CHAPTER 1

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CHAPTER 1
INTRODUCTION TO THE RESEARCH

1.0 Introduction

The 21st century heralds a significant change in society. This change is the permeation of information and communication technology (ICT) into all walks of life, business, administration, government, education…(Stevenson, 1997). The rapid proliferation of information and communication technologies (ICT) has significantly changed the educational landscape globally. ICT is developing at a rapid rate and one of the characteristics of ICT is its dynamism. It is difficult to set limits to what ICT can achieve as it is a constantly shifting frontier.

1.1 ICT in Education

Enhancing educational quality is a constant process and is top priority. Education systems work to prepare the next generation for a successful future in a changing world, the knowledge economy of 21st century. Today, it is necessary to help teachers who in turn help students develop the intellectual skills they need for a higher order of thinking and to assist them to realize their abilities and potential and this is possible only through the medium of ICT. It is now impossible to imagine future learning environments that are not supported, in one way or another, by ICT.

Traditional teaching and learning paradigms have been shaken by the impact of ICT on educational practices. One of the greatest challenges which needs to be overcome on our way to the 21st century is to enable teachers and students to achieve competency and mastery in the use of technology. There is inundation of information because of developments in technology, leading to profound effects on education. Technology and the use of computers within or outside the classroom is not to be viewed as a fad or a cure-all. As educational institutions move towards the mainstream use of ICT in teaching and learning there appear to be some critical steps and vital ingredients needed for the successful infusion of ICT into educational environments. Although standalone computers have been in most educational institutions for more than two decades now,
teachers continue to grapple with how to use ICT to enhance teaching and learning environments.

There has been a growing recognition that technology used in the absence of a sound theoretical framework or pedagogy is generally not very effective in reaching programme goals. Laurillard (2002); Mishra and Koehler (2006) and Unwin (2007), for example, have cautioned against the use of ICTs without a conceptual framework or without a clear understanding of why and how the ICT will contribute to students’ learning. These insights have led some educationists to realise that pedagogically sound integration of ICTs in teaching requires more than technical support; it also needs professional upgradation for teachers to use ICTs in their teaching and learning. It is already predictable that the use of ICT in education is enriching in many ways. Yet, there are voices arguing that this is time consuming, costly to implement, and with benefits that remain unclear or dubious.

The need of implementing the use of new technologies in educational process depends on many factors, such as:
• Our overall understanding about quality teaching and learning, educational goals and values;
• The learning objectives we target;
• Our motivation and opportunities;
• The methods and teaching style;
• The social context and personal issues.

The decision on when and how we integrate the new technologies in our teaching process is mediated by the particular configuration of the above mentioned factors.

Yet, as the UNESCO World Educational Report (1998) notes, “the new technologies challenge traditional conceptions of both teaching and learning, and, by reconfiguring how teachers and learners gain access to knowledge, have the potential to transform teaching and learning processes.” ICTs provide an array of powerful tools that may induce the transformation of the present isolated, teacher-centered and text-bound classrooms into rich, student focused, interactive knowledge environments.
ICT has the potential to change the shape of the classroom; change the relationship between teacher and learner; offer new tools to support new ways of teaching and learning; open up access to knowledge across distances through developments in bandwidth. Oblinger and Rush (1997, p. 51) assert that technology allows a greater participatory and collaborative society.

However, within higher education, the idea of active engagement of learners in rich learning tasks and the active, social construction of knowledge and acquisition of skills are still rare. There is a need to develop rich pedagogical uses of ICT that involves social, collaborative construction of knowledge. ICT offers more flexible and wider access to learning than was ever possible before. The profound shifts undergone in the field of education due to ICT requires a pedagogical shift. It is strongly believed that our teachers need to be trained in pedagogy based approaches to technology.

They need to have hands-on experiences with technological tools that advance their own studies and educational and professional goals, as well as develop skills to be able to design appropriate learning activities for their students. In today’s standards-driven milieu, we frequently look to the standards for teachers established by national professional organizations such as the National Educational Technology Standards (NETS) for Teachers created by the International Society for Technology in Education (ISTE, 2000). These categories provide a framework for linking performance indicators within the Profiles for Technology Literate Students to the standards. Teachers can use these standards and profiles as guidelines for planning technology-based activities in which students achieve success in learning, communication, and life skills. These standards address the following six areas:

1. Teachers demonstrate a sound understanding of technology operations and concepts.
2. Teachers plan and design effective learning environments and experiences supported by technology.
3. Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning.
4. Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.
5. Teachers use technology to enhance their productivity and professional practice.

6. Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PK-12 schools and apply those principles in practice.

