The Need of Information and Communication Technology (ICT) in Teaching and Learning Process

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Abstract

ICT have become familiar in all aspects of life. Across the past 20 years, the use of ICT has fundamentally changed the practices and procedures of nearly all forms of endeavor within business, entertainment, governance, banking and education etc. Within education, ICT has begun to have an existence but the impact has not been as extensive as in the other fields. Education is a very socially oriented activity. The quality education has traditionally been associated with strong teachers having high degrees of personal contact with students. However today, the education scenario has been altogether changed. The effective integration of this technology into classroom practices poses a challenge to teachers and administrators.

This study analyzes what is happening at schools regarding the integration and use of ICT and to examine teachers' perceptions about what teaching and learning processes can be improved through the use of ICT. In this study a multiple-case-study research methodology was applied. From a previous exploratory research, four different types of schools were determined to analyze the data. Data show there is a widespread view that ICT in teaching favours several teaching and learning processes. In particular, it shows that the contribution of ICT to the improvement of teaching and learning processes is higher in the schools that have integrated ICT as an innovation factor. The innovations that ICT has brought in teaching learning process include: e-learning, m-learning, u-learning, e- communication, quick access to information, online student registration, online advertisement, reduced burden of keeping hard copy, networking with resourceful persons, etc. To attain this highest level implies that a school not only has to modernize the technological tools, but also has to change the teaching models: the teacher's role, issues regarding classroom organizational, the teaching and learning processes, and the interaction mechanisms.

Keywords: ICT, higher education, teaching-learning process, higher institutions of learning, quality education, educational innovation, school improvement

INTRODUCTION

ICTs have become, within a very short time, one of the basic building blocks of modern society. It is a force that has changed many aspects of the way we live. It is potentially a powerful tool for extending educational opportunities and can provide remote learning resources. In recent years, several research studies have highlighted the opportunities and the potential benefits of ICT for improving the quality of education. ICT is viewed as a "major tool for building knowledge societies".

In Europe, proper use of ICT in school education is considered a key factor in uplifting quality at this educational level. So, the Commission of Europe is encouraging the use of ICT in learning process Trough its eLearning Action Plan. One of the aims of which is "to improve the quality of learning by facilitating access to resources and services as well as remote exchange collaboration." The report published by UNESCO (ICT competency standards for teachers: Competency standards modules) draws many aspects to be observed and encouraged, such as extensive use of broadband technologies, faculty development program for teachers, more emphasis on how people teach and learn using ICT, new high-quality online content etc. make the use of ICT at school easier.

This study aims on the need to develop proper strategies to face this new teaching role and the

students" role while integrating ICT in teaching-learning process.

ICT and Education

According to **David Warlick**, "We need technology in every classroom and in every student and teacher"s hand, because it is the pen and paper of our time and it is the lens through which we experience much of our world".

Technology can play a traditional role, i.e. as delivery medium for instructional lessons or in a constructive way as partners in the learning process. Educational Technology is a way for teachers to deliver content to students by using different tools of modern technology.

Tools of Technology which we can use in teaching are:

Multimedia

Audio-Visual, Video Conferencing and Animations

Digital Devices (like cameras, scanners etc.)

Personal Digital Assistants (PDA)

Community Resources (like online lectures)

Database

Software libraries or Digital libraries (e-books, interactive CDs and teaching tools etc.)

Teacher to Teacher interaction to share experience with each other

Teacher to Student interactions and student to student interactions (online discussions on various aspects of the course on weekends and holidays).

Online testing

Role of a teacher in the present era:

The starting point of a digital classroom is a teacher.

Teachers must be trained to effectively use the technology for planning and student instruction

The role of the teacher has shifted from being the sole provider of the knowledge to being a facilitator as the student explores for himself, the expansive world of knowledge.

The Learning Management System (LMS) harnesses the potential of technology to improve learning outcomes and to prepare students for the change in the world in which they live.

Students use Information technologies to:

Improve the ways of learning in new fashions.

Working in groups for cooperative and collaborative learning.

Developing self-learning habits at their own pace and time.

Learn with the teacher rather by the teacher.

Develop inquiry-learning habits.

Review and explore qualitative data.

Exchange learning experiences and information with other students and teachers living anywhere in the world.

Teachers use Information technologies to:

Present the material in more interesting and attractive way.

