



Title: Role Of Information Communication Technology In Higher Education In Ranchi

Maneesh Dubey, "Research Scholar Centre for Studies in Science, Technology and Innovation Policy (CSSTIP), School of Social Science (SSS), Central University of Gujarat, Gandhinagar – 382030, India", dubeymanish972@gmail.com <https://orcid.org/0000-0002-2851-3452>

Dr. Kunal Sinha, Assistant Professor, Centre for Studies in Science, Technology and Innovation Policy (CSSTIP), School of Social Science (SSS), Central University of Gujarat, Gandhinagar – 382030, India. kunalsinhajnu@gmail.com <https://orcid.org/0000-0001-8364-630>

Abstract. This study highlights the role of information and communication technology (ICT) in higher education in the Ranchi district of Jharkhand, India. Other considerations influence how ICT and higher education systems are integrated to improve teaching and learning. The study uses Everett Rogers's 1962 diffusion of invention framework, highlighting student adoption of technologies and organizations influenced by state policies. The data was collected from Ranchi's higher educational institutions. The results indicate that most students are in favour of using ICT in the teaching-learning process. It also suggests the significance of collaboration among the numerous players who have learned new ICT techniques in educational systems. It assumed that government participation would aid in the spread of ICT in education.

Keywords: Higher Education, Information communication technology, Policy, Adoption, Collaborative learning approach.

INTRODUCTION

Education aims to raise a nation's desired standard of living and change in human behaviour. Education should be accepted socially, culturally and reflect in a transfer of knowledge, skills, attitude, and understanding. Traditional education is only to get knowledge but, now it is changed into the invent. Students need to build their understanding of each scientific concept. A teacher's key challenge is to offer teachings and develop a relevant knowledge base to use them further. (Achimugu, Oluwagbemi, & Oluwarnti, 2010). The capacity to learn information and implement it is essential for every country's economic and social well-being. The nations having higher and better knowledge and skills respond more effectively and quickly to globalisation challenges and opportunities.

Education is detecting a significant change regarding access, equity, and quality in India. This transition is being accelerated by the exponential growth of ICT in the world's educational systems. Making full use of ICT diffusion resources in education is a significant obstacle for educational institutions. The Indian higher education system's governing bodies are advanced in science and technology, especially in ICTs that play a dynamic role in all educational process segments. For instance, internet technology has boost ICT and influenced every sector of the Indian education system. With this context, Snehi (2009) argued institutions had used computers in their academic programs for producing a better quality of knowledge output and learning in the higher education sector (Snehi, 2009). Higher education raises awareness, creates intelligence, and gives the recipient a more comprehensive view of the global

community. Furthermore, as universities play a significant role in economic growth and development, many believe that higher education is an entry point to participate in and contributes to the overall personal development phase (Sharma & Sharma, 2015).

Jharkhand's higher education sector has grown dramatically since its inception in 2000, from 111 to 313 higher education institutions/universities (AISHE report 2018-2019). Ranchi has a population of 2914,253, with 1,494,937 men and 1,419,316 women. The Ranchi overall literacy rate is 76.06 per cent, with male and female literacy rates of 84.26 per cent and 67.44 per cent, respectively (Census, 2011). Ranchi is the educational hub of Jharkhand. Many higher education institutions, such as central university, IIM, five state university, INIFD, Indian institute of information technology, National Institute of Foundry and Forge Technology, NLU, Deemed university, and many colleges, are located in Ranchi. The government is also taking the initiative to use ICT in higher education and provide education during pandemic.