The challenge is to use ICT in teaching learning judiciously and effectively and if this is to happen then the change has to begin from the roots of education i.e., the teacher education system.

1.1.1 ICT in Teacher Education

Teacher education has been slow to break with the traditional ‘mould’. Notwithstanding the good points relating to the lecture mode, it is clear that teacher education institutes and teacher educators need to develop policy with respect to how ICT can be used to improve teaching and learning and to widen access to learning in a lifelong learning framework. Designing and implementing successful ICT-enabled teacher education programs is the key to fundamental, wide ranging educational reforms. Teacher education institutions may either assume a leadership role in the transformation of education or be left behind in the swirl of rapid technological change.

Preparing teachers to use technology effectively in the classroom is a central issue the field of education faces in the 21st century (Bolick, Berson, Coutts, & Heinecke, 2003). Preservice teachers must be proficient in using technology for their productivity and also prepared to integrate technology effectively into instruction. Often, however, the integration of technology into preservice teacher education programs is the exception rather than the norm (Cantu, 2000). As a result, preservice teachers often graduate with limited knowledge of how to integrate technology effectively into the classroom curriculum (Cantu, 2000).

Teacher education institutions and programs must provide the leadership for pre and in-service teachers and model new pedagogies and tools for teaching learning. Preservice students should learn the uses of ICT because they are integrated into their course work, both theory and practical experiences. They should see their professors model innovative uses of ICT in their teaching, they should use it in their own learning, and they should explore creative uses of ICT in their teaching. Teacher educators should expose pre-service teachers to regular and pervasive modeling of ICT. Unless and until teacher
educators do not model effective use of ICT in their own classes it will not be possible to prepare a new generation of teachers who effectively use ICT in their transaction of teaching learning. It is the responsibility of teacher preparation programs to prepare candidates with the latest technological tools of the profession. Helping teacher candidates become proficient in using technology in a constructivist way in all of their academic endeavors should be woven throughout the teacher education programs.

1.1.2 Effective ICT Integration

Technology integration should not be done just on occasion, nor is it meant to be hard work that can be easily forgotten. Teacher candidates are expected not to use technology for the sake of simply using it, but rather to engage in critical analysis and reflection to identify which modes of technology most complement their teaching and student learning outcomes. Through analysis and reflection we can learn how technology can be used effectively. Multiple perspectives, realistic and authentic tasks, activities and environments, self-analysis and reflection, experiential learning, and collaborative and cooperative learning are some of the themes associated with constructivist teaching and learning that provide a direction of how technology can be incorporated in teacher education programs (Murphy, 1997).

Providing opportunities for constructivist teaching and learning through authentic, real-life tasks and situations, experiential learning with and through technology is what needs to be encouraged. What best describes this approach is often labeled as constructivist learning, which was summarized by Grace (1999) as one that is “continual, effortless, independent of reward and punishment, never forgotten, inhibited by testing, and dependent on the growth of the learner.” Smith (as quoted in Grace, 1999) claimed that, on the other hand, learning is often viewed as “occasional, hard work, dependent on reward and punishment, easily forgotten, ensured by testing and dependent on memorization” (p. 50).

1.1.3 Constructivism and ICT

Constructivism focuses on knowledge construction. It is a belief that one constructs knowledge from ones experiences, mental structures, and beliefs that are used to interpret
objects and events. Constructivists advocated a learning model with learners as the centre and the teacher as the guide. Constructivism describes a learner-centered environment where knowledge and the making of knowledge is interactive, inductive, and collaborative, where multiple perspectives are represented, and where questions are valued. Constructivist learning environments are learner-centered, knowledge-centered, assessment-centered and community-centered. The processes of learning, teaching, and assessment should be designed to support such learning environments.

The use of ICT must support constructivist learning environments by supporting the processes of learning, teaching, and assessment. Technology can play a significant role in applying constructivist approach in today’s classroom. Technology makes possible the instant exchange of information between classroom as well as individual students; it allows instant access to databases and online information services, and provides multimedia resources such as interactive audio and video. Technology also allows presenting educational materials across media formats like: print, software like power-point, still and motion video, animations, computer graphics.

