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IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON HIGHER EDUCATION: A STUDY ON PRE-SERVICE TEACHER TRAINING

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Abstract
The COVID-19 pandemic has paved the way for a new horizon of skill sets in the teaching-learning ecosystem. The long-standing traditional methods of the Indian educational system have been uprooted to pave way for a new approach to education that has led to the post-COVID machine learning era. This article explores the educational implications of information and communication technology (ICT) and assesses the impact of the use of ICT in pre-service teacher training courses. It focuses on integrating ICT-based teaching and learning in the highly neglected higher education system in India, particularly with reference to West Bengal. The importance of the digitalization of resources and the use of OER are also discussed. Analyzing data from 180 trainee-teachers pursuing B.Ed and M.Ed courses attending government and private colleges in eastern India, this study finds that ICT-based learning will be effective in the future educational scenario, especially in developing country such as India. Exploration of the gap in the practical and theoretical implementation and determining the attitude of student-educators' attitudes and perceptions towards ICT-based education in rural and urban areas are the core study areas of this research. The findings shall help the policy-makers frame a practical design for implementing technology-based education in higher studies especially Pre-service Teacher-training programmes.
Key words:-Digitalization of resources, OER , Pre-service teacher training.

1.0 Introduction

The Indian education system has undergone an unprecedented era during the outbreak of Covid-19 when institutions of education have had to shut their doors to students and the unprepared educators lacked training to restore the normalcy of education. Although information and communication technology (ICT) has long been a part of the education system in developed countries, in developing countries like India, integral implementation of ICT in education is still a distant dream. ICT-based education comprises of the use of modern and relevant technology in the education sector (e.g., radio and television in the previous decades and computers and the internet in today's era) to facilitate the learning capabilities of the students. Teachers have been using several tools during the process of teaching from time immemorial to create and retain the

motivation as well as the attention of the students. Similarly, ICT is a culmination of several tech-based tools.

Information technology deals with the domain of knowledge that has been stored and retained digitally and communication technology is the digital process of communication that has advanced with the ever-evolving technology after the industrial as well as the technological revolution beginning in the 19th century. Classrooms were essentially places where the processes of teaching-learning went on, with the central focus on the teacher. The teacher decimated the knowledge which he had gathered and analyzed throughout his study. With the advent of new technologies decimation of knowledge has changed rapidly. For example, one of the first communicative devices, the radio provided the learners with lectures from all over the world. Television was one such device during the 1970–2000 era, which could have been used as an ICT tool in the classroom, harnessing the potential of the available technology. However this was not the case with the education system of India. The NPE of 1986 viz-a-viz 1992 focused to employ educational technology to benefit the students and to improve the education quality in India. Due to those initiatives, two new projects came to the surface, educational technology (ET) and computer literacy and studies in schools (CLASS). These projects paved the employing way for the National Curriculum Framework (NCF)2005. When things were changing rapidly in the urban schools with the implementation of technology-based education, certain steps were also taken for the rural schools under the Sarva Sikhsha Avijan (SSA), where remote schools were given grants for setting up computer equipment.

On the other hand, the higher education sector has largely neglected the needs and importance of the usage of ICT in their classroom. The lecture method was largely opted, and communicative or constructive approaches were seldom used in colleges and universities pan India. Drastic changes in the approaches took place as the pandemic spread across the globe. The entire education system took a hit and higher education was no exception. The need and scope of ICT in higher education are much needed in the current scenario.

1.1 Discussion on the Impact of ICT on Teachers and Students

1.1.1 Motivation

In Students

ICT-based education is generally associated with higher motivation among students of all age groups. Though studies are currently underway to assess the motivational level of the students, it is for certain that ICT plays an important role in that.

In Teachers

New-age teachers as facilitators are highly skilled individuals who have the necessary capabilities to use ICT in the new-age classrooms. Digital classrooms are better oriented and student interaction seems to be better, therefore the motivational level of teachers is highly aroused.