Background of Studies

1. ICT in Higher Education in India

In today's scenario, many ICT tools are available in the educational world that can be used to create and spread information. Computer, internet, mobile phone, laptop, tablets and many other hardware and software applications are used as the ICT tools in the educational world. The usage of information and communications technology in the teaching and learning (Agrawal & Mittal, 2018). Indian higher education system has taken the initiatives to provide education through ICT; for this initiative government launched the Gyan Darshan program in 2000 to broadcast the educational program for university students, adults, and school students. Gyan Vani and E-Gyankosh were other programs that many institutions like the Indira Gandhi National Open University (IGNOU) and IITs initiated to preserve digital learning resources. The National Program for Technology Enhanced Learning (NPTEL) launched in 2001. It is another joint initiative of IITs and IISc, which promote education through innovative technology. In 2009, the Indian government (Ministry of HRD and Cabinet Committee on Economic Affairs) took various initiatives. These initiatives aimed to develop and standardize digital content for the Indian higher education system through the "National Mission on Education through ICT" scheme. The Indian government dedicated the period between '2010-2020' for the decade of innovation (Pegu, 2014). The condition has shifted, and therefore necessitated new interventions. Due to the current increase of epidemics and pandemics, we must be prepared to pursue alternative learning methods if the conventional learning and teaching methods are unavailable or not feasible. The National Education Policy 2020 emphasized the higher education's digitalisation is to maximise the gains of technology while accounting for the challenges and opportunities it poses (Government of India, 2020).

2. Uses of ICT in Higher Education

Information communication technology is a method that teachers and students may utilize to support them in the teaching-learning. The web-based teaching-learning classes and library catalogues are used in higher education institutions like career development services, simulation learning, internet connectivity, and essential resources such as MS Word, PowerPoint, and Excel. These are developed to introduce students to a wider variety of the basic resources they might use in a classroom. These programs assert that they can improve participants' abilities, perspectives, deep learning, access to knowledge, and expand their philosophy—additionally, ICT methods used by university management. Thus, we have enrollment, registration, testing, and other record-keeping processes in place and coordination with students, instructor and leadership teams, administration, and the government etc.

“International Workshop on Improving E-Learning Policies and Programs” further demonstrates how ICT can help change government by transforming the workforce, educating citizens, and optimizing service delivery (Bank, 2004). Educational theorist and technologist Curtis Bonk argues in his book ‘The world is open’ that, as a result of the advancement of ICT, even the most isolated regions of the world now have access to the highest quality educational services (Bonk, 2009). Among the type of application that most of the teachers consider, help in the enhancement of efficiency. They used new technologies that convey information (like lectures accessible online), skills practice software for reading and writing for any subject like mathematics, science, language, etc. Innovations (ICTs) incorporated into established classrooms without altering the essence of what is learned or the communication between teachers and students in the learning environment.

2.1 Specific Uses of ICT

Although we have focused on the organised and personal usage of technology in school, there are many higher education topic areas where students use it. Students can see a lot of encouragement in it and learn more efficiently because of the variety of tools it offers and the motivation to get more support and reduce the pressure on their shoulders (Grgurovic, 2014).

2.2 ICT Tools in Reading Process

Many software has developed for enhancing the reading skill of learners. The technology that is used to assist moderate learners in achieving greater reading fluency. Reading application (PDF reader) will supply learners with a document to interpret and then display the text digitally spoken in line with the student's pronunciation. Students have trouble with a sentence, and the text reading program usually provides methods for analyzing the narrative or communicating the text orally to enable the student to continue reading. Speech recognition software is now capable of interpreting a young learner's spoken word and deciding if corrective input is necessary. (Means & Roschelle, 2010).

Software system can also support the learner's vocabulary and comprehension through hyperlink definitions of unfamiliar words or concepts. Some software provides the summary of the main text to check the comprehensive level of understanding. Many software is available online, like 'Interactive Strategy Training for Active Reading and Thinking' (iSTART). This program is web-based and uses animated character to teach comprehension strategies such as paraphrasing, predicting and elaboration. Universal Design for Learning (UDL) is an approach in which instructional materials are designed with optional supports to be used effectively by the learners (Rose & Meyer, 2006). Through UDL software, learners learn from science texts quickly, explore the science diagram, and enhance their skills (Dalton & Strangman, 2006).

2.3 ICT Tools in Writing

The universal use of writing ICT tools (word, notepad, blogs, etc.) is available in the higher education system to increase learners' writing quality. Bangert, identified in his research that writing tools have a minor yet substantial positive impact on learners' overall writing efficiency (Bangert-Drowns, 1993).

