

From Policy Mandate to Classroom Reality: An Empirical Study of Digital Literacy Skills and Educational Outcome among Secondary School Students of Nalbari District, Assam

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Abstract

The pedagogical paradigm of the 21st century has shifted from traditional, teacher-centric instruction to active, learner-oriented frameworks. While the National Education Policy (NEP) 2020 mandates comprehensive technology integration, structural disparities in remote and geographically volatile regions often turn these mandates into a "double digital divide." This study investigates the influence of digital literacy and technological adaptation on the academic achievement of senior secondary (Class-XII) students (n=42) across nine (09) senior secondary schools under the Barkhetri education block of Nalbari district, Assam. Specifically, it explores how basic digital proficiency and positive student perceptions facilitate knowledge exploration and motivation. Adopting a mixed-methods descriptive design, the study evaluates students' computer competencies, frequency of use, and perceived pedagogical outcomes.

The empirical findings reveal a persistent digital divide: while 66.6% of the surveyed schools possess basic digital infrastructure (ICT labs or Tele-Education), severe disparities in software competency, localized technical support, and linguistic barriers prevent meaningful pedagogical integration. Fluency in dominant languages (English and Hindi) acts as a powerful form of cultural capital, stratifying digital access and leaving rural vernacular-medium students marginalized. To address these systemic gaps, this paper proposes a transition toward localized, vernacular educational technologies, accompanied by constructivist teacher training.

Keywords: digital literacy, ICT in pedagogy, academic achievement, socio-spatial stratification, language capital, education in assam

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I. Introduction:

The Role of ICT in Modern Pedagogy

In the contemporary educational discourse, digital literacy has transitioned from an auxiliary technical skill to a foundational cognitive competency. It encompasses the multi-dimensional ability to locate, critically evaluate, synthesize, and create information using diverse digital interfaces. When integrated systematically within schools, Information and Communication Technology (ICT) acts as a catalyst for a constructivist shift in classroom dynamics. By dismantling the communicative constraints of traditional, physical classrooms, ICT enables a decentralized, collaborative learning ecosystem where students interact with global knowledge networks. This transition alters the role of the educator from a primary repository of static knowledge to an active facilitator of student agency and critical thinking.

The national educational landscape of India, guided by the National Education Policy (NEP) 2020 and the Digital India initiative, emphasizes the integration of technology to bridge historical educational inequities. Centralized digital platforms such as: DIKSHA, SWAYAM, and the PM e-Vidya program aim to democratize access by hosting extensive repositories of multi-lingual, curriculum-aligned open educational resources. In Assam, these national mandates have been localized through significant digital restructuring. For instance, over 152 textbooks have been energized with 2,564 QR codes linked directly to state-curriculum-specific audio, video, and interactive resources on the DIKSHA-Assam portal.

However, despite these centralized, state-led technological milestones, a substantial gap persists between policy-level infrastructure development and the grass-roots realities of classroom implementation, particularly in remote and geographically marginalized educational blocks.

Research Background and Gender Dynamics

While ICT is globally recognized as a catalyst for educational innovation (Papanastasiou & Angeli, 2008), its implementation in schools often lags behind the ubiquity of personal computing. In Assam, a state experiencing rapid digital growth, this study examines the relation between utilization of various ICT tools & techniques and academic achievement based on the same among senior secondary students in the Nalbari district.

Academic discourse generally suggests a nuanced gender disparities in ICT engagement. While teacher-directed usage remains relatively uniform, discretionary usage often varies; research indicates that boys may gravitate toward database management and gaming, whereas girls frequently prioritize social communication and creative publishing (Waite et al., 2006). This study utilizes a sample of 42 students across nine provincialized and private schools in the Barkhetri Education Block, employing descriptive statistics to evaluate these variables.

Research Objectives

1. To find out the knowledge base of the secondary level students about digital literacy
2. To find out the availability of digital resources (including assistive technologies for Children with special needs) at secondary schools of Nalbari district
3. To study the relation between digital literacy and academic achievement among the sample students

Relevance of the study

This study is situated within India's ongoing educational reforms, which prioritize the development of a knowledge society. National policies, including the 11th and 12th Five Year Plans and the National Education Policy (NEP) 2020, have consistently emphasized ICT integration to bridge the "digital divide" (NEP, 2020, Para: 24.2).

