

The role of information and communication technologies in improving teaching and learning processes in higher education: Bridging the gaps

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ABSTRACT

Information and communication technologies (ICT) has turn out to be regular entities in all aspects of human activities. In recent times the use of ICT has primarily changed the practices and procedures of nearly all forms of endeavour within educational institution, industry, research, media and governance. In the field of education sector, ICT has begun to have a presence but the impact has not been as extensive as in other fields. The use of ICT in education lends itself to more student-centred learning settings and often this creates some tensions for some teachers and students. The objective of the article is to look at the role of ICT in higher education in Nagaland. It emphasizes computer technology and media because of their availability in educational institutional and their great impact on teaching and learning processes and highlight some changes ICT might have on the role of the teacher in the classroom. The present paper focuses on incorporation of ICTs in educational system in Nagaland and highlights on present educational scenario. The results show that 74.5 per cent of teaching faculties emphasize the need to expand educational opportunities for students in terms of contented interaction and satisfaction in the process of educational activity. This paper is an attempt to draw attention on policies implementation regarding ICT integration and effectiveness of teaching-learning environment.

Keywords: *Information and communication technology, e-learning and motives*

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1. Introduction

Information and communication technologies (ICT) are an umbrella term that includes all technologies for the management and communication of information (Basargekar and Singhavi, 2015; Mou, 2016; Pulkkinen, 2007; Wood, 1995; Koehler and Mishra, 2009; Hathaway, 1995; Kumar, 1996). ICT considers all the uses of digital technology that already exists to help government, research institute, education, individuals, business and organization. ICT is concern with the storage, repossession, manipulation, broadcast or receipt of digital data (Balanskat *et.al*, 2006; Owston, 2006; Richardson, 2011). The addition of ICT issues in the curriculum and provision of these telematics in colleges have raised many issues of concern to educators, parents, researchers, policy makers and politicians. Some of the most noteworthy issues are the function of the information technology in the curriculum, and how these issues should be addressed in the curriculum, and most importantly how they impact teaching and learning (Dagdilelis, Satratzemi, and Evangelidis, 2004; Narula, 2008; McConnell, 2001). The other issue of concern is the repercussions of these technologies in terms of increasing access to high quality education. If one was to compare such fields as medicine, tourism, business, law, banking, insurance etc., the impact of ICT across the past two or three decades has been vast (Rastogi and Malhotra, 2013; Tomei, 2007; Pelgrum, 2001; Williams, 2006; Barak, 2006). A number of people have attempted to discover this lack of action and influence. These have included such determinants as a lack of financial support to purchase ICT technology, require training among the teachers, a lack of motivation among teachers to adopt ICT as teaching tools in class room teaching and demonstration (Collis, 2002). But in recent times, factors have emerged which have strengthened and positive moves to adopt ICTs into classrooms and learning settings. These have included a

growing need to discover efficiencies in terms of program delivery, the opportunities for flexible delivery provided by ICTs, the capacity of technology to provide support for customized educational programs to meet the needs of individual learners and the growing use of the Internet as tools for information access and communication (Oliver and Short, 1996; Higgins and Moseley, 2011; Kennedy and McNaught, 1997).

As we move into the age of digital technology, these factors and many others are bringing strong forces to bear on the adoption of ICTs in education and contemporary trends suggest will soon see large scale changes in the way education is planned and delivered as a result of the opportunities and affordances of ICT (Yusuf, 2005; Keengwe and Onchwari, 2011; McCarney, 2004). Learners in colleges today will require considerable ICTs knowledge, soft skills and awareness if they are to be successful in the future. The economy will depend on a high level of ICT capability from its people if it is to develop technologically and to compete internationally (Gill, 2017; Youssef and Dahmani, 2008). The aim of this paper is to improve access to basic information in the colleges by improving ICTs infrastructure so as to enhance the soft skills capabilities of the teachers and students.

