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ICT for Curriculum Support and Teaching

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Abstract

This paper presents an overview of the use of information and communications technology (ICT) in education, with a focus on the tools, framework architecture for designing curriculum and impact on teaching, curriculum and learning environment of ICT. The government's current ICT policy in education is then explained, together with a review of the status in the implementation, regarding the four aspects of access and connectivity, teacher ennoblement, curriculum and support, and community-wide culture. Issues and concerns facing teachers and schools are addressed in this movement towards the integration of technology in education.

1. Introduction

The advent of the information society has called into question many of our assumptions about education. New information and communications technologies (ICT) are changing the world we live in, and the way we learn to live. ICT changes teaching and learning through its potential as a source of knowledge, a medium to transmit content, a means of interaction and dialogue. Thus, ICT is both a cause of change and a means of achieving it.

As ICT enters every classroom, what is the impact on teachers? Does it give them more work, or less? Is it a tool that helps them to teach the curriculum or does it add extra curriculum content? Does it change what they teach and how they teach it? It is beginning to look as though ICT and, in particular, connection to the Internet will have profound effects on schools. It is too early to draw firm conclusions about what those effects will be. The advance of the most significant new application, the Internet, has been both recent and rapid - the World Wide Web started its exponential growth only in 1994. But we can identify pointers for teaching in the connected classroom. This paper does so by addressing two basic questions:

- What differences do communications technologies make to school?
- How does ICT enrich learning?

2. ICT

Information and communications technologies are a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information". In general we are talking about technologies and tools that people use to share, distribute, gather information, and to communicate with one another, one on one, or in groups, through the use of computers and interconnected computer networks.

ICT is emerge as major tool for learning and teaching and from one of the survey it is clear that the average rate of retention is high when learner learn

through listening and even more by seeing. The learning Pyramid below clearly indicate this and hence, it is clear that how ICT is useful in teaching and learning.

Learning Pyramid

People retain only 20% of what they see and 30% of what they hear. But they remember 50% of what they see and hear, and as much as 80% of what they see, hear and do simultaneously (Computer Technology Research, 1993).

3. ICT tools and Resources for supporting curriculum and teaching

There are various tools of ICT like white board video conferencing system, web-based resources electronic and digital libraries and many more, which supports learning and teaching. With the tools of ICT, students can dramatically raise knowledge levels, learn problem-solving techniques, develop the skills required to manage massive amounts of information, analyze concepts from several different perspectives, and develop the hard-to-qualify higher-order analytic and critical thinking skills that are necessary for lifelong learning, not only student but teacher also benefited from it, as it help in reducing the duplication of effort when preparing lesson plans, worksheets and reports as well as it provide method for teaching like through Multimedia presentations of the content, by audio and through video conferencing and even they can share there view, resources

and also get advices form other experienced person and many more. There are many tools of ICT some of them are given below:

1. Web-based resources
2. Electronic libraries & databases
3. Multimedia resources
4. White board
4. Productivity and analysis tools
5. Computer-based assessment
6. Streaming video
7. Discussion lists & newsgroups
8. Student web publishing
10. Conferencing systems

4. ICT in Teaching and Learning

By their very nature, ICT call for innovation. It is about exploiting the full capabilities of technology to open new perspectives for both teachers and students. At the same time, it is unwise to ignore traditional styles and models of learning as well as ideas from the past that were not implemented in the mass school but were precious exceptions. Therefore, we need to start with things that we are already doing, but consider them anew.

Lots of possible areas are there for the use of ICT in teaching and learning like presentation, calculation, completing assignments, information sources, and some of the other possibilities are (1):

- *Immediate oral communication*
- *Reading*
- *Writing*
- *Science experiments and observations*
- *School use of general and professional applications*
- *Virtual laboratory*
- *Organization of the learning process*
- *Information resources for education*

More Complex Educational Events (1)

- *Approaching the new literacy*
- *Foreign language learning*
- *Design and construction in learning*
- *Microworlds*
- *Scientific research.*
- *Research in social sciences and humanities*
- *Providing support to the school and community*

5. Framework for Implementing ICT in Curriculum Design

Why a framework for ICT ? (4)

Realising the potential benefits of ICT has been shown over the years to be difficult to achieve unless it is clear what capabilities the students are being expected to develop in the course.

