements have affected Indian society and the freedom struggle.

Keywords: Major social reform movements from 1835 to 1946, education system, British education policy, colonial India, Indian Renaissance.

Introduction

The earliest history of education in India is found in Vedic education, which was given in Sanskrit language. And it is also called Brahmin period education. In Vedic period education, along with providing education of Vedas and Upanishads to the students, practical education

on religion, morality was also given. After Vedic period education, the practice of Buddhist education started in our India. During the Buddhist period education, three important universities were established in India - Takshila University, Vikramshila University and Nalanda University. During Buddhist education, in about the fifth century, Bakhtiyar Khilji destroyed these three universities and gave rise to Islamic education, which led to the beginning of Islam religion and Islamic education in India. In 1557 AD, the Mughals were defeated in the Battle of Plassey and the education system of India came under the East India Company. As a result, the education system of India came under the hands of the British. And modern education was born in India, which can be called English education. The foundation of English education was laid in 1813, when in the Charter Act of 1813, a sum of ₹100000 was used for provision of educational grants. But in Article 43 of this act, it was not clearly mentioned in which education this money would be spent on. English education or Indian education. Because the British wanted that this money should be spent on English education, while the Indians wanted that this money should be spent on Indian education. That is, a dispute arose between the two sides regarding the money, which is known in history as Oriental- Occidental Controversy. Since the Oriental- Occidental dispute in India became serious, the British Parliament ordered to send Lord William Batting to India to end this dispute. But Batting sent legal expert Lord Macaulay to India in 1835 to resolve this dispute. Under this study- Macaulay's manifesto in 1835, Auckland's manifesto in 1837, Adams Report in 1838, Wood's dispatch in 1854 in major educational reforms, Wood's manifesto in 1864, Hunter Commission in 1882, Indian University Commission 1902-04 i.e. Curzon Policy (Railway Commission), Gokhale Bill in 1911, Kolkata University Commission or Sadler Commission in 1917, Hartang Commission in 1829, Wood Award Report 1935, Indian Renaissance, Wardha Education Conference/Basic Education Policy/Basic Talim/Zakir Hussain Committee 1937, Sergeant Plan 1944, etc. are important. Due to the influence of these revolutionary movements, the role of education in Indian society was redefined. Out of which the access to education was widened especially for women, poor class or Dalit class. In this research paper, a critical reflection has been done on the major educational revolutionary movements that took place between 1835 and 1846 and the effectiveness of these movements. At the same time, we will try to understand how these movements affected Indian society and the freedom struggle.

Objective of the study

The main objective of this research is to study the movements and reforms in the ancient Indian education system between 1835 and 1946. This research paper is to understand the British

education policy and its impact on the Indian education society, to study the prominent educationists and movements and to study its relevance to the current education system.

Research Question

- What were the major educational movements between 1835 and 1946?
- What impact did these movements have on the Indian education system and society?
- What is the relevance of educational reforms in the current education system?

Research Method

This study is based on qualitative method. Various sources have been used for this study:

- Secondary Source - In this study, the researcher has studied critical articles, research papers and historical books related to education as secondary sources.
- Study of Historical Sources - In this study, a critical study of major educational revolutionary movements from 1835 to 1946 has been done as historical sources.

Concept of Critical Thinking

Critical thinking is one of the best features of the human mind, which is their ability to think, understand and use discretion. When this ability of a human being to think, understand and use discretion is used with a logical, analytical and objective approach, it is called critical thinking. Critical thinking teaches a human not only to think, but also the art of learning “how to think”. Critical thinking is not just a means of condemning or opposing a subject, but it is a concept or process in which a human being, on the basis of experience, logic and facts, deeply examines any subject or problem and reaches a transparent decision.

- Literal meaning of critical thinking- Critical thinking is made up of two words- criticism + thinking = critical thinking. That means “to think while criticizing.”

Criticism does not only mean negative but it also means objective, critical and balanced evaluation. That is, in this way we can say that "critical thinking is such thinking which is unbiased and based on logic and evidence in solving any problem and deeply analyses any subject, idea, information, problem or belief." This thinking is not only based on emotions or beliefs of individuals. Rather, critical thinking is both positive and negative.

This thinking guides us towards analysis of elements, validating logic in finding solutions to problems, comparing alternative viewpoints and taking appropriate decisions.

- **Some definitions of critical thinking**

Robert H. Ennis:

"Critical thinking is the reasonable and committed reflection that decides whether to accept, reject or stop an idea."

Richard Paul:

"Critical thinking is a self-directed, self-disciplined, self-monitoring and self-correcting thinking process. It conforms to intellectual standards such as clarity, accuracy, logic, relevance and depth."

John Dewey:

"Critical thinking is a type of active, careful and continuous thinking in which the basis and consequences of a belief or knowledge are carefully examined."

Benjamin Bloom (in the context of taxonomy):

"It is a high-level cognitive process, which includes steps like analysis, synthesis and evaluation."

Major Educational Revolutionary Movements 1835-1946

Macaulay's Manifesto 1835

Macaulay interpreted Article 43 of Act-1813 to end the Oriental-Occidental Controversy in such a way that this controversy ended to a large extent-

- According to Macaulay, this money will be spent on Indian education only but the right to do so will be with the East India Company and not with the Indian people.
- This money will be spent on literature only but literature means English literature and not Persian, culture and Hindi literature. Because according to Macaulay- "The entire Indian literature of India is equivalent to a 'book' kept inside a cupboard in the library of the University of London."
- According to this policy of Macaulay, scholars will be prepared through this money. A scholar will be the person who has knowledge of English literature. Macaulay also said that, in the English medium university, only the upper-class Indian students or the students of the rich class will have the right to get education along with English. And when these upper-class Indian students or the students of the rich class get educated, then they will provide education to the people or students of the class below them. And in this way, this education will reach from the upper class to the lower class. This idea of Macaulay is called the filtration theory.

Auckland's Declaration 1837

Since the Oriental-Western dispute was not completely resolved by the declaration, William Bentinck and Macaulay were called back to England. And Lord Auckland was sent to India to end this dispute. Lord Auckland was also a follower of English civilization, but he was under immense pressure regarding this dispute. Therefore, in his declaration, he made a provision to

spend ₹31000 out of the total amount of 1 lakh on Indian education. And thus the Oriental-Western dispute ended.

John Adams Report 1838-39

Along with Lord Adams, John Adams also came to India for the propagation of missionary work. But he was so impressed by Indian education and literature that in his report on Bengal's education, he declared Indian literature to be superior to English literature. And he spoke of not advocating the spread of English education in India. Also, he recommended opening a teacher training institute in every province.

All the three reports (1838, 1839 and 1841) presented by Adams were rejected by the British Parliament.

Wood's Declaration 1854

Wood's Dispatch is called the Magna Carta of English education in India. Because it presented suggestions on holistic education (all aspects of education) in India. However, it advocated keeping English as the medium of education. On the suggestions of this manifesto of Wood, Kolkata University, Mumbai University, Madras University were established in 1857.

- Wood Dispatch suggested the establishment of an educational inspection and supervision department in each province.
- On the suggestion of Wood Dispatch, the post of an education director was created in each province.
- Through this manifesto of Wood Dispatch, along with male teacher education, female teacher education was also suggested.

Hunter Commission 1882

This commission was formed by Viceroy Lord Ripon mainly in the context of primary education. This commission had a total of 20 members including the chairman, out of which 6 were Indian members.

Recommendations

- The administration, management and finance of primary education should be given to the local bodies i.e. Gram Panchayat, Nagar Palikas, Municipal Corporation etc. i.e. primary education should be decentralized.
- The medium of primary education will be local or provincial languages.
- The main objective of primary education will be to provide birth education or education of practical life.

- Those subjects should be included in the curriculum which can contribute to a person's practical life.
- Trained teachers should be appointed in primary schools, and to increase the number of trained teachers, the number of teacher training institutes (DIET) should be increased etc.

Although the main objective of this commission was to give recommendations in the context of primary education. But the commission has also presented its recommendations in the context of secondary and higher education.

Indian University Commission or Curzon Education Policy or Raleigh Commission 1902-1904

Lord Curzon organized an education conference in Shimla in 1901.

The foundation of Indian University was laid in this conference. The scope of work of this commission is mainly related to higher education or university education. Hence, its recommendations are also linked to the University Education Commission.

Recommendations

- All universities in India should accept the responsibility of providing recognition and certificate distribution as well as formal education to the students.
- The government should itself shoulder the responsibility of higher education. For this, the government should open a **central education department** in every province.
- Changes were made in the structure of the **Senate and Syndicate** for the creation of the university's administration management.
- **Educational inspector and supervisor** were introduced at the higher education level
- Advocated keeping English as the medium of education.
- Most emphasis was given on moral education at the higher level. The word religious education was removed from moral education, etc.

Gokhale Bill 1911

The first recommendation made by the government regarding providing primary education in India as compulsory education and completely free education is Gokhale Bill.

Kolkata University Commission or Sadler Commission 1917

In Kolkata University or Sadler Commission 1917, there was a revolutionary change in higher education in India. Like -

- Higher education was separated from school education.
- Central Advisory Board of Education (CABE) was established.

- Court and Executive Council were formed in place of Senate and Syndicate in the university.
- Teacher Board and Scholar Council were established for curriculum development and examination related decisions in the university.
- Subject wise departments should be established in the university etc.

Hartang Committee 1929

The Hartang Committee highlighted the problem of wasteful and obstructive education in India's primary education. Its chairman was Dr. Philip.

Wood Award Report 1937

Technical education in India was born through the Wood Award Report. It was recommended to start independent technical education and curriculum at higher and higher secondary levels in India.

Wardha Education Conference/ Basic Education Policy/ Basic Education/ Zakir Hussain Committee/ New Education Education/ Basic Education 1937

In this conference Gandhiji presented his personal viewpoint in the context of Indian education, especially in the context of **primary education**. And also mention the 7 basic principles-

- Compulsory and free primary education should be provided to children between 7 and 14 years of age.
- Mother tongue should be the medium of education.
- Everyone should have equal right to receive primary education.
- Education should be organized according to the needs of rural people. Also, everyone should be motivated to receive education compulsorily. That is, provision of general education should be made.
- Moral education should be given place along with language and constituted subjects.
- Knowledge of agricultural education and hand skills should be provided, that is, education should be linked to real life.
- Self-reliant education, that is, autonomous education should be conducted. So that students can become self-reliant.

In Wardha Education Conference, Gandhiji gave the formula of 3H instead of **3R u**nder education.

- HEAD
- HEART

- HAND

Sargent Plan 1944

In 1944, under the Sargent Plan, modern higher education was laid in India. Under this, a state advisory board of education was formed.

The concept of national education system was developed for the first time in India. On the recommendation of the Sargent Plan, the UGC (University Grants Committee) was formed in 1914.

The University Grants Committee worked as a regulatory body to coordinate all the then universities since 1945.

After independence, the first commission in the context of education was formed in 1948, the University Education Commission or Radha Krishna Commission. It gave some important suggestions in the context of higher education -

- University Grants Commission should be formed for the control, administration and management of higher education in India.
- Some education should be reorganized throughout India as well as structural reforms should be done.
- The problems of the then Indian University should be found out. Also, the problems related to administration and finance in the university should be resolved.
- To determine the objectives of education.
- UGC was formed on 28 December 1953. The then Education Minister Dr. Abdul Kalam ji laid the foundation stone of UGC in 1953. Later in 1956, UGC got the status of a statutory body by making a law in the Parliament.

Impact of the movement on Indian education system and society

Indian education system was a period of transition and struggle from 1835 to 1946. Whenever English colonialism tried to implement a new education system in accordance with its colonial policies by putting the Indian traditional Gurukul system or Vedic education and Madrasa system or Muslim education at stake, many Indian ideas, social reformers and movements tried to make education accessible, modern and full of national consciousness.

Indian Education System The educational movement between 1835 and 1946 created a dual consciousness in the Indian society; on the one hand, it exposed the limitations of the colonial education system and on the other hand, it took concrete initiatives towards modernity, scientific approach and social reform. The Indian education system during this period was not

only a medium of knowledge but it was also the basis of social change, nation transformation and self-respect.

The present era is the era of globalization, innovation and digital revolution. In this era, education should not be just a means to pass exams but it should be made a medium for the overall development of the student. “Educational reform is like a bridge in this era which is laid on the foundation of an inclusive, strong and self-reliant India.”

Relevance of educational reforms in the current education system

Education is the soul of the nation. Because it is the basis of social, economic and cultural development along with communicating knowledge. In a country like India with a huge population and diversity, it is necessary to change the education system from time to time in accordance with the changing social, technological and global contexts. That is why educational reforms are not only necessary in the present era, but it has become necessary to restructure the entire system.

- Skills like coding, entrepreneurship, communication skills and critical thinking have been included in the curriculum contained in the new education policy 2020, so that vocational and skill education can be brought into the mainstream in the country.
- Provision of life skill based programs in colleges and schools.
- Change in teaching methods in the current technological era.
- Improvement in the infrastructure of government colleges and schools.
- Regular training and accountability system.
- Ensuring equal quality education.
- Continuous and comprehensive evaluation system in education. And group activities, project and practical evaluation system to be promoted.
- Strengthening special education services in schools for students with special needs. Along with linking their nutrition and health services, scholarships to education. Strengthening social inclusion and gender equality.
- Orienting higher education institutions more and more towards innovation and research.

Results

- The traditional education system collapsed.
- Women's education was encouraged.
- National sentiment developed.
- Through this education, young Indians joined the freedom struggle and the freedom struggle gained strength.

- Modern education institutions were reorganized and emerged.
- The Gandhian education model developed, which made the teacher self-reliant, professional and morally perfect.

Conclusion

This research paper focuses on some of the main points of the ancient education system and the main educational movements from 1835 to 1946.

Ancient Education System: Major Educational Revolutionary Movements from 1835 - 1946 Revolutionary changes took place in the Indian education system. While the England education policy or British policy influenced the traditional teacher system on one hand, on the other hand, the reform movement gave a new direction to the Indian education system. With the efforts of Raja Ram Mohan Roy, Mahatma Gandhi etc. and other social reformers, education was linked to nation building. The legacy of these movements can still be seen in the Indian education system. The current New Education Policy 2020 is also highly inspired by Gandhian thoughts and the principle of Indian Renaissance.

