

## Exploring the Changes in Teaching Strategies Enabled by Information and Communication Technology

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### Abstract

The Information and Communication Technology (ICT) in now a day plays a very strategic role in the transforming phase of education. Thus government also taking many initiatives and tried to integrate ICT to teaching learning process like the introduction of ICT@School Scheme. But the problem lies in its effective use in classroom. Is teacher being competent enough in use of ICT in classroom, what are the some of the changes teachers are making when they used ICT tools with their students in the classroom and how strategies are changing, what contributes to the change, and what is the change in classroom dynamics and traditional time structures? These were the few issues which addressed in the present study. For this purpose, a qualitative approach with an interview study was adopted for the study. Further, it delimited to Cuttack district of Odisha and ten secondary schools and total thirty teachers, three from each school was selected as its sample by using purposive sampling method. The investigator makes classroom observation, extensive field notes and interview with the respondents for collection of data. The collected data was analyzed by thematic description related to foregoing issues with specific reference to the four key themes: the changing role of the teacher, classroom dynamics, teacher predictions of ICT in school and the concept of the classroom. The findings of the study revealed that the ICT in the classroom influenced the process of learning and in order to integrate ICT effectively, teachers are adopting different teaching strategies. Further it has also been revealed that they need drill for the power shift in the classroom because often students had more knowledge of ICT than them. The findings also revealed that the dynamic of the classroom was also changing due to ICT. Finally, the teachers needed time to learn about the technology and to understand how to integrate ICT into the curriculum.

### Keywords

ICT Integration; Classroom Dynamics; Teacher Perception



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### INTRODUCTION

Human beings are the supreme creation of God. The presence of rational thinking within the individuals makes them different from other creatures of this mysterious world. The creative spark of

human brains has given birth to new innovations and inventions as a result of which the whole world is going under rapid changes. These rapidly changes are mainly due to development of science and technology. Rapid development of science

and technology has its imprints in all walks of life. In this context, education has been also going under the changing processes keeping pace with the requirements of time. This has lead education to face numerous challenges in providing quality education to the mass with insufficient financial support. In order to provide high quality education and training it has become a critical question to be answered by those who need education and expect benefits from it in the most cost-effective way. In the information age, educational systems have attempted to overcome the challenges by developing new approach namely Information and Communication Technology (ICT) for dissemination of information and helping to meet these challenges (Lever-Duffy, McDonald, & Mizell, 2003; USDE, 2000). ICT has been a pivotal in improving the quality of education from the very beginning of the information age. Hence, all the countries of the world want to enhance the quality and effectiveness of the learning processes in schools; and consider ICT as one eminent means of achieving this goal. This role in education includes helping learners in learning and teachers in performing their teaching profession more effectively and efficiently. Rapid developments in ICT have

also led drastic changes in education system by catering to the diversified needs of the learners and enabling the learners to get ready for this shift to information and knowledge society. ICT has been a key for smooth functioning of educational processes in all levels of education. With continuous advancements in educational technology and the increasing availability of technology to both universities and K-12 schools, it is incumbent upon Schools of Teacher Education (STE) to look critically at how technology is integrated into their programmes (Parker, 1997). Integration of ICT in classroom activities, curriculum, management, library and any educational settings has a considerable importance. Integration of ICT is important for the enhancement of quality education and enabling educators to create alternative pathways of learning in the global world. Thus, it has no doubt with the statement that teaching with technology is always better than teaching without technology. Even this statement is supported by number of substantial research work which were done across the globe such as Cox et al. (2003) concluded that teachers' pedagogies had an outsized impact on pupils' attainment, with aspects such as the technologies selected, the ways in

which they were deployed and the extent to which the teacher planned and prepared for the lesson, being significant. In a similar vein, Passey et al. (2004) concluded that, wherever ICT was clearly embedded in classroom activity, there was a positive impact on pupil attainment. Pittard *et al* (2003) noted that evidence from large-scale studies showed that the use of ICT can encourage and motivate pupils and result in a positive effect on attainment amongst those pupils who make relatively high use of ICT in their subject learning, where ICT has become a regular part of the classroom experience, there is evidence of positive impact on learning and pupil performance. Numerous studies have revealed that the visual nature of some technologies, significantly animations, simulations and moving mental imagery, engaged learners and increased their abstract understanding. Therefore, realizing the importance of knowledge and communication technology, educators and policymakers also now providing supreme importance to ICT for the future of education and, in turn, for the country at large. Our Govt. also taking several initiatives in this respect like the introduction of ICT@School Scheme. It is one of the creative evolutions which is