Without a clear overview of the learning processes required to develop such capabilities, there is a tendency for ICT to be "bolt on", time-consuming and costly to implement and its benefits remain unclear or dubious.

Course Design Models (4)

There are various models are present for course design but the basic point are same to some extend. In designing course we should always kept in mind some of the points like what should be the content, what is the objectives and what is the process used for the implementing it.

Content

- Selection of content and learning resources
- Knowledge rather than competence or capability
- Teaching and assessment methods support transfer and recall

Objectives

- Linear planning with specific behavioural goals for students
- Actions, conditions and criteria applied
- Teaching and assessment methods support training model

Process

- Development of the individual within the discipline context
- Student centred, experiential, intellectual, flexible
- Assessment supports mastery and a range of levels of achievement

Considerations in course design (4)

During the designing we should always keep in mind the following consideration;

Teaching goals → The teaching goals should be the transfer of information (knowledge), skills development (training), active participation (deep learning) higher level thinking (adaptive learning) by using ICT.

Learning goals → The learning goals are to acquire subject knowledge, discipline-based techniques and transferable capabilities to be intelligent and creative, to be able to analyse critically and reason, to pose and solve problems, to make judgements and take decisions, to communicate well and work effectively in a group by using ICT tools.

Along with the above goals we should also consider the **Capabilities and learning processes** and along with it **Assignment tasks and assessment** during the course design.

Mapping ICT to purpose: EXAMPLES

Purpose		ICT can facilitate
1. ICT for courses	Acquiring and absorbing	- Flexible learning & access - **Web resources**, CAL - Multimedia, databases - Presentation and animation
2. ICT for learning	Applying and extending Evaluating and reasoning Sharing and creating	- Productivity & analytical tools - **Computer-based tests** - Simulations and games - Discussion lists/Web boards - Computer/video conferencing - Access to remote experts - **Student web publishing**
3. ICT for admin		- Information handling - Student administration - Course evaluation

6. The Impact of ICT on Teaching, Learning environment and on the Curriculum

While theoretical arguments can be put forward to provide a strong rational for the use of ICT, the only real rational is based on whether, in practice, it has a positive impact on learning, the learner and teacher. The impact of ICT on learning, student, the curriculum, teachers, school and school system are discussed below. The relevant connections between these entities are shown in the diagram below that will act as a theoretical framework for the discussion.