2. Background

One of the most noteworthy questions asked by educators is: what is the long term impact of the introduction of ICT in the core curriculum courses? Computers, in particular, have positive effects on learning and are motivating for learners. They are acknowledged by more teachers than other technologies and are widely supported by administrators, teachers, parents, politicians and the public in general (Owston, 2006; Pelgrum, 2009; Fredriksson, Jedeskog, and Plomb, 2008). Reeves argue that computers increase equity of access, and reduce the time needed to accomplish a given set of objectives. One of the goals of the Ministry of Higher Education is equity of access to quality education for all; hence this technology is essential if we are to achieve this goal (Reeves, 1998; Lalitbhushan, Jagzape, and Raweker, 2014). Hunt (2004) argues that because of the phenomenal rate at which the volume of available information increases and access to an increasing range of sources, it is becoming clearer than ever that the ability to find appropriate information and use it effectively is of greater value than being able to remember facts. The skills of locating, evaluating and using information effectively from a range of sources constitute the information skills which are needed for people to become information literate, enabling them to engage in effective decision making, reasoning, problem-solving and research (Skinner, 1968; Williams, 2005; Ringstaff and Kelley, 2002). Therefore the importance of ICT cannot be over emphasized as it offers the education process one of the most potentially powerful learning tools available. It also supports a wide range of broader educational objectives including independent learning, collaboration with others and communication skills (Hunt *et al.*, 2004; Sandholtz and Ringstaff, 1996).

Training a teacher by means of telematics is more crucial than acquiring an outsized number of computers. Human resources in the institution have to be trained to facilitate the learning process, make the process real, achievable, challenging, yet exciting and not intimidating. They need to know that in 21st century, information is not difficult access, instead organizing, sharing, and collaborating become essential skills (Alam, 2016; Andersson, 2006; Maskeliunas, and Damasevicius, 2018; Peeraer and Petergem 2011). But this information can become true information only when the teacher makes it significant. Here the teacher can use telematics to make topics more understandable (Ali, Haolader, and Muhammad, 2013; Sangra, and Gonzalez-Sanmamed, 2010; Egoeze, Misra). The effectual use of ICT has enormous impact on teaching and is positively varying the role of the teacher in the classroom. According to Jenkins (1999) ICT changes teaching and learning through its potential as a source of knowledge, a medium to broadcast content, a means of interface and conversation. The role played by these technologies in the classroom provides a challenge to teachers because they make them change the way they have been doing things.

With the present soft infrastructure, class size, availability of teachers, quality of teachers, training of teachers, etc., it is difficult to achieve all the objectives. Further, most of the teachers use traditional method i.e., lecture method which does not have potentiality of achieving majority of above mentioned objectives (Stephen, Sandra, and Silva, 2007; Tondeur, Valcke, and Braak, 2008). The information technology can fill this gap because it can provide access to different sources of information (Windschitl and Sahl, 2002). Students and teachers can exchange their ideas and views, and get clarification on any topic from different experts, practitioners, etc. It helps learners to broaden the information base technology. ICT provides variety in the presentation of content which helps learners in concentration, better understanding, and long retention of information which is not possible otherwise (Dzidonu, 2010; Manisha, 2014). ICT provides flexibility to learners which are denied by the traditional process and method. Flexibility is a must for mastery learning and quality learning (Zhao *et al.*, 2002; Sarkar, 2012).

3. Research methodology

3.1. Instrument development design

The college was the unit of sampling used. A procedure for data gathering was developed and a number of instruments to collect the necessary information were designed and validated. To determine the sample, a selection of typical-ideal cases (Goetz and LeCompte, 1988) with an instrumental purpose was chosen. Three measurement structures were combined to categorize the centres: infrastructure, ICT use and innovation. Infrastructure is understood as the hardware and connective systems available in the college centre, and the structural organization of the teaching spaces linked to ICT. Use is understood as the type of the use of ICT being carried out in each college centre. Innovation was understood as the impact of ICT on increasing the quality of education in the college centre, and the degree of involvement of the entire staff in this commitment.

In addition four college 'levels' were established by combining these three dimensions mentioned above.

- (a) *Level 1 college*: colleges with a limited use of ICT in educational tasks. Connectivity is limited to a computer without having a network.
- (b) *Level 2 college*: colleges that have a well-equipped computer classroom. Its use is not intensive and depends on the interest of some teachers.
- (c) *Level 3 college*: colleges having one or more very well-equipped computer classrooms. These computers are interconnected and a local area network has been set up.
- (d) *Level 4 college*: colleges that have decided ICT is a characteristic element of their educational activities. They have very good equipment and are fully connected to the internet.