being developed to boost secondary education sector in India by providing opportunities to students to mainly build their capacity on ICT skills and make them learn through computer aided learning process. But here the problem arises regarding the effective use of ICT in classroom. Is teacher being competent enough in use of ICT in classroom, what are the some of the changes teachers are making when they used ICT tools with their students in the classroom and how strategies are changing, what contributes to the change, and what is the change in classroom dynamics and traditional time structures? In order to address the foregoing issues, the investigator go through the review of related literature to the selected problem, looking onto the review of related literature the investigator first categorized it under four heads like: relationship between computer technology and educational change, technology and organization of school, collaborative and constructivist learning environments and the role of the teacher in using ICT in classroom.

In connection to the relationship between computer technology and educational change, it revealed that there including a number of perspectives of the

positive and negative aspects of using computer technology in the teaching and learning process. Kerr (2006) suggests that a large part of the problem with technology and educational change is our stance towards it, what we think it is good for and what it means. All technologies in the past seem to have been introduced into the school system with enormous expectations. With the new wave of interest in ICT, the expectations about how they will affect the teaching and learning process seem just as great (Davis and Tearle, 1999; Lemke and Coughlin, 1998; Yusuf, 2005; Al-Ansari, 2006). Similarly, in connection to the technology and organization of school it has found that not only the use of ICT has an impact on teaching strategies, but also on the organization of classrooms and schools as a whole. This section explored some of the opinions and research on what aspects of school and curriculum organization might change; for instance, the student-teacher relationship and the nature of student learning. In addition; this section illustrated some areas which need to be explored further in order to embark on the task of reconceiving how we think about technology and the organization of schools. These areas included the future purpose of

the school, the curriculum and the classroom (Holloway & Valentine, 2013; Becta, 2015; Facer *et al.*, 2016). The next section reviews the literature on collaborative and constructivist learning environments. With respect to this it revealed that with the introduction of ICT, learners might take a more active role in their learning, as the teacher alone will no longer direct the control and flow of information. Further constructivist learning environments put an enormous amount of pressure on the teacher in terms of being in tune with individual student progress and being able to assess individually constructed learning (Wilson, 2015; Collis & Jung, 2016;). The last section of the review deals with the role of the teacher in light of the possible change resulting from them using more ICT into the classroom. In this connection it was explored that some of the challenges teachers may face as they endeavor to implement ICT into their classrooms so there is a need of training to teachers to learn how to use ICT tools (Keengwe, J, 2007; Fatima, S, 2013; Natia, James & Wassan, 2015).

So although the above foregoing review helped in making a concise idea on integration of ICT in teaching strategies and how far it makes improvement in teaching

learning process but my rationale behind this study was to document some of the challenges teachers face in trying to integrate a new and powerful resource in the teaching and learning process. It is important to note that the essence of change outlined in this research was in the classroom. This study did not address the shifts and change seen with ICT tools, nor the potential change in relationships between the teacher and student. The research focused with specific reference to the central query i.e. what are the some of the changes teachers are making when they used ICT tools with their students in the classroom and how strategies are changing, what contributes to the change, and what is the change in classroom dynamics and traditional time structures?

### **OBJECTIVES OF THE STUDY**

Keeping in view the requirement, the study focused on the specific objectives as mentioned below:

1. To study the nature of the change experienced by secondary school teachers when they started to use ICT in the classroom on a regular basis.
2. To study the nature of the interactions between the teacher and student in a classroom where the teacher uses ICT for his/her subject specialty, and are the interactions different from before the teacher was using ICT.
3. To study the teacher's understanding of ICT and his/her perceptions of the implications of using ICT in the classroom.
4. To explore the changes in traditional time structures, with the introduction of ICT in the classroom.

