CHAPTER- VI
SUMMARY, CONCLUSION AND IMPLICATIONS

6.1 Introduction

In this chapter a brief summary of the research study, findings, discussion of result, research contributions, educational implications, suggestions for future research, limitations of the study and conclusion are presented. It also addressed gaps that need to be further examined and studied which are presented in this section.

6.2 Summary

This research study was conceived with the presupposition and rational ICT is playing in the field of education especially in creating easy access to learning for the masses. Based on this, the objectives of the research were ---

1. To assess the existing ICT facilities in higher educational institutions (HEIs) in Assam,
2. To assess the extent of ICT utilization in the teaching learning process (TLP) by the HEIs in Assam,
3. To examine the problems and prospects of integration and usage of ICT in HEIs in Assam,
4. To explore the scope for improving the present status,

Drawing from the theoretical propositions and establishing a lack of knowledge on major ICT academic, instructional and logistical infrastructure enumerated in subsequent chapters, the following research questions were examined:

- RQ1. What kind of ICT tools and methods are being used in the universities of Assam?

- RQ2. How do users perceive ICT and its benefits in their pedagogy?

- RQ3.What are the perceived issues that hinder proper integration of ICT into their pedagogy?

The objectives and research questions were the roadmaps for the preparation of the methodologies. Based on this, the researcher defined its population of the four target universities and their population. For this, students, teachers and ICT experts / administrators were identified as the real resources of information about ICT in their

respective universities. Among the university community and target respondents, 320 students, 140 teachers and 40 ICT experts / administrators were selected as samples from the total population following stratified and purposive sampling. For these respondents, questionnaires were prepared for each group and administer ethically in each university. The feedback was captured and analysed using SPSS focusing on the percentage and weighted mean.

Having passed all these rigorous steps of the research, it has resulted in the following key findings as ---

6.3 Understanding about ICT

Understanding about ICT was geared towards the key question of 'what is your idea about ICT?' Based on this frame, most of the respondents (77.4%) reflected their view and finally came with the view that ICT is 'combinations of internet connectivity, computerized facilities, telecommunications (telephone lines and wireless signals), computer with software, audio-video systems which enable users to access, store, transmit and manipulate information'. However, very few of them (2.5%) perceived ICT as internet connectivity. In line with these, Internet was the top ICT element which was needed by students for their teaching learning process though there is interest on all of the ICT facilities. However, downloading, ppt, printing and scanning were less demanded for the course of students.

6.4 Training and support

The need for training and support to handle, manage and utilize ICT facilities was one of the research questions in this study. Thus, more than 84.4% of the students affirmed their need of having ICT training for handling facilities at the beginning of the course and the need of the training was not lined with the residential background of students. The need for the training was also appreciated by the ICT experts / administrators where strong reminder is forwarded to universities to organize the training. Most of the students were happy on the quality of technical support offered by experts as well and they rated it very good in some universities like TU. Teachers were also happy on the technical supports. But there are still concerns on the technical support of DU.

In order to maintain the ICT facilities, almost all (95%) of the universities are using their internal resources / staff for maintenance of ICT equipment and facilities. The ICT experts / administrators are satisfied with the overall ICT facilities availed in each university where 60% of them are still rating it as 'great'.

6.5 Availability of ICT facilities

This theme focused on the key statement of whether any of the ICT devices are available for use of students in the institute / department, class of each university. TU is relatively better than other universities in availing ICT facilitates. In general, almost there is no desktop or laptop without internet connectivity where TU has the highest and more than 83% of them are also using it. Almost in all universities ICT facilities like desktop, laptop, video conferencing / virtual classroom / interactive board, desktops and laptops are available. In most of the departments and laboratories, on an average 100 and above sets of computers are available and the highest was observed in TU and 50 and above sets of computers are found in their in their libraries as well. However, most of the universities don't have interactive white boards; they are rarely found in departments which usually range from 1 to 5 in number. All universities have their own home pages or websites, local area network (LAN) and email addresses which is accessible for more than half of teachers and students.