1.2 Need of the Research

With the advent of ICT came new hopes in the potential of the information Superhighway. However, little seems to have changed. Technology is increasingly accessible, intuitive, reliable, and diverse in its application, and yet, has fallen short in delivering similar gains in education. As Alexander (1995) states, “It seems surprisingly obvious that there is no reason to expect the quality of learning to improve if we simply transfer a learning experience from one medium to another”. Reynolds (2001) presents an appropriate summary of the situation: “… we are trapped in a cycle of classic innovation failure – a low quality implementation of a not very powerful new technology of practice produces poor or no improvement in outcomes, which in turn produces low commitment to the innovation and a reluctance to further implement more advanced stages of the innovation (like the new communities of learning now possible with ICT) that are more likely to generate the improvement in outcomes that would produce the commitment to ICT utilization.”
The models and programs that have been developed are mostly related to either school teaching/school teachers or pre-service training programs/teacher trainees. There is no program/model at present which specifically targets using ICT in the teacher education program. Many programs are limited to computer literacy and do not train teachers in the instructional use of ICT. By focusing on basic ICT skills, training fails to prepare teachers to integrate ICT in their pedagogy.

Teacher educators often have little experience of using ICT to deliver the curriculum. As a result, teacher trainees lack practical models of ICT integration. Most of the teachers/teacher educators perceive the use of a PowerPoint presentation as the be-all and end-all of ICT integration which in turn completely negates all the multiple benefits that appropriate use of ICT can generate for a learner. The presence of ICT in the curriculum is still far from being satisfactory and demands a double effort from all educational authorities: firstly the integration of ICT into the curriculum not only as a cross-curricular subject, but also as central to teaching and learning processes; secondly an effort to provide teacher educators and consequently teachers with specific training programs to prepare them to face the harnesses of change and to familiarize them with the new teaching and learning scenarios, facilitating, at the same time a life-long and life wide type of learning.

Teacher training is understood as essential and key for the development of the knowledge society and in a more restricted area to reach success in the acceptance and implementation of ICT in the teaching. Despite the willingness of many teachers to defy difficulties and integrate ICT into their teaching procedures, still the use and deployment of ICT in teaching is far from being a reality. Only with a correct acquisition by teachers of both pedagogical and technological skill and proper competency will we be able to face the challenge that living in the society of knowledge supposes. Ideal integration of ICT into the teaching learning process requires access to ICT in the classroom, the motivation to use it but most of all a practical model of ICT integration.
1.3 Importance of the Research

The present research is an effort to fill the lacuna created by the absence of any specific model for integration of ICT into the teaching of the theory courses in the B.Ed. curriculum. It is an endeavour to promote change from the topmost echelons of teacher training i.e., the teacher educators by integrating ICT into the teaching learning process. Successful implementation of the information and communication technology ICT based model of curriculum transaction for teacher educators will help in improving the quality of teacher training being imparted in teacher training institutions. The concepts of constructivism, active learning, collaborative learning, self learning, continuous assessments, reflective practice and justified use of technology on which the model is based will find expression in day to day teaching thus putting ideal theory into model practice.

1.3.1 Development of ICT Based Model of Curriculum Transaction

The key to success lies in finding the appropriate points for integrating technology with constructivism into pedagogical practice, so that it supports the deeper, more reflective self-directed activity. In a technology rich environment one must remember that the educational focus is on learning and instruction goals instead of the technology itself, because technology are merely tools or vehicles for delivering instruction. There is a strong link between effective use of modern technology and the theory of constructivism which is what has been explored in the current research to develop a constructivism integrated ICT based model of curriculum transaction. A brief overview of the principles of constructivism which have been used by the researcher in developing the ICT based model of curriculum transaction is provided in Table 1.
Table 1. Comparison of Pedagogies

<table>
<thead>
<tr>
<th>Traditional Classroom</th>
<th>Constructivist Classroom</th>
<th>ICT based model classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge is seen as inert.</td>
<td>Knowledge is seen as dynamic, ever changing with our experiences.</td>
<td>Justified use of ICT to facilitate knowledge construction</td>
</tr>
<tr>
<td>Strict adherence to fixed curriculum is highly valued.</td>
<td>Pursuit of student questions and interests is valued.</td>
<td>Student centered learning</td>
</tr>
<tr>
<td>Learning is based on repetition.</td>
<td>Learning is interactive, building on what the student already knows.</td>
<td>Active learning</td>
</tr>
<tr>
<td>Students work primarily alone.</td>
<td>Students work primarily in groups.</td>
<td>Collaborative learning using ICT</td>
</tr>
<tr>
<td>Teachers disseminate information to students;</td>
<td>Teacher's role is interactive, rooted in negotiation. Teachers have a dialogue with students, helping students construct their own knowledge.</td>
<td>Teacher as a facilitator</td>
</tr>
<tr>
<td>Assessment is through testing, correct answers.</td>
<td>Assessment includes student works, observations, and points of view, as well as tests. Process is as important as product.</td>
<td>Continuous assessment using ICT</td>
</tr>
<tr>
<td>Students are taught Expert Evaluation</td>
<td>The students learn HOW TO LEARN. Self evaluation</td>
<td>Reflective practice by students Reflective practice by teachers</td>
</tr>
</tbody>
</table>