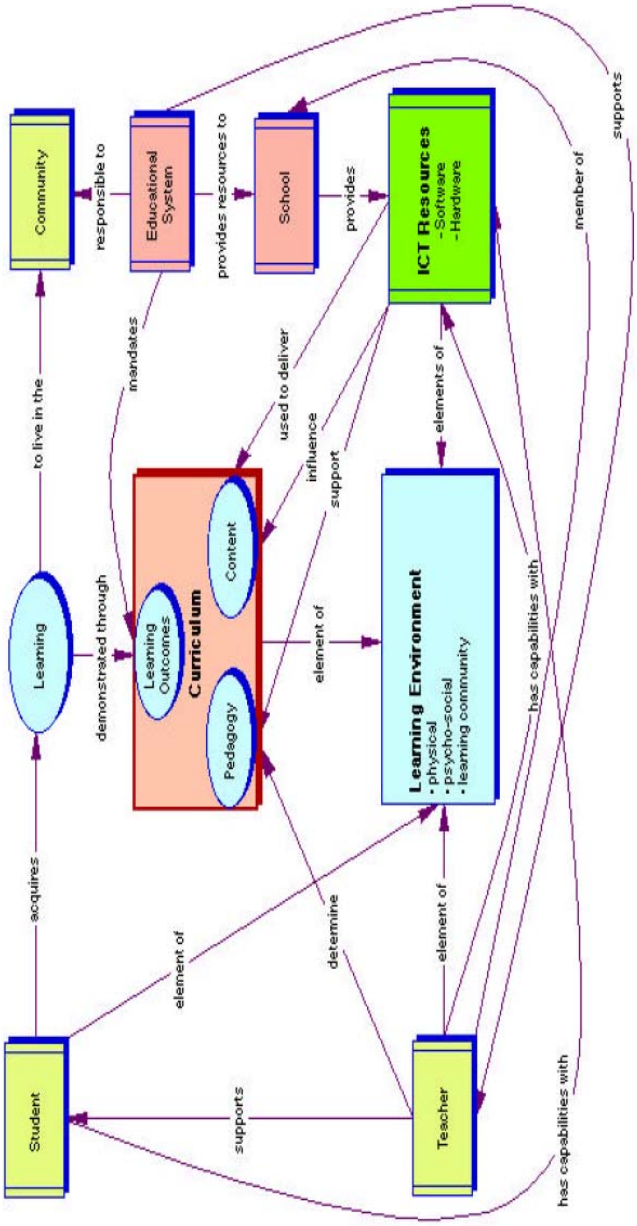

Figure 3 *Concept map indicating relationships between learning environment entities and external entities.*

***6.1 Impact on Curriculum** (2)*

Earlier it was argued that there is a two-way relationship between ICT and the curriculum where ICT may be used to assist in conveying the curriculum but at the same time may change the content of the curriculum. Further, research has shown that the effectiveness in the use of ICT to support learning is a function of the curriculum content and the instructional strategy such that when appropriate content is addressed using appropriate strategies students and teachers will benefit .The impact of ICT on curriculum content may be viewed in terms of:

- **Declarative knowledge -** describes objects and events by specifying the properties which characterize them, or 'knowing that'
- **Procedural knowledge -** focuses on the processes needed to obtain a result, or 'knowing how'

So the use of ICT impacts on both the 'what' and 'how' of the curriculum.

***6.2 Impact on Learning Environment** (2)*

It has been argued earlier that ICT is a mediator of learning as a component of the learning environment. While it is difficult to measure and directly demonstrate the impact of ICT in schools on learning it is possible to suggest possible impacts by connecting ICT as a mediator with well researched theories of learning and strategies for providing learning opportunities.

It is generally agreed that in education the unique instructional characteristics of computers needs to be exploited. There are four distinct characteristics of computer technology, which have clear implications for using computers in the classroom: **logical programming, interactive control, graphics and audio output, and information processing**. There are many ways in which these characteristics could be used and have been

shown to support students and teachers in improving learning outcomes and increasing productivity. The degree to which each of these should be applied will depend on an array of variables such as the developmental age and personal characteristics of the student, the characteristics of the learning environment, and the nature of the curriculum content.

Investigate reality and build knowledge:

Students use ICT to analyse, organize and creatively represent real information in constructing knowledge

Promote active learning and authentic assessment:

ICT may be used to support students to design and produce their own knowledge representations and thereby engage with powerful learning experiences. The evaluation of learning outcomes requires methods that measure understanding. These can be supported by the use of ICT.

Engage students by motivation and challenge:

Students have more positive attitudes towards their classes and learning when ICT use is included The use of ICT has consistently improved students' attitudes towards learning and their own self-concept Content-related graphics (both static and animated) and video can help improve student attitudes and motivation in mathematics and science.

Provide tools to increase student productivity:

Students tend to complete more in less time when they use ICT. Improvements of students using an integrated learning system to support the development of skills in spelling, vocabulary, reading and mathematics, showed more cost effective than other major initiatives.