6.6 Importance and utilization of ICT

On the utilization of computers, students shared their experiences as they are working with computers and found it really fun, very important for academic work, bringing interest, learning and means of capacitating them. Most of the students (80%) don't consider working on computers as a distractor where they lose track off time when they are working on it. Rather more than 52% of the respondents agreed on its importance and the highest agreement was recorded in TU (81.6 %), GU (79.0%) and DU (76.1%). Among these statements, 'use a computer to learn as it will help in the work that I want to do later on' was highly ranked by all students with an average response rate of 96.9%.

Teachers have also shared their experiences about utilization of the virtual learning system or learning management system software like Litmos Learning Management System, WebCT, Moodle, etc. in their teaching learning process where 91.3% of the

teachers are not using them at all. A better glimpse of attempts is observed in AU and TU. Teachers were also asked about their technological expertise in using ICT in their daily class. Hence, 64% of the teachers are comfortable and 46.7% of them are very comfortable in using it. It was only 4.3% of them who are not comfortable in their technical expertise in class. Among universities, TU teachers are better comfortable in using ICT facilities with a response rate of 68.6% followed by DU and AU each having 40% response rate.

The capacity of students in using the available computers was assessed and most of the students (around 82%) can create a multi-media presentation with sound, picture and video whereas 31.9% of them are doing it with the help of someone. It was the AU students who can do better in creating multimedia presentation by themselves, followed by GU and the least was observed in DU. On the ability of 'using the spread sheet to plot a graph', most of the students were not able to use it and taken as the gap in the use of Microsoft Office next to creating data bases (use of access). Students are good at using ICT facilities related to browsing where most of the respondents agreed on with the option of 'I can do this very well by myself'. AU students were more efficient in utilizing ICT for this purpose which was followed by TU, DU and finally GU.

On the view of Levin et al. (1999), technology is an important and newest thing, you want to think about the power and how it can, you know, it's kind of like the calculator.

It can allow us to do things really sophisticated in an easier way. I think that it is important for teachers to see technology in that way and develop a curriculum that will give kids experiences and that are appropriate for their age levels, and...When they finish school we want them, to be able to use these tools. So, where does it make sense to introduce spreadsheets or introduce a drawing tool...? I see some of the game software as one very small part of technology. I think that some people think that's it. There are all these things that kids can do. I think that we need to think about the end goal for kids to be adults in the workplace and remember that there is a lot of power in these different tools.

6.7 Impacts of ICT on the teaching-learning process

ICT, especially in the 21st century is considered as one of the variables that can affect the teaching learning process where the activity is supposed to be ICT- supported. Based on this, it has been accepted as a means of creating concentration more on what they are learning, increasing the understanding level of students, enhancing the possibility of remembering more easily what students have learnt, work better with other students on tasks, favour of 'a lot' in terms of the role of ICT in improving the atmosphere of the classroom, in favour of it in understanding practise and skills. All these are impact indicators of ICT on the teaching learning process. For this, they prefer technology-supported lectures and virtual classroom / online learning. But there are still ample numbers of student respondents who are in favour of interactive and inspiring lectures without any ICT was relatively of the highest preference in AU (16.5%) compared to the remaining universities. ICT was also conceded as an important tool in improving the relationship of student and teacher to the level of 'great extent' which was 30.4% and 30.0% respectively at the level of 'some extent'. On the contrary, 11.6% of them have replied that ICT-enabled teaching learning process has 'not at all' improved the student-teacher relationship where the highest rate was observed in GU (17.5%) and DU (12.3%). However, excessive use of technology was commented in creating a gap among the people and driving them towards virtual reality where 18.4% of them agreed on 'to a great extent, 63.2% 'to some extent'.