This commitment is evidenced by numerous government initiatives, such as the ICT@Schools scheme (2004), and the launch of national digital platforms, including SWAYAM, DIKSHA, e-Pathshala, and the SAKSHAT Portal.

Theoretical Framework

This study conceptualizes the digital divide not merely as a binary deficit of physical hardware, but as a multi-layered social phenomenon structured by pre-existing economic, regional, and linguistic inequalities. Paul Attewell's formulation of the "first-level" versus "second-level" digital divide provides a foundational distinction for this analysis. While the *first-level* digital divide concerns the disparities in physical access to computers, mobile devices, and internet connectivity, the *second-level* digital divide addresses the inequalities in digital literacy, cognitive readiness, and qualitative usage patterns, which are required to leverage technology for social mobility and academic enrichment.

In the digital sphere, English and Hindi serve as the dominant languages of interface design, operating systems, and high-quality e-learning content. Fluency in these languages functions as digital cultural capital. Students possessing this capital navigate advanced software, educational portals, and global online communities with ease. Conversely, rural and tribal students in vernacular-medium schools, who operate predominantly within local linguistic codes, experience a severe linguistic-digital barrier.

Socio-Spatial and Geographical Context of Nalbari District and Barkhetri Block

Nalbari is overwhelmingly rural, with 89.28% of its population residing in rural areas characterized by low per capita income and an economy dependent on subsistence agriculture. Although Nalbari is historically celebrated as "Nabadeep", a renowned seat of traditional Sanskrit education and boasts a high overall literacy rate of 79.89%, severe sub-district and block-level disparities persist regarding access and utilization of digital infrastructure.

The Barkhetri Education Block, situated in the southern, low-lying riverine belt of Nalbari district along the banks of the Brahmaputra, represents one of the most marginalized spaces in the region. Barkhetri is characterized by its "char" (river island) areas, which are geologically unstable, isolated from the mainland, and highly flood-prone. These riverine conditions create unique developmental challenges. The block has historically been designated as an Educationally Backward Block (EBB) due to its low female literacy rates and poor student retention.

These persistent challenges led to targeted state interventions, including the establishment of the Kasturba Gandhi Balika Vidyalaya (KGBV) in Mukalmua, a residential boarding school designed to provide protective educational access to girls from marginalized, low-income backgrounds and Model Schools under the Rashtriya Madhyamik Siksha Abhijan (RMSA).

However, despite these interventions, the region continues to struggle with high dropout rates and low transition rates to higher secondary education (61.4%), driven by systemic poverty, seasonal displacement, and deep digital and linguistic inequalities.

Demographic Parameter	District Context (Nalbari Overall)	Block Context (Barkhetri Block)
Total Population	771,639 (2011 Census)	200,000
Literacy Rate	79.89% (Male: 85.58%, Female: 73.85%)	58.4%
Religious Composition	Hindu: 69.11%, Muslim: 30.56%	Hindu: 26.54%, Muslim: 73.23%
Geographical Profile	Plains of the Brahmaputra Valley	Low-lying, active flood-prone char areas
Primary Economic Base	Agriculture and allied activities (71%)	Subsistence agriculture and riverine fishing

Table 1: Socio-Spatial Demographics of Nalbari District and Barkhetri Block.

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II. Research Design And Empirical Procedures

Research Methodology:

This study intended to find out the impact of digital literacy in secondary schools of Barkhetri Education Block of Nalbari district with respect to academic performance. Descriptive study was designed to achieve the objectives of the study. Both Qualitative and quantitative research methods were adopted for the study. The students studying in Class-XII of 9 (nine) numbers of senior secondary schools in Barkhetri block of district Nalbari, (Assam) constituted the population of the study.

Method Adopted

The researcher developed a Questionnaire with interview schedule for the study. The questionnaire was developed for the sample students to collect information about their digital literacy and its impact on their academic achievement. The data thus obtained was analyzed with the help of statistical techniques with Microsoft Excel as the primary tool.

Sample

For this study, 42 secondary school students (5 students per school for 8 schools and 2 students for 1 school) studying in std. XII of 9 Government/ Provincialized and Private schools were selected for data collection. The students were randomly selected from the schools to get the feedback on their academic performance.