3.2. Data collection

3.2.1. Participants and procedures

A simple random sampling method was applied. From the 200 teachers working in the 30 college, have been interview and discuss the wide range of ICT application. Keeping in mind the aim of obtaining information to identify trends and practices on the use of ICT at college in Nagaland (Ertmer, 2005; Law, Chow, and Allan, 2005; Nachmias *et al.*, 2004; Tearle, 2003). Colleges from every district were selected. Data were collected using the following tools: interview with the teachers, good practice guidelines, and other information resources from the different colleges. All teachers at the participating colleges were asked to complete a questionnaire to collect data about their competencies, uses and attitudes related to ICT in education. The specific questionnaire was drawn up with this objective. It was divided into five sections: use of ICT in teaching practice, attitudes towards ICT, training experience and training needs, and college equipment.

3.3. Data analysis

For the study, the researcher used simple statistical techniques. The data collected are analyzed on the basis of the responses given by the respondent to the questionnaire prepared and findings will be concluded through tabulation and percentage conversions were given accordingly.

4. Principle findings and discussions

Even though we have data relating to teachers' gender, age and teaching experience, in this paper we will only discuss the main findings. Approximately two-thirds of the sample was women (60.7%). Regarding age, most of the teachers were between 35 and 44 years old (45.1%). Outside this age group, 28.6% were between 25 and 34 years old, and 25.9% were between 45 and 54 years old. Finally, most of the teachers in the sample (34.1%) had more than 20 years of teaching experience, followed by those with between 10 and 20 teaching years experience (26.5%).

Table 1: Higher institution distribution by districts

Sr	Districts	Number	%	Sr	Districts	Number	%
1	Dimapur	11	36.67	7	Peren	1	3.33
2	Kiphire	1	3.33	8	Phek	2	6.67
3	Kohima	6	20.00	9	Tuensang	2	6.67
4	Longleng	1	3.33	10	Wokha	1	3.33
5	Mokokchung	3	10.00	11	Zunheboto	1	3.33
6	Mon	1	3.33	Total		30	100

Source: Field Survey Report, 2019-2020

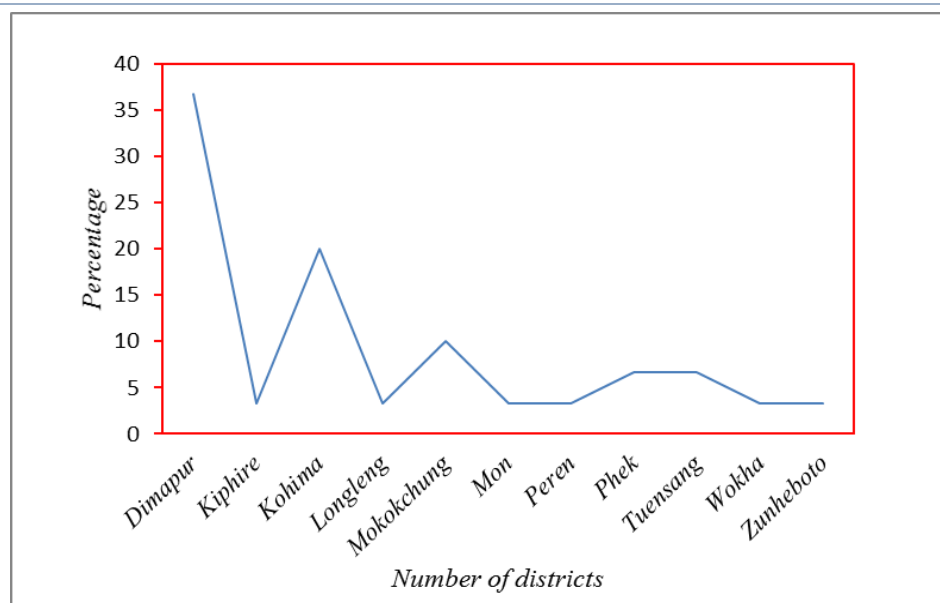


Fig 1: No. of Higher education institution

Table 2: Distribution of the colleges in the sample

Sector	Number	%
Public	12	40
Private	18	60
Total	30	100

Source: Field Survey Report, 2019-2020

4.1. General motives of teachers during the introduction of ICTs in their teaching

We can analyze what motives are more important for college teachers in the implementation of ICTs. For this reason we investigate the following indicators: the desire to make their professional activity more comfortable; the teacher's desire to meet the requirements; the desire to increase educational opportunities for students in terms of comfortable communication and satisfaction in the process of educational doings; the desire to prepare students for life-long learning, continuous professional growth; improving the excellence of students' education; higher personal position for college teachers, professional self-realization of the teacher; the desire to use modern models of information behaviour, including the models you can address to the students and so on.

