ICT AS A LEARNING TOOL TO ASSIST TEACHING ICT IN PRIMARY SCHOOLS

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General terms

Prior to discussing this research, it is necessary to clarify the way in which certain terms have been used in this paper:

'Traditional learning' refers to the learning which occurs during face-to-face teaching. The teacher conveys information (written and oral) to the student directly.

'E-learning' (as defined by Pollard and Hillage, 2001) is "the delivery and administration of learning opportunities and support via computer, networked and web-based technology to help individual performance and development." In some cases the teacher will not provide a series of facts to the students, but ask them to locate information from on-line sources. The teacher becomes a facilitator, as opposed to the keeper and transmitter of information. This approach is favoured by the action learning community; 'ICT' information and communication technology; Edutainment has come to have a specific meaning: products that are educational but that have some entertainment value, the term typically applies to games, stories, children's software in which the entertainment elements are obvious.

Introduction

ICT has turned from being a technology of communication and information to a curriculum creation and delivery system for teachers and learners. However, there is an unresolved tension around the issue of ICT as a subject in its own right that comprises the knowledge, skills and understanding to make appropriate, productive use of ICT, or as a set of tools with which to deliver and absorb other subjects in the curriculum. Smith (1999) mentioned "the focus is on the subject being taught or studied rather than developing pupils' skills with, and knowledge of, the technologies themselves'."

Accordingly this argument is a discussion that shows no sign of coming to resolution. As Dale, Robertson, and Shortis (2002) predict that "the qualitative and quantitative gaps between the pupils' and the teacher's understanding of the affordances of ICT as a technology of teaching are much greater than has heretofore been the case with any other teaching technology."

As a tool, "ICT has the potential to transform the way that education is delivered" (Fisher 2001). ICT can facilitate differentiation and individualization in education: it makes it possible to tailor both the content and the presentation of the subject matter to the individual background, experience and needs of students. In addition, as Schiller & Tillett (2004) said "ICT enhances what is possible by amplifying what teachers are able to do, by providing an entry point to content and enquiries that were not possible with out the use of ICT, by extending what students are able to produce as a result of their investigations, and finally by providing teachers with the opportunity to become learners again."

According to the possibilities of utilizing ICT as a tool in education, its usage spread. "92% of primary schools teachers make regular use of ICT for teaching and learning" (BECTA 2004) However, as indicated by Ofsted (2005) "In primary schools ICT was used mainly to support English and mathematics; there was some use of ICT in other subjects but application across the curriculum was still largely undeveloped."

In addition to the current concern of raising standards of ICT usage across curriculum, "the National Curriculum for ICT in England has been considered to provide a useful framework for 'ICT capability' or 'information literacy'. Such capability enables children to demonstrate the development of their knowledge, understanding, and skill in making

'informed judgments about when and where to use ICT to best effect, and to consider its implications for home and work both now and in future" '(DFEE 1999:96). Which signify that, ICT capability is not limited to a facility with a range of techniques and skills with particular technologies and software applications.

The National Curriculum in England identifies the 'programmes of study' and 'attainment targets' from which schools can develop their planning and organization of the curriculum. The framework for the knowledge, skills and understanding in ICT curriculum is presented in four aspects: Finding things out; developing ideas and making things happen; exchanging and sharing information; reviewing, modifying and evaluating work as it progresses.

However, the inspection report (1999) revealed ICT to be the "least well taught" of National Curriculum subjects and subject to a "substantial underachievement in about two fifths of primary schools."

Two years later, Scottish school inspectors continued to report "few examples of ICT usage consistently and effectively" and important weaknesses in the majority of schools" (Scottish Executive, 2000) and school inspectors in England reported "some improvement" (Ofsted, 2002). But as indicated by QCA annual report (2004) "In Key Stages 1 and 2 there has been a general improvement in ICT provision, in 90 % of primary schools inspected by Ofsted since their last inspection. The pupils' achievements have continued to improve in ICT more than in any other subject. However, in a significant minority of schools ICT is still unsatisfactory. Lately Ofsted (2005) "most schools made satisfactory curriculum provision for ICT, including some balance between teaching ICT capability and its application across subject"

Though, most of the obtainable literature regards the integration of ICT across curriculum. As indicated by Heemskerk et al. (2005) there is a general lacuna in research on ICT and education concerning the relationship between learning outcomes in ICT curriculum and the use of ICT as a teaching tool.

This study focuses on the use of ICT as a tool in ICT curriculum it self, by answering the following questions:
1) What is the pedagogy used in teaching the ICT curriculum?
2) What are the ICT tools that are being used in teaching the ICT curriculum?
3) What are the obstructions that face teachers in teaching ICT?

These were put in place to identify what is needed to improve the quality of teaching ICT curriculum.