Population of the study:

There are total 9 numbers of schools, including Govt./Provincialized and Private schools under Barkhetri education block of Nalbari district, which have functional Grade-XII integrated in them. The total

number of students, studying in Grade-XII of all these 9 schools are 1313, while the total number of teachers are 173.

Tool for data collection

In order to study the impact of digital literacy on Academic Performance through incorporation of ICT, the researcher developed a questionnaire as tool for collecting diverse information on areas like: knowledge on basic computer skills, internet search, incorporation of ICT in the teaching-learning process for various academic endeavours etc. The questionnaire had four sections. The very first section designed to find the academic performance which was based on five-point Rating Scale having options Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree, second, third and fourth to find the awareness of ICT in students was used to collect the data.

Methodology of Data Collection

The researcher conducted in-person visits to each sample school to administer a questionnaire. This instrument, comprising both open- and closed-ended questions, was designed to assess student expertise in using ICT for academic improvement. The questionnaire also gathered data on the availability of digital infrastructure, teacher competencies in ICT integration, and related implementation challenges. The researcher personally distributed the questionnaires to the sample students and collected the completed responses.

III. Empirical Results And Data Analysis

The data collected was analyzed using excel as a tool to perform statistical analysis and to generate visual representations in the form of bar and pie charts. The empirical data gathered from the fieldwork reveal significant challenges regarding technological access and digital competencies in the Barkhetri block.

The figure 3.1 below shows the availability of Digital infrastructure in the sample schools. The Barkhetri education block under Nalbari district has a total of 13 numbers of senior secondary schools, out of which 10 schools are Govt. recognized/ Provincialized; 2 Schools are Private and 1 school is Venture unaided. Again, out of these 13 schools, 4 numbers of schools are such which have no enrolment in Class-XII. For this study, only those schools are selected, which are Govt./Provincialized or Private and which have functional enrolment in Class-XII. Out of the selected 9 numbers of schools, 3 schools are reported to have ICT lab facility, 3 schools have Tele Education facility and other 3 schools have no digital infrastructure; making the percentage of each category to 33.33%.

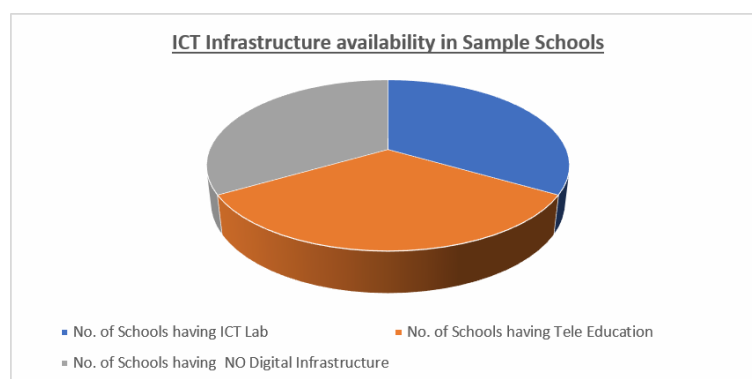


Fig: 3.1: ICT Infrastructure availability in Sample Schools

The figure 3.2 shows the Gender-wise distribution in each of the sample schools. Since KGBV is an exclusively girls' residential school, all the selected sample from the school are girls. Again, in Char Anchalik H.S. School, both the functional enrolment are girls. Hence the sample from this school also consists of 2 girls. Other than that, from the rest 7 numbers of selected schools, the samples are chosen randomly in such a way that 3 boys are selected and 2 girls are selected; thus making the total sample size to 21 Boys and 21 Girls.