Provide scaffolding to support higher-level thinking:

It appears that appropriate use of ICT results in new learning experiences requiring higher levels of thinking and problem solving. Animation and

video can enhance learning when the skills or concepts to be learned involve motion or action.

Increase learner independence

Increase collaboration and cooperation:

Introducing technology into the learning environment has been shown to make learning more student-centered, to encourage cooperative learning, and to stimulate increased teacher/student interaction.

Overcome physical disabilities:

The children with physical disabilities may use adaptive technologies to maximize their successful use of ICT.

6.3 Impact on Teaching and pedagogy *(2)*

Teachers are a key component in the learning environment and therefore the impact of ICT on teachers and the strategies they employ to facilitate the environment are critical. There sometimes appears to be an assumption that using ICT to support learning requires change for all teachers whereas clearly some teachers (the authors included) have been creating appropriate learning environments for years without using ICT. However, these teachers tend to use ICT because they readily perceive that in doing so they will provide even better such environments (Becker et al., 1999). The impact on teachers is varied and idiosyncratic although some general areas of impact may be identified as,

- *the balance of roles they play with a perceived risk of reduced influence,*
- *providing greater access to information, leading to increased interest in teaching and experimentation,*
- *requiring more collaboration and more communication with teachers, administrators and parents,*
- *requiring more planning and energy,*

- *requiring the development of skills and knowledge of ICT, and providing more time to engage with students, leading to greater productivity*

The impact on pedagogy can be summarized as being strategies that are,

- *more learner-centered,*
- *more cooperative and collaborative,*
- *more active learning, and*
- *based on greater access to information and sources of information.*

These impacts on pedagogy have been discussed in earlier sections of this review but relate directly to impacts on teachers, in particular the roles they play, their use of information, and their workload.

7. Perceptions of the contribution of ICT

About the contribution – actual or potential – of ICT to teaching and learning can be summarised conveniently in terms of six major organising themes which will be discussed below:

- *Tasks effected*
- *Refinement assisted*
- *Ambience altered*
- *Motivation changed*
- *Learning reshaped*
- *Teaching displaced*

The first theme, **tasks effected**, illustrated how pupils viewed ICT tools as enabling them to carry out tasks easily, rapidly and reliably and to present neat and attractive products. The second, **refinement assisted**, emphasized the ways in which these tools facilitated the progressive editing and revision of written work and exploratory development of ideas and designs. The third theme, **ambience altered**, revealed that many pupils

regarded computer use in school as typically distinct from regular classroom activity in terms of novelty, location, layout and interactions between themselves and their teachers. Elements from these three themes were also closely intertwined with the fourth theme, **motivation changed**. Whilst pupils associated using ICT with difference, fun, enjoyment, challenge and the removal of constraints associated with manual tasks, they also pointed to attenuated personal satisfaction when automated processes removed the opportunity for their active involvement with the task in hand. Similar reservations were identified within the first theme where pupils felt that uniformity of output detracted from individual creative expression. Motivation was also reduced where inadequate technical skills inhibited pupils' participation in computer-based activities – particularly when these involved considerable keyboard input.

The fifth theme, **learning reshaped**, highlighted ways in which pupils distinguished between using ICT as an expedient production tool and 'something to learn with'. In the latter case, dynamic visual representations and interactive models and simulations enabled clearer focus on, and understanding of, the topics in question; courseware that offered self-paced opportunities for reiteration or practice provided effective means of identifying and repairing knowledge gaps. Yet, resonant with earlier themes, pupils were concerned that, for some operations (especially in Maths and Science), powerful processing tools could inhibit as well as strengthen understanding. The final theme, **teaching displaced** underlined pupils' apprehensions about the impact of ICT on both the level and quality of teacher-pupil interactions and emphasised the significance of the teacher's role in orchestrating the academic, technical and social aspects of classroom experience.