2.4 ICT Tools for Studying Science

ICT techniques have been necessary for scientific practice. ICT also enhanced the profession's essence and affected science teaching. In scientific fields such as biochemistry, environmental science, and physics, probes and sensors attached to devices, online databases, and computer simulation models are essential. Many ICT tools like virtual classroom, simulated teaching, MOOC, Swayam, web-based interaction, Online Tutorial etc., support science education

programs. Features such as email, webcasts, electronic chat, and bulletin boards support students' scientist interaction programs (Lin, 2006).

2.5 Online Resources and Virtual Classroom

Web-based online learning is the best way to learn anything quickly. E-learning offers the unique opportunity of making material and training readily available at any time and place, no matter where the student might be. In online learning, different technology and applications support other online learning models; for example, in one class, asynchronous communication technology like mail, peer groups discussion, newsgroups, etc. In other class, synchronous communication technology (webcasting, chat room, desktop audio-video technology, etc.) used for face-to-face teaching and learning strategies. Face to face teaching and learning strategies are like delivering lectures, holding group discussion in the classroom or anywhere (Means & Roschelle, 2010). Therefore, ICT learning is analysed from the perspective of diffusion of innovation theory (Rogers 2003).

3. Conceptual Framework

A conceptual framework for this study focuses on the diffusion of innovation theory given by Everett Rogers. This widely accepted concept considers technological innovation a sociological phenomenon characterized by successive levels of consciousness mediated by various factors. (Rogers, 2003).

Diffusion of innovation theory analyses how to adopt any new technology in societies (Sasaki, 2018). The diffusion of innovation theory is categorised into three main pillars: first Attributes of innovation, the second Innovation decision process, and third Adopter categories (Rogers, 2003).

Table 1: Pillars of Diffusion of Innovation Theory

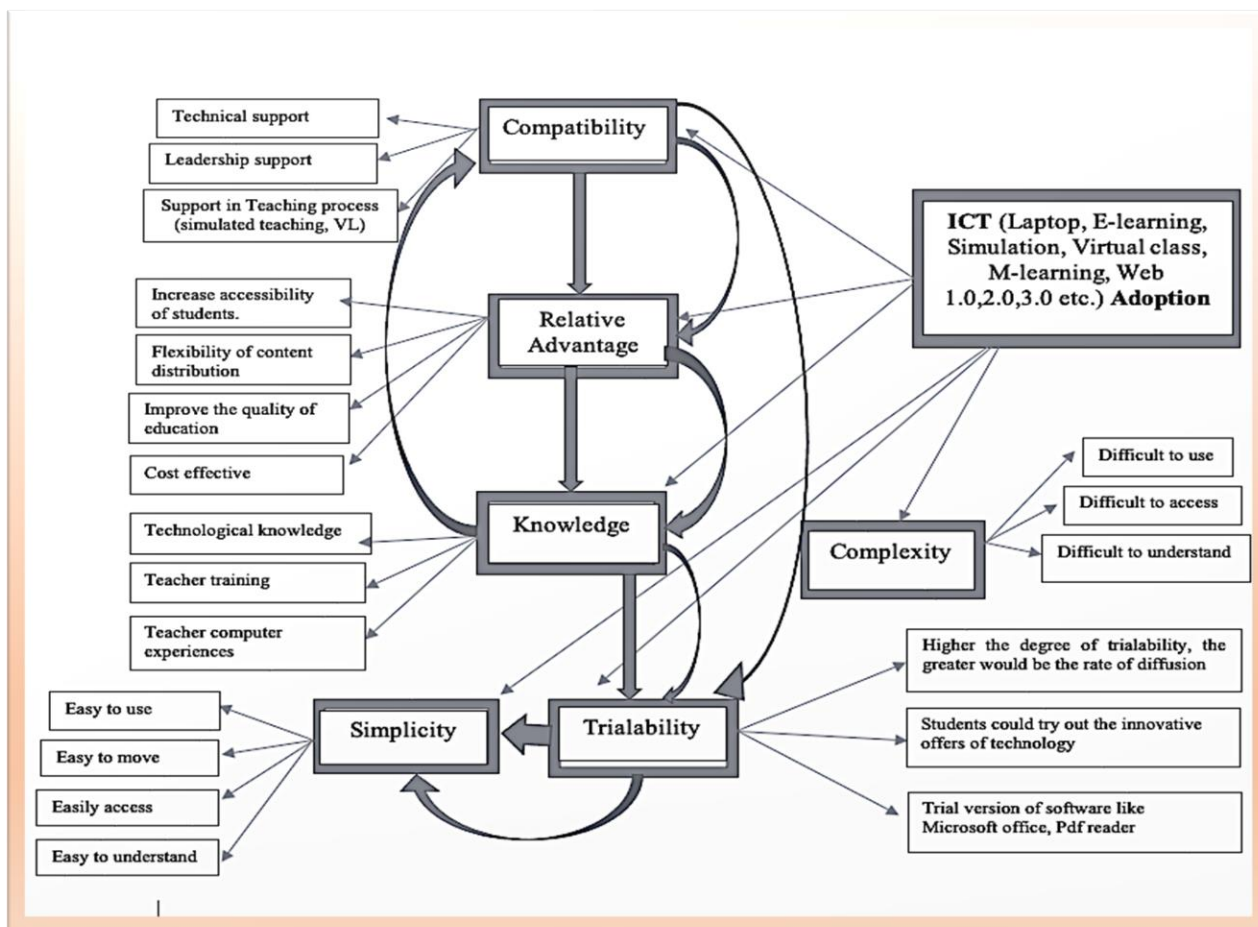
Diffusion of Innovation Theory		
Attributes of Innovation	Innovation Decision Process	Adopter Categories
1. Relative Advantage	1. Knowledge	1. Innovators,
2. Compatibility	2. Persuasion	2. Early adopters
3. Trialability	3. Decision	3. Early majority
4. Observability	4. Implementation	4. Late majority
5. Complexity	5. Confirmation	5. Laggards.