1.1.2 Accessibility

Remote learning: Learning is synonymous with classrooms, be it schools or higher education institutions (HEIs), but the change in the direction of the approaches in teaching has paved a new way.Remote learning, a distant dream has become a reality for many learners. According to the AISHE report of 2019–2020, there were 42,343 colleges in India with just a nominal growth from 39,071 in 2015–2016 that cater to the huge Indian population engaged in higher education. It was also reported that the total enrolment in higher education was 3.85 crores whereas the number of teachers was 15,03,156.College density in places like Bihar was 7 colleges/lac students whereas the national average stood at 30 colleges/lac.

Accessibility remains one of the core issues of the 60.56% of colleges situated in the rural parts of India.The use of ICT will surely benefit the students as they could take part in lectures remotely and can save time and effort in reaching the distant colleges.

1.1.3 Barriers of time

In the post-COVID era, we have seen a steep rise in the drop-outs in every educational sector. Multiple studies have indicated that the rural male population has been engaged in several small-time jobs to sustain their family as COVID has adversely affected the rural economy. The female population has been married off rather than pursuing higher studies. This has affected the growth of the total enrolment number in higher studies. Reversing the process seems futile and the use of ICT can help us manage the situation better. Recorded classes, e-books, online examinations, and the use of the Internet can break the barrier of time, and students who are engrossed with other petty works can continue their studies as well as support their families simultaneously.

1.1.4 Autonomy

ICT-based learning has led to the push of increased autonomy of the teaching-learning process. The three pillars of education (institutions, teachers,and students) have undergone a very high level of self-autonomy. Courses have become more flexible allowing teachers to teach using a variety of mixed methods and approaches. Constructive decisions are taken swiftly with the change of power dynamics at the institutional level and students have benefitted much from the same.

1.1.5 ICT and Physical Disability

Physical disability commonly includes physical monstrosity affecting upper and lower limbs, inability to move or coordinate bodily organs, and other psychomotor disabilities.The Indian Constitution guarantees the Right to Education for all citizens, including those with disabilities. Specifically, Article 29(2) states that admission cannot be denied to any citizen on the basis of religion, caste, race, or language. Further, pursuant to Article 45, the State is required to provide free and compulsory education to all children until the age of 14, without any discrimination based on religion, caste, race, language, or disability..

Inclusive education, a dream of every aspiring nation can be fulfilled digitally. Digital inclusion can aid physically disabled students to participate and learn equally with their peers. Information and communication technology have eased the way for physically handicapped students to achieve higher education by transferring the required technology to the learner for the achievement of the

learning goals to the specific nature and severity of the disability. The constant feedback from the learners is helping the content creators to be more specific in their respective domains.

1.1.6 Open educational resource

Repositories are, according to Merriam-Webster*,"one that contains or stores something nonmaterial"*Open educational resource(OER) repositories are storage(s) that store e-learning materials, such as e-books, .pdfs, Powerpoint presentations, and as well as audio and videos for learning. Massive Open Online Courses(MOOCs) can also be a part of the OER. These open-sourcelearning materials can be freely re-used by anyone willing to do so, thus making these repositories a pool of resources that educators and learners can use to enhance their knowledge.

1.1.7 Gamification

The new digital age has sourced newer concepts in technology that can be applied to achieve more quality in ICT-based education. Gamification of concepts has long been used in offline classrooms, with interactive games for math, literature, grammar, and so on. Quiz and role-plays have been frequently used in classrooms, especially in school education. Gamification in ICT-based higher education classrooms has not been explored but it has a scope for exponential growth. Online games have become another reality for students aged 18–23 and if education can be incorporated into games, or the other way around, it shall consequently benefit them. Games are interactive and challenging; they provide ample scope for team play and yet are generally individualistic in nature. There is a perceived sense of winnability in any game and as the player plays and wins, he is rewarded in some sense. This philosophy can be incorporated in the ICT-based learning where the virtual education is engrossing as well as enlightening at the same time. Rewards can be given if an E-book is read, an online quiz is taken, or a presentation is made. Each student must be awarded credits and there should be a sense of challenge, perceived winnable

2.0 Review of Related Literature:

2.1 Technological Integration in Higher Education:

The infusion of ICT into higher education has prompted a revaluation of traditional teaching methodologies (Selwyn, 2011). This shift is not merely about substituting conventional methods but involves a fundamental reconceptualization of the teaching and learning processes.