Table 3: Motives for teachers during the introduction of ICTs

Options	%
The desire to expand educational opportunities for students	74.5
Improving the quality of students' education	83.2
The desire to meet the requirements	67.8
The desire to make professional activity more comfortable	73.1
The desire to prepare students for lifelong learning	85.0
Improving personal status of a teacher	82.7
The desire to use modern models of information behavior	91.4

Source: Field Survey Report, 2019-2020

The findings observe that among the list of significant motives 74.5% of respondents highlight the need to enlarge educational opportunities for students in terms of comfortable interaction and satisfaction in the process of educational activity (refer table 3). Slightly smaller group of respondents 83.2% prefer to progress the quality of students' education. An even larger group (67.8%) focuses on the desire to conform to the requirements for the university teacher and the desire to make their professional duties more comfortable (73.1%). The need to prepare students for lifelong learning, continuous professional development (85.0%), higher personal status as a teacher, professional self-realization of the teacher (82.7%) and the need to use modern models of information

behavior, including such models that you can address to the students (91.4%). Thus, noting the benefits of electronic educational and scientific space, we conclude that respondents preferred access to professional information processing and communication in digital form using computer tools in general (office applications, Email, Google classroom Talent LMS, iTunes U, Zoom platform). Among the problems that hinder the implementation of e-learning technologies by university teaching staff the respondents stressed the fact that the system of remuneration for the implementation of ICTs in the university educational process is not developed in much detail. Along with this problem the following issues were emphasized.

4.2. Problems hindering the performance of e-learning technologies

We attempted to analyze the problems that hinder the execution of e-learning technologies in the teaching activity of teachers of higher educational institutions in the mode of a multiple-choice question. These problems include: the intensity and complexity of work associated with the improvement of electronic educational resources; lack of training in the area of educational and information technology, which is connected with the potential of the electronic environment; insufficiently developed regulations for the use of electronic appliance in higher education; insufficiently formed e-environment of higher educational establishments, lack of Wi-Fi, and a unified system of electronic courses, databases, electronic library, and so on; insufficiently developed system of incentives for accomplishment of e-learning in institutions, and so on.

It is obvious that among the problems that hinder the implementation of e-learning technologies in teaching, the first problem is insufficient degree of incentives' system for the introduction of telematics in higher education, namely 77.5% which is quite surprising. The subsequent issues attracted rather little attention: the absent of regulations for using electronic tools in higher educational institution (91.3%) and problems of insufficient degree of electronic space development in higher educational institutions, the lack of Wi-Fi, a unified system of electronic courses LMS (Learning Management System), databases, electronic library (70%) and poor training in the field of information technology (87.9%). And, of course, the last problem is the lack of training in the field of educational technology, which is connected with the potential of the electronic environment (86.3%), and the problem of access to electronic resources, which scored 78.4% of the respondents' votes (refer table 4). Analyzing the above, we can bring to a close that the list of these problems confirms that the main factor of effectiveness of implementation of e-learning technologies is the curiosity of students in educational material and attracting a lot of attention to it. We should note that this approach does not only develop individual abilities of students, but also reveals personal skills and abilities of college/university teachers.