Guide and help students in searching the qualitative material.

Make best use of time.

Direct the students toward cooperative as well as collaborative learning activities.

Prepare learning material for students, rather teaching in conventional situations.

Diagnose the learning problem of the students and help them to overcome.

Technology, learning and educational practice:

When, how and why do computers come to be used in classrooms? What are the factors involved in the processes of technology integration in schools? In what teaching and learning processes are computers used in the classroom?

Attempt to answer these questions have resulted in a number of different studies that have identified the uses of technology in education and its role in the educational practice.

As stated in the VI Annual Report on the Development of the Information Society in Spain (2006), since the 1980s every regional authority has provided several programmes aiming at integrating ICT into society and, particularly, in education. The actions carried out ranged from the development of infrastructures, to the setting up of educational web-pages with educational resources for teachers, parents and students, to training programmes for using ICT.

Some studies reveal that previous practice in using computers and positive attitudes towards technology are variables that favour success in teachers" integration of ICT. In addition, research shows that ICT is not generating the expected significant changes. On the other hand, it is clear that educational changes addressed through ICT may result in effective changes in student learning.

The purpose of this research study is to analyse what is happening in schools related to the integration and use of ICT. In this research, we have two specific aims of the project:

To examine teachers" perceptions on which teaching and learning processes could be

improved through the use of ICT, and

To outline the involved factors for the effective use of ICT.

METHODOLOGY

In this study, a multiple-case-study research methodology was applied. The school was the unit of sampling used. A procedure for data gathering was developed and a number of tools to collect the required information were designed and validated.

Keeping in mind the aim of the study and practices using ICT at the school are pointed out as a key issue, three dimensions were combined to classify the centres: Infrastructure, Use and Innovation.

Infrastructure means the hardware and connectivity systems available in the school.

Use means the types of use of ICT being carried out in each school.

Innovation means the impact of ICT on increasing the quality of education in the school. In addition, four school levels were established by combining above three dimensions:

Level 1: Schools with limited use of ICT in educational work. There is a lack of motivation or interest from the teachers.

Level 2: Schools having a well equipped computer classroom but the use of ICT is not outlined in the development plan.

Level 3: Schools having one or more well equipped computer classroom. These computers are interconnected by LAN. The use of ICT is partially included in the development plan.

Level 4: Schools having decided ICT is a distinctive element of their educational activities. They have well equipped classrooms and all computers are connected to the net. There is someone responsible for solving any maintenance problem. In this category, the schools have a development plan.

The selection was made considering the four levels of schools established by the research team in a previous exploratory research. Categorisation and selection of schools were made from the information provided by system supervisors, coordinators of ICT integration programmes and advisors to teacher support centres. Two schools (one primary and one secondary) for every determined level were selected from each region.

On this basis, schools representing each level were chosen in each region of the study (Meerut, Mawana and Sardhana), as shown in Table.

Table 1. School distribution by region

Region	n	%
Meerut	10	40
Mawana	8	32
Sardhana	7	28
Total	25	100

Table 2. Geographical distribution of the schools in the sample

Situation	n	%
Rural	5	20
Urban	13	52
Town	7	28
Total	25	100

Table 3. Ownership distribution of the schools in the sample

Ownership	n	%
Public	13	52
Private	4	16
Private partially funded	8	32
Total	25	100

Table 4. Types of schools in the sample

Type of school	n	%
Primary	11	44
Secondary	4	16
Both	10	40
Total	25	100

Source: Plan for Data collection from Primary sources for table 1, 2, 3, 4

Data were collected by interview with the school"s Executive Board, Principal and other information resources from the different schools like reports, teaching plans etc. and a questionnaire given to school teachers. The questionnaire was divided into five sections: personal data, use of ICT in teaching practice, attitudes towards ICT, training experience and training needs, and school equipment. Each item was related to a five-point Likert"s scale: 1- nothing, 2- a few, 3- something, 4- quite enough, and 5- a lot.

From the 424 teachers working in the 25 schools, a total of 325 questionnaires have been gathered, representing 76.65% of the universe of the sample. An analysis of the 325 answers was carried out with the Statistical Package for Social Sciences.