6.8 Major challenges in ICT utilization

There are several challenges the implementation of ICT is encountering in the teaching learning process

- Inadequacy of physical facilities of ICT like computers is a challenge for the process where its impact of insufficient number of computer is 'a lot' at a rate of 48.6% and 'to some extent' (31.6%) and 'a little' (16%) in the target universities.

- In-house regulations and access which are restrictions on the downloading, access to more e-resources / journals and internet site surfing is affecting the students to the level of 'a lot' and 'to some extent'. On the practical effects of restriction on downloading 49.7% have agreed to a degree of 'a lot' and 27.5%

with a level of 'some extent'. Its effect was more severe in AU and GU where student respondents agreed 'a lot' with 59.3% and 58.2% of response rate respectively.

- The attitude hindrance on the implementation of ICT in the teaching learning process of higher education referred that there were few teachers who were not in favor of use of ICT in class and also ICT in the teaching and learning process being a goal in their institution.

- Curriculum-related challenges were also observed on 'insufficient ICT-supported content / material for teaching". Inadequacies because of difficulties to integrate ICT in the curriculum; lack of pedagogical models how to use, and unclear benefit to use ICT for teaching.

6.9 Suggestions

Respondents have forwarded several strategies and suggestions to address the gaps and make use of ICT impactful in the teaching learning process. This may include --

- Physical Facilities

    Students and teachers, ICT experts and administrators have recommended the ICT facilities to be more accessible to beneficiaries; equipment's shall be reliable especially in state universities

- Training

    The provision of training on how to use and manage ICT facilities was valued by respondents. It was marked as 'very highly important' especially on focusing on pedagogical area requested to be strengthened. The nature of training was also reminded to be practice-oriented. There shall be continuous technical support besides the training on the use and management of ICT facilities

- In-house regulations / policies

    Policies of regulations should not be a battering stich that extends to the degree where they affect the total aims of ICT. Thus rules and regulations shall be friendly; flexible that can accommodate the needs and interest of

students as well. ICT experts and administrators also suggested the policies to be related to incentives or salary, promotion. Regulations and policies need to consider the time needed or invested to prepare, explore and develop academic works for integration of ICT-enabled technology in the course for having better teaching learning process.

The researcher has given the following recommendation or suggestions for better utilization of ICT in the TLP:

1. The study recommends for establishing appropriate ICT infrastructure (like electricity, laboratory, high speed Internet connectivity etc. and taking care of the under-utilized ICT facilities by encouraging the users)

2. University authorities should encourage students and teachers to enhance interaction among them through ICT facilities.

3. Awareness may be created among students regarding various digital resources and must be motivated to use them by actively involving students.

4. Digital content creation by teachers will be an added advantage. Institutions need to make more of an effort at popularizing educational portals, through periodic announcements about the benefits.

5. Universities should make appropriate policies and guidelines for effective utilization of ICT for achieving educational excellence.

6. The study also recommends that the existing hardware and software support must be expanded to include instructional design support

7. It is also advised that authority should timely organize trainings and workshop to their teachers, students and even ICT experts and administrators to enhance the skills, knowledge and attitudes and prepare them to address challenges that may encounter them in due process.

6.10 Suggestions for future research

Further research is needed to determine whether the findings of this study will be supported for university community in different institution types, academic programs and demographic groups.

Additional dimensions of student's development, such as cognitive or moral development in relation to ICT need to be studied.

Finally, technology changes constantly and applications and uses change even while research is being conducted. On-going studies are needed to track trends in usage, adoption of new applications and effects of technology depending on the age of first exposure.

6.11 Conclusion

ICT has now become a revolutionary phenomenon since it ensures and necessitates the development and transformation of productive capacity of human beings in almost all walks of life. These development trends have substantially enhanced the effectiveness, efficiency and productivity of the sectors that are fond of it. More specifically, the contribution of ICT in the teaching learning process of higher education is now becoming magnificent where its role is amplified in students achievements. For this reason, starting from the last two decades HEIs are investing heavily in ICT (Youssef & Dahmani, 2008).