### **METHODS**

#### **Design**

Keeping in view the above objectives the investigator conducted an interview study by selecting qualitative approach for the study. However, the investigator selected this approach in order to capture the enthusiasm, concerns, perspectives and opinions of the teachers in their own words and in the context of their own classrooms. This study focused primarily on secondary school teachers, on their recollections as to how they conduct their classes using ICT, and which strategies, if any, they have changed or adapted from their previous teaching practices.

#### **Population and Sample**

The target population for the present study was all the secondary school

teachers. Further, the investigator has purposively selected ten secondary schools and total thirty respondents, three from each school as its sample.

### **Tools Used**

In the present study the following tools have been used to obtain information from the respondents. All the tools have been developed by the investigator.

#### *Classroom observation schedule*

A classroom observation schedule was prepared by the investigator with the intention to observe ICT integration in teaching learning process and to note student-teacher interactions. Moreover, the underlying reason behind this tool was to make a triangulation and cross-validation of data with the interview data.

#### *Semi-structure interview schedule for teachers*

A semi-structure interview schedule also prepared by the investigator to make one-to-one interviews with teachers, which allowed them to talk about their own experiences. This was also made with key intention to capture as rich a description as possible of the classroom dynamics and its interactions.

#### *Field notes*

The investigator also prepared extensive field notes during the time spent in the four schools in addition to tape recording of interviews and class observations. The field notes were made with specific reference to two key intensions: impressions of each school's philosophy on integrating technology into the curriculum, and the school's achievements in "formal" training in ICT for the teachers.

### **ANALYSIS AND INTERPRETATION**

In data analysis and interpretation section the investigator tried to work the data into a broad level framework consisting of four key concepts: interactions, teachers' perceptions, time structures and teaching strategies, as these concepts related directly to original research objectives. Then the investigator explored the relationship between the concepts, looking for commonalties. What emerged were patterns of data that fell into the four following themes: the changing role of the teacher, classroom dynamics, teacher predictions of ICT in school, the concept of the classroom. These four themes became made the final

categories for data and the framework from which the findings were drawn.

### **The Changing Role of the Teacher**

The information obtained from the teachers with respect to first segment it was revealed that when teachers used ICT in the classroom their role shifted dramatically. They reported that ICT in the classroom influenced the process of learning and, as a result, their approach to teaching changed. When they used ICT with their students they engaged in different styles of delivery with less planning and additional spontaneity. With the use of ICT learning became more process oriented and more exploratory. Teachers said they put more emphasis on how students learned as well as what they learned. Teachers labelled themselves not as teachers, but as facilitators and coaches. These labels were not new to many teachers but as the attention shifted towards seeking information from ICT, teachers identified more readily with a role where they were guiding and facilitating a process. The problem, however, was that some teachers felt as though they were “learning alongside the learners” and that often the students knew more about the technology than they did. Further, real

change for teachers occurred in the approach to management, lesson plans and learning outcomes. In connection to learning outcomes they discussed the importance of a learning outcomes and how they needed a thorough understanding of the various ways in which a student could meet an outcome. The teachers also realized that there is not just one way of doing something through the lessons they design. It is now turned over to a student’s understanding of an outcome and how s/he chooses to demonstrate it. But in addition to teachers who are very traditional in their curriculum delivery face a much steeper learning curve. Thus teachers in this study said they needed coaching on the integration of ICT into the curriculum as well as how to expand the curriculum using ICT. Overall, teachers reported that bringing ICT into the classroom expanded and extended learning and made learning more alive and relevant. They also commented on the increased collaboration among students where they acquired a greater responsibility for their own learning which was viewed as a positive event.