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The Bard and the Box Office: Shakespearean Adaptations in Film and Theatre as Tools for English Education

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Abstract

This theoretical article discusses the Shakespearean film and theatrical adaptations as new pedagogical practices in the re-energisation of English language and literature education. Although Shakespeare has always been maintained in the canon, his language and cultural dislocation can be difficult to modern students, as it encourages detachment. The study will build its argument on the concept of adaptations as multimodal bridges, which integrate verbal, visual, and performative components to improve the accessibility of the narratives, cultural relatability, and criticality, based on the adaptation theory (Hutcheon, 2013; Sanders, 2016), multimodality (Kress, 2010), reception aesthetics (Jauss, 1982), and constructivist pedagogy (Vygotsky, 1978). In comparison with the theatre productions, which look at the issues of the contemporary world through the lenses of Boal (1979) performative learning and queer theory (Sedgwick, 1990) and are more supportive in their embodied empathy and inclusiveness, film adaptations, including 10 Things I Hate About You and She is the Man, simplify their plots but approach the modern challenges through the prism of globalization (Appadurai, 1996). Repeatability of the film can be contrasted against immediacy in the theatre, as argued using the media theory proposed by McLuhan (1964), with a need to adopt hybrid solutions. To facilitate progressive learning, the article suggests a novel adaptive cycle of Literacy, the adaptive literacy cycle, including exposure, analysis, creation and reflection, in line with the updated taxonomy by Bloom (Anderson and Krathwohl, 2001). Adaptations address the eroding interest in classics and enhance inclusivity and service to diverse learners including ESL students by fostering transmedia literacy (Jenkins, 2006) and student agency (Barthes, 1977).

Keywords: Shakespearean Adaptation, Film and Theatre, English Education, Multimodality, Adaptation Theory, Pedagogical Framework, Transmedia Literacy.

Introduction

The lasting place of William Shakespeare in the English education has its basis in his canonical reputation of being the greatest writer of English language in the genre of plays and poetry. The works by Shakespeare have been used in the world since the 19th century as a pivotal part of

educational programs in schools to signify the art and culture of excellence (Bloom, 1994). His plays and sonnets are frequently required in secondary and higher schooling and they build analytical and critical thinking and empathy. Nevertheless, modern educators have a great difficulty with making Elizabethan texts of interest to modern students. The antiqueness of Shakespearean language, convoluted syntax, and the time restrictions of the subjects and times of those who wrote the plays can confuse the digitally native learners, who are used to multimodal and direct communication. Such linguistic and cultural distance most often leads to the lack of engagement, where students view the texts as part of a different world or something that they cannot access.

The emergence of the adaptations in both the film and theatre presents the positive points of entry to Shakespeare oeuvre that is easy to reach. The retellings of the story in film, like William Shakespeare's Romeo + Juliet by Baz Luhrmann (1996), relocate the action to a modern metropolitan area, preserving the original script but combining visual effects with verbal accuracy to overcome the divide between generations. On the same note, theatrical performances are becoming fuller of modernized staging, inspired by new musicals like Hamilton by Lin-Manuel Miranda (2015), which uses hip-hop and nontraditional casting to revitalize historical work- elements used to produce a gender-swapped or culturally-appropriated Twelfth Night or Hamlet. These translations make Shakespeare democratic, and turn works of elite canons into vibrant, familiarizing events that can appeal to a wide range of audience.

The current body of literature concerning Shakespearean adaptations focuses mostly on the textual faithfulness, cultural influence and the postcolonial reinterpretations. Classical contributions to the theory of adaptation, like the work by Hutcheon (2013) on adaptation as a creative process and Sanders (2016) distinction between adaptation and the process of appropriation, tend to focus on analyses of adaptation disobedience to or respect to the original, and issues of authorship and intertextuality. Cultural critiques that have been informed by the postcolonial theory (ex: extensions of Said 1978 framework onto Shakespearean representations of the Other) analyse the functions of adaptations in the global propagation and ideological bargaining. Nevertheless, these debates also under-research adaptations as a purposeful pedagogic tool in English education. Although other researchers recognize the relevance of multimedia in instruction (e.g., multimedia learning theories), theorizing of film and theatre adaptation as a method of literacy, critical thinking and curriculum integration in formal teaching of English language and literature instruction is also lacking.

Literature Review

Shakespeare in Education: Historical and Theoretical Context

The canonization of Shakespeare in English school and university canons can be traced to the 19th century when the plays he wrote started to dominate the new field of English literature in English schools and universities. Shakespearean plays during the Victorian era were propagated as a form of moral enlightenment and national identity and fitted in with imperial ideology that placed English literature as a civilizing power (Baldick, 1983). His presence in the curriculum became a solid part by the early 20th century due in part to critics who made him the exemplar of humanistic expression. In his canonical defence, Harold Bloom (1994) states that Shakespeare is in a special place, and he invented the human by creating an extensive psychological depth and word play; his works are indispensable to the comprehension of individual consciousness and cultural heritage.

Nonetheless, this canonical supremacy is more and more undermined by the debates of the postcolonial circles. The orientalist scheme of Edward Said (1978) has been applied to Shakespearean criticism to show how plays such as The Tempest and Othello reiterate and continue the colonialist outlook on the Other. According to Postcolonial scholars, the imposition of Shakespeare in education curricula continues to promote Eurocentric discourses at the expense of non-Western voices and as a means of cultural imperialism in the world education systems.

Adaptation Theory: From Text to Performance

Adaptation studies give a sound structure of comprehending Shakespearean reimagining through media. In her groundbreaking theory, Linda Hutcheon (2013) views the process of adaptation as a creative and interpretive one in which there is repetition with variation, in which adapters become dialogically involved with source texts. Adaptations are not derivatives but independent works that comment on originals in terms of cultures and history. Julie Sanders (2016) differentiates adaptation, typically featuring plot and setting transposition, and appropriation, which is more radically placing or recontextualizing the source, and making it their own ideological property.

These ideas shed light on filmic and theatrical adaptations of Shakespeare. Film adaptations focus on visual and narrative differences where cinematographic techniques are used to rebrand the texts. The example of Henry V by Kenneth Branagh (1989) uses gritty realism and non-linear flashbacks to make the king more relatable, which is contrasted to the previous versions of patriotism and is used to show ambiguities of war from a close-up perspective and battle

scenes. Theatrical versions, in their turn, place more emphasis on performativity and immediacy on stage. The contemporary performances of the Royal Shakespeare Company like the 2016 Hamlet by Simon Godwin with Paapa Essiedu acting as the prince in an African-inspired setting rely on various casting and contemporary staging to uncover the theme of identity and power, which the film, lacking audience engagement and embodiment, fails to convey. Both adaptations expand the presence of Shakespeare beyond fixed form to create living performance that hammers out the fidelity, novation, and cultural currency.

Pedagogical Applications of Media in English Teaching

The multimedia learning theories emphasize the effectiveness of film and theatre translation in the teaching of English. The cognitive theory of multimedia learning by Richard Mayer (2021) assumes that the information is processed by the human brain in two parallel streams- verbal and visual- which creates less mental load in case words and pictures are brought together in a meaningful way. The concepts like multimedia (the combination of words and pictures contributes to the better comprehension) and coherence (the attention is paid only to useful information) correspond to the application of the Shakespearean alterations to explain the complicated Elizabethan language and the issues.

These are in line with the constructivist pedagogy, which is based on the experiential learning as defined by John Dewey (1938), the stages of cognitive development as outlined by Jean Piaget, wherein the social scaffolding facilitates development through active knowledge construction, and the zone of proximal development that is outlined by Lev Vygotsky, where the social scaffolding helps people to develop. Constructivist approaches are made easy, through film and theatre adaptation making students construct meaning by watching, talking, and acting linking archaic text to the present.

This is especially beneficial to learners such as English as a Second Language (ESL) students because visual cues and contextualization that can help learners understand and participate are present. Critiques however note shortcomings: adaptations can simplify themes, focus more on spectacle than textual subtlety or be restricted by directorial interpretation limiting student agency. Nevertheless, the Shakespeare pedagogy taught through multimedia adaptations fosters critical thinking, empathy and inclusivity.

Theoretical Framework

Core Concepts: Multimodality and Intertextuality

The multimodality theory according to Gunther Kress (2010) assumes that meaning-making is done by combining various resources of semiotic modes, i.e. linguistic, visual, auditory,

gestural, or spatial resources. Within the Shakespearean adaptations film and theatrical adaptation, this theory highlights the fact that these reinterpretations break the constraints of printed texts to provide deeper viewing experiences of English literature. The conventional Shakespearean pedagogy tends to favour the verbal form of original plays, and learning is reduced to textual analysis and close reading. Nevertheless, adaptations mix verbal (e.g. dialogue) with visual (e.g. cinematography in film), and performative (e.g. gestures by actors in theatre) modes and form multimodal ensembles that are accessible to a variety of cognitive activities. As an example, in cinematic versions, such as the one by Baz Luhrmann in Romeo + Juliet (1996), the visual poetry of the Shakespearean text is overlaid with visual motives, such as neon lights, colourful costumes, and active camera movements, and students are thus able to decode the meanings in more than one way. This multi-modality can be used to make abstract concepts such as fate and conflict more concrete and accessible to particular learners such as the visual or kinesthetics learner.

Along with the phenomenon of multimodality is the idea of intertextuality which emphasizes the way in which texts allude to and reform one another. By its very nature, adaptations rely on intertextual conversation with the originals of Shakespeare, stealing, but adding new texture. The essential essay of Roland Barthes (1977) on the death of the author further theorizes this process by decentring the intent of the originating creator and allows the audience, or, in the given case, the viewer and the students, the status of active meaning producers. In learning institutions, this change promotes agency among students because accommodations encourage redefinitions and not memorization.

Reception and Reader-Response Theory

The theory of reception, especially the aesthetics of reception developed by Hans Robert Jauss (1982), focuses on the historical and contextual horizons of reception and interpretation of texts. This theory describes the mediation of the film and theatre versions of Shakespearean adaptations between the Elizabethan source and the modern audiences to allow student engagement through alignment with modern horizons of expectation in the play. Incorrect readings of Shakespeare can lead to the conflict between the culture of students and the passive consumption; adoptions, in turn, reset such horizons with the new settings and stories. As an example, such a movie as 10 Things I Hate About You (1999), which is a version of The Taming of the Shrew, reestablishes the gender nature of the play in a high school environment and thus issues of choice and romance become very relatable amongst teenagers. The model by Jauss

therefore puts adaptations as bridges whereby passive encounters with texts are transformed into active encounters where students negotiate meanings based on their experiences.

In addition to this, the idea of the interpretive communities by Stanley Fish (1980), according to which meaning is created in the process of shared strategies of interpreting the text by social groups instead of attributable to specific textual qualities, complements this argument. The adaptations in the classroom environment enable the development of such communities through the promotion of a group discussion about the Shakespearean works. Watching a theatre performance, i.e. the inclusive Twelfth Night of the Royal Shakespeare Company, makes students create an interpretive consensus or disagreement by discussing the play in the group, transforming a single reading into a shared sense-making.

Integrated Pedagogical Model

In this paper, the author suggests a novel model called the Adaptive Literacy Cycle into which Shakespearean adaptations could be incorporated into the English curriculum. This cyclical model consists of four phases that integrate with each other, that is, exposure, analysis, creation, and reflection, which is meant to scaffold learning in a progressive order. Students in the exposure phase will watch film or theatre versions in order to have early exposure to the Shakespeare stories using multimodality to create familiarity without reading. This is followed by analysis, which entails comparative examination of adaptations in relation to originals in order to bring out the intertextual changes and produce the ability to think critically. The phase of creation gives power to the students by allowing them to reinterpret things practically, like writing a contemporary scene or a mini-performance, which encourages agency according to the theory of Barthes. Lastly, reflection involves critical essays or discussions that are synthesizing, which promote metacognition.

This model corresponds with the revision of taxonomy by Benjamin Bloom (Anderson and Krathwohl, 2001), which advances the former level of skills (remembering and understanding through exposure) to the higher level (analysing, evaluating and creating through further stages). Its iterative cycling strategy is the method by which it embraces a variety of learners including ESL students and deals with reception theory by contextualizing interpretations in the horizons of students. Finally, the theorized Adaptive Literacy Cycle conceptualizes the dynamic in adaptations into adaptive pedagogies, which rejuvenate the learning of Shakespeare in a way that is not rigid but dynamic and structured.

Decolonizing the English Education

The inclusion of Shakespearean adaptations in movie and theatre in the English school environment can be considered at a deeper level in the context of Indian Knowledge Systems (IKS), which is highlighted in the National Education Policy (NEP) 2020 of India. IKS is a collection of ancient Indian epistemologies, such as dramaturgy of Bharata Muni Natya Shastra (c. 200 BCE-200 CE), which theorizes theatre as a whole art form, rasa (emotional essence), bhava (expression), music, dance and narrative, to produce aesthetic experience and moral consideration. This native prism allows one to take a decolonizing perspective on Shakespeare, which, since Indian curricula have incorporated it since colonialism, represents a tool of western supremacy (Trivedi, 2016). Indigenizing adaptations can enable educators to make Eurocentric texts culturally hybrid by connecting them to Indian performative cultures, generating cultural hybridity, critical consciousness, and inclusive pedagogy.

Shakespeare, in the past, was introduced into Indian education through colonial systems and it represented cultural hegemony (Said, 1978). Nevertheless, the postcolonial adaptations have repossessed his writings and made them substantive to IKS principles of localized storytelling and rasa evocation. The trilogy of Vishal Bhardwaj is a good example: Maqbool (2003, based on Macbeth) switches ambition and destiny to the world of the Mumbai underworld, where Bollywood song-dances replicate the idioms of folk theatre based on the aesthetic of the Sanskrit language (Allen, as cited in Mukherjee, 2021). Omkara (2006, Othello) brings the theme of jealousy and betrayal to the countryside of Uttar Pradesh and employs local dialects and cultural images such as the kamarbandh (waistband) to signify truth to emotion and feeling, just as Natya Shastra did with symbolic props to express emotion. In Hamlet, Haider (2014, Hamlet), is set in the war-torn Kashmir, and using Kashmiri folk elements and political commentary turns Shakespearean soliloquies into reflective songs that bring out shanta (peace) or bibhatsa (disgust) rasas.

These are films which go along with IKS by creating parallels in the Shakespearean dramaturgy and Indian traditions. According to early critics, Shakespeare was attracted to the Sanskrit aesthetics, and adapted to classical forms such as Kathakali (Kerala) and Yakshagana (Karnataka). Adaptations of King Lear or Othello into Kathakali include kathakali mudras (hand gestures), costume/makeup (aharya) and nine emotions (navarasa), replicating the structure of Natya Shastra but humanizing Shakespearean characters by enacting them (Richmond, 1990). The Barnam Vana (1979 version of Macbeth) by Yakshagana incorporates

Carnatic music, lavish costumes and episodic storytelling to combine the Shakespearean tragedy with Indian epic stories of Mahabharata or Ramayana.