The key findings of the research in line with the objective of 'to assess the existing ICT facilities in higher educational institutions in Assam confirmed that most of the universities, whether they are using them to their full potential or not, they have basic ICT facilities like desktop, laptop, internet connectivity, webpage and email accounts for teachers and students, conferencing / virtual classrooms, internet. However, interactive white board is a very rare ICT facility where universities need to think of adopting it. Based on the research findings it can be concluded that among these universities, Tezpur University is in good status in general in terms of availing basic ICT facilities compared to others whereas GU is a little bit behind. In general, the availability of ICT in higher education is a concern of all educationists in the recent phenomenon as the teaching learning process; especially the curricula are designed with ICT-supported instructional approaches.

The second objective of this research is to find out the extent of ICT being utilized in the teaching learning activity by the HEIs in Assam. Availability merely accentuates the utilization of ICT facilities, thus it is important to see how universities are using

them. In line with this, the use of ICT in the teaching learning process has been found as a means by which HEIs implement interactive learning. And the use of ICT in higher education is allowing a shift from a teacher-based approach to a student-based approach which created an opportunity for students to invest more time in their courses. Students like working with computers and considered it as a unique learning experience that they want to do jobs later on and other related careers. However, the teachers' preparedness is less where they need to have more training on integration of ICT with the curriculum related to content, pedagogy and material preparation.

The third and fourth objectives of the research were related to examining the challenges and mitigation strategies. As per the responses of target groups, challenges related to curriculum integration and attitude were enumerated, hence, it has been concluded that the management of each university needs to work on each gap via training, workshop or other capacity building strategies.

6.12 Implications

The world where we are working and living is changing fast to the digital era. So, important aspects like leadership, library, learning, marketing, literacy, media etc. all are also becoming essentially-digital. All these are direct reflections of the development of ICT or simply technology. It has now been recognized as "a powerful tool for teachers and students to use for learning" (Levin et. al, 1999). It is also conceived on the importance of introducing and using various tools in developmentally-appropriate ways. Thus, it has now become a concern of researchers to examine ICT in line with the teaching learning process. This research is part of the initiatives which focuses on higher education especially ICT utilization in universities of Assam.

Thus, its integration in the teaching learning process has its advantages not only in terms of transacting the traditional ways of teaching but making students, teachers and ICT expert to be creative in producing their own friendly modes of delivery. With this possible advantages of ICT researchers are recommended to undertake activities related to the benefits, utilization, impacts, attitudes and challenges of integrating ICT in the curriculum and other student-centred approaches such as constructivism,

collaborative learning, interactive approaches etc. that can provide more evidence full of suggestions for further enhancement .

Universities are also advised to organize training and workshop for their teachers, students and even ICT experts and administrators to enhance their skills, knowledge and attitudes and prepare them to address challenges that they may encounter in due course of time.

Beyond these, the research is supposed to have implications on being a stepping stone for further research on ICT utilization, effectiveness, how to integrate with the curriculum, how to use it in distance mode of learning, practices in synchronous and asynchronous modes, etc. focusing on North East region of India that can address both states, private universities, state universities and central government institutes.

This research also recommends further and intensive studies to identify key areas of capacity development and strategies as one of the ways in introducing significant changes on the university community to augment the current evolution of traditional method of teaching to integrated and ICT-supported modes of the teaching learning activity.

University leaders, administrators and faculty members who have a direct or indirect impact on the policy of universities with regard to ICT have to strive to ensure ergonomics that rests not only within the upper structure of hierarchy, but throughout the functioning system of the institute which still needs to be done based on research findings.

The focal points are on enabling communication and promoting respectful sharing of multiple perspectives instead of perpetuating group think. These of course, have to be synergistically supported by an upper management who believes in empowering people and not merely passing the buck. They should have genuine interest in finding out the various influences underpinning teachers' actions and subsequently provide further resources to support the teachers.

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