### **Classroom Dynamics**

The findings related to classroom dynamics revealed that as a part of a teacher's different style of delivery in the classroom, his/her physical presence shifted from being at the front of the class most of the time, to circulating among students. As a result, teachers worked with students on a more informal and individual basis, kneeling next to work stations and helping students work through problems. They said things like, "I am not really a teacher anymore, rather more of a coach, or guide, or facilitator." Further, it has also found that while teachers experienced a shift away from students, they observed more student-student interaction and more emphasis on peer teaching. It has also reported by teachers that these things lead to more collaboration and even student-teacher interaction was geared more towards teachers helping students interpret an outcome and discovering ways to meet that outcome. Thus it revealed that the emphasis was clearly on a more collaborative environment where teachers gave up an element of control and students engaged in a more mutual responsibility for learning. It has also been suggested by the teachers that the advantages towards this style are mirrored in student's workplace where we they were encouraged to work in teams and to negotiate problems and solutions. This study also reported that in a classroom where the teacher used ICT the move was towards increased interaction in the class with definite emphasis on teachers using the technology to open the classroom up and let students explore and discover. Overall, the findings related to classroom dynamics revealed that there found a nature of change in student-teacher interactions which was viewed positively. Finally, the study also revealed that time for teachers to learn the technology themselves before using it with students because this was the most important component to ensuring positive change when introducing the technology and to promoting positive interaction between teacher and student. In response to the original research questions on the nature of the interactions and how they differ from what previously occurred, it can be concluded that the emphasis on a more collaborative environment may be leading teachers and schools towards the development of a new educational paradigm that accommodates the new technologies. These approaches, largely initiated by Dewey and Piaget also which



espouse that students construct their own understandings.

### **Teacher Predictions of ICT in School**

A general consensus derived from the interviews was that a teacher's understanding of ICT was that its use in the classroom has expanded and broadened their teaching skills. Interestingly, almost all teachers in this study recognized the alluring nature of the ICT and most were trying and succeeding to integrate it into their classroom work. However, it is fair to say that most were still at the early stages of using the technology. Most were enthusiastic but slightly wary of how to properly design and deliver material that is useful and relevant to students. Further teachers suggested that when they used ICT it broadened and expanded their teaching by giving them more curriculum ideas. Given this, it seems fair to say that the success of ICT in the classroom will be greatly influenced by teacher training. So the response of the teachers' anticipation seemed both positive and negative. Somewhere teachers viewed ICT as positive as another resource that offered an additional divergent activity in the classroom that helped liberate them from their defined role, but in some case they

also suggested its negative impact like it also created more work while they were redefining their roles and processes. Further, although teachers interviewed all seem to agree that there will be more extensive and more effective utilization of ICT in the future, but still they also reported that they still face formidable challenges in integrating ICT. Teachers were both enthusiastic about having a new resource to access both professionally and for their students. They enjoyed the increased communication with peers and with pen pals for the students. But however, for many of them, the newness and novelty of the ICT was still apparent. What appeared more difficult to predict was how ICT, other than being new and exciting, would affect learning. New skills needed to be taught about finding, reading, analyzing, discarding and continually assessing information. Before teachers can address these skills, they need to better understand what they are and how they are different from previous skills. In connection to training most of the teacher suggested that out of formal training in ICT, they also need training and support through staff development programme for preparation and support in integrating ICT into their teaching. Further

they also suggested if ICT is to be more pervasively integrated, then teacher training needs to be more defined and thorough. They all should learn terms of teaching new skills and need to learn how to assimilate, read and write using new ICT tools. In summary, the implications are seems to be toward a more positive change in the overall approach to schooling. The teachers perceived ICT to be a positive tool in the classroom and a tool that will become more pervasive as time goes on. However, teachers raised concerns also such as: about an increase in workload, the fundamental effects of having so much divergent activity going on in the classroom, the risks involved with students having superior ICT knowledge and the need to learn new academic skills.

### **The Concept of the Classroom**

The concept of the classroom, however, appeared to be undergoing significant change. The results of this study showed that traditional time structures are still in use in the way a school day is divided. There was still a school day, divided into periods, which included lunch, and a daily breaks. Students had a beginning and an end to their school day. All teachers agreed, however, that

classrooms were revolving doors with students coming and going and that boundaries between classroom and disciplines were diminishing. In response to the original research question on whether traditional time structures change, it has revealed that ICT had contributed to significant changes within the classroom. Further data collected through interview confirmed that a restructured classroom in terms of space is becoming more and more usual and the role of teacher is moving away from teacher-centered activities. When teachers used ICT, their role shifted to the facilitator, rather than deliverer of knowledge. The interactions between teacher and student became more fluid. But the challenges reported by the teachers to this scenario was to make themselves accommodate completely to this shifted role. Further, in the same vein in respect to the movement and fluidity of the classroom some suggested that their classroom as being 'nomadic' as teachers and students moved from one physical arena to another during a class period. Teachers reported that the classroom as a physical space may cease to exist as we know it. A classroom with ICT was where students learned without structured time periods or designated physical spaces.