Such IKS-based adaptations in the educational setting are utilised as decolonization tools as per the NEP 2020 requirement to incorporate traditional knowledge (Government of India, 2020). They address Eurocentric fidelity arguments (Leitch, 2007) by advocating appropriation (Sanders, 2016) so that students are able to address the universality of Shakespeare by recognizing culturalscapes that they are able to recognise (Appadurai, 1996). As an example, comparing Haider with Hamlet helps to compare: students can watch how the song-dance sequence of Bismil as the modern-day Mousetrap was shot in Haider and bring up the rasa of karuna (compassion): the song-dance sequence is shot in the atmosphere of political oppression, and the moral dilemma of Indian epics will be reflected.

This theoretically represents an adaptation of Hutcheon (2013) of dialogic process, with IKS contributing the holistic multimodality (Kress, 2010). It corresponds to the constructivist pedagogy (Vygotsky, 1978), scaffolding archaic texts through visual-performative modes that appeal to the cultural horizons of Indian learners (Jauss, 1982). All these adaptations ensure inclusivity in a multiethnic classroom (such as ESL), gender fluidity in Omkara dialogs with queer theory (Sedgwick, 1990), and postcolonial critiques of identity and power (Loomba, 1998).

Problems still exist: the resources are limited to expose Kathakali/Yakshagana live, and fidelity purists will be misunderstood. However, this is overcome by hybrid models of screening Bhardwaj movies followed by student-led folk adaptation to facilitate a longer Adaptive Literacy Cycle into IKS dimensions.

Analysis and Discussion

Adaptations of Films as a Pedagogical Tool

Narrative Accessibility

Shakespearean films are maximally successful in terms of narrative approach, facilitating complex Elizabethan plots to learners with lower levels of experience and at the same time maintaining the depth of the theme, which is also consistent with the assumptions of the multimodal approach to learning presented in the theoretical model. Through visual narrative and use of modern vernacular, movies minimize mental obstacles created by archaism and allow students to master the basic narratives more quickly and turn to a higher-level analysis earlier. It is based on the cognitive theory of multimedia learning proposed by Mayer (2021), according to which two channels of processing information verbal (subtitles dialogue echoes)

and visual (action sequences) offload any unnecessary requirements, allowing one to understand everything during the exposure stage of the Adaptive Literacy Cycle.

The best example is 10 Things I Hate About You (Junger, 1999) which is a free variation of The Taming of the Shrew. The original elements of Shakespeare include curved Paduan suitors, conceits, and a questionable subplot of taming, full of Elizabethan gender conventions. The movie simplifies this into high school rom-com: Kat Stratford (Julia Stiles) is as shrewdly independent as Katherina, refusing to accept superficial popularity in consumerist teenage culture, and Patrick Verona (Heath Ledger) is the typecast as Petruchio, who bets to date her to Bianca (Larisa Oleynik), in order to have romantic access. Other subplots such as the disguise of the tutor to Lucentio is reduced to a grave Bianca courtship by Cameron (Joseph Gordon-Levitt) and does away with obscure details such as the auction of Gremio. Pittman (2004), observes the ideological differences that come out in this transposition where the modern viewer will not accept the psychological techniques of starvation used by Petruchio instead accepting the voluntary softening of Kat who has experienced betrayal before, thereby sustaining the theme of agency and transformation without condoning abuse.

Thematic depth prevails: the relationships of power remain, although they have been transformed into mutual vulnerability, and Barthesian (1977) reader agency in which students redefine taming as empowerment. This helps to analyse in classes, as the films and texts can be compared through the multimodality of Kress, (2010) of montages of prom rituals to visualize the process of Bianca being commodified, which reflects the negotiations of the dowry which Baptista was negotiating. Visual cues are advantageous to ESL learners, as Pittman (2003) noted in responses of students where ontological subjectivity of films were more preferred to the static ontology of Shakespeare. So, this type of adaptation scaffolds Vygotskian (1978) proximal development that turns novices into interpreters.

Cultural Relevance

The cultural relevance of Shakespearean film adaptation becomes pedagogically powerful in traversing Appadurai's (1996) globalization escapes, including mediascapes (flow of images through Hollywood), ethnoscapes (diverse teen casts), and ideoscapes (gender equity ideologies) to make the global themes locally relevant in the global fluxes. Such disjuncture enables the films to challenge the current world to think critically in the stage of creation of the Adaptive Literacy Cycle, where students can re-adapt Shakespeare to contemporary situations according to the adaptive repetition-with-variation by Hutcheon (2013).

As a derivation of Twelfth Night, she is the Man (Fickman, 2006) is one example of this through gender performativity. Viola Hastings (Amanda Bynes) disguises herself as a boy, Sebastian, and enters the soccer team of Illyria Prep (a girls soccer team) after the disbandment of her girls' team, just like Cesario did at the start of the shipwreck. Soccer substitutes Illyria with courtly intrigues, and Title IX-era ethnoscapes of American youth masculine sexism; physically, Viola dribbles and saves, as Katherina, battling binarism thanks to slapstick (e.g., hormone-pill laughs), and love triangles with Duke Orsino (Channing Tatum) and Olivia. Homosexual intimations of homoeroticism in locker-room talk liberalize Shakespeare among heteronormative viewers and inspires Sedgwickian (1985) queer discourse of fluidity as discussed by Klett (2008) in a teen cinema re-enactment of Viola.

The mediascapes of Appadurai can enhance relevance: the ideoscapes of feminism are spread globally, Elizabethan sumptuary laws are adapted to the cultural context of patriarchal sports, finding an echo in a variety of classrooms (e.g. ESL students who have to work around identity ethnoscapes). Local (U.S. high school) and global (Shakespeare, universality), these films harness the marginalized voices to overcome the objections raised against decolonization (Said, 1978) Principal Horatio, the person who fails, is reduced to the role of Malvolio, his puritanism. In teaching, this drives Jaussian (1982) horizon moves: the current demands of students (e.g. the gender equality demanded by the hashtag Me Too) to converse with the original, as Fish (1980) had proposed in his interpretive communities in group discussions. Therefore, adaptations Shakespeare democratize, theorizing transmedia literacy (Jenkins, 2006) as opposed to canonical elitism.

In spite of the presence of affordances, film adaptations generate the problem of fidelity, with Leitch (2007) critiquing the fallacy of fidelity, a fidelity-fuelled evaluation of films as determined by the text promotes literature over cinema in the autonomous semiotics of adaptation and students can fail to understand that the misogyny of 10 Things I Hate About You is itself an instance of a paradox of fidelity, a failure of adaptation to function creatively.

Leitch claims that fidelity discourse regards media disjuncture as insignificant, but pedagogically the discourse runs the danger of directorial overdetermination, the neon Romeo + Juliet of Luhrmann (1996) enforces spectacle, and Barthesian (1977) agency is constrained at the point of no analysis. Novices are doomed to misinterpretation: visual shorthand (e.g., the soccer proxy in She's the Man) can lead to loss of Shakespearean linguistic subtlety, which fits the coherence critique by Mayer (2021) on this point in case the additional teens tropes clog

the brain. The impact of classroom hybridity is based on Adaptive Literacy Cycle reflection, and access inequities remain a problem in under-resourced schools.

Adapting the Theatre in the Classroom

Performative Learning

Theatrical interpretations of Shakespeare promote performative learning with a focus on embodied learning that promotes empathy and language, which uses the Theatre of the Oppressed by Augusto Boal (1979). The framework proposed by Boal, a follower of Freirean pedagogy, puts theatre as a practice of rehearsing the actual life, where the actors play the roles to act critically towards the societal structure. This can be translated into learning situations whereby the students are actively involved in performing or watching Shakespearean adaptations and no longer reading passively but are involved in a more kinesthetics form. Unlike the stagnant texts, live theatre requires the physical presence, which is consistent with the zone of proximal development as proposed by Vygotsky (1978) due to the scaffolded role plays that develop linguistic and emotional abilities.

As an example, in stagings makeovers such as the Hamlet of the Royal Shakespeare Company (2016) with Paapa Essiedu in an African-inspired setting, the performers and the audience are encouraged to play postcolonial identities, according to Boals forum theatre in which spectators intervene to change events. Instead of learning monologues by heart, as Shakespeare did, students play the scenes, internalize the soliloquies and reflect the doubt and revenge, which is a great way to develop language skills through vocal modulation, gesture, and improvisation. This is a mode of performance that builds empathy: when acting out the roles of characters, such as the insanity of Ophelia or the sorrow of Hamlet, students get to explore a new dimension in themselves mentally and develop the emotional acuity that is essential to English instruction.

The oppression attacks that Boal makes further roll over to Shakespearean issues of power and marginality, and theorize the possibility of theatre as a dialogic learning tool. During the creation phase of the Adaptive Literacy Cycle, students practice the adaptations, and through the process of writing down the dialogues, students rewrite the text to reflect modern day injustices, thereby making abstract literacy a lived experience. This embodied method is theoretical, contrary to disengagement with Elizabethan language, though it is, empirically, aligned, with vocabulary and syntax being strengthened by muscle memory and social interaction, when performative repetition is engaged.

Interactive and Inclusive Pedagogy

Theatrical performance encourages active and participatory pedagogy theorized based on the queer theory by Eve Kosofsky Sedgwick (1990) that challenges the normative binary of gender and sexuality. The epistemology of the closet as described by Sedgwick is the essentials of performances that expose and challenge suppressed identities and thus gender-swapped play such as Twelfth Night is powerful in all-inclusive classrooms. Through this destabilization of heteronormativity, these productions create a discussion of identity, which is consistent with reception theory (Jauss, 1982) with the growth of horizons of students due to the performative queerness.

An example of this can be the all-trans and non-binary 2025 production of Twelfth Night directed by Phoebe Kemp where an entirely trans cast transforms Viola cross-dressing into a trans story of fluidity and desire. In this case, the masquerade of Viola as Cesario reinforces the paranoid/reparative interpretation of Sedgwick, the "closet" is a place where homoerotic interests define the relationships between Orsino and Cesario, and Olivia, and constructs traditional gender dichotomies. This interactivity, in the form of audience participation or after performance discussion, in the academic environment, causes the students to challenge the text of Shakespeare, according to the death of the author, proposed by Barthes (1977), in which meanings are created within the queer reinterpretations.

It includes non-normative learners: the non-normativity of queer theory and performativity (Butler, 1990) supports non-normative identities to the benefit of LGBTQ learners, as well as teaching other students the importance of empathy. Algorithms based on deconstruction of such adaptations in the analysis and reflection stages of the Adaptive Literacy Cycle facilitate the interpretive communities proposed by Fish (1980) when shared queer lenses can provide the inclusive revelations. This, in theory, is a counter to canonical heteronormativity (Said, 1978), democratizing English education where the marginalised voices are put to the focus in live interactive formats.

Although there are merits, theatre adaptations have challenges of implementation such as access, theoretical overdependence on live performance. Unequal access due to resource differences: schools in urban areas can afford RSC tours or even local productions, whereas schools in rural or underfunded areas could use recordings, which reduces immediacy according to the embodied ethos of Boal (1979). This increases educational inequalities, because the transformative nature of live theatre still remains elitist. Others criticize excessive

dependence on performativity: It is an effective way to raise empathy but, unless scaffolds, it can be superficial to the extent that it is unfaithful to the text (Leitch, 2007).

Comparative Synthesis: Film vs. Theatre in Education

The adaptations of films and theatre provide different affordances in Shakespearean education theorized through the media theory by Marshall McLuhan (1964) who theorizes the media as the continuation of human senses that influence perception. Films are cool mediums that demand high engagement at the visual level, which offers repeatability: students repeat viewing scenes such as the Veronna Beach brawls by Luhrmann (1996), which can be analysed later in the stages of exposure and analysis of the Adaptive Literacy Cycle. This repetition is in line with the multimedia principles of Mayer (2021), where multimodal components can be decoded repeatedly, which are soundtracks, edits, and help to create a profound narrative understanding.

Theatre, on the other hand, epitomizes the hot media promoted by McLuhan: high-emphasis immediacy through the presence of the live requires low-participation and heavy-emotion involvement, as in the Twelfth Night (Kemp 2025) where the audience contributes to the meaning through their reactions. It is ephemeral, which makes empathy stronger by having unscripted moments, as Boal (1979) claims, but it is not as archival as the film.

Relatively, the universal nature of film through streaming negates the geographic nature of the theatre business, but theatre is more interactive, creating community (Fish, 1980), something lacking in the lone viewing. The tetrad in advance (both extend Shakespeare), obsolescence (film obsoletes the seclusion of print; theatre obsoletes passive spectators), retrieval (both recover oral traditions), reversal (overuse results in spectacle over substance) of the tetrad are used by McLuhan to shed light on trade-offs.

The suggestion to implement hybrid method can be the best: mix film previews with film workshops, merging predictability and immediacy. As an example, gender-swapped scenes can be developed by first screening She’s the Man (2006) and later staging, which develops Vygotskian (1978) development. According to Hutcheon (2013), this synthesis views adaptations as palimpsests, which enriches curricula by means of transmedia navigation.

Broader Implications for English Education

The adaptations of Shakespearean plays in film and theatre are precursors of changes in the direction toward transmedia literacy as theorized by Henry Jenkins (2006), where convergence culture is viewed as making participatory interactions across platforms possible. Transmedia narratives such as navigating originals, films such as 10 Things I Hate About You (1999), and

theatre productions oppose the loss of people's interest in classics by outfitting digital ecosystems with Shakespeare to promote lifelong learning outside of rote curriculum.

Theoretically, this is an antidote to the canonical anxiety of Bloom (1994) in which adaptations democratize access, as Barthes (1977) puts it, and Kress (2010) in his multimodal landscapes students are made co-creators. Adaptations, in responding to the issue of disengagement, such as the use of archaic language to deter millennials, help to revitalize education in English, which is consistent with constructivism (Dewey, 1938) in seeking an experience.

Bigger pictures are to be found in inclusivity: queer and postcolonial perspectives (Sedgwick, 1990; Said, 1978) in hybrids foster equity, and the reduction of literacy drops by appealing formats. Finally, the tools develop critical and empathetic citizens, theorizing education as adaptive, lifelong conversation with the Bard.