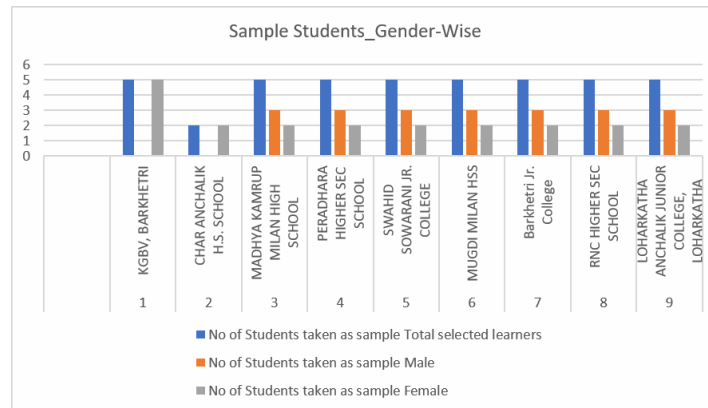


Fig. 3.2: Sample Students Gender-wise

On the other hand, figure 3.3 shows the frequency of use of computers for various educational purposes by the sample students. According to it, 23.8% of the sample students use the computers on everyday basis for Class assignments; 59.5% students use computers 2/3 days a week and 16.6% students use it once a week for the same purpose. Again, 23.8% students out of the 42 sample students use computers on everyday basis for their project work; 71.4% students use it 2/3 days a week and 4.7% students use computers once in a week for the same purpose. On the other hand, 76.1% students are found to use computers on a daily basis to search/use the internet; while 23.8% students use it 2/3 days a week for the same purpose. According to the responses received, it is again found that for playing computer games, 4.7% students use the computers on daily basis; 11.9% students use it 2/3 days a week and 83.3% students use it once in a week. For Retrieving information, 23.8% of the sample students are found to use the computers on everyday basis; almost 69% students use computers 2/3 days a week and 7.1% students use it once in a week. Again for Social Networking, 71.4% numbers of students use the computers on everyday basis; 19% students use it 2/3 days a week and 9.5% students are found to use it once in a week.

Thus, it can be inferred that majority of the students use the computers 2/3 days a week for doing their class assignments, project works and for retrieving information. A good number of students use the computers on everyday basis to use the internet and for social networking. On the other hand, comparatively fewer students use the computers for playing computer games once in a week.