Teachers agreed, however, that learning in schools would always take place in a group, regardless of the physical location. Thus a classroom may need to be redefined and specific lesson plans that decide how outcomes are to be met may be replaced by more broadly defined goals that span a week, month, or entire school term. In summary, it can be concluded that teachers reported stability in time structures of a school day, but a shift in the concept of a classroom. There was less definition between classes and less structure within a class. Teachers called for a re-definition of the term 'classroom' as for them, students, and where students learn, defined the class rather than a specific physical space. However, classrooms are fundamentally teacher-centered environments. Teachers are losing privacy in their classrooms and the classroom is no longer their domain in which to retreat and recharge.

#### **MAJOR FINDINGS OF THE STUDY**

1. The major findings of the study in connection to the changing role of the teacher revealed that almost all teachers reported that bringing ICT into the classroom expanded and extended learning and made learning more alive and relevant. It increased their collaboration among students where they acquired a greater responsibility for their own learning which was viewed as a positive event.
2. The major findings of the study in connection to the classroom dynamics revealed that overall, the nature of change in student-teacher interactions was viewed positively. Teachers seemed to enjoy collaborating with students and teaching them to explore, question and plot their own work course.
3. It has also been revealed that time for teachers to learn the technology themselves before using it with students was the most important component to ensuring positive change when introducing the technology and to promoting positive interaction between teacher and student.
4. In connection to teacher prediction of ICT in school revealed that the teachers perceived ICT to be a positive tool in the classroom and a tool that will become more pervasive as time goes on. Teachers raised concerns, however, about an increase in workload, the fundamental effects of

having so much divergent activity going on in the classroom, the risks involved with students having superior ICT knowledge and the need to learn new academic skills.

5. Finally, the major findings of the study in connection to the concept of the classroom revealed that there is still stability in time structure in school so they called for a re-definition of the concept.

### **Recommendations**

The recommendations based on the results of the study are as follows:

1. For better effective teaching through ICT preservice teacher education programs should provide ICT training for prospective teachers that satisfy their specific needs in the schools at which they work. Therefore, cooperation between schools and NCTE is needed in designing ICT training curriculum to meet teachers' specific technology needs.
2. Provision should be made to equip all classrooms of secondary schools with computers and other peripherals. So that the teachers can use them without any time restriction or taking the students to computer lab for

transaction of subject specific contents.

3. School should provide mandatory basic ICT training programme to all newly appointed teachers.
4. Skill specific training programme should be undertaken after basic ICT training programme for all teachers.
5. As ICT is least used in co-curricular areas. Therefore, schools should give due weight age on the in-service teacher training programme of teachers on co-curricular areas.
6. Schools should regularly monitor the ICT training needs of their staff.
7. Other than basic ICT applications (word processing) teachers need to be aware of other appropriate software (tutorials, simulations and web applications) and use them to enrich their courses in an integrated manner.
8. Teachers should be fully exploit the potentiality of ICT to facilitate the development of student's complex life skills such as communication, problem-solving, collaborative, presentation and referencing skill.
9. Government should allocate more budgets under ICT development head. So that adequate equipment and resources can be purchased.