The present research is a small contribution in the large pedagogical change that is required to keep teacher education abreast with the rapid changes and growth in education due to ICT. On this background a dire need has been felt for a practical and
usable model of ICT based curriculum transaction which incorporates the strong pedagogical theory of constructivism. Thus the researcher after extensive review and research has developed the ICT based model of curriculum transaction which uses the principles of constructivism as its theoretical bases and a study of the effectiveness of this model is the basis of this research.

1.4 Title of the Research

Study of the effectiveness of an Information and Communication Technology (ICT) based model of curriculum transaction for teacher educators.

1.5 Statement of Aim

To research current practices of ICT based teaching in colleges of education and to design, develop and test the effectiveness of an Information and Communication Technology (ICT) based model of curriculum transaction for teacher educators.

1.6 Operational Definitions

1. Study of Effectiveness

a) The difference in teacher trainee’s achievement in content test after curriculum transaction through ICT based model on experimental group and traditional method on control group.

b) Teacher trainee’s feedback on the criteria of effectiveness given: Preparation, Use of Teaching Aid / ICT Tool, Management of Session / Activities, Teacher Educators Role, Teacher trainees Role, Collaborative Learning, Assessments and Overall Impression.

c) Peer teacher educator’s feedback on the criteria of effectiveness given: Preparation, Use of Teaching Aid / ICT Tool, Management of Session / Activities, Teacher Educators Role, Teacher Trainees Role, Collaborative Learning, Assessments and Overall Impression.

d) Study the usability through usability quality components-Understandability, Learn ability, Objective Achievement, Operability, User Satisfaction and Applicability.
2. **Information and Communication Technology Based Model - ICT Based Model**

   The ICT based model developed by the researcher integrating the theory of constructivism using the principles of student centered and active learning, collaborative learning, self learning, continuous assessments, reflective practice and justified use of technology through the medium of ICT in the curriculum transaction process.

3. **Curriculum Transaction**

   An inclusive phrase to mean the organization of the teaching, learning, assessment, evaluation and reflection of the sessions for the theory component of the B.Ed. course of University of Pune.

4. **Teacher Educators**

   Teachers teaching in the B.Ed. course.

1.7 **Objectives of the Research**

1. To analyze the ICT based curriculum transaction practices by teacher educators.
2. To develop an ICT based model of curriculum transaction integrating the theory of constructivism, using the principles of student centered and active learning, collaborative learning, self learning, continuous assessments, reflective practice and justified use of technology through the medium of ICT in the curriculum transaction process.
3. To determine the effect of ICT based model of curriculum transaction on teacher trainee’s achievement.
4. To examine the effectiveness of ICT based model of curriculum transaction through teacher trainee’s feedback.
5. To examine the effectiveness of ICT based model of curriculum transaction through peer teacher educator feedback.
6. To find the usability of the ICT based model of curriculum transaction for teacher educators.
1.8 Assumptions

- It is assumed that the teacher trainees have a basic level of ICT competency i.e., able to operate computers and internet as it is a compulsory theory paper of 40 marks weightage and practical work with 60 marks weightage in the B.Ed. syllabus of University of Pune.

1.9 Research Questions

For Objective 1

- What are the current ICT based curriculum transaction practices by teacher educators?

For Objective 7

- What would be the response of the user group of teacher educators about the usability of the ICT based model of curriculum transaction?
- How much is the total usability of the ICT based model of curriculum transaction for teacher educators?

1.10 Hypothesis

Research Hypothesis for Objective 2, 3, 4 and 5.

H₁ - The ICT based model of curriculum transaction will produce better teacher trainee achievement in content test than the traditional method.

H₂ - The ICT based model of curriculum transaction will be more effective than the traditional method through teacher trainee feedback.

H₃ – The ICT based model of curriculum transaction will be more effective than the traditional method through peer teacher educator feedback.

Null hypothesis for Objective 2, 3, 4 and 5.

H₀₁ - There is no difference in teacher trainee’s achievement in content test between the ICT based model of curriculum transaction and traditional method.

H₀₂ - There is no difference in effectiveness between the ICT based model of curriculum transaction and traditional method through teacher trainee feedback.
**H₀₃** - There is no difference in effectiveness between ICT based model of curriculum transaction and traditional method through peer teacher educator feedback.