8. Advantages and Disadvantages of ICT in Teaching and Learning

In creating this new teaching and learning environment, ICT offer numerous advantages and provide opportunities for:

- *facilitating learning for children who have different learning styles and abilities, including slow learners, the socially disadvantaged, the mentally and physically handicapped, the talented, and those living in remote rural areas;*
- *making learning more effective, involving more senses in a multimedia context and more connections in a hypermedia context; and*
- *providing a broader international context for approaching problems as well as being more sensitive response to local needs***.**

Besides the undoubted advantages of ICT, it is rather important to draw attention to certain drawbacks of ICT, some of the drawbacks are:

- *Wasting of time in playing Computer games rather than using it for learning;*
- *Unlimited access to information which also not good;*
- *Losing traditional skills; and*
- *Health problems associated with computers*

9. Barrier for ICT implementation

Along with lots of advantages associated with the use of ICT in education sector, it also have lots of barriers in the implementation of ICT in the education sector. The following mentioned below are some of the barriers at different level (teachers, students, government, etc.):

Financial (1)→

- Finance is considered as a major barrier to extending current practice in terms of maintaining existing equipment, keeping up with fast pace of technological change in order to take full advantage of ICT in school teaching and learning environment. It is also an issue in terms of training to teachers.

Time and Teacher Workload (1)→

- ICT technologies impact greatly on teacher time and workload because they require a large investment of time to assimilate knowledge and how it can be applied to teaching and learning**.**

ICT in the Home (1)→

- Not many parents have computers in home, therefore the student have no access for homework/assignment and they are unlikely to complete homework/assignment through the traditional medium of pen and paper. The student is also unable to practice the skills they learn in school. Parents do not have the necessary skills to help in doing their assignments.
- The lack of resources is also a barrier.

Volunteers (1)→

- The most obvious barrier is how can we support small groups of students with competent staff? The school cannot rely upon volunteer help, parental support and availability of staff**.**

Government (3)→

- Lack of infrastructure for implementation of ICT in school in whole country.
- Lack of good ICT policy in the country**.**

Further reasons for slow progress to innovate are just as important as the obstacles just noted. These include:

- the (often unconscious) resistance of many educators to the intrusion of still obscure technological newcomers that threaten to alter drastically long-established and time-honored practices and customs;

- the lack of teachers who are trained to exploit ICT proficiently. Technology-rich curricula materials are therefore rarely implemented because students and teachers often have insufficient access to technology, and schools are unable to rearrange the curriculum to exploit the advantages of these materials.
- Low reliability. ICT hardware and software were initially designed and developed for non-educational purposes, and are thus poorly fitted physically for ordinary classrooms, especially in elementary schools. Available computers often do not work**,** which is aggravated by lack of maintenance support and inadequate software. This low and unreliable access to technology means that students do not get enough experience to master complex software tools, and teachers cannot assign tasks that assume ready computer availability.
- The rigid structure of the *classical* system of schooling. Rooted in the educational paradigm of the 18th and 19th centuries, this kind of school could gain little from modern ICT unless it is radically transformed in its constitutive principles.

The last point is perhaps the most crucial. In fact, most educators are not ICT-resistant, but the system in which they work under undoubtedly is. Technology (information or any other) brings little benefit unless it is skillfully and thoughtfully conducted and managed by teachers to enhance students' capacity to learn. Never before has the mission of school teachers been so heavily loaded as today.

10. Conclusion

ICT tools will transform our capability to embrace an educational paradigm that deals with learning as a vital, fulfilling, and continuing part of life at home and in the workplace as well as within educational institutions. There needs to be a balance between using technology and traditional methods of teaching and learning.

In the various survey it clear that ICT has positive effect on teaching and learning and even on curriculum. Effective integration of ICT in schools may thus, in the end, require the transformation of school culture. ICT will perhaps, in retrospect, be seen as the catalyst which stimulated new ways of thinking about teaching and learning, and finally opened the classroom to change.

The policy of the government should be changed in order to implement ICT in school in whole country and other agencies, school management should also provide support for implementation.

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