2.2 Pedagogical Transformation:

The transformative potential of ICT in pre-service teacher training is emphasized by Mishra and Koehler's (2006) Technological Pedagogical Content Knowledge (TPACK) framework. This framework advocates for the seamless integration of technology into teaching practices, enhancing the ability of educators to convey subject matter effectively.

2.3 Professional Development and Lifelong Learning:

ICT provides avenues for continuous professional development and lifelong learning for pre-service teachers (Ertmer & Ottenbreit-Leftwich, 2013). The integration of technology is not a one-

time acquisition of skills but an ongoing process that requires educators to adapt to emerging tools and methodologies throughout their careers.

2.4 Enhancing Collaborative Learning:

Collaborative learning environments facilitated by technology play a crucial role in pre-service teacher training (Anderson & Kanuka, 2003). These environments contribute to the development of a sense of community among pre-service teachers, fostering collective knowledge and skills.

2.5 Challenges and Barriers:

Despite the potential benefits, the integration of ICT in higher education faces challenges such as inadequate infrastructure and resistance to change among educators (Albirini, 2006; Pelgrum & Law, 2003). Addressing these challenges is essential for harnessing the full potential of ICT in pre-service teacher training.

2.6 Impact on Student Outcomes:

Well-designed ICT interventions positively impact student outcomes (Davis et al., 2019). In the context of pre-service teacher training, technology integration can enhance student engagement, critical thinking, and problem-solving skills, preparing future educators for the demands of modern classrooms.

3.1 Statement of the Problem

The present study aims to find out the impact of the use of ICT in higher education classrooms, with special reference to the Teacher Training Programme.

3.2 Objectives of the study

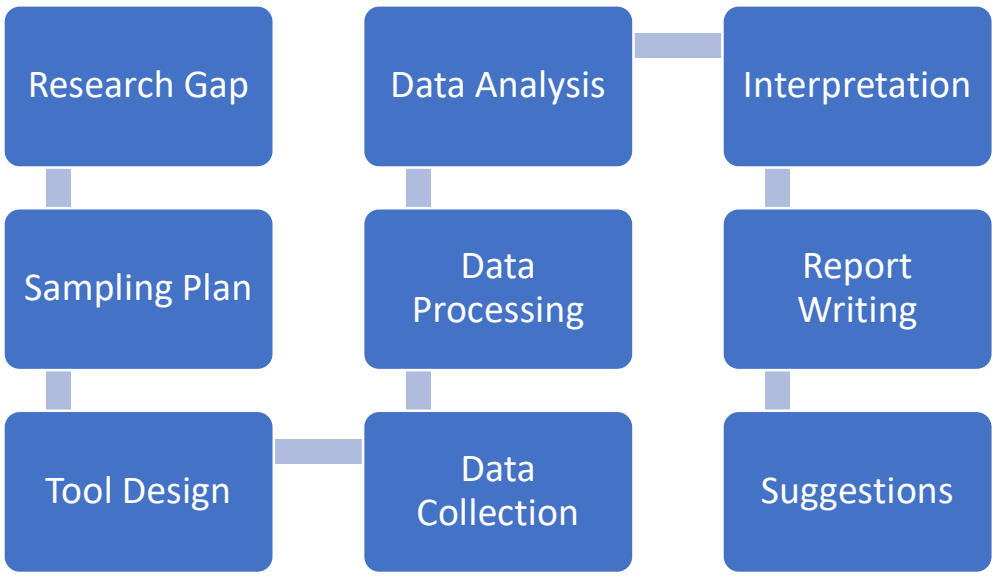
1) To find out the impact of the use of ICT in higher education, especially in teacher-training institutes.
2) To explore the efficiency of ICT-based learning in teacher training.
3) To access the knowledge of ICT in trainee-teachers.
4) To find out the number of trainees undergoing or completed online courses such as Massive online open courses(MOOCs).

3.3) Research Questions

1) Does the use of ICT in classrooms really help in Teaching-Learning Process?
2) Is technology the future of Teaching-Learning?
3) What is the efficiency of ICT based Education?