**1.11 Scope of Research**

- The study covers teacher educators teaching in B.Ed. in colleges of education, University of Pune.
- The study extends to teacher trainees pursuing B.Ed. in colleges of education, University of Pune.
- The study relates to the curriculum transaction of theory component of B.Ed. course of University of Pune.
- The ICT based model developed by the researcher integrating the theory of constructivism using the principles of student centered and active learning, collaborative learning, self learning, continuous assessments, reflective practice and justified use of technology through the medium of ICT in the curriculum transaction process is a guideline and framework for curriculum transaction of theory component of the B.Ed. course by teacher educators.

**1.12 Limitations of the Research**

- The impact of the teacher trainee’s I.Q., interest in learning, motivation levels for the session, and background knowledge on teacher trainee’s achievement in content test and responses in teacher trainee feedback has not been considered.
- The tools used for data collection are not standardized tools but have been developed by the researcher.

**1.13 Delimitations of the Research**

- The ICT based model of curriculum transaction is designed in English language only.
- The present research is delimited to implementing the ICT based model of curriculum transaction by researcher in theory part of curriculum transaction in B.Ed. course only.
• The present research is delimited to implementing the ICT based model by researcher for curriculum transaction of three topics in three theory papers of B.Ed. curriculum of University of Pune as follows:

### Table 2. Sessions of ICT Based Model

<table>
<thead>
<tr>
<th>Theory Paper</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational Evaluation</td>
<td>Coefficient of Correlation</td>
</tr>
<tr>
<td>Educational Psychology</td>
<td>Memory training techniques</td>
</tr>
<tr>
<td>English Education</td>
<td>Techniques of teaching English - group work, pair work</td>
</tr>
</tbody>
</table>

• The difference in teacher trainee’s achievement of experimental group and control group is reflected by scores in content test only.

• The criteria of effectiveness studied are Preparation, Use of Teaching Aid / ICT Tool, Management of Session / Activities, Teacher Educators Role, Teacher trainees Role, Collaborative Learning, Assessments and Overall Impression only.

• The usability quality components studied are understandability; learn ability, objective achievement, operability, user satisfaction and applicability only.

### 1.14 Theoretical Base of the Study

The development of the ICT based model of curriculum transaction is based on the theory of constructivism. The principles of student centered and active learning, collaborative learning, continuous assessments, reflective practice support the theory of constructivism. Teacher as a facilitator and justified use of technology are principles which are necessary for effective use of ICT. The theoretical background of the theory of constructivism and all the principles used in the development of the ICT based model of curriculum transaction are summarized in the Table 3.
Table 3. Theoretical Bases of the Study

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Theory</th>
<th>Theorist</th>
<th>Use in Present Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Constructivism</td>
<td>Jean Piaget (1930)</td>
<td>ICT based Model</td>
</tr>
<tr>
<td>4.</td>
<td>Student centered and Active learning</td>
<td>Bonwell and Eison (1991)</td>
<td>ICT based Model</td>
</tr>
<tr>
<td>5.</td>
<td>Collaborative learning</td>
<td>David and Roger Johnson (1975)</td>
<td>ICT based Model</td>
</tr>
<tr>
<td>6.</td>
<td>Formative and summative assessments</td>
<td>Michael Scriven (1967)</td>
<td>ICT based Model</td>
</tr>
<tr>
<td>7.</td>
<td>Teacher as facilitator</td>
<td>Carl Rogers (1985)</td>
<td>ICT based Model</td>
</tr>
<tr>
<td>8.</td>
<td>Justified use of ICT</td>
<td>Intel teach initiative</td>
<td>ICT based Model</td>
</tr>
</tbody>
</table>

1.15 Significance of the Study

Possibly the greatest contribution that this study brings is in its approach to remain relevant and withstand the rapid changes of technology. Other researches examining the adoption of ICT into mainstream learning have focused on what is done with technology rather than on its effect. Consequently, when the specific technology becomes obsolete, the research risks becoming obsolete and its findings lose relevance. It is hoped that this study will stand the test of time by focusing on the pedagogical process rather than a process of implementation of ICT. The distinction here is that this change concerns the
personnel involved i.e., the teacher educator and teacher trainees, whereas implementation concerns the technology involved. The findings of this study are expected also to contribute to theoretical and methodological knowledge and give clear and useful advice and support relating to effective curriculum transaction through integration of information and communication technologies.

This study identifies teacher trainee and teacher educator related factors that optimize teacher trainee learning outcomes in an ICT-rich learning environment. In doing so, it is expected that educational leaders, nationally and internationally, can better formulate strategies for developing ICT embedded curricula that support learning from a holistic approach.