## DISCUSSION AND CONCLUSION

Based on the findings, the nature of change was in the approach to delivery and roles. As a teacher's role changed from a strict instructor to being more of a coach and facilitator, so too did the approach to the delivery of content. Teachers reported an increased emphasis on outcomes and in recognizing that there are many different ways to approach an outcome. ICT brought more facts, opinions and perspectives into the classroom, and in their approach to teaching, teachers needed to account for a student's different style of learning and assimilating and assessing facts. Teachers said their teaching had broadened as they were no longer the main source of information in the class. Instead, their role had shifted to organizing, directing and helping students manage the information and the tasks. The nature of change was also illustrated by teachers having to give up an element of control and in many cases team alongside the students'. In relation to classroom dynamics teachers reported that the nature of the interactions was more informal. As the physical presence of the teacher has shifted from being at the front of the class to circulating among students, teachers were often found kneeling next to

students working at a computer terminal. Teachers chose to label themselves as guides, coaches and facilitators in order to illustrate the change in the relationship between themselves and their students. Teachers said they spent little time presenting concepts and facts and more time interpreting outcomes with students and helping them chart their own learning course. Finally, teachers reported on an increase in student-student interactions and a lot more emphasis on peer coaching and collaboration. Further, in relation to teacher's understanding of the ICT and its use in the classroom has afforded teachers the ability to expand and broaden their teaching from two perspectives. The first was to use ICT as a resource in the classroom and the second was to use ICT as a professional tool themselves to communicate with other teachers and to source new lesson plans and curriculum ideas. When teachers used ICT as a professional tool not only did they become more fluent in using the technology but also they could find resources for their own subject matter as well as for their students. A teacher's perception of the new ICT was greatly influenced by the training received on how to use the technology. As part of the defining criteria for selection, all

teachers in this study had received formal technology training and support from peers and the Board on learning how to integrate the technology into the curriculum. However, teachers recognized the need for further definition and research into valid ways ICT can be integrated into the curriculum. Many of the teachers were still at the “see how it goes” stage and were still experimenting with various techniques. It is fair to say that teachers needed to have a clear focus on the learning outcomes and then either learn themselves, or be shown by others, how ICT can facilitate the achievement of the outcome. This process needs the attention of sound and effective training that can be transferred to classroom use. In the same vein in relation to concept of classroom, it has revealed that traditional time structures in terms of the division of a school day did not change with the introduction of ICT. However, the concept of the classroom may be re-inventing itself. The teachers defined a classroom as their students, rather than a physical place where learning occurred. A classroom was made up of students and a teacher and this unit could access a number of resources in a number of locations during any given school period. The physical aspect of a

classroom had thus become secondary. As was previously discussed, with the change in classroom structure, some teachers reported a difficulty in giving up control. There also seemed to be less emphasis on rules and routine, which typically govern a classroom environment. A teacher may become used to routines and if they change, classroom balance is upset. For example, a routine may spell out the procedures for accomplishing a task in the classroom. With many students working with a variety of resources, time management had also become a bigger issue in terms of teachers being able to assist students to identify, interpret and achieve learning outcomes. Thus a classroom may need to be redefined and specific lesson plans that decide how outcomes are to be met may be replaced by more broadly defined goals.

So towards the end it can undoubtedly said that the ICT plays a very strategic role everywhere. In fact, we most often take their importance for granted in everyday life. Thus it is quite vital for teachers to learn more about these technologies and the implications for further use in education. In addition, we should continue to explore the ways in which teachers use ICT to enhance learning. This study

suggests that as ICT proliferates into the school system, the role of the teacher will continue to change. The change will include two components: adapting teaching strategies and the approach to achieving learning outcomes, and a change in student-teacher interactions. In addition, the results from this study also suggested that the notion of the classroom be redefined. Out of it this study revealed certain issues and perspectives on how teaching strategies change when teachers use ICT in the classroom, the learning potential of ICT for both teachers and students is far from being fully realized. The contribution ICT can make to the teaching and learning process in schools needs to be better understood and documented in order for teachers to continue to make practical and meaningful uses of the technology. For the purpose of this study, ICT was defined as the application and use of modern communications and computer technologies to create, manage and use information sent and received through computer networks. ICT in the classroom included technologies that connect the classroom to the outside in order to explore how teachers are reacting to the changes, and not to document whether or

not these new technologies enhance learning. There is a definite need for further research in exploring and identifying teaching strategies employed in classrooms where ICT is used as a part of the teaching and learning process. Further, schools can also continue to explore the potential of ICT and work with other researchers to examine the components of change needed in the school system for future applications of ICT.

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