Approximately two-thirds of the sample was women (66.77%), which is the usual average found

on current teachers" characteristics and strengthens the idea of the feminisation of teaching. Regarding age, most of the teachers were between 35 to 45 years old (39.1%). Outside this age group, 25.2% were between 25 and 35 years old, and 23.9% were between 45 and 55 years old. Finally, most of the teachers in the sample (34.1%) had more than 10 years of teaching experience, followed by those with between 6 and 10 teaching years experience (26.5%).

Research Questions:

In this paper, we focused on two research questions: (1) How is ICT contributing to the development of teaching and learning processes? (2) What, if any, are the differences between the teachers at the different school levels we have categorised?

Question 1: How is ICT contributing to the development of teaching and learning processes? As previously pointed out in our review of the literature, one of the main concerns of studies on educational technology has been to identify what uses of ICT are being applied in schools and how teaching and learning processes can be better developed through them. Keeping in mind this perspective, we considered it of interest to inquire into teachers" opinions about the teaching and learning processes we could be encouraged to use when incorporating ICT in teaching and learning. The average scores from the questionnaires were quite high and were spread evenly across the three domains (see Table no. 5). Therefore, we can affirm that teachers have a high expectation level with respect to ICT and a positive estimation of its impact on learning. Most of the teachers that took part contended that the use of ICT in classrooms benefits some teaching and learning processes.

Table 5. Influence of ICT in developing teaching and learning processes

S.N.	Teaching and learning process	n	Average
1	Knowledge acquisition	318	3.89
2	Understanding improvement	319	3.73
3	Application of learning	317	3.91
4	Strategies of analysis	310	3.43
5	Synthesis processes	308	3.48
6	Evaluation processes	314	3.58
7	Fixing attention	317	4.09
8	Response mechanisms	311	3.94
9	Evaluation strategies	311	3.45
10	Organizational schemes	308	3.55
11	Perception skills	313	3.97
12	Expression communication	307	3.44

Source: Primary data

Teachers have pointed out that using ICT at school helps to improve students" attention ($x = 4.09$) and perception skills ($x = 3.97$). If we consider attention as a basic requirement for learning, we could suppose that ICT is facilitating learning because it helps create better learning conditions by raising and promoting students" attention skills. Moreover, increasing perception skills could be favourable to learning because students will be in a better condition to process and translate the stimuli that allow them to build new thinking and action schemes.

The use of ICT also stimulates the creation of responding mechanisms ($x = 3.94$), needed to face learning experiences and the resulting new demands. One of these mechanisms relates to applying what you have learned, and in this respect ICT is also perceived as a help. ICT offers numerous possibilities to manipulate and simulate situations, phenomena, actions, and so on, representing extraordinary educational potential for the application of learning.

We should also highlight the average score obtained in items related to knowledge acquisition ($x = 3.89$) and content understanding improvement ($x = 3.73$). Thus, the potential of ICT to make students" learning content processes easier has been recognised: to remember, define, recognise or identify particular information; to understand and absorb this information, to organise and mentally sort it, to interpret it from the standpoint of their own thinking schemes and to express it in their own words.

Other teaching and learning processes get lower averages, as in the variables related to strategies of analysis ($x = 3.43$), evaluation processes ($x = 3.58$), synthesis processes ($x = 3.48$), strategies for evaluation ($x = 3.45$) and organisational schemes ($x = 3.55$). Expression and communication are the least valued items, perhaps because the teachers considered the use of ICT as being one-way, where students act just as receivers.

It is interesting to observe that some teachers have not yet discovered or understood the possibilities that ICT offers to students as a means of complementing their traditional receiver role with that of a message producer-transmitter. Networking, in particular, as based on the

communicative opportunities that technological systems are making easier and in promoting positive attitudes towards a collaborative and constructive learning perspective.

Teachers are also less confident using ICT to promote the development of more complex teaching and learning processes, such as strategies of analysis, synthesis, evaluation and organisation. Remarkably, these are very important skills for navigating the net and for taking advantage of the enormous amount of information available. This means that the role of the teacher will be fundamental to contributing to the growth of these skills and for orienting a useful employment of ICT.

Several studies highlighted the crucial role of teachers, their beliefs and practices in determining the level and type of use of technologies in the classroom. Some of these studies contend that ICT use strengthens traditional practices, and they found that it is difficult for teachers to develop innovations by taking advantage of what technology has to offer, our findings demonstrate that technology is mainly used to develop low-level teaching and learning processes, suggesting teacher-centred models.