Sources: Developed from (Rogers, 2003)

3.1 Attributes of Innovation

According to E. Rogers, spreading the new technology can be achieved by considering six characteristics related to the latest technology from adopters' perspective.

Figure 1: Conceptual Model of Adoption



Source: (Compile by Authors, 2019)

1.Relative Advantage: The degree to which a new technology (laptop, iPad) perceived as being more significant to the technology it replaces. It indicates the degree to which an adopter feels advantages or disadvantages in adopting innovation or new technology. This study improves the quality of learning and relative advantage of ICT (laptop, computer, projector, internet, online education, simulated learning, etc.)—the greater advantage, the greater the opportunity for adoption.

2.Compatibility: The impact of an invention considered on principles, prior knowledge, requirements, and potential adopters' motives. Compatibility is the degree of harmony between innovation and traditional practices (innovative teaching practices and conventional teaching practices) (Rogers, 2003). The compatibility of technology is perfectly suited to preceding users' past perceptions and expectations (Grgurovic, 2014).

2.1Simplicity and Ease of Use: the adopter can adopt any idea quickly if he has technological understanding.

3.Trialability: in this process, the adopter uses technology many times before adoption.

4.Observable Results: observer result is a process in which any adopter gives his view before adopting technology.

5. Knowledge of Technology: Knowledge of new technology is essential in the diffusion of any innovation. If the adopter has not any technical knowledge, he will not adopt it quickly.

6. Complexity: The degree to which a modern technology is challenging to comprehend and use characterised as complexity—the higher the complexity, the lower the rate of acceptance. (Rogers, 2003)