Table 4: Problems that hinder the performance of e-learning technologies in teaching

Parameters	%
Insufficiently developed system of incentives for performance of information	77.5
Insufficiently developed regulations for the use of electronic tools	91.3
Insufficiently formed electronic space of higher educational establishments	70.0
Lack of training in the field of information technology	87.9
Lack of training in the field of educational technology	86.3
No access to the resources	78.4

Source: Field Survey Report, 2019-2020

Although this is a positive move towards providing quality education to students at this level, there are serious challenges in this endeavor:

- Geographical disadvantage:* Physical barriers such as remoteness and lack of electricity supply: Some colleges are in very remote areas far away from the power lines. Computers, photocopiers, Xerox machines, etc. need electricity. The Government would have to find ways of providing these with power.
- Lack of funds:* Especially for maintenance of hard and soft infrastructure
- Lack of ICT skills for staff:* Most of the college teachers lack skills whatsoever in ICT, let alone having basic training in computers. The challenge facing the Ministry if it were to include ICT issues in the college curriculum is to address lack of ICT skills by teachers.
- Inadequate and improper software:* appropriate software will have to be acquired if desired skills which are in line with curriculum needs are to be developed.
- Lack of technical support:* The findings indicated that although teachers had a strong desire to use ICT in the classroom, they were encountered with some barriers. Insufficient technical supports at college and little access to internet in remote areas and ICT were considered as the major barriers preventing teachers to integrate ICT into the curriculum.

- f) *Misuse of RUSA Fund*: Rashtriya Uchchatar Shiksha Abhiyan is the most ambitious project being undertaken by the Ministry of Education to provide strategic funding to higher education in the country. The objective of the mission is to improve the quality of higher education through institutional academics; training to faculties and governance reforms etc. but recent study has found that most of colleges have misused the RUSA fund.
- g) *Lack of knowledge*: Some other factors which were more internal to the teachers such as resistance to change and lack of awareness of the benefits of the ICTs for learning were reported in Jones' study.
- h) *Cost effectiveness*: ICT is an expensive affair, the resources required to set up the infrastructure is quite high plus the cost of maintenance (repairing, up-gradation of software etc.) In government colleges the students does not have to bear its cost but in private colleges ultimately falls on the students.
- i) *Infrastructure related challenges*: Firstly, it requires appropriate place such as rooms or buildings for implementing the information technology. Secondly, very basic requirement is availability of power supply and other things.
- j) *Lack of internet connection or slow connection*: Sometime due to weather condition or some other factors the connection may be slow down and in such cases the ICT program will not provide the good result.

5. Conclusions

It has been found that ICT has a significant role to play in improving the standards in higher education hence its enclosure in the curriculum is a step in the right direction. Both teachers and students in college should acquire ICT knowledge, skills, and awareness if they are to be successful in their futures (Karasavvidis, 2009). As discussed in this paper telematics tools has the potential of promoting employment and entrepreneurship, reducing gender gaps, and raising the standard of living of the state as a whole (Jamir, 2020; Jamir and Ezung, 2017b; Jamir and Ezung 2017a). Amongst the information technology computers are the most favored because they have positive effects on learning and are motivating to learners. It also supports a wide range of broader educational objectives including independent learning, collaboration with others and communication skills. The government policy says ICT should be incorporated across the curriculum so as to develop learners ICT capability and provide them with a range of knowledge, skills and attitudes applicable across the curriculum (Pegu, 2014). This paper argues that in order for teacher to effectively integrate ICT into teaching and learning they need to understand the relationship between a range of ICT resources and the concepts, processes and skills in their subject; use their subject expertise to select appropriate ICT resources; develop confidence in using arrange of ICT resources; and know how to prepare and plan lessons where ICT is used in ways which will challenge pupils understanding and promote greater thinking and reflection. It has been found that one of the worst hit by the COVID-19 pandemic has been the education sector. The closure of schools, colleges and universities around the world has affected over 87% of the students globally, according to a UNESCO report. In the meantime, ICT/digital education has emerged as a clear winner during this pandemic around the world (Emami, 2020; Wootton *et.al*, 2020). Therefore, the policy suggest that successful implementation of ICT is more important in influencing and empowering teachers and supporting them in their commitment with students in learning rather than acquiring computer skills and obtaining software and equipment (Jhurree, 2005).

Abbreviations

ICT: Information and Communication Technologies

LMS: Learning Management System

NGO: Non-Governmental Organisation

RUSA: Rashtriya Uchchatar Shiksha Abhiyan

UNESCO: United Nations Educational Scientific and Cultural Organisation

Wi-Fi: Wireless Fidelity

Compliance with ethical standards

Conflicts of interest

The authors declared no potential conflicts of interest with respect to the research, authorship and publication of this article.

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