Conclusion

Summary of Key Arguments

This paper has postulated Shakespearean forms in cinema and theatre as one of the most effective multimodal strategies to reinvigorate English education. It has also made use of the theory of adaptations (Hutcheon, 2013; Sanders, 2016), multimodality (Kress, 2010) and reception aesthetics (Jauss, 1982) to state that adaptations are crucial mediating factors between Elizabethan work and modern pedagogy. Adaptations address the obstacle of archaic language by incorporating the three modes of communication (verbal, visual, and performative) to facilitate the accessibility of narrative and cultural significance to diverse learners. Movies, like 10 Things I Hate About You (Junger, 1999) and She’s the Man (Fickman, 2006), make it easier to comprehend their plots without losing their themes and solving contemporary problems with the help of globalization structures (Appadurai, 1996). Adaptations within the theatrical arts are based on the performative pedagogy by Boal (1979) and the queer theory by Sedgwick (1990), which promote embodied empathy, interactivity, and inclusiveness, especially in the form of gender-swapped productions. The Adaptive Literacy Cycle, which incorporates exposure, analysis, creation, and reflection, is based on a constructivist approach that fits the updated taxonomy of Bloom (Anderson and Krathwohl, 2001) and scaffolding principles of Vygotsky (1978). A comparative analysis, based on the media theory by McLuhan (1964) shows the repeatability of film versus the immediate of theatre to propose hybrid methods. Finally, adaptations encourage transmedia literacy (Jenkins, 2006), decentre authorial intent (Barthes, 1977) and student agency in interpretive communities (Fish, 1980). Such contributions bring Shakespeare out not as an elitist antique but as a vibrant tool of critical,

inclusive and engaging English learning. The process of revitalizing the English education requires the adoption of these tools in their entirety, beyond textual faithfulness to the transmedia convergence. The inter-disciplinary engagement--between the scholars of literature, educators, media theorists and practitioners of the theatre--is needed to come up with inclusive curricula which acknowledge the universality of Shakespeare without perpetuating its historical privileges. By doing that, we make sure that the Bard is not an object of the museum but a living being, who makes generations think about the complexity of humans through the constantly changing prism.

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Integrating Traditional Ecological Knowledge in Formal Science Curriculum at the Middle Stage for Contextualised Learning

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Abstract

When it comes to understanding our natural world, science and Traditional Ecological Knowledge (TEK) are equally valuable, as both offer distinct yet complementary perspectives. Both should be merged like a mosaic to get a holistic understanding of the natural world. TEK is established on lived experiences, cultural, and spiritual beliefs of Indigenous people, while science heavily relies on methodical, evidence-based approaches. This paper explores the integration of TEK into formal science curricula at the middle stage, which emphasises its relevance in addressing demanding environmental challenges and preserving and disseminating invaluable cultural knowledge. Focusing on Zanskar Valley (a region inhabited predominantly by the indigenous "Boto or Bot" tribe) in Ladakh, India, a region rich in Indigenous knowledge and wisdom but facing rapid modernisation due to massive hard infrastructure development, the study employs an ethnographic approach to document TEK, analyzes it thematically, and proposes its contextual incorporation into middle-school NCERT science curriculum. The study is conducted in three phases: documenting TEK through in-depth ethnographic interviews and participatory observation, thematically analysing obtained data with existing NCERT science curriculum given themes, and demonstrating integration strategies using Fogarty's four-step model. With the theme "Food," this study demonstrates how rich and holistic TEK is in bridging cultural relevance and context with formal science. This study further highlights the need and significance of a contextualised curriculum to reconnect Indigenous learners to their cultural heritage and wisdom for a sustainable future. Future generations can access a holistic knowledge system that supports ecological balance and cultural continuity by embedding TEK within science education.

Keywords: Traditional Ecological Knowledge, Indigenous, Sustainability, Zanskar, Integration, Science, Curriculum.

Introduction

Science is a systematic quest for knowledge that seeks to understand the natural and social world through evidence-based methodologies. It is universal, subject to change, and distinct from other forms of knowledge (Hohenberg, 2017). While a widely accepted definition, stated

by Berkes (1999), describes Traditional Ecological Knowledge (TEK) as “a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, and about the relationship of living beings (including humans) with one another and with their environment.”(Berkes, 1999; Hoagland, 2017) Traditional Ecological Knowledge (TEK), also known as folk knowledge, is developed via long-term association with a place and includes beliefs and acquired understanding (Sindhya,2018). TEK is a subjective, organic, complex, and emergent knowledge system that embraces the metaphoric mind and helps localised people preserve and flourish in particular locations. Therefore, in terms of developing innovative and cumulative strategies for surviving within an ecological domain, TEK is both an art and a science (Nelson, 2014).

Although the exact origin of the term "TEK" is unknown, the term "traditional ecological knowledge" is an extension of the term "traditional knowledge," which has often been used to refer to the knowledge and practices of Indigenous populations. The term TEK does not represent the entirety of Indigenous knowledge (IK) and is considered a subset of the broader category of IK. TEK is a form of academic appropriation of Indigenous knowledge. TEK is constructed based on Western interests in creating "science concrete"—factual knowledge about the environment—out of Indigenous knowledge (Kim et al., 2017). Capturing traditional ecological knowledge from indigenous communities is essential for revitalising tribal knowledge and enhancing sustainable environmental management. Numerous indigenous communities have experienced substantial losses of Traditional Ecological Knowledge (TEK), and over time, TEK may vanish entirely (Hoagland, 2017).

Relationship between TEK and Science

Indigenous knowledge and science reflect two distinct takes on the world: Indigenous knowledge provides information about the world holistically, whereas science concentrates on its constituent elements (Sindhya,2018). Integrating TEK (a subset of indigenous knowledge) in formal science education is essential to preserve the invaluable insights that are in danger of being lost in this rapidly changing world. As the severity of today's environmental issues increases, disregard for TEK may result in the loss of critical ecological practices and generation-old cultural knowledge. Future generations may not recognise the importance of successfully managing sustainability concerns if this wealth of information is not incorporated into school curricula (Oando, 2024). Neither TEK nor Science alone will achieve comprehensive environmental protection, and dependence on a single paradigm could worsen the environmental crisis. Simply put, without knowledge, science lacks consciousness

(Hoagland, 2017). Even NEP 2020 focuses on integrating IK into the curriculum, whether it be Indigenous ways of teaching and learning, Indigenous literature and knowledge, or Indigenous sports, in pedagogical practices to help develop skills. This integration highlights how science education has the capacity to empower communities and promote cross-cultural learning, along with bridging knowledge gaps. It fosters cooperation, mutual respect, and shared accountability for sustainable development (Nair, 2024).

The Difficult Position for Indigenous Students in Science Learning

TEK has been passed down traditionally through various events and activities, such as farming, weaving, hunting, and cooking; now, Indigenous children only have the opportunity to receive traditional knowledge from home or festivals that have become uncommon and tourist attractions in recent decades due to school teaching interfering with mainstream culture and children spending much time in school. Hence, they feel less connected to traditional culture and disconnected from traditional knowledge (Chiang & Lee, 2015). To connect these children with Traditional Ecological Knowledge, preservation, and documentation are needed, as well as contextualising the curriculum to disseminate it. The formal science curriculum should be contextualised so that indigenous learners do not feel alienated from science.

Disseminating TEK in the context of Zanskar

India, with over 500 different, colourful Indigenous tribes, has the most incredible collection of acquired Indigenous tribal wisdom. A press release of the 119th meeting of the National Commission for Scheduled Tribes states that with more than 97 percent of the tribal population, the newly created Union Territory of Ladakh is primarily a tribal region, followed by 99.16 percent in Zanskar Valley is predominantly Boto or Bot tribe (NCST Writes to Union Home Minister & Union Tribal Affairs Minister Conveying Its Recommendation to Include Union Territory of Ladakh Under 6th Schedule of Constitution Of India, n.d.). Zanskar, or "Zangskar" (the land of copper), a remote valley in Ladakh now declared a district, is known for its hauntingly beautiful landscapes, rugged terrain, and vibrant cultural heritage, which embeds Indigenous Buddhist tribes with a rich repository of Indigenous knowledge and wisdom. (Hodge, 2013)

For over 2,500 years, human settlements in Zanskar have been well-acknowledged. In such harsh and challenging terrain, where survival was the primary concern, communities developed a unique cultural knowledge system that enabled them to survive. This wisdom was transmitted across generations orally and through hands-on learning (Chatterji, 1992). However, the fast development of hard infrastructure in the modern era puts Zanskar's indigenous wisdom at risk

of loss. The remote isolation that once protected this cultural heritage is being replaced by accessibility. The Border Roads Organization (BRO) is set to complete the black-topping of the Nimmo-Padam-Darcha Road by 2025, which connects Leh to the Zanskar Valley, marking a significant development. This road will bring economic potential to the valley, but the influx of tourism and consumerism seriously threatens to undermine the preservation of Zanskar's traditional knowledge system. It emphasises the importance of recording and protecting this indigenous knowledge and wisdom. Lack of documentation, lack of contextualised curriculum, and lack of place-based pedagogy are the main concerns that most researchers highlight. There are many ways it can be done. First, it can be passed on to future generations through education by integrating it into the formal curriculum while maintaining its relevance in the modern era. In Zanskar, most schools follow the NCERT curriculum, while a few follow the Jammu and Kashmir (J&K) board curriculum; neither is contextually framed to pass on Indigenous knowledge to the next generation.

From the start, rote learning is encouraged by the children's inability to connect the concepts in their books with those in their surroundings. They study other world wonders and shout about the Taj Mahal, but learn nothing about the Leh Palace. They chant about how hydrogen and oxygen atoms combine to make molecules, but do not mention how glaciers are the lifeline of irrigation in Ladakh. This has long-term effects on the pupils' lives (Rehman,2013). A contextualised curriculum tailored to the needs and surroundings of indigenous learners will motivate them to pursue science in the future, spark their interest in science, and help them feel more at home in the classroom. Bridging culture in formal science curricula is now widely accepted worldwide. Researchers and policymakers must focus on this to make learning more holistic for native learners. The study supports the notion of making science relevant, accessible, culturally sensitive, and consistent with students' cultures (Pawilen, 2021).

Zanskar is one of the last remaining Tibetan cultural settlements and one of Ladakh's least impacted microcosms (Zanskar | District Kargil, Union Territory of Ladakh | India, n.d.). In Zanskar (a remote valley nestled in the UT of Ladakh), people have developed and honed TEK over the years to mindfully interact with their natural resources, minimising waste and pollution. In Zanskar, people possess intimate knowledge of their environment and utilise their resources optimally, considering their technological level, worldview, and priorities (Chatterji, 1992). However, with the flourishing of hard infrastructure development, as consumerism creeps into the valley, the traditional ecological knowledge that they have honed over

generations is on the verge of vanishing. To preserve and disseminate this knowledge, a curriculum can be a vital means to pass it on to the next generation.

Research Objective:

1. To document the TEK of the "Boto" tribe in Zanskar Valley and integrate it into the formal science curriculum at the middle stage for contextualised learning.

Methodology

This study employed a qualitative research approach, collecting information through in-depth ethnographic interviews, document analysis, conversation analysis, and participatory observation. As an outsider, to document the Traditional Ecological Knowledge of the indigenous people of Zanskar Valley, the researcher opted for ethnography as the most suitable method to meet the study's requirements. To document TEK, participatory observation and semi-directive interviews are prominent tools while living with the community (Huntington, 2000). The researcher spent 5 months in Zanskar Valley (June to October 2024) to document TEK. To select appropriate informants, snowball sampling or chain referral sampling was employed until a point of saturation was reached (32 in-depth interviews were conducted, recorded, and transcribed). During participatory observation, the researcher immersed herself entirely in the field. Wherever required, help from an interpreter was taken. Additionally, the research examines secondary sources, including documents and documentaries, to supplement primary data. This study can be divided into three phases, as outlined in Table 1.

Table 1: 3 Phases of this study

Phase 1	TEK documentation (primarily primary data via ethnography as a method, which is further supplemented with secondary data)
Phase 2	Data Analysis (Thematic analysis of documented data as per themes provided in middle-stage science curriculum, as well as analysing existing formal science curriculum at middle stage, i.e., NCERT for TEK, to see the scope of integration)
Phase 3	Integrating TEK with formal Science Curriculum using Fogarty's model of integration

There is a total of seven themes in the middle stage NCERT Science curriculum.

i. Food
ii. Materials
iii. The World of the Living
iv. How Things Work
v. Moving Things, People, and Ideas
vi. Natural Phenomena
vii. Natural Resources

Thematic analysis was done according to the above themes.

How can TEK be integrated into the curriculum?

The Four-step model suggested by Fogarty can be used to integrate TEK into science curricula. (Handayani et al., 2018); Fogarty, 1991)

1. **Fragmented/Cellular:** Traditional ecological knowledge and formal science are studied separately in an isolated system. Each is considered a distinct discipline and comprehensive in itself. TEK and formal science are considered independent of each other. The aim of this fragmented step was to preserve the sincerity of each knowledge area.
2. **Connected:** After analysis, the results of each knowledge system are studied in fragmented steps, connected based on themes, concepts, topics, and subject areas. Both knowledge systems begin to overlap and interpenetrate each other. Like osmosis, the knowledge system with greater concentration, i.e., traditional ecological knowledge, begins to permeate formal science. This is done deliberately to correlate indigenous knowledge within a discipline. By connecting within a discipline, one can gain a broader perspective and engage in focused study, allowing for review, reconceptualization, and assimilation of ideas.
3. **Sequenced:** In the next step, alignment is done to examine the relationship between the two knowledge areas in depth and detail, where the universe of traditional ecological knowledge and science classrooms were linked and correlated. This is done to arrange the topics, concepts, themes, and skills that were similar between the two.
4. **Integrated:** This step involves identifying overlapping skills, knowledge, and attitudes when developing a curriculum. The two fields of knowledge become interrelated due to the integrated model, promoting cross-disciplinary understanding. To achieve the desired competency in students, both kinds of knowledge are combined to form a new curriculum.

The researcher has attempted to demonstrate how this integration can be achieved by using one theme, "Food," as a reference. This will integrate the science curriculum's content into learners' everyday experiences and contexts.

Table 2: Illustrating the theme “Food” based on Fogarty’s model of curriculum integration.