Research Method
This paper explores the use of ICT in teaching ICT, based on an analysis of the strength and weakness of the pedagogies and technologies currently used in teaching ICT in primary schools. To determine current practice, 60 primary schools were contacted in the West Midlands with 18 of them approving the visit. 10 of these were selected as providing a representative sample in terms of the catchments' area (to ensure that the students are from different social environments), provision of ICT facilities in the school , its usage level , and the school standards as recorded in the most recent Ofsted report of each school.

In total, 10 ICT coordinators and 7 teachers were interviewed to accompany classroom observations of 18 ICT lessons.

ICT lessons were observed in years 3 and 6 to look at the methods and technologies. All the schools were in Coventry and visited during the autumn term of 2005.

Simi- structured Interviews were conducted with the teachers of the observed lesson whether s/he was the ICT coordinator or not. The interviews questions reflect the teacher's wider perspective of the methods and techniques used in the observed lesson, and the questions were divided into two main sections; Section 1 concerned the ICT resources being used in

teaching ICT skills including software packages, CD-ROMs, websites, technological tools such as projector, and edutainment materials including stories and games. The purpose of use, target audience, selection criteria and student's motivation were considered. Section 2 focused on the ICT curriculum, its content, difficulties and obstacles of teaching.

Since most of the studies about embedding ICT in practice and the ICT curriculum refer to inconsistencies between schools, in conducting the interviews and the observations, the focus was on similarities between schools that weren't considered in previous studies.

Results
1. Teaching Practices in ICT
Traditional teaching method is used by all teachers' in the first part of the ICT lesson, while in the second part; students practice what shown to them. As 20% of the teachers' uses prompt sheets from the LEA, 30% creates their own sheets, and 50% asks the students verbally to perform a particular task.

70% of the teachers allow pupils to explore new things if there is available time at the end of the lesson. Whereas 30% of them signified that their teaching principle is not to teach pupils every thing but to let them discover by themselves.

2. ICT in teaching ICT Curriculum
Commercial educational software packages are responsible for most ICT usage in schools. However, it's not used in teaching ICT curriculum, 60% of the teachers claimed that this might be due to the unavailability of an educational CD-ROMs that teaches ICT skills in the market. In addition, 10% of the teachers indicated that, "A teacher may not have time to develop the skills to build a learning application from scratch. But if s/he receive a template today into which s/he can put educational materials they have readily to hand, and this then becomes both more motivating and more accessible to their students, they can probably find the time to do this minimal task. While, 40% of the ICT coordinators believed that they would not find an educational CD-ROM that would satisfy their needs and fit in the curriculum.

30% of the teachers said that if there were available educational CD-ROMs that teaches ICT curriculum they would associate its usage with the weak students.

However, 80% of the teachers supported the idea of using supportive CD-ROMs for revision purposes in a group collaborative context.

In 90% of the schools, the selection of the educational software's is completely up to the ICT coordinator; the teachers rarely get involved in that decision and pupils never been involved in the selection process. 70% of the ICT coordinators prioritize the criterion according to the entertainment value then correlation with the curriculum.

Although 40% of the students suggest the use of online resources; 90% of the teachers weren't convinced to use it in teaching ICT curriculum. They justify that by their assumption that the students will not be motivated to use the computer as learning medium; neither by reading a tutorial nor watching a recorded video.

In addition, edutainment materials such as stories or games are not used in teaching the ICT curriculum. Though, 90% of the teachers present the ICT lesson using projected screen and only 40% of them use PowerPoint to present the aims and objectives of the lesson.

3. ICT Curriculum
30% of the primary schools are following the ICT National Curriculum strictly. However, 70% are using it as a guidance to develop the curriculum that suits their needs. Whatever the ICT curriculum of the school was, computer applications (Microsoft Office) represent the main part of it. In all the visited schools Microsoft Word starts to be taught in year 3 and PowerPoint in year 6.

This divergence between the schools in their ICT curriculum content is mainly due to the obstructions

that are facing the teachers in teaching ICT Curriculum, which indicated by the teachers as follows:

1. Teachers ICT knowledge: 70% of the primary school teacher's knowledge is limited to the techniques of using computer application, mainly Microsoft office.
2. Class management: 60% of the teachers face some difficulties to sustain student's attention when teaching in the ICT suite. Teachers expound that to be because the layouts of the ICT suits were the pupils' work with their backs to the teacher so they are engaged by using the computer.
3. Lack of assessment: students ICT capability is not being assessed during the ICT lesson, 80% of the teachers were assessing the subject that ICT is being integrated in and not the ICT skills itself.
4. Un-tangible gap between school and home use of ICT: all ICT coordinators and teachers mentioned that the divergence between the students in their home access to computers is an obstruction in teaching ICT skills. 70% of the teachers believed that equal access to information technology and learning through ICT is vital if we are to have equal opportunities.
5. Computational Thinking: 30% of the teachers are facing problem in student's understanding of the abstract computational concept, they commenced that most of the students forget the sequence of executing a command and the teacher needs to repeat it again, although they consider the differences in student's ability.