3.0) Research Methodology

The methodology of the study consists of the objectives pertaining to the research gap found by the authors. The investigators has made a flowchart for conducting the research to gain a better understanding of the research problem. The research is done through both qualitative and quantitative analysis of the raw data.



3.1 Sampling Plan

The study was conducted among randomly selected 180 students pursuing B.Ed and M.Ed courses through an online survey through self-made questionnaire on the "Study on the Imapct of ICT in the Field of Higher Education."

The population consisted of all the students pursuing higher education in India, for the sake of the study, the investigator has delimited to 180 students of private and government B.Ed colleges in West Bengal and adjoining states for the study of "The Impact of Information and Communication Technology on Higher Education: A Study on Pre-Service Teacher Training"

3.1.1 Workgroup

The average age of the students is 27 years 5 months out of which 73.9% are females. 47% of the respondents live in rural areas and 26.4% each in Semi-urban and Urban areas. 67% of them use mobile data at their residence and 42.5% said that they use mobile data in their institutions as well.

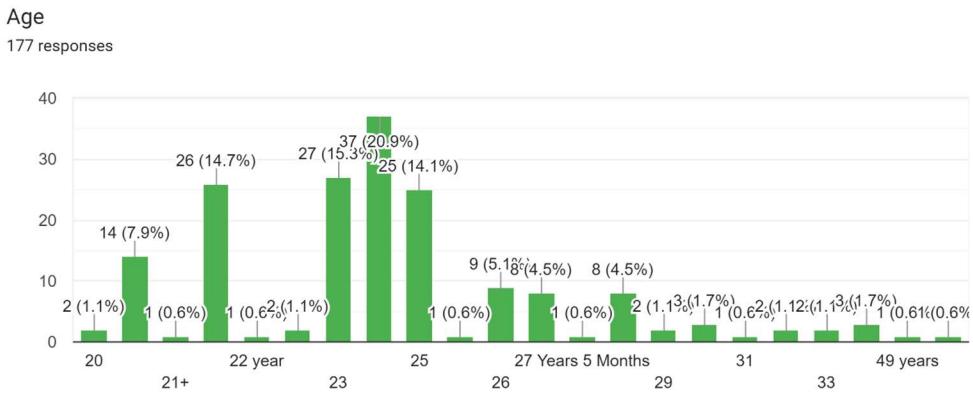


Fig-1 (X axis-Age, Y axis- number of respondents)

4.0 Analysis

The research questionnaire was formed to find and analyze the impact of the use of ICT in the emerging higher education sector, especially in teacher training courses. Most of the respondents (58%) agreed that E-learning shall be the future of learning rather than the conventional way, while 26.7% strongly agreed with this fact.

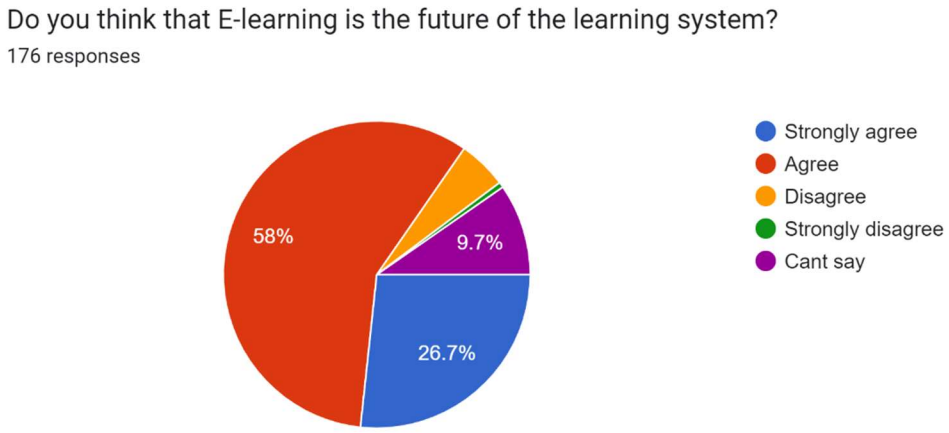


Fig:2

It implies the impending usage of technology in the Indian educational sector in the near future. The future teachers who are currently being trained think that technological advancement in learning driven by software should be considered as the future of learning.