Fragmented		Connected	Sequenced (embedded in content) Linking traditional practices with scientific principles	Integrated (Via activity)
Formal Science	TEK			
Sources of Food (Plant parts and animal products as sources of food)	Edible native plants (Classification of plants based on their edible parts: roots, stems, leaves, flowers, fruits, seeds), animal products consumed like butter, milk, meat, curd. Livestock management and	Native plant and animal products are sources of food, the interdependency of humans on the ecosystem, and livestock in Zanskar	1. Classification of plants based on edible parts (roots, stems, leaves, etc.) 2. Prominent plants consisting of the valley’s ecosystem, like Sea buckthorn, Willow, Poplar, Juniper, Barley, and black pea, along with	1. Draw a classification chart of hybrids of native livestock 2. Write all the dishes and their composition you see during *nyopta* (a community event during

	classification of their hybrid species		some fodder plants. 3. Livestock management principles used by indigenous people of the valley over time, and hybrid identification of yak and cow to learn genetic inheritance and crossbreeding. 4. Animal products as a source of food. 5. Concepts of interdependence, ecological balance, and sustainable animal husbandry.	marriage) 3. Construct a food web including local edible plants and animal products. 4. Make a table illustrating the difference between the dietary habits of your grandparents and those of you. 5. Map the seasonal migration of the herders of your village and write a report on their daily routine. Highlight the concern over abandoned *doksa*.
Components Of food (balanced diet)	Traditional diet components of Zanskar- *Tsampa*, *Paba*, *Kholak*, *Khambir*, *Skyur*, *Paktuk*, *Tangtur*, *chhutagi*, *Thukpa*, *Stri*, *Tara*, *Maar*, *Dabo*, *Churrpey*, Milk, butter, *Thuth*, *Gyuma*, curd, Yak Meat (*shapchen*), Leafy vegetables, Berries, Butter Tea, Local Fruits, *Chhang* (local beverage), *Arak, Siri, gur gur cha,* i.e., butter tea	Rich sources of necessary nutrition, catered to their living circumstances, are the main elements of the cuisine of indigenous people of Zanskar. These elements call for carbohydrates, proteins, vitamins, minerals, fats, fiber, and water. "Four pillars of life": *tsampa (*barley flour), meat, salt, and tea."	1. Carbohydrates- staple food *barley* i.e. *neh* consumed in various forms is a rich source of carbohydrate. 2. Proteins- Meat and dairy products like milk, curd, and cheese. 3. Vitamins- Sea buckthorn is a source of vitamin C, leafy vegetables, and berries are a source of vitamins. 4. Minerals- Salt from *Changthang*, Wholegrains, Milk products 5. Fat- Yak butter, cheese, and curd are sources of fat 6. Fiber- Wholegrains, vegetables. 7. Hydration –Butter tea is not only hydrating but also aids in replenishing electrolytes, promoting digestion, and protecting against the harsh climate by moisturizing skin and lips.	1. Create table featuring food combinations where Tsampa is a core ingredient. 2. Document the ceremonial roles of Tsampa in rituals like *Gustor* and *Saka*. 3. Research and record the preparation process for butter tea. 4. Collect oral histories about *Changthang* traders and goiter-related folktales involving salt exchange 5. Analyze the evolution of meat consumption patterns over generations, exploring changes in accessibility and preferences within the valley.

Cleaning food (Threshing, winnowing, hand picking, sedimentation, filtration.)	Yaks and *dzhos* are used to separate grain from husks. Natural wind currents are used to separate lighter chaff from heavier grains. Flowing water is used in *Kuhls* to clean grains. *Chhang* is filtered using handmade sieves and vaporized to make *arak.*	Separating grain from husks is threshing. Winnowing is separating lighter chaff from heavier Sedimentation is being done via flowing water to clean the grains *Chhang* is filtered, and condensation produces *arak*.	1. Threshing (Using yaks and dzhos)- Mechanical separation using kinetic energy. 2. Winnowing (Using wind currents)- Aerodynamics and density difference 3. Sedimentation (Using *Kuhls* for grain washing)- Gravity-induced separation 4. Filtration (Handmade sieves for *chhang*)- Physical separation (porosity) 5. Condensation (Distilling *chhang* into *arak*)- Phase change (evaporation & condensation)	1. Create a small-scale model of a traditional threshing setup using craft materials. 2. Learn a folk song sung to yaks while threshing 3. Engage students in cleaning and maintaining *Kuhls*; include discussions on glacier dependence and community water-sharing methods. 4. Prepare a chart to show the process of distillation while preparing *arak.*
Crop production (Soil preparation, selection of seeds, sowing, applying fertilizers, irrigation, weeding, harvesting, and storage; nitrogen fixation, nitrogen cycle)	*Saka* festival marks the ceremonial opening of the farmland. Selecting seeds based on color, size, and viability. Time of sowing based on the local calendar, *lotho*. Use of nightsoil for soil enrichment. Distributing water through *Kuhls*. Manual removal of weeds. Crop rotation with legumes. Different harvesting techniques are used for barley, wheat, and peas. Storing food in *panga*, *laptong*, *churches*, *checho ng*, *pitzey*, *dzama*, and by dehydration.	*Saka* festival embarks ploughing journey; seeds are selected for better yield. Organic manure from dry toilets is used as fertilizer, maintaining water gradients via *kulhs* for irrigation. Harvesting peas using a sickle to leave roots behind for nitrogen fixation. Traditional food storage and preservation methods.	1. Soil preparation-With *Saka* ploughing, compacted soil is disrupted, improving water infiltration and root penetration. 2. Selection of seeds- seeds chosen maximize germination rates and promote traits for better yield. 3. Sowing- *Lotho* determines favorable climatic conditions for sowing. 4. Applying fertilizers- nightsoil enriches the soil sustainably, recycling nutrients. 5. Irrigation- Kuhls distributes water efficiently using gravity, showing the immense significance of glaciers in the region. 6. Weeding- Eliminates unwanted growth, enhancing nutrient availability for crops while using it for fodder. 7. Harvesting-Barley and wheat are uprooted while peas are harvested using a sickle so that legumes fix nitrogen in the soil. 8. Nitrogen Cycle: Legume roots host nitrogen-fixing bacteria, converting atmospheric nitrogen into usable forms. Nightsoil enhances organic matter recycling, completing the nitrogen cycle	1. Provide students with samples of different seeds and have them observe traditional criteria for selection alongside scientific traits. 2. To learn determining sowing times using *lotho* and have students map climatic conditions having any impact on sowing schedules due to climate change. 3. Have students design visual models depicting the nitrogen cycle, incorporating legume cropping and nightsoil application in Zanskar farming. 4. Students build replicas of structures like *panga* and *laptong*, and study their effectiveness in preserving food compared to refrigeration.

			loop 9. Storage- Structures like *panga, laptong, churches, checho ng, pitzey, dzama,* and dehydration methods preserve food naturally by controlling temperature and moisture.	
Microorganisms	Fermented food and beverages like *chhang*, *khambiri*, *tara*, *maar*, etc.	Traditional foods like *chhang*, *khambir*, *tara*, and *maar* rely on microbial fermentation. Microorganisms trigger fermentation, producing beneficial compounds like probiotics. Microorganisms produce natural acids that prevent food spoilage, preserving food traditionally.	1. Microorganisms like yeast and lactobacillus break down starches and sugars, leading to fermentation. 2. Scientific principle: Anaerobic Respiration – microbes convert sugars into alcohol and acids in the absence of oxygen. 3. Biochemical Preservation – Lactic acid bacteria prevent harmful bacterial growth, extending shelf life. 10. Microbial Action in Digestion – Fermented foods regulate gut microbiota and improve nutrient absorption.	1. Collect fermented food samples, i.e., chhang, and observe microorganisms under a microscope. 2. Explore how fermented beverages like *chhang* play a role in festivals and ceremonies. 3. Students write the process of making *khambiri*.

Discussion

According to the United Nations Declaration on the Rights of Indigenous Peoples (U.N. Assembly, 2007), Indigenous peoples have the right to education that is culturally relevant. Indigenous Peoples have the right to an education that is in line with their own teaching and learning methodologies, according to Article 14 of the Declaration, and their education should take into account the diversity of their cultures, customs, histories, and goals, according to Article 15 (Sánchez Tapia et al., 2018). With the inclusion of TEK in the formal science curriculum at the middle stage, learning will be more culturally relevant and contextually relevant for Indigenous learners. It will increase their engagement and motivate them to pursue their rich cultural heritage. They would be able to connect their surroundings to the classroom. (Nair, 2024) discovered that a case study conducted in a rural village in Tamil Nadu, India, demonstrated that incorporating Indigenous Knowledge Systems (IKS), including traditional water harvesting methods and sustainable agricultural practices, into the science curriculum enhanced student learning outcomes and fostered an appreciation for cultural heritage. He further supports the success of this integration in bridging the learning gap by providing various examples within the Indian context. Two notable instances he has evaluated as successful accounts of Indigenous Knowledge Systems (IKS) integration in science education are the

TERRA (Traditional Ecological Resource Research and Utilization) Project in India, initiated in the 1990s, which sought to incorporate local forest management knowledge into school curricula, thereby enhancing student engagement, environ-mental awareness, and community empowerment, and the Traditional Ecological Knowledge (TEK) initiative within Alaska Native Science Programs. Numerous school districts in Alaska have integrated Traditional Ecological Knowledge (TEK) into their science curricula, wherein elders instruct students on animal tracking, traditional hunting methodologies, and indigenous astronomy. This approach enhances students' understanding of their cultural heritage, environment, ecosystems, and sustainable practices, while fostering respect for diverse knowledge systems and scientific inquiry (Nair, 2024). In the above cases, we can assert that TEK holds the key to sustainability in modern times, including practical knowledge about various sustainable practices, such as crop rotation, water conservation, and the use of native plants, thereby fostering a greater commitment to a sustainable future. Teaching such practices can provide students with actionable strategies for sustainability that they can apply in their lives and communities. It can foster a generation of students who are knowledgeable about eco-logical principles and equipped to support and implement sustainable practices in their communities (Oando, 2024). Preserving and reviving indigenous knowledge systems is essential, as is the need to popularize them among the youth to prevent their gradual loss over time (Rai, 2007). In addition to preserving and honouring these traditional systems, the integration of Indigenous Knowledge Systems (IKS) into contemporary science education and environmental practices enhances students' educational experiences and helps them to more fully value both scientific paradigm and cultural heritage (Phirke, 2025).

Conclusion

Indigenous learners gain firsthand knowledge from the community in their context, including livestock management, agriculture, health, healing, religious aspects, Indigenous crafts, and language. When they bring it to the table in the classroom, some of the information can be discarded by not labelling it as science, but rather as a community value. Although formal science may reject such knowledge, socio-cultural factors in science learning are now widely accepted worldwide (Aikenhead & Michell, 2011). It will make learners appreciate their own culture rather than feeling backward. It will significantly contribute to cultural inheritance and connect learners to their community (Chiang & Lee, 2015). To connect the gaps and build meaningful learning experiences for Indigenous learners, TEK in the science curriculum holds the potential to ensure that native learners do not feel separated from their environment

(Handayani et al., 2018). To properly recognize this knowledge, NEP 2020 also supports its inclusion in the curriculum. Concluding with a quote by Gitga'at elder Tina Robinson, "We might go back to this, the way the world is going" (Hoagland, 2017; Turner & Spalding, 2013).

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भारतीय ज्ञान प्रणाली के प्रचार में सोशल मीडिया: अवसर, चुनौतियाँ और रणनीतियाँ

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सारांश

भारतीय ज्ञान प्रणाली भारत की आत्मा है — एक ऐसी विरासत जो सहस्राब्दियों से विज्ञान, दर्शन, चिकित्सा, कला और जीवनशैली को दिशा देती आई है। आज जब विश्व डिजिटल संवाद की ओर अग्रसर है, तब सोशल मीडिया एक ऐसा सेतु बन सकता है, जो इस प्राचीन ज्ञान को आधुनिक चेतना से जोड़ सके।YouTube, Instagram, X, Facebook और LinkedIn जैसे मंचों पर आयुर्वेद, योग, वास्तु, संगीत, और नैतिक दर्शन जैसे विषयों को संक्षिप्त वीडियो, इन्फोग्राफिक्स और पॉडकास्ट के माध्यम से प्रस्तुत किया जा सकता है। "एक मिनट में वेद" जैसे अभियान न केवल युवाओं को आकर्षित करेंगे, बल्कि उन्हें अपनी जड़ों से जोड़ने का कार्य भी करेंगे।जनजातीय और ग्रामीण समुदायों के पारंपरिक अनुभवों को डिजिटल कहानियों के रूप में प्रस्तुत कर हम न केवल उनके ज्ञान को सम्मान दे सकते हैं, बल्कि उसे वैश्विक मंच पर भी पहुँचा सकते हैं। हैशटैग अभियानों जैसे #DigitalVedas, #IKSForSDG, और #BharatiyaGyanOnline के माध्यम से यह संवाद सीमाओं से परे जा सकता है।शैक्षणिक संस्थानों को चाहिए कि वे IKS आधारित डिजिटल प्रतियोगिताएँ, वेबिनार और सोशल मीडिया चैलेंज आयोजित करें, जिससे नवाचार और सहभागिता को प्रोत्साहन मिले। साथ ही, विशेषज्ञों को सोशल मीडिया पर प्रामाणिक प्रतिनिधि के रूप में प्रस्तुत कर IKS को लोकप्रिय संस्कृति में स्थान दिलाया जा सकता है। इस प्रकार, सोशल मीडिया केवल एक प्रचार माध्यम नहीं, बल्कि भारतीय ज्ञान प्रणाली को पुनः जीवंत करने का एक सांस्कृतिक आंदोलन बन सकता है — जो लोक से वैश्विक तक, जड़ से आधुनिक तक, और परंपरा से नवाचार तक की यात्रा को संभव बनाता है।

बीज शब्द: भारतीय ज्ञान प्रणाली, सोशल मीडिया प्लेटफ़ॉर्म, डिजिटल शिक्षा, लोक संस्कृति, ज्ञान का प्रसार, रणनीतियाँ।

प्रस्तावना

भारतीय संस्कृति का स्वरूप इतना विराट और गहन है कि उसके भीतर समाहित ज्ञान परंपरा एक अमूल्य निधि के समान है। यह केवल ग्रंथों के पन्नों तक सीमित नहीं, बल्कि ऋषि-मुनियों के तप, योगियों की साधना, वैज्ञानिकों की खोज और कवियों की वाणी से प्रवाहित होती रही है। यही भारतीय ज्ञान प्रणाली है, जो हजारों वर्षों से हमारी सभ्यता की धड़कन बनी हुई है।वेदों की ऋचाएँ इसका शाश्वत स्रोत हैं, जिनमें सृष्टि के रहस्य, जीवन के आदर्श और मानव कल्याण का मार्ग प्रकाशित होता है। उपनिषदों में आत्मा और परमात्मा के अद्वैत का गूढ़ दर्शन मिलता है तो रामायण और महाभारत में आदर्श, नीति और धर्म का जीवन्त चित्रण। पुराणों ने इस ज्ञान को लोकभाषा और कथाओं के माध्यम से जन-जन तक पहुँचाया इस ज्ञान परंपरा की सबसे बड़ी विशेषता है इसकी समग्र दृष्टि—जहाँ विज्ञान और अध्यात्म, तर्क और अनुभूति, भौतिकता और आध्यात्मिकता का सुंदर समन्वय देखने को मिलता है। इसमें केवल जानने की जिज्ञासा नहीं, बल्कि