Discussion
In the division of the ICT lesson into two parts; teacher-centered and learner-centered we have an application of Dewey's theory: "learning by doing". Although children learn to use ICT by copying from competent users such as teachers, parents, and colleagues, many children described learning to use the computer and its software through trail and error, fiddling, just picking it up, practicing, reading the help files and working it out for themselves. One child explained that 'you mess around and find out how it works'.

Allowing children to explore by themselves in the free time at the end of the lesson can be considered as an individualization of learning experience according to the learner ability. Leask and Pachler (1999) supported the idea of exploration when they discussed the need of the pupils to have time to explore freely any new software on their own before being asked to engage in the set task.

In the teacher-centered part of the lesson, teachers are relying on the traditional method, with out the use of any supportive educational CD-ROMs that teaches ICT curriculum itself. Despite the teachers support to the use of educational CD-ROMs for revision purposes by group of students collaboratively if it were available.

In addition, e-learning has been applied in most curriculum area. This embeds a query: why e-learning is being used to teach most of the curriculums in primary schools, but not to teach ICT curriculum it self? Although 60% or more of the time spent by students in the ICT lesson is in practicing, and e-learning "is particularly suited to cognitive learning, learning that requires practice and review, for those with reflective or theorist learning styles" (Epic, 1999).

E-learning will help as well to improve the ICT skills as supported by the National Education Centre (2000) and this is one of the aims of the ICT curriculum. Whence I believed that applying e-learning in teaching ICT curriculum itself must be done before applying it in other curriculums.

The use of e-learning will affect the role of the teacher dramatically. Since there is a new presence in classroom providing a supply of knowledge and information, thus reducing the dependency of pupils on teacher. Most of the teachers acknowledge that they are learning from their students most of the time. And their role is as a guider or a facilitator, but this is not the case every time. In some cases the teacher has to be an expert and purveyor of knowledge.

The biggest encumbrance in using ICT in the educational process is on the teachers, As Griffin and Bash (1995) discussed "the acceptance of computer in primary classroom may be dependant upon assumed cultural norms of behavior, both of teachers and children." Teachers have to develop their own personal and professional applications and adapt their teaching strategies for different learning environments, such as the ICT suite, portable computers in class, and home –school links. Yet, technological determinism in education leaves largely invisible the work that teachers must undertake in order to realize the improvements that technology offers, if education is transformed, as Fisher (2005) mentioned "it will be because teachers - no doubt making use of particular technologies - have made it happen." If the teacher develops their personal applications as indicated by Bennett (1997) "they will feel more confident and more effective as teachers of ICT." However, they may resist applying the change in their classroom even if the resources are available in the school. As one of the primary school teachers said "although I have been trained to use ICT and we have good resources at school, I didn't start to use it yet, I feel that it is waste of time and a new duty that has been added to my list of tasks."

Against the application of e-learning, most of the teachers recommended the use of edutainment materials in teaching to motivate children. However, they are not using it in teaching ICT curriculum. And the main problem is that ICT is one of the main subjects which students experience outside the school that is associated with fun and entertainment. This leads to a need to develop ICT teaching practices to be enjoyable, engages fun, exploration and entertainment.

The use of edutainment might help in obviation of the obstructions of teaching ICT, such as holding the students attention when teaching takes place in the ICT suit. Despite, doing an ICT lesson in the ICT suite can be very productive in introducing the pupils to new packages and allowing them to gain familiarity with computers and software. However, as Leask and Pashler (1999) discussed "classroom dynamics alter considerably with ICT, especially when teaching takes place in an ICT suit." This might be because in most of the ICT suites the workstations are arranged along the sides of the room with the screens facing inwards and the pupils work with their backs to the teacher that increases the noise levels, and make it difficult for the teacher to hold the attention of the whole class. However, the teacher can see every screen from the centre of the room.

Since computers distract pupils from the teacher most of the time, the teachers prefer to teach the theoretical part of the lesson and then ask the pupils to log in to the computers to avoid distraction. This requires duplicated effort from the teacher in controlling the pupils to ensure that they have an opportunity of preparing and discussing work away from computer. However not all computer suites have sufficient space for pupils to work away from their computers. One school solved this problem by having ICT lessons timetabled alternately in classrooms and computer suites.

In addition to the obstruction in teaching in the ICT suit, the gap in school – home interaction represents a vital obstacle in teaching ICT since the home use of ICT influences the content of the ICT curriculum and the methods used to teach that content. As one of the primary school teacher said "the increment in the usage of computers at students' home lead to the enhancement of student's ICT capability comparing to 3 or 4 years ago. This led me to develop the curriculum to include more advanced skills."

While access to ICT in home is generally improving, it is clear that this picture is not consistent across society as a whole. Still, as reported by QCA (2004) "the impact of e-learning and ICT capability developed by learners outside school hours is not yet fully appreciated." There is a mismatch between children and young people's experience of digital technologies in their social and cultural lives and in school classrooms. Robinson argued what was