While trying to understand the impact of ICT and technology in classrooms investigators surveyed the exposure of ICT in the Pre-covid times, where it was found that only 46.9% of the respondents had been exposed to some kind of ICT-based education in the pre-COVID era. Thus, the lack of infrastructure is posing challenges in the integration of ICT in classrooms(Albirini,2006)

The data also shows that 71% of the teacher-trainees think that they have strong knowledge of ICT which they can use for their professional requirement.

The investigators asked the Trainee-teachers to put their views on the efficiency of the use of ICT-based teaching and learning, it was found that 19% of the respondents said that they think that ICT-based classes would be immensely efficient, 39% thought that ICT in education would be moderately effective, and the mean score of the study was 0.76.

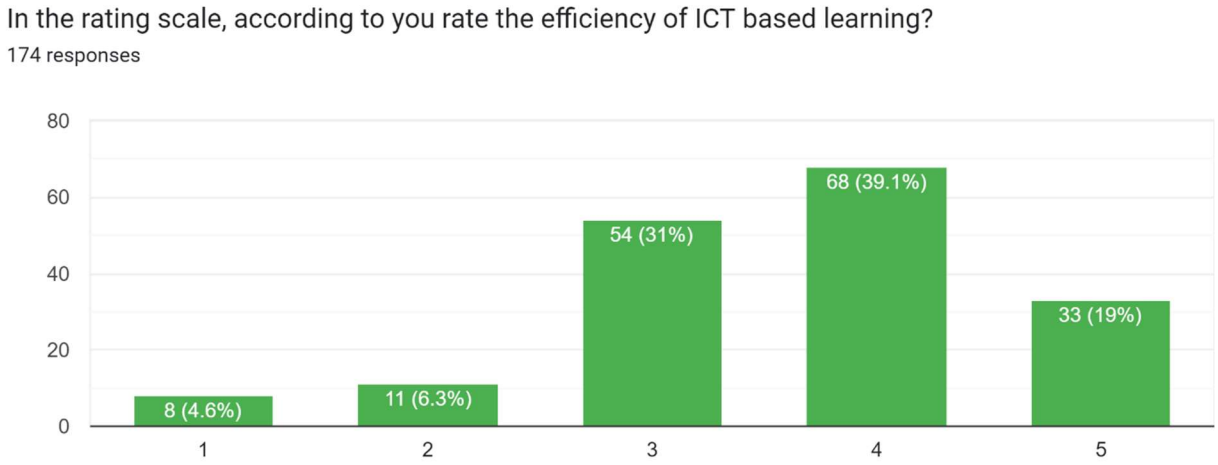


Fig-3: Scale (High-5, Moderate -4, Medium-3, Less-2,Nil-1)

. With respect to the understanding of the advantage of ICT-based education, the majority of the respondents think that the flexibility about the timings is a boon to the aspiring student community and therefore online learning can be fruitful for them giving the students the autonomy required to facilitate a conducive education environment.