3.2 Innovation Decision Process

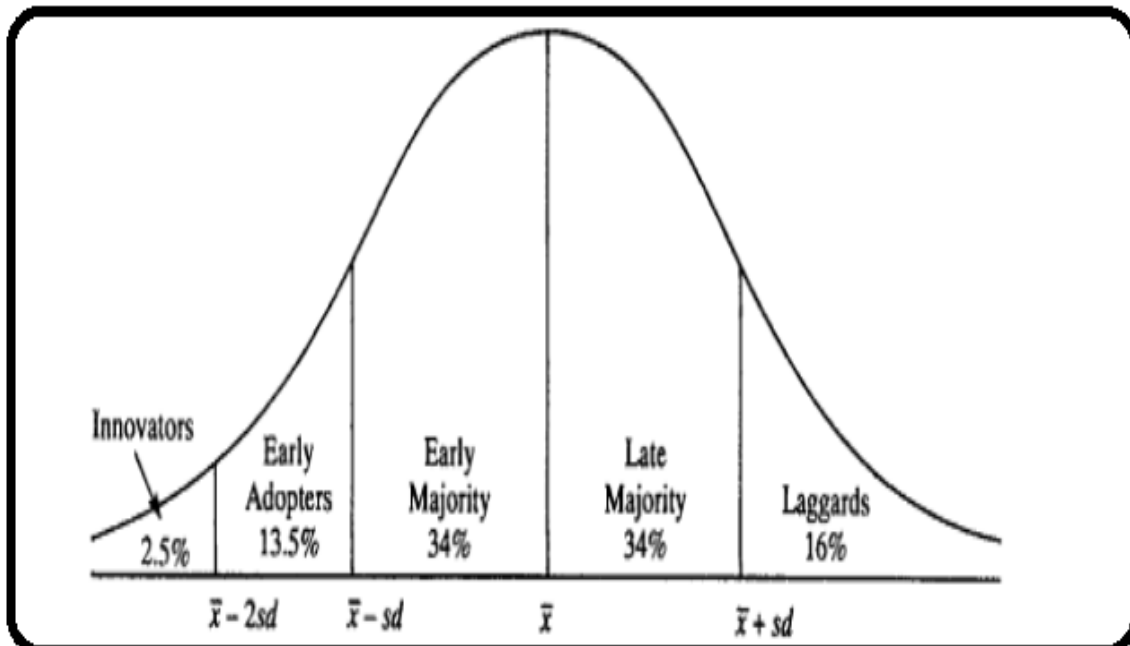
Adoption as a decision-making mechanism necessitates that the prospective adopter obtain knowledge about the emerging innovations. It's common for individuals to play with the latest technological advances and evaluating their utility before completely accepting them (Rogers, 2003). This definition examines how an invention can extend to individuals, people, or objects integrated into society. The diffusion of innovations approach offers valuable insights into social change as the main qualities that successfully spread an invention. It includes the significance of peer-to-peer conversations and peer networks and understanding different user segments' needs (Robinson, 2009).

- **Knowledge:** The person is introduced to and familiar with a technology.
- **Persuasion:** Individuals shape opinions on the new technology. This viewpoint may be either positive or negative, influencing whether the invention is accepted or refuted.
- **Decision:** Adopting the invention is the time for people to choose whether or not to introduce an idea (Innovation) in their society. They could also have other exemptions.
- **Implementation:** The users may find emotional support in the form of assistance or acceptance. If an invention has become common practice, the spread and diffusion stages begin.
- **Confirmation:** The invention's adoption is easily implemented into regular activities, whereas the user can start spreading it to others.

3.3 Adopter Categories

Roger classify the adopters of innovation categorised into five different parts: innovators, early adopters, early majority, late majority, and laggards.

Figure 2: Adopter Categorisation



Sources: (Rogers, 2003, p. 281)

Methods of The Study

This research gathered data utilizing a variety of methods and techniques. Several analysis approaches are considered, including discussions, questionnaires filled out by students, and interviews with teachers in higher educational institutions. The research collected data from both primary and secondary sources. Main sources include quantitative data from surveys and qualitative data from interviews with educators, instructors, university students, schools, and organizations. Secondary data points include journal reviews, books, education policy, five-year strategies, and information and communication technologies in education.

RESULTS

Findings and Analysis

In this study, 100 students participated with a five-point Likert-scale based questionnaire administered to understand students profile. The analysis about gender distribution of students indicates that 64 per cent are males and 36 per cent are females' students. Thirty-nine per cent of students age group of (20-24) years while 37 and 24 per cent students belong to the age group of (17-20) and 25 years above respectively. As for the distribution of students by their stream is concerned, 28 per cent belong to management, 24 per cent students are research scholars, 25, 17, 6 per cent students belong to science, social science, commerce stream respectively.