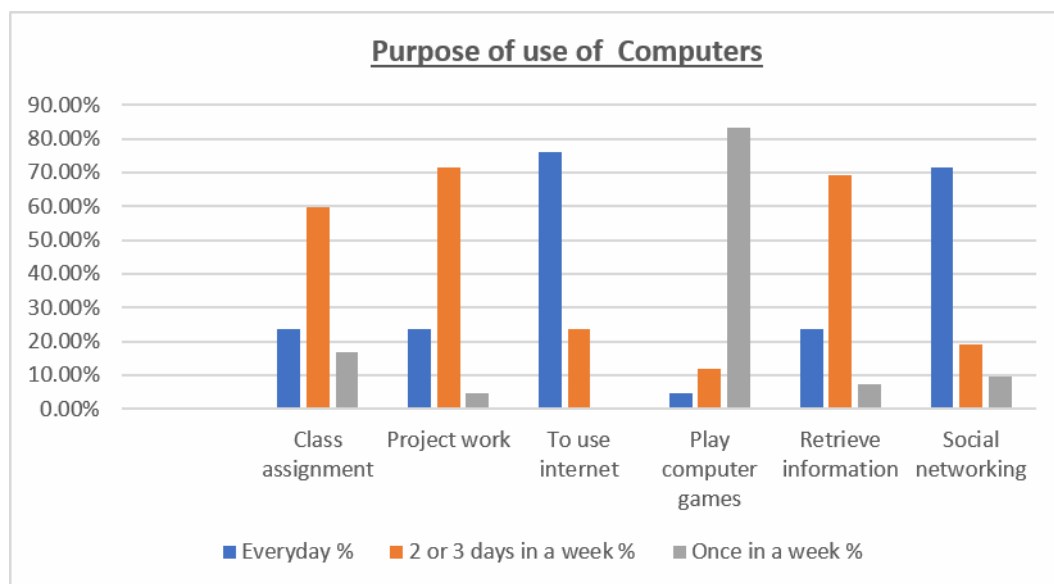


Fig. 3.3- A: Purpose of use of computers

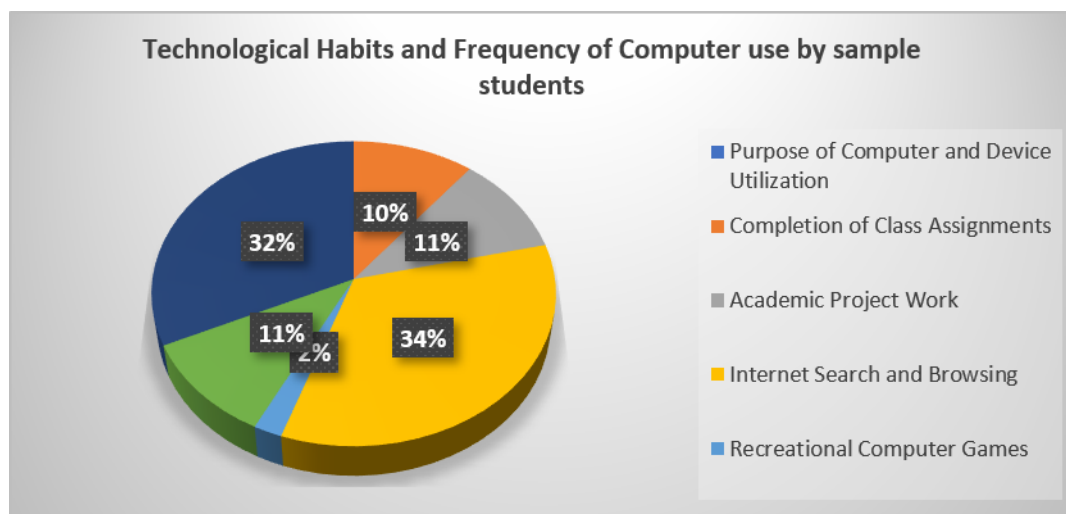


Fig: 3.3- B: Frequency of use of computers

Regarding expertise of the sample students in using various computer operations, **figure 3.4** shows the competencies in performing basic computer operations (opening, closing of files etc.), where only 11.9% out of the sample 42 students are 'very good' at Competencies on basic computer operations like: opening & closing of a file; while 17 students are recorded as 'good' and 47.6% students are recorded as 'average' on the said skill.

Again, regarding competency about knowledge on various operating systems, **figure 3.5** shows that 35.7% out of 42 students have responded as 'very good'; 47.6% students recorded as 'good'; 11.9% students are recorded as 'average' and 4.7% of the sample students have reported to be 'poor'.

Regarding use of Internet for various educational purposes, **figure 3.6** reflects that 16.6% of the sample students are 'very good'; 47.6% are 'good'; 26.1% are 'average' and 9.5% students are reported as 'poor' in the said skill.

On the other hand, regarding usage of various software by the students for educational purposes, **figure 3.7** shows that only 4.7% of the sample students are 'very good'; 35.7% are 'good'; almost 38% are 'average'; and 21.4% of them are reported to be 'poor'.

This data reflects that majority of the students are Good at all the mentioned competencies.

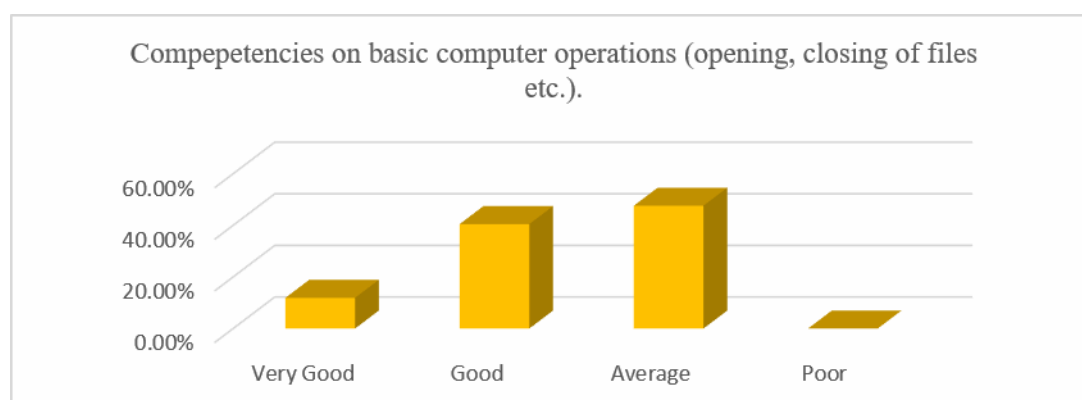


Fig: 3.4: Competencies on basic computer operations (opening, closing of files etc.).