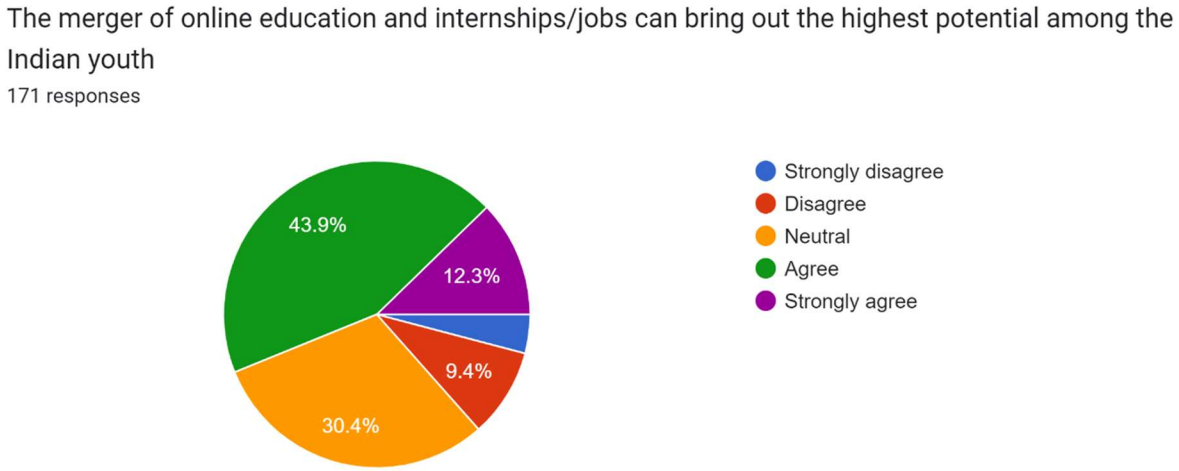


Fig-4

It was shown that the respondents feel merger of technology-based education with internship can result in enhanced potential among the Indian youth community who are ready for the job market. Based on the same data it was found that 37.4% of the respondents are neutral and 30% agree with the hypothesis that Edtech companies can overpower the formal educational system that is long prevalent in the educational scenario. An impending scenario can be observed where technological advancement such as Artificial Intelligence will heavily impact the traditional classroom teaching-learning process.

84.2% of the respondents haven't completed any of the Massive open online courses(MOOCs) through online portals such as SWYAM or DIKSHA, The majority of the responses(60%) claim that online education certainly can impair the psyche of young learners as (Waxman, Lin, and Machiko 2003) argues that though small but a negative effect on students' outcome was noticed in a naturalistic setting.

78.3% of the respondents think that professional courses like B.Ed cannot be taught by online mode only.

5.0 Findings and Conclusion

The inference drawn based on the responses received was made through analysis of the raw data through qualitative and quantitative analysis.

Major Findings and Inferences

5.1 Pertaining to objective-1

The study shows that technology has become an integral part of the neo-educational system of the post-covid era. Teacher-education programmes need more emphasis on the infrastructure and the integration of ICT-based learning in their classrooms. Students are aware of the technology around them which can be accessed and harnessed by the teacher for enhanced Teaching-learning. Online education backed by internships during higher education could be fruitful in bringing out the best in them. Trainee-teachers are the future educators who shall shape and mold the young aspiring minds of school children and as it is evident that E-learning shall be one of the crucial components of education in the coming years, the HEIs on teacher education have to knuckle up on providing the latest infrastructure to its trainees.

Pertaining to objective-2

ICT has been found to be more engaging and motivating among the learners and therefore new policies by the Indian Government should come in place. NEP 2020 strongly agrees to a complete reform in the existing structure of the Teacher-Education programme and the use of ICT in the process of learning. Furthermore, it can be claimed that the teacher-education programme is an intensive programme, and though ICT shall help in the dismission of the knowledge by the teacher, the teacher-education program cannot be conducted as an online-only course, as it shall diminish the scope of the in-hand experience by the trainees during actual classroom interaction.

Pertaining to objective-3

Trainee-teachers undergoing B.Ed and M.Ed training programmes responded that most of them have used platforms other than Google Meet and Zoom to gain knowledge and 71% of them think that they have enough knowledge to teach the future E-classrooms. The opinion regarding the incorporation of open open-book education system was moderately divided into agreements and neutral statements. Therefore it could be concluded that trainee-teachers have the understanding of the required knowledge for the upcoming technological power shift in modern classrooms.

Pertaining to objective-4

It was also found that though the teacher trainees have knowledge of the Internet and computer ,there is a significant lack of awareness of online courses which provide flexibility and

accessibility to students. Online courses and programs need to be developed in areas of teacher education from the grassroots level.

In conclusion, ICT has emerged as a transformative force in pre-service teacher training, offering a plethora of opportunities to enhance the preparation of future educators. By effectively integrating ICT into teacher training programs, we can empower pre-service teachers to embrace technology as a powerful tool for fostering student engagement, promoting active learning, and cultivating innovative pedagogical practices.

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