The access about courses material information through ICTs tools (personal & institutional) collected. Their responses presented in table 2

Table2: Accessibility of ICT in Personal and Institutional

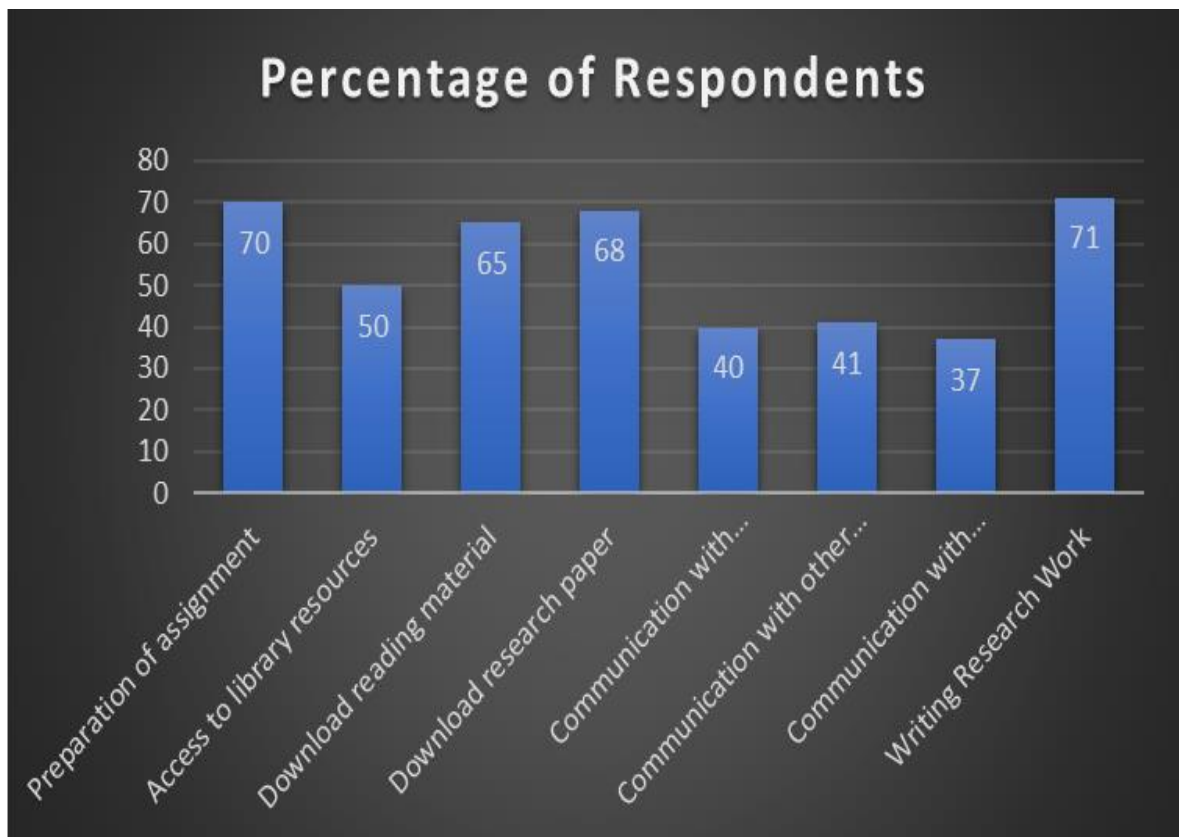
Type of ICT	Personal (%)	Institutional (%)
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Desktop with internet	25	75
Laptop with internet or wi-fi	66	20
Tablet/iPad	10	3
E-reader	8	10
Mobile Phone	35	5

Source: (Compile by Authors, 2019)