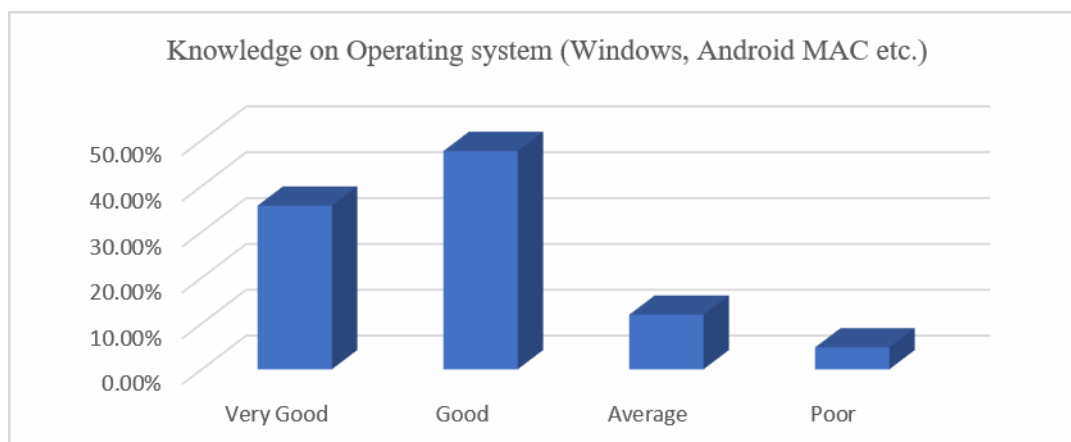


Fig: 3.5: Knowledge on Operating system (Windows, Android MAC etc.)