जीवन को जीने की कला निहित है। यही कारण है कि यह प्रणाली "सर्वे भवन्तु सुखिनः" के आदर्श को आत्मसात करती है और समूचे विश्व को एक परिवार—"वसुधैव कुटुम्बकम्"—के रूप में देखने की प्रेरणा देती है।आज के युग में, जब मानवता भौतिक प्रगति की अंधी दौड़ में थकान और अशांति का अनुभव कर रही है, तब भारतीय ज्ञान प्रणाली एक प्रकाशस्तंभ की भांति मार्गदर्शन करती है। यह हमें बताती है कि सच्चा ज्ञान वही है, जो मानवता को जोड़ने वाला, प्रकृति का संरक्षण करने वाला और आत्मा को ऊर्ध्वगामी बनाने वाला हो।संक्षेप में, भारतीय ज्ञान प्रणाली केवल अतीत की गौरवशाली धरोहर नहीं, बल्कि वर्तमान की आवश्यकता और भविष्य का पथप्रदर्शक है—एक ऐसा पथ, जो हमें सत्य, सुंदर और शुभ की ओर ले जाता है।

सोशल मीडिया प्लेटफ़ॉर्म

सोशल मीडिया प्लेटफ़ॉर्म वे डिजिटल माध्यम हैं, जिनके माध्यम से लोग इंटरनेट पर एक-दूसरे से संवाद करते हैं, विचारों का आदान-प्रदान करते हैं, सूचनाएँ साझा करते हैं और विभिन्न प्रकार की गतिविधियों में सहभागिता करते हैं। यह केवल संवाद का साधन नहीं है, बल्कि शिक्षा, व्यापार, मनोरंजन और सामाजिक जुड़ाव का भी महत्वपूर्ण साधन बन चुका है।

प्रमुख सोशल मीडिया प्लेटफ़ॉर्म –

चित्र 1. प्रमुख सोशल मीडिया प्लेटफ़ॉर्म

सोशल मीडिया प्लेटफ़ॉर्म की विशेषताएँ

सोशल मीडिया प्लेटफ़ॉर्म ज्ञान, सूचना और संवाद को तीव्र गति से साझा करने का माध्यम है। यह शिक्षा, संस्कृति और व्यवसाय को जोड़ते हुए वैश्विक स्तर पर लोगों को जोड़ने का सशक्त साधन है-

1. **संपर्क और संवाद को आसान और तेज़ बनाना:** सोशल मीडिया प्लेटफ़ॉर्म का सबसे बड़ा योगदान यह है कि यह लोगों को भौगोलिक दूरी से परे जोड़ता है। चाहे कोई व्यक्ति देश के किसी भी कोने में हो या विदेश में, वह तुरंत संदेश, कॉल या वीडियो कॉल

के माध्यम से अपने मित्रों, परिवार और सहकर्मियों से जुड़ सकता है। पहले जहाँ संवाद पत्र या टेलीफोन पर निर्भर था, वहीं अब सोशल मीडिया ने संवाद को तत्काल और सुलभ बना दिया है।

2. **सूचना और समाचार का त्वरित आदान-प्रदान:** सोशल मीडिया प्लेटफ़ॉर्म आज के समय में सूचना और समाचार का सबसे तेज़ स्रोत बन चुके हैं। किसी घटना के घटित होते ही कुछ ही सेकंड में वह पूरे विश्व में वायरल हो जाती है। समाचार चैनलों और अखबारों की तुलना में सोशल मीडिया सूचना के प्रसार का अत्यधिक गतिशील और सशक्त माध्यम है। हालाँकि, इसकी चुनौती यह है कि सूचना की सत्यता कभी-कभी संदिग्ध भी होती है।
3. **शैक्षिक संसाधन और सीखने के अवसर उपलब्ध कराना:** आधुनिक शिक्षा में सोशल मीडिया की भूमिका महत्वपूर्ण होती जा रही है। यूट्यूब, टेलीग्राम, लिंक्डइन, गूगल क्लासरूम और अन्य प्लेटफ़ॉर्म पर लाखों ई-लर्निंग संसाधन उपलब्ध हैं। छात्र-छात्राएँ इनसे नई चीज़ें सीख सकते हैं, प्रश्नों का समाधान पा सकते हैं और विशेषज्ञों से जुड़ सकते हैं। विशेषकर ऑनलाइन कोर्स, वेबिनार और ई-लाइब्रेरी ने शिक्षा को वैश्विक स्तर पर सुलभ बना दिया है।
4. **व्यापार और मार्केटिंग के लिए प्रभावी माध्यम:** आज लगभग हर छोटा-बड़ा व्यवसाय सोशल मीडिया से जुड़ा है। फेसबुक, इंस्टाग्राम, यूट्यूब और लिंक्डइन जैसे प्लेटफ़ॉर्म पर कंपनियाँ अपने उत्पादों और सेवाओं का प्रचार करती हैं। इससे व्यापारियों को कम लागत में अधिक ग्राहकों तक पहुँचने का अवसर मिलता है। डिजिटल मार्केटिंग, ऑनलाइन शॉपिंग और ब्रांड प्रमोशन सोशल मीडिया के माध्यम से बहुत सरल हो गए हैं।
5. **मनोरंजन और रचनात्मकता को प्रोत्साहन:** सोशल मीडिया केवल संवाद और शिक्षा का माध्यम नहीं, बल्कि मनोरंजन और रचनात्मकता का भी केंद्र है। इंस्टाग्राम रील्स, यूट्यूब वीडियो, फेसबुक पोस्ट, मीम्स और शॉर्ट वीडियो आज युवाओं की रचनात्मकता को व्यक्त करने का लोकप्रिय साधन हैं। कलाकार, लेखक, गायक और रचनात्मक व्यक्तित्व अपने कार्य को साझा कर वैश्विक पहचान बना रहे हैं। इसने नए-नए करियर विकल्प भी प्रदान किए हैं, जैसे कंटेंट क्रिएटर, ब्लॉगर, यूट्यूबर आदि।

सोशल मीडिया प्लेटफ़ॉर्म और भारतीय ज्ञान प्रणाली का वर्तमान में संबंध

भारतीय ज्ञान प्रणाली और सोशल मीडिया प्लेटफ़ॉर्म, दोनों ही अपने-अपने युग की विशिष्ट देन हैं। एक ओर भारतीय ज्ञान प्रणाली, जो हजारों वर्षों की साधना, चिंतन और गहन अनुभव से जन्मी शाश्वत परंपरा है, वहीं दूसरी ओर सोशल मीडिया प्लेटफ़ॉर्म, जो आधुनिक विज्ञान और तकनीक की गति से निर्मित एक नवीनतम माध्यम है। वर्तमान समय में ये दोनों ध्रुव जैसे मिलकर एक नवीन समन्वित संसार रच रहे हैं, जहाँ परंपरा और आधुनिकता का अद्भुत संगम दिखाई देता है।

1. **ज्ञान प्रसार का साधन**: प्राचीन भारत में ज्ञान का प्रसार गुरुकुलों की पवित्र वाणी, *श्रुति और स्मृति की परंपरा*, तथा *शास्त्रार्थ की गंभीर सभाओं* के माध्यम से होता था। आज वही ज्ञान-दीपक सोशल मीडिया के आकाश में पुनः प्रज्वलित हो रहा है। यूट्यूब के व्याख्यान, फेसबुक के मंच और इंस्टाग्राम की झलकियों में भारतीय दर्शन, योग, आयुर्वेद और गणित नई भाषा और रूप में उजागर

हो रहे हैं। जिस प्रकार ऋषि अपने यज्ञकुंड से ज्ञान की आहुति देते थे, उसी प्रकार आज का सोशल मीडिया मंच भी ज्ञान की आभा को विश्वव्यापी दिशा में प्रेषित कर रहा है।

2. **वैश्विक स्तर पर पहुँच**: भारतीय ज्ञान प्रणाली ने प्राचीन काल से ही *"वसुधैव कुटुम्बकम्"*—सम्पूर्ण विश्व को परिवार मानने की अवधारणा दी। किंतु वह विचार सीमित समाजों और संस्कृतियों तक ही संप्रेषित हो पाता था। आज सोशल मीडिया ने उस विचार को मूर्त रूप दे दिया है। योग की साधना, आयुर्वेद की औषधियाँ, गीता के श्लोक और उपनिषदों की गूढ़ शिक्षाएँ अब केवल भारत तक सीमित नहीं रहीं, बल्कि सोशल मीडिया की पंखुरी पर बैठकर वे विश्व के प्रत्येक कोने में सुवासित पुष्प की तरह फैल रही हैं।
3. **युवा पीढ़ी से जुड़ाव**: शाश्वत ज्ञान की धारा कभी-कभी युवा मन के लिए गंभीर और कठिन प्रतीत होती है। किंतु सोशल मीडिया ने उस धारा को सरल भाषा और आकर्षक रूप देकर युवाओं तक पहुँचा दिया है। इंस्टाग्राम की लघु झलकियों में गीता के श्लोक जीवंत हो उठते हैं, यूट्यूब के रचनात्मक वीडियो में वेदांत की गहराई सरल व्याख्या में खुल जाती है। जिस प्रकार प्राचीन काल में कथा-वाचक लोकभाषा में ज्ञान सुनाकर जन-जन को जोड़ते थे, उसी प्रकार आज सोशल मीडिया आधुनिक कथावाचक बनकर युवाओं के हृदय में भारतीय ज्ञान के बीज बो रहा है।
4. **संवाद और विमर्श का माध्यम**: भारतीय परंपरा में *शास्त्रार्थ* केवल तर्क का खेल नहीं था, बल्कि सत्य की खोज का मार्ग था। आज वही परंपरा डिजिटल रूप में सोशल मीडिया पर पुनर्जीवित हो गई है। ट्विटर (X) की बहसें, यूट्यूब के लाइव विमर्श और टेलीग्राम के समूह चर्चाएँ आधुनिक शास्त्रार्थ की सभाएँ हैं, जहाँ विद्वान और सामान्य जन एक ही मंच पर विचार-विनिमय कर रहे हैं। यह परंपरा दिखाती है कि ज्ञान केवल पुस्तकों में सीमित नहीं, बल्कि जीवंत संवाद में पल्लवित होता है।
5. **संरक्षण और पुनर्जीवन**: भारतीय ज्ञान प्रणाली की अनेक शाखाएँ समय के साथ धुंधली पड़ गईं थीं—किसी लोकगीत की मधुरता, किसी शिल्प की निपुणता, किसी हस्तकला की परंपरा धीरे-धीरे विस्मृति में जा रही थी। किंतु सोशल मीडिया ने इन धरोहरों को नवजीवन दिया है। डॉक्यूमेंट्री, डिजिटल आर्काइव्स और वर्चुअल कक्षाओं ने उन परंपराओं को न केवल बचाया है बल्कि नई पीढ़ी के सामने गौरवपूर्ण रूप में प्रस्तुत किया है। जैसे कोई चित्रकार पुराने धुंधले चित्र पर नए रंग भर देता है, वैसे ही सोशल मीडिया ने भारतीय ज्ञान प्रणाली की विस्मृत धरोहरों को आधुनिक आभा प्रदान की है।

भारतीय ज्ञान प्रणाली और सोशल मीडिया प्लेटफ़ॉर्म का वर्तमान में संबंध केवल तकनीक और परंपरा का मिलन नहीं है, बल्कि यह मानवता के अतीत, वर्तमान और भविष्य का पुल है। एक ओर भारतीय ज्ञान प्रणाली हमें गहराई, मूल्य और दिशा प्रदान करती है, तो दूसरी ओर सोशल मीडिया उसे गति, व्यापकता और आधुनिक भाषा देता है। यह संगम इस सत्य की पुष्टि करता है कि चाहे माध्यम बदले, परंतु ज्ञान का प्रकाश शाश्वत है—वह हर युग में अपना मार्ग ढूँढ लेता है।

डिजिटल शिक्षा

डिजिटल शिक्षा ने भारतीय शिक्षा प्रणाली में क्रांति का स्वरूप ले लिया है। पारंपरिक गुरुकुल और शैक्षिक संस्थान अब केवल भौतिक कक्षाओं तक सीमित नहीं रहे। ऑनलाइन प्लेटफ़ॉर्म, वेबिनार, ई-लर्निंग कोर्स, शॉर्ट वीडियो और इंटरैक्टिव क्लासेज ने ज्ञान के आदान-प्रदान की गति और पहुँच को अभूतपूर्व रूप से बढ़ा दिया है।आज विद्यार्थी घर बैठे ही वेद, उपनिषद, योग, आयुर्वेद, गणित, विज्ञान और कला के गहन अध्ययन में संलग्न हो सकते हैं। डिजिटल शिक्षा ने ज्ञान को समय और स्थान की सीमाओं से मुक्त कर दिया है। दूर-दराज़ के गाँव, छोटे शहर, और आर्थिक रूप से पिछड़े क्षेत्र भी अब विश्वस्तरीय शिक्षा का लाभ उठा सकते हैं।सिर्फ जानकारी का संचार ही नहीं, बल्कि डिजिटल शिक्षा ने अध्ययन को अनुभवमूलक और संवादात्मक भी बना दिया है। ऑनलाइन क्विज़, चर्चा मंच और समूह परियोजनाओं के माध्यम से विद्यार्थी ज्ञान को केवल ग्रहण नहीं करते, बल्कि उस पर चिंतन, विश्लेषण और नवाचार भी करते हैं। इस प्रकार डिजिटल शिक्षा भारतीय ज्ञान प्रणाली को सजीव और सर्वग्राह्य बनाने का अमूल्य साधन बन गई है।

लोक संस्कृति

भारत की आत्मा उसकी लोक संस्कृति में निहित है। लोककथाएँ, लोकगीत, नृत्य, शिल्पकला और पारंपरिक त्योहार केवल मनोरंजन के साधन नहीं, बल्कि जीवनदर्शन, सामाजिक मूल्य और सांस्कृतिक ज्ञान के वाहक हैं। डिजिटल प्लेटफ़ॉर्म इन सांस्कृतिक धरोहरों को नवजीवन और वैश्विक पहचान प्रदान कर रहे हैं।सोशल मीडिया के माध्यम से युवा पीढ़ी अब लोककथाओं और लोकगीतों से जुड़ रही है। नृत्य और शिल्पकला की प्रस्तुतियाँ वीडियो, लाइव स्ट्रीम और डिजिटल डॉक्यूमेंट्री के रूप में सुरक्षित हो रही हैं। यह न केवल हमारी सांस्कृतिक पहचान को संरक्षित करता है, बल्कि आने वाली पीढ़ियों को अपनी जड़ों से जोड़ने और उनसे सीखने का अवसर भी प्रदान करता है।लोक संस्कृति का डिजिटल रूपांतरण हमारे सांस्कृतिक संवाद और वैश्विक आदान-प्रदान को भी सशक्त बनाता है। विदेशी दर्शक भारतीय परंपरा, संगीत और कला के अद्भुत अनुभवों से परिचित हो रहे हैं। इस प्रकार सोशल मीडिया केवल ज्ञान का माध्यम नहीं, बल्कि संस्कृति का **सेतु और संवाहक** भी बन गया है।