Question 2: Is there any significant difference between teachers from different school levels? In general, we can see that teachers in centres where ICT is considered a key innovation factor (Level 4 schools) have a more homogeneous view of the analysed processes, perhaps because technology has been integrated in a stable way and is not seen as either a novelty or as being deceptive (see Table 6).

Table 6. Correlation between school levels and the teaching and learning processes facilitated

S. No.	Teaching & Learning Processes	Level 1 Schools		Level 2 Schools		Level 3 Schools		Level 4 Schools	
		Avg.	SD	Avg.	SD	Avg.	SD	Avg.	SD
1	Knowledge acquisition	3.73	0.94	4.05	0.73	3.68	0.85	3.88	0.81
2	Understanding improvement	3.66	0.88	3.84	0.79	3.42	0.84	3.78	0.78
3	Application of learning	3.91	0.90	3.96	0.68	3.74	0.70	3.94	0.83
4	Strategies of analysis	3.41	0.89	3.52	0.74	3.37	0.77	3.36	1.02
5	Synthesis processes	3.41	0.91	3.54	0.70	3.33	0.76	3.55	0.94
6	Evaluation processes	3.56	0.91	3.58	0.83	3.58	0.71	3.60	1.01
7	Fixing attention	4.04	0.84	4.08	0.83	4.09	0.80	4.14	0.86
8	Response mechanisms	3.48	0.92	3.84	0.76	4.05	0.43	3.73	0.92
9	Evaluation strategies	3.38	0.91	3.52	0.85	3.46	0.64	3.37	0.99
10	Organizational schemes	3.52	0.96	3.57	0.83	3.40	0.73	3.61	1.08
11	Perception skills	3.95	0.85	4.05	0.74	3.95	0.64	3.89	0.87
12	Expression communication	3.36	0.98	3.47	1.11	3.59	0.98	3.35	1.17

Source: Primary data

Teachers from Level 2 schools get the highest scores, probably because they are in an initial phase of development and their expectations are still quite high. On the other hand, it is quite surprising that the lowest scores come from the Level 3 school teachers, those schools labelled as having an intensive use of ICT.

The item in which highest scores coincide independently of the school level is that which acknowledges the role of ICT in promoting attention skills. The second highest score relates to the improvement of perception skills.

Perceptions are quite varied with respect to the items that get the lowest average scores, except for the item referring to expression and communication skills, which was rated lowest by most of the teachers.

Previous studies show that the success of innovative practices of technology use in schools is strongly related to the particular characteristics of each school. Infrastructure, equipment, a favourable school culture and the support from staff make the development of innovative practices with ICT easier.

In addition, as **Voogt (2008)** stated, effective integration of ICT implies the reviewing of educational aims and their curricular content. Domain analysis developed in this research could become a reference to re-consider what we would like our students learn and how to use technology to help ourselves to this end.

3. CONCLUSION

From the teachers" opinions, we can conclude that there is a mainstream opinion that sees using ICT in teaching as favouring several processes related to teaching and learning – in particular, those involving attention, perception, responding mechanisms, application of learning and understanding. Moreover, those related to information transmission and knowledge facilitation are well thought of. However, some of the proposed processes were more poorly valued. Interaction processes, expression and communication skills were not held in high regard by the teachers, probably because they have considered ICT as being generally used in a one-way mode. On the other hand, there seems to be a relationship between teachers" perceptions and the three dimensions (equipment, use and innovation) of our analysis.

Teachers in Level 4 schools have a more favourable view concerning the processes that ICT makes easier, probably because they use them in a more general and systematic way and, for this reason, they have developed the needed skills to take a better advantage of them. In this sense, it should be taken into consideration that improvement in the learning outcomes are usually linked to an innovative educational use of technologies (Balanskat, Blamire, and Kefala 2006; Zhao et al. 2002). Finally, the teachers develop an appropriate and trusting atmosphere in the schools that help them to increase the use of ICT. They are involved in a global project that takes into account aspects such as continuous training and motivation and they feel the schools have strong leadership. We can conclude that the kind of use of ICT is a key factor for innovation, teaching and improvement of learning processes. Designing a plan for ICT integration in which you get the participation of the whole teaching staff of a school will give us the opportunity to reflect and analyse why and with which aim ICT will be used, and this will contribute to its potential as an innovative element of the curriculum (Somekh 2008).

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