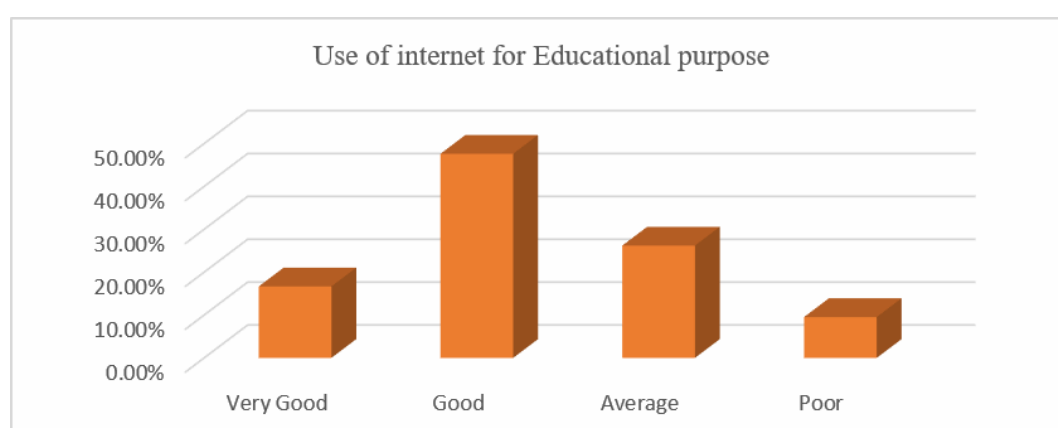


Fig: 3.6: Use of Internet for Educational purpose

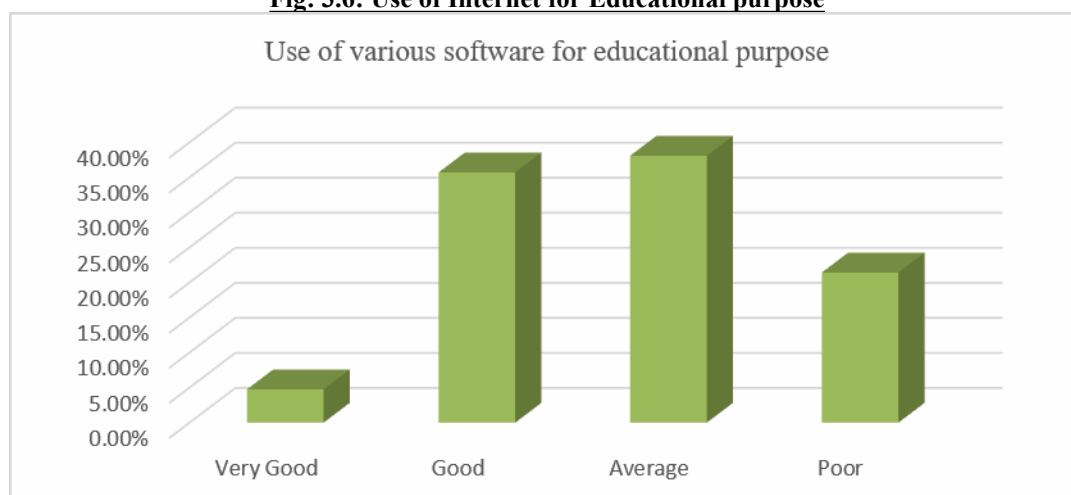


Fig: 3.7: Use of various Software for Educational purpose

IV. Summery And Conclusion:

Education is a process that develops an individual's potential in accordance with the demands of society. In the contemporary era, Information and Communication Technology (ICT) is a primary catalyst in this process. Its integration has fundamentally altered the education system by enabling new modes of teaching and learning. ICT empowers educators to enhance their instructional methods, while also accrediting students with a more dynamic, convenient, and in-depth learning experience. Teachers have accepted that ICT enhances collaboration and critical thinking among students. It improves teaching and learning process and tends to increase students learning motivation by making students more enthusiastic and helps them to experience things more actively. Web based learning course enables the student to understand course content effectively.

While technology assists students in visualizing abstract concepts and accessing a wider range of reliable information, consequently the role of teachers has also expanded; it now includes preparing students with the critical skills needed to navigate a globally competitive environment.

The findings of the present study indicate that ICT has a noteworthy, positive impact on the learning process. It demonstrably enhances students' lesson preparation, improves access to information, and facilitates curriculum-related collaboration. Despite these benefits, the research identifies a significant skills gap, with both teachers and students often lacking the capacity for effective ICT utilization. While some educators acknowledge the advantages of ICT, few currently leverage it to support constructivist pedagogical methods. This study, therefore, contributes to a better understanding of the existing digital divide in ICT awareness.

V. Recommendations:

Based on the findings of this study, the following recommendations are suggested:

- I. It is imperative for any organization's management to invest in and strategically deploy targeted ICT resources and tools to address specific curricular challenges.
- II. Leadership should ensure that the integration of ICT facilities is made directly relevant to curricular goals to actively promote student skill attainment and proficiency.
- III. A broader strategy, engaging technological interventions and mass media, should be employed to enhance pedagogical practices. This approach should involve a hybrid model, integrating traditional learning with open and distance learning (ODL) systems. Furthermore, non-formal educational channels, such as broadcast media and satellite technology, should be systematically utilized for the professional development and capacity building of educators.
- IV. **Vernacular Localization of Digital Resources:** To address the digital-language gap, state agencies must expand the localization of digital learning contents. While the DIKSHA-Assam portal has made progress in translating resources, there is a need to develop highly interactive, peer-reviewed educational software, concept maps, and simulation tools in Assamese and other local languages for making educational technology accessible to first-generation learners and vernacular-medium students.
- V. **Constructivist Professional Development for educators:** To address the teacher skills gap, teacher education institutions like SCERT and DIETs must shift their training focus to robust in-service teacher training, focusing on integrating technology with constructivist pedagogical practices. Teachers should be trained in student-centered models, such as using digital resources for project-based learning, structuring web-based inquiry activities (WebQuests), and managing hybrid classrooms. At the same time, such trainings must be accompanied by the deployment of dedicated ICT support staff at the block level to handle technical maintenance and reduce the administrative burden on teachers.
- VI. **Targeted Digital Equity Allocations:** To promote educational equity, there should be special support plans for covering Educationally Backward Blocks (EBB) like Barkhetri, with sufficient allocation for digital resources as well as dedicated staff for handling those resources. By ensuring equitable access to digital learning opportunities, the Govt. aided vernacular medium schools can help improve student retention, boost higher secondary transition rates, and close the academic achievement gap even in geographically isolated regions.

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