ज्ञान का प्रसार

सोशल मीडिया और डिजिटल प्लेटफ़ॉर्म ने भारतीय ज्ञान प्रणाली के **प्रसार की गति और प्रभावशीलता** को अभूतपूर्व रूप से बढ़ा दिया है। योग, आयुर्वेद, वेदांत, दर्शन, विज्ञान और कला के गूढ़ तत्व अब केवल शिक्षक और छात्र तक सीमित नहीं हैं; बल्कि यह जानकारी हर व्यक्ति तक पहुँच रही है।डिजिटल माध्यमों के प्रयोग से ज्ञान **सुलभ, रोचक और संवादात्मक** बन गया है। शॉर्ट वीडियो, पॉडकास्ट, इन्फ़ोग्राफ़िक्स, एनिमेशन और ऑनलाइन सेमिनार के माध्यम से कठिन शास्त्रीय सिद्धांत भी सहज और आकर्षक रूप में प्रस्तुत किए जा सकते हैं।इसके अतिरिक्त, वैश्विक मंच पर भारतीय ज्ञान प्रणाली का प्रचार-प्रसार बढ़ा है। विदेशी विद्वान, शोधकर्ता और विद्यार्थी अब योग, आयुर्वेद और भारतीय दर्शन का अध्ययन और विमर्श कर रहे हैं। डिजिटल ज्ञान का यह वैश्वीकरण भारतीय शिक्षा और संस्कृति की प्रतिष्ठा को विश्व स्तर पर उजागर कर रहा है।

भारतीय ज्ञान प्रणाली और सोशल मीडिया प्लेटफ़ॉर्म में नवाचार अवसर

भारतीय ज्ञान प्रणाली और सोशल मीडिया प्लेटफ़ॉर्म का संगम नवाचार के नए अवसर पैदा करता है, जिससे ज्ञान का वैश्वीकरण और युवा पीढ़ी में सांस्कृतिक जागरूकता बढ़ती है। यह डिजिटल माध्यम भारतीय परंपरा और आधुनिकता को जोड़कर शिक्षा और संस्कृति के प्रसार को सशक्त बनाता है-

चित्र 2. सोशल मीडिया प्लेटफ़ॉर्म में नवाचार अवसर

सोशल मीडिया और भारतीय ज्ञान प्रणाली का संगम आधुनिकता और परंपरा का अद्भुत मेल है। यह वह दीप है, जो ज्ञान के अंधकार को मिटाकर समस्त विश्व को आलोकित कर रहा है। अवसर असीमित हैं—प्रश्न केवल इतना है कि हम इस साधन का उपयोग कितनी दूरदर्शिता और निष्ठा के साथ करते हैं।

चुनौतियाँ

सोशल मीडिया प्लेटफ़ॉर्म पर भारतीय ज्ञान प्रणाली के प्रसार में सत्यापन, गुणवत्ता और सांस्कृतिक संतुलन की चुनौतियाँ सामने आती हैं। इसके अतिरिक्त डिजिटल असमानता और ध्यान विचलन जैसी समस्याएँ भी ज्ञान के प्रभावी वितरण में बाधक बन सकती हैं-

क. **सत्यता और प्रामाणिकता का संकट:** सोशल मीडिया ज्ञान का समुद्र है, परंतु इसमें मोती और कंकड़ साथ-साथ बहते हैं। प्रामाणिकता की छानबीन के बिना मिलने वाली जानकारी विद्यार्थी और शोधार्थियों को भ्रमित कर सकती है। जहाँ भारतीय शिक्षा प्रणाली शास्त्रों और ग्रंथों की गहन समीक्षा और प्रमाण पर आधारित है, वहीं सोशल मीडिया पर अफ़वाहें, आधी-अधूरी सूचनाएँ और भ्रामक तथ्य अधिक तीव्रता से फैलते हैं। यह स्थिति ज्ञान के वास्तविक स्वरूप को धूमिल कर देती है।

ख. **ज्ञान का बाज़ारीकरण:** भारतीय परंपरा में शिक्षा को "विद्या ददाति विनयम्" की दृष्टि से पूजा गया है। यह साधना का मार्ग है, वस्तु की तरह बिकने वाली सामग्री नहीं। किंतु सोशल मीडिया के वाणिज्यिक स्वरूप ने शिक्षा और ज्ञान को भी उत्पाद का रूप दे दिया

है। पेड कंटेंट, विज्ञापन और लाइक्स-शेयर की संस्कृति शिक्षा को 'निष्ठा और साधना' से हटाकर 'लाभ और प्रसिद्धि' की दिशा में मोड़ देती है।

ग. **डिजिटल असमानता का संकट:** भारत गाँवों और नगरों का देश है, जहाँ अब भी बहुत बड़ी आबादी इंटरनेट और आधुनिक तकनीकी संसाधनों से वंचित है। डिजिटल डिवाइड शिक्षा में गहरी खाई उत्पन्न करता है—जहाँ कुछ विद्यार्थी नवीनतम शैक्षिक सामग्री और ऑनलाइन व्याख्यान तक पहुँच रखते हैं, वहीं कई अन्य विद्यार्थी इस सुविधा से वंचित रह जाते हैं। भारतीय ज्ञान प्रणाली का सार्वभौमिक उद्देश्य तभी सफल होगा, जब यह ज्ञान सभी तक समान रूप से पहुँचे।

घ. **एकाग्रता और गहनता का विघटन:** भारतीय शिक्षा प्रणाली का मूल आधार ध्यान, एकाग्रता और आत्मचिंतन है। उपनिषदों से लेकर गुरुकुल परंपरा तक, विद्यार्थियों को "श्रवण, मनन और निदिध्यासन" की त्रिवेणी से ज्ञान अर्जित करने का उपदेश दिया गया है। लेकिन सोशल मीडिया की तेज़ रफ्तार, निरंतर नोटिफिकेशन और सतही संवाद विद्यार्थी को क्षणिक संतोष की ओर खींचते हैं। गहन अध्ययन और आत्म-चिंतन की क्षमता धीरे-धीरे क्षीण होती जाती है।

ङ. **सांस्कृतिक असंतुलन:** सोशल मीडिया वैश्विक संवाद का माध्यम है, किंतु इसमें पाश्चात्य जीवनशैली और उपभोक्तावादी दृष्टिकोण का वर्चस्व अधिक है। भारतीय संस्कृति की गहराई, उसकी साधना, त्याग और संतुलन की भावना कई बार इस चमकदार डिजिटल संसार में दब जाती है। यदि भारतीय ज्ञान प्रणाली को उचित मंच और प्रस्तुति न मिले तो सांस्कृतिक असंतुलन उत्पन्न हो सकता है, जहाँ विद्यार्थी अपनी जड़ों से दूर होते जाएँ।

च. **भाषाई विसंगतियाँ:** भारत की शक्ति उसकी विविध भाषाओं में निहित है। संस्कृत, प्राकृत, पाली से लेकर हिंदी, तमिल, बांग्ला और मराठी जैसी भाषाओं ने ज्ञान की धारा को समृद्ध किया है। किंतु सोशल मीडिया पर विदेशी भाषाओं, विशेषकर अंग्रेज़ी का आधिपत्य स्थानीय भाषाओं के साहित्यिक और शैक्षिक महत्त्व को कम कर देता है। भारतीय भाषाओं में उपलब्ध ज्ञानसंपदा अनुवाद और उचित प्रस्तुति के अभाव में उपेक्षित रह सकती है।

छ. **नैतिकता और आचार का ह्रास:** भारतीय शिक्षा प्रणाली का लक्ष्य केवल जानकारी प्रदान करना नहीं, बल्कि व्यक्ति के भीतर नैतिकता, करुणा और सत्य की ज्योति प्रज्वलित करना है। परंतु सोशल मीडिया पर फेक न्यूज़, ट्रोलिंग, साइबर बुलिंग और आपत्तिजनक सामग्री का प्रसार इस नैतिक शिक्षा के आदर्श को चुनौती देता है। यदि विद्यार्थी इस आभासी वातावरण में अनियंत्रित रूप से विचरण करेंगे तो उनके मूल्यबोध पर प्रतिकूल प्रभाव पड़ सकता है।

ज. **अति-निर्भरता और आत्मनिर्भरता का ह्रास:** भारतीय शिक्षा आत्मानुशासन और आत्मनिर्भरता पर बल देती है। "स्वाध्याय" इसकी आत्मा है। किंतु सोशल मीडिया पर लगातार उपलब्ध उत्तर और आसान व्याख्याएँ विद्यार्थियों को सुविधा-प्रिय बनाती हैं। वे स्वयं प्रयास करने की बजाय तात्कालिक उत्तर खोजने की ओर झुक जाते हैं। यह प्रवृत्ति उनके भीतर के जिज्ञासु, शोधशील और चिंतनशील व्यक्तित्व को दबा देती है।

इस प्रकार, सोशल मीडिया और भारतीय ज्ञान प्रणाली का संगम जितने अवसर प्रदान करता है, उतनी ही गंभीर चुनौतियाँ भी हमारे सामने खड़ी करता है। इन चुनौतियों का विवेकपूर्ण समाधान ही शिक्षा के भविष्य को उज्ज्वल बना सकता है।

रणनीतियाँ

भारतीय ज्ञान प्रणाली के प्रभावी प्रचार के लिए सत्यापित सामग्री, रचनात्मक प्रस्तुति और सुविचारित डिजिटल रणनीतियाँ अपनाना आवश्यक है। इसके माध्यम से ज्ञान का सुलभ, रोचक और वैश्विक स्तर पर प्रसार सुनिश्चित किया जा सकता है-

क. **सत्यापित और प्रामाणिक सामग्री का प्रसार**: भारतीय ज्ञान परंपरा की सबसे बड़ी शक्ति उसकी प्रामाणिकता और गहनता है। सोशल मीडिया पर आयुर्वेद, योग, वेदांत या दर्शन से जुड़ी सामग्री तभी विश्वसनीय बनेगी जब उसे मान्य ग्रंथों, विश्वविद्यालयों और विद्वानों के प्रमाणित स्रोतों से साझा किया जाए। "सत्यं ब्रूयात् प्रियं ब्रूयात्" की परंपरा को ध्यान में रखकर हर जानकारी को सत्य और प्रमाण के साथ प्रस्तुत करना आवश्यक है।

ख. **शैक्षिक संवाद मंचों की स्थापना:** डिजिटल युग का विद्यार्थी केवल श्रोता नहीं, बल्कि सहभागी भी है। वेबिनार, लाइव सेशन, क्विज़ प्रतियोगिता, इंटरैक्टिव क्लास और ई-वर्कशॉप जैसे साधन भारतीय ज्ञान प्रणाली को केवल जानकारी नहीं, बल्कि अनुभव के रूप में प्रस्तुत कर सकते हैं। इस प्रकार शिक्षा संवादमूलक और जीवंत हो जाती है।

ग. **लोक संस्कृति का डिजिटल संरक्षण:** भारत की असली पहचान उसकी लोककथाओं, लोकगीतों, हस्तशिल्प और लोकनृत्यों में छिपी है। सोशल मीडिया एक विशाल डिजिटल आर्काइव का रूप ले सकता है, जहाँ इन सांस्कृतिक धरोहरों को वीडियो, ऑडियो और ई-डॉक्यूमेंट के रूप में संग्रहित किया जाए। यह संरक्षण न केवल हमारी संस्कृति को जीवित रखेगा, बल्कि वैश्विक स्तर पर उसे सम्मान दिलाएगा।

घ. **युवा पीढ़ी हेतु आकर्षक प्रस्तुति**: आज की पीढ़ी तेज़ गति और दृश्यात्मक भाषा को अधिक ग्रहण करती है। शॉर्ट वीडियो, रील्स, एनिमेशन, कॉमिक स्टोरीज़ और इन्फ़ोग्राफ़िक्स भारतीय ज्ञान प्रणाली को सरल, रोचक और मनमोहक ढंग से प्रस्तुत कर सकते हैं। जब आयुर्वेद का सूत्र, गीता का श्लोक या तर्कशास्त्र का सिद्धांत चित्रात्मक या दृश्यात्मक रूप में आता है तो वह स्मरणीय और सहज हो जाता है।

ङ. **वैश्विक नेटवर्किंग का सशक्त उपयोग**: सोशल मीडिया एक ऐसा पुल है जो संस्कृतियों और देशों को जोड़ सकता है। भारतीय ज्ञान प्रणाली को वैश्विक विमर्श से जोड़ना आवश्यक है। योग, आयुर्वेद, ज्योतिष, वास्तु और दर्शन पर अंतरराष्ट्रीय सेमिनार, चर्चा और सहयोगी प्रोजेक्ट्स सोशल मीडिया के माध्यम से आयोजित किए जा सकते हैं। यह भारत की बौद्धिक विरासत को विश्व पटल पर उजागर करेगा।

च. **बहुभाषिकता का संवर्धन**: भारत की आत्मा उसकी भाषाओं में बसती है। यदि भारतीय ज्ञान प्रणाली केवल एक या दो भाषाओं तक सीमित रही तो उसका प्रसार सीमित रह जाएगा। सोशल मीडिया पर संस्कृत श्लोकों का हिंदी, अंग्रेज़ी और अन्य भारतीय व

विदेशी भाषाओं में अनुवाद प्रस्तुत कर बहुभाषिक संवाद स्थापित करना चाहिए। इससे ज्ञान का प्रवाह सर्वसुलभ और सर्वग्राह्य बनेगा।

छ. **नैतिक शिक्षा का पुनर्संस्कार**: भारतीय शिक्षा का मूल उद्देश्य केवल जानकारी देना नहीं, बल्कि मूल्य और संस्कार देना है। सोशल मीडिया के माध्यम से "नैतिक शिक्षा श्रृंखला" शुरू की जा सकती है, जहाँ प्रतिदिन छोटे-छोटे वीडियो, प्रेरक कथाएँ और सूक्तियाँ साझा हों। इस प्रकार आभासी जगत में भी नैतिकता की ज्योति प्रज्वलित की जा सकती है।

ज. **शोध और नवाचार को प्रोत्साहन:** भारतीय ज्ञान प्रणाली केवल परंपरा तक सीमित नहीं, बल्कि निरंतर नवाचार की प्रेरणा देती है। सोशल मीडिया पर शोधपत्र, नए विचार, इनोवेशन प्रोजेक्ट्स और प्रयोगात्मक कार्यों को साझा करके युवाओं को अनुसंधान की ओर प्रेरित किया जा सकता है। इससे प्राचीन ज्ञान और आधुनिक विज्ञान का समन्वय संभव होगा।

झ. **सहयोगी समुदाय:** सोशल मीडिया केवल जानकारी देने का साधन नहीं, बल्कि एक समुदाय बनाने का भी माध्यम है। विषयवार समूह, पेज, और मंच बनाकर विद्यार्थी, शिक्षक और शोधकर्ता एक-दूसरे से संवाद कर सकते हैं। इससे सामूहिक अध्ययन और साझा अनुभवों की परंपरा विकसित होगी, जो भारतीय "सहकार" की भावना को डिजिटल युग में जीवित रखेगी।