Table two shows that 66% of the computers, laptops have internet and Wi-Fi. This quarter, 25% of the households had connections to a computer with internet. Research shows that over half of respondents possess both smartphones and e-readers (8 and 35 per cent, respectively). The use of ICTs (75% of universities) expenditures the laptop, computer and internet was highest in institutions concerned. Because of this study, the participants all accepted that using ICTs would help them cut down on our research's time and effort. The problem turned out to be a lack of planning and assistance on the other end. Teachers utilised ICT to render material rich in visuals to comprehend better how relevant it is in interactivity. Students and instructors are suitable instruments for studying ICT when they have ICT-specific learning platforms, including a virtual lab with online connectivity and laptop machines with the potential to link to the internet. Additionally, researchers noticed that students who enrolled in the three Indian Institutes of Technology utilised Internet access to a device during fieldwork at those institutions.

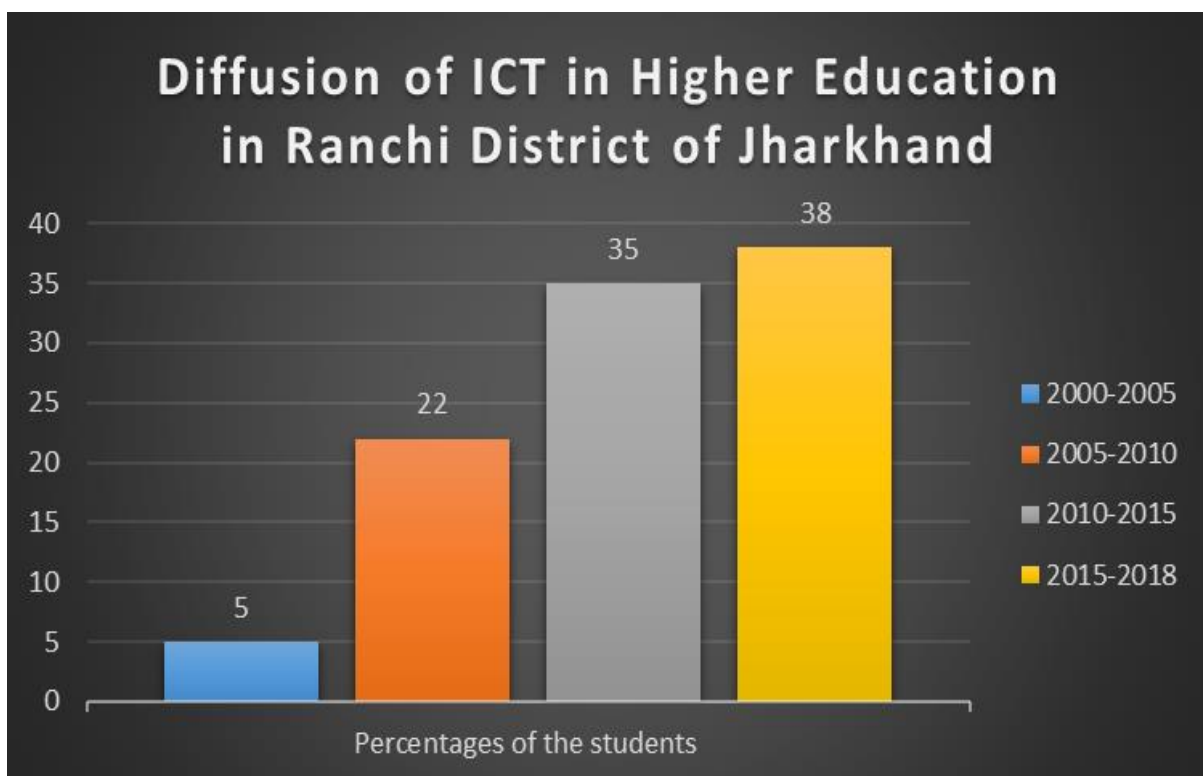
FIGURE 3: Purpose of use of ICT in Higher Education Institutions



Source: (Compile by Authors, 2019).