ञ. **रचनात्मक डिजिटल कहानियाँ और डॉक्यूमेंटेशन**: ज्ञान को केवल शुष्क सिद्धांतों में न बाँधकर कहानियों, वृत्तचित्रों और पॉडकास्ट्स के माध्यम से प्रस्तुत करना चाहिए। उदाहरण के लिए, पंचतंत्र की नीति कथाएँ या उपनिषदों की प्रेरक वार्ताएँ एनिमेटेड डिजिटल कहानियों में ढाली जाएँ। इससे न केवल मनोरंजन होगा, बल्कि शिक्षा भी सहज और गहन होगी।

इस प्रकार, यदि इन रणनीतियों को योजनाबद्ध ढंग से लागू किया जाए तो सोशल मीडिया भारतीय ज्ञान प्रणाली का केवल प्रसारक ही नहीं, बल्कि संरक्षक और संवाहक भी बन सकता है।

निष्कर्ष

सोशल मीडिया प्लेटफ़ॉर्म आज भारतीय ज्ञान प्रणाली के प्रचार-प्रसार का नवीन, सशक्त और प्रभावी साधन बन चुका है। यह केवल सूचना का वाहक नहीं, बल्कि परंपरा और आधुनिकता को जोड़ने वाला वह सेतु है, जो भारत की प्राचीन धरोहर को नई पीढ़ी तक जीवंत रूप में पहुँचाता है।इसने ज्ञान के प्रवाह को तीव्र गति दी है, युवाओं को सांस्कृतिक मूल्यों से जोड़ने की दिशा में मार्ग प्रशस्त किया है, और विश्व मंच पर भारत की आध्यात्मिक तथा बौद्धिक छवि को और भी उज्ज्वल बना दिया है।सफल प्रचार की कुंजी है—सत्यापित और प्रामाणिक सामग्री का चयन, रचनात्मक और आकर्षक प्रस्तुति, तथा सुविचारित रणनीतिक योजना। यदि इन तीनों सूत्रों का संतुलित रूप से प्रयोग किया जाए, तो भारतीय ज्ञान प्रणाली का प्रकाश दीपक की लौ की भाँति न केवल भारतभूमि को आलोकित करेगा, बल्कि विश्व के कोने-कोने तक अपनी ज्योति बिखेरेगा।

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Anirvacanīya-Khyāti and the Ontology of Error: A Conceptual Analysis

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Abstract

The problem of perceptual error is indeed fundamental to any theory of knowledge because it presents a dilemma of how cognition can be both a means to truth and a means to illusion. This problem was also faced by ancient Indian philosophers, and they addressed that in theories collectively known as khyātivāda. Among these theories is the most distinct solution proposed by Advaita Vedanta in terms of anirvacanīya-khyāti and how this theory offers what amounts to a "third category" ontology of appearance that undermines traditional notions of truth and falsehood as irreversible facts. A conceptual analysis of anirvacanīya-khyāti will be provided in this paper, along with the demonstration of how this theory offers insights about appearance in general by setting this theory within the Indian tradition in relationship with more recent debates surrounding virtual reality.

Keywords: Khyātivāda, Anirvacanīya-khyāti, Adhyāsa, Ontological dependence, Advaita Vedānta, Virtual Reality.

Introduction

It does not necessarily mean that human thinking is accurate. In many cases, people have a wrong vision, they confuse the appearance and the reality, and make true convictions which are later proved to be false. The question then poses as to how cognition can be true and false and what is the status of that which is perceived to be false in such situations. When one sees a snake in a narrow passage and then later on gets to realize that it was actually a rope, then it is an ontological question that has been brought up. Is the snake something real as it is being perceived? Alternatively, because the experience of fear was physical, why was the nothingness of the snake enough to evoke the fear response? Moreover, the rope, as it was nothingness, why should it be perceived at all? Western philosophy has traditionally approached this problem with a two-fold ontological paradigm, in accordance with which things exist or non-exist. In this paradigm, the error can be both misperception of the existent or a hallucination of the non-existent. Nevertheless, this dichotomy does not explain the givenness of the illusory object.

The more fined-out response of classical Indian philosophy for the same comes in the form of khyativada. The doctrine of anirvacaniya-khyati of Advaita Vedanta is notable in its rejection of the possibility of categorizing the illusory object as being or non-being. This paper will

discuss this doctrine in greater detail, elaborate on its logical mechanics and its application to modern philosophy.

To understand this 'givenness' in a modern context, one might look at the parallels between ancient metaphysics and computational science. As Sharma (2020) notes, 'The Adi Shankra narrates the world as a Non-Dual (Unique) or Maya,' where 'The Maya depicts world as an unreal, illusionary and magic since Rig-Veda period'. This is comparable to how 'Virtual Reality is the simulation of real world by the machine'. Just as a computer integrates sensor data, human cognition involves sensory parts that 'perceive the information and after processing information become reality'. Thus, the human is essentially 'a machine like a computer with higher intelligence' where the brain processes information into a perceived reality.

Significance of the Study

The contemporary usage of this study can be traced back to the dynamically shifting concept of the term “reality” in the digital age. With the onset of a world of full immersion of virtual reality, the boundaries of the real and imaginary start to blend. The standard binary ontologies have problems with classifying a digital object that has causal efficacy (it can influence the emotions and choices of a user) but does not have any physical substance. The conceptual framework of advaita offers a very sound analytical approach to negotiating these borderline phenomena as archetyped by anirvacanīya. The logic of the middle-finding will also lead us to comprehend the nature of these non-physical things, altering the debate on whether "Is it real?" to "How does it depend?"

Objectives of the Study

1. To examine the logical basis of the Anirvacanīya-khyāti by using some primary texts of Advaitism.
2. To provide a comparative critique of competing Khyātivāda to highlight Advaita's dialectical strength.
3. To apply the "Indeterminable" framework to the modern-day "Virtual Realism".
4. To address internal philosophical objections to the Anirvacanīya position.

Methodology and Delimitation

The research methodology is qualitative conceptual analysis based on hermeneutics, working from Sanskrit primary texts. The texts considered for this research are Śaṅkara's Brahma Sūtra Bhashya and Vedāntaparibhāsā of Dharmaraja Adhvarin. The study is limited to the epistemological and ontological aspects of error and does not go so far as to learn about the

psychological and neurobiological processes of visual processing, rather concentrating on the "status of the object" post-perception.

Theoretical Framework: The Levels of Being

Advaita Vedānta operates within a three-tier ontological hierarchy (*Sattātraya*).

1. **Pāramārthika Sattā (Absolute):** Non-dual consciousness (*Brahman*), which is never sublated.
2. **Vyāvahārika Sattā (Empirical):** The world of space-time and causality, which is real for all practical interactions until the realization of the Absolute.
3. **Prātibhāsika Sattā (Apparent): (**Dharmarāja Adhvarindra's *Vedāntaparibhāṣā)*. The level of illusions and dreams. These objects are "private" and exist only as long as the specific cognitive error lasts.

In this framework, the "rope" belongs to the *Vyāvahārika* level, while the "snake" is *Prātibhāsika*. The error consists of superimposing the lower level (*Prātibhāsika*) onto the higher level (*Vyāvahārika*).

Analysis and Discussion

1. The Mechanism of Adhyāsa (Superimposition)

Adhyāsa is the foundation theory of Advait. Śaṅkara (8th century CE) defines this in his *Adhyāsa-Bhāṣya* :

"Smṛtirūpaḥ paratra pūrvadṛṣṭāvabhāsaḥ" which means Superimposition is the appearance of something previously seen, which is of the nature of memory, in something else.

For Śaṅkara, error is not a lack of perception, but rather a 'mis-perception' which is a coupling of the real and the unreal. The "Is-ness" or existence of the rope is real, but the "Snake-ness" is a false projection. This is the reason the illusion is not a total void. It has a "backbone" of reality in the form of the rope. Without the rope, there would be no illusion but without the mental projection there would be no snake. This intersection is what gives the unique status of the illusory object. As Amma (2013) clarifies, "According to Sri Sankara, the world is only relatively real. He advocates Vivartavada or the theory of appearance or superimposition. Just as a snake is superimposed on the rope in twilight, the world is superimposed on Brahman. If we get the knowledge of the rope the illusion of snake in the rope will vanish".

2. The Dialectic of Anirvacanīyatvam

Advaita employs "negative dialectic" for establishing the status of the illusory object. The object is neither Sat (Real), nor Asat (Unreal). As S. Mishra (2023) explains: "The Anirvacaniya-Khyātivāda theory of the Indescribable is an Advaita philosophy that proposes

that an object is neither existent nor non-existent, but rather indescribable. The illusory object is a result of ignorance about the underlying reality, and the error is caused by Maya, which is also indescribable". However, this ontology has been called a "strange thesis" by critics like Srinivasa Rao (2011), who argues that Advaitins hold that when ropes are mistaken for snakes, "there are indeed snakes there, but only illusory ones". Rao challenges this by noting the obvious facts that after realizing the illusion, no one believes there was a snake of any kind, and it was just the rope itself that was seen as a snake.

A. Rejection of the Unreal (*Asat*): In Indian logic by Asat is meant what is totally non-existent, like a "sky-flower." A sky-flower can never be an object of immediate perception. However, the snake is likened to Furthermore, Asat is unable to generate causal effects. Since the perceived snake causes real fear and the beating of a heart, it must not be purely Asat. Hence, as it is perceived, it is not non-existent.

B. Rejection of the Real (*Sat*): Reality is simply that which is never contradicted. Since the snake disappears when light is brought to the rope, the snake is sublated. Therefore, it cannot be Sat.

"Bādhitatvāt na sat" (Because it is sublated, it is not real).

Consequently, the object is **Sadasadvilakṣaṇa** (different from both). This is the "Third Category" that breaks the binary of the Law of Excluded Middle.

3. Comparative Critique of Competing Theories

Advaita's position is strengthened when contrasted with other *khyātivādas*:

- **Anyathākhyāti (Nyāya):** The Naiyāyikas (the school of logics) argue that the "snake" is a real snake existing in a forest, perceived here due to a memory-complication. Advaita says with a strong argumentative power: If the snake is there in the forest, then it cannot be the object of an "immediate" (aparokṣa) visual perception here. My eyes are not in contact with the forest; they are in contact with the rope. Therefore, the "forest snake" theory does not explain the immediacy of the error. Advaita instead assumes the formation of a temporary, apparent snake.
- **Ātmakhyāti (Yogācāra):** The Idealists argue the snake is a mental idea projected outward. But the experience is "This is a snake." The "This" (Idam) indicates a locus external to the mind, a locus which the mind cannot just make up without any substratum.

4. Counter-Objection and Reply

The Objection: A critic (probably from the Nyaya school) may say: "If the snake is 'indeterminable', then your theory is only an admission of ignorance." A thing either exists or

it does not exist. It is a logical fallacy to say it is 'neither.' B.K. Matilal (1986) notes that for a Realist, error is not a new creation but a mis-apprehension or **Anyathākhyāti**, where a real object is wrongly related to a real locus.

The Advaitic Reply: Advaita replies by saying that "indeterminability" is not a failure of the philosopher, but an exact characterization of the object's nature. Logic must be the consequence of experience, and not the other way round. If we experience the existence of an object which is perceived (not unreal) but disappearing (not real), the most "logically mature" stance is to allow it a special ontological position. Advaita argues that the binary logic of the critic is too rigid to capture the "fluid" nature of the power of illusion (Maya).

5. Dialogue with Contemporary Digital Ontology

This "fluid" ontology is perfectly suited for Virtual Reality (VR). In his work Reality+ (2022), David Chalmers does something like a "grand tour" of the biggest ideas in philosophy (from the nature of God to the relation between mind and body) by using virtual reality as his primary lens. Chalmers major project is to present a novel perspective on old philosophical questions: How do we know there is an external world? What is the nature of reality?

Using the logic of Anirvacanīya-khyāti on Chalmers' mind-bending analysis, we can twist our understanding of digital being. Chalmers suggests that virtual reality technology doesn't simply entertain us; it throws light on the very structure of our universe. When we examine an object of VR like a sword on the basis of Advaitic frame of knowledge, we get a perfect match:

- The VR Sword is not "Real" (Na Sat): As per Advaitic definition, a real object must be uncontradicted in all the time. In the context of Chalmers "nature of reality" inquiry a VR sword does not pass this test. It cannot have physical wood-cuts in the external world; its "reality" is limited. As the simulation is switched off, the sword disappears. Thus, it is not Vyāvahika (empirical reality).
- The VR Sword is not "Unreal" (Na Asat): However, as Chalmers explores in his tour of big ideas, virtual objects are not "nothing." They possess what Advaita refers to as arthakriyā-kāritva (causal efficacy). In the simulation, the sword functions as a sword. It generates a psychological and "behavioral" reality for the user. It is experienced direct, that is, it cannot be dismissed as a total non-entity like a "sky-flower."

This creates the "Indeterminable" status. Advaita provides "sophisticated nuance" that adds value to Chalmers' opinion. While Chalmers uses VR to ask the question "How do we know there is an external world?", Advaita answers that the "external world" itself might be a higher-level simulation (Maya) superimposed on the ultimate substratum of consciousness. By

identifying the VR sword as Pratibhasika, we can accept the rich experience of digital worlds - an answer to Chalmers' question of how to live a "good life" or have meaningful experiences in a simulation - without making the "ontological error" of regarding these digital objects as independent, absolute realities. The digital object is "ontologically dependent" on the underlying code and hardware just as the illusory snake is dependent on the rope.

Conclusion

In conclusion, Anirvacanīya-khyāti is a sophisticated and balanced account of perceptual error which carefully avoids the pitfalls on either side of the choice between extreme realism or subjective idealism. While realism has difficulty explaining why an illusion is even perceived at all, and idealism has difficulty explaining the external 'givenness' of the error, Advaita Vedanta is able to do so because it does not attempt to fit the experience into a narrow binary. By adding this third ontological category, it provides a framework that is uniquely capable of meeting the epistemological puzzles of an ancient past as well as the digital paradoxes of the modern age.

This perspective acknowledges that the human mind tends to generate appearances that are simply experienced as strongly compelling and functionally "real" to the observer in question, but are still dependent for their ontology on something deeper lying behind. It recognizes that an experience can be very strong and powerful and not necessarily true in the final outcome. As we live in a time of simulations, virtual environments and digitally mediated reality this ancient framework is a remarkably "honest" and practical maps of the human condition. It gives us the logical weapons to appreciate our immediate experiences and not lose the wisdom to look beyond them to the ultimate truth.

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