Data in the preceding figure 3 demonstrates ICT's function in the learning phase. 70% of respondents use computers, e-services (online databases, web sites), while 29 per cent do not follow-up study where 70% of respondents report utilising tablets, personal computers, e-journals, etc. Digital media, though, is operated by 37% of study respondents. In Figure 2, no groups have yet resisted the use of IT (information, communication, and technology) resources. Because ICTs followed a new strategy, moving from discussion to open source and organisations. To transfer ideas into content in many media, they create abstract principles. Many students and teachers utilised standard applications like PowerPoint, but others moved in different ways, using Word and Excel programs for unique presentations. The teachers see technology as vital more like MOOC, virtual reality (class) or immersive classrooms or a mix of MOOC and virtual reality. While open-source software is better used to exchange content rather than create new media, the internet (Web1.0, 2.0, and 3.0) is an excellent resource for these kinds of projects. Educational establishments provide state-of-the-art ICTs to encourage students to do their work and contact teachers.

FIGURE 4: Analysis of Overall Diffusion of ICT in Higher Education Institutions of Ranchi in the Given Time Framework



Source: (Compile by Authors, 2019)

Figure 4 represents the data of Diffusion of ICT in higher educational institutions in the given time framework. Therefore, data divided into four-time zone (2000-2005, 2005-2010, 2010-2015, 2015-2018). The first time zone is 2000-2005. In this time zone, only five per cent of ICT tools (computer, internet) have been adopted in higher educational institutions because the first time zone was the initial stage of ICT innovation in Indian higher education. The second time zone (2005-2010) shows that 22 per cent of respondents were using laptops, the internet, and desktop for educational purposes. Therefore, India's government launched many programs (NPTEL, Gyan Vani, E-Gyankosh) related to ICT in the educational curriculum to improve quality education. In the third time zone (2010-2015), the adoption rate of ICT tools increased 35%

because the government launched the program National Mission on Education through ICT (NMEICT). The NMEICT program has many objectives like building a knowledge network among higher education institutions, spreading digital literacy, making available e-knowledge, improved ICT infrastructure in higher educational institutions, etc. In the fourth time zone (2015-2018), the digitalisation (MOOC, E-Gynkorsh, simulated learning, video-conferencing, artificial intelligence, web-based learning) increased. Data also prove that the increased ratio of ICT adoption in higher education in the Ranchi district of Jharkhand is (38%).

Conclusions and Future Perspective

This paper examines the use of ICTs in the teaching-learning process in higher education in the Ranchi districts of Jharkhand. This study also determines the adoption of ICT and sees ICT tools' effectiveness during the teaching-learning process. The research indicates that most higher education institutions have adopted ICTs (computer, laptop, e-learning, e-journals, E-Gyankorsh, MOOC, email, MS office, etc.) to perform various classroom activities. However, there is a massive contrast among the higher education institutions on utilising ICT in their curriculums. The usage of technologies must expand online and interactive education equality. Effective teachers necessitate training and improvement. Teaching online is just as difficult, if not more. While pedagogy is an art, assessments employ a different approach. Many constraints come into play when conducting extensive online exams, including limited types of questions, complex infrastructure, and unacceptable behaviour. Creative methods in the digital environment can defeat subjects like the performing arts and science. Unless blended with real-based learning, online education will be cognitive, affective, and psychomotor in orientation.

The new education policy considers digital technology's prominence as a teaching and learning tool, such as proof of concept equity encouragement and inspiration website design, and students' adaptive measures. According to central and state government-funded institutions, the different higher education institutions are at divers' ICT implementation stages in the teaching-learning process because of policy performance. The Central government-funded institutions have better funding than state-funded institutions. So, the infrastructure of ICT in central funded institutions have better than in state-financed institutions. This research has also explored that most of the higher education institutions in the Ranchi district of Jharkhand that have adopted ICT can improve higher education quality, increase transparency and accountability, optimise e-resource use, and enhance the quality of research. Look, the national education policy of 2020 addresses both the benefits and hazards of technology. It calls for careful and well-executed pilot studies to explore how online and digital education affects students' outcomes. Established interactive channels and ongoing ICT-enabled curriculum programs are must be fine-tuned to address current and potential educational needs. As long as 'Digital India' remains a fantasy and computers are not available to all, steps to close the digital gap would be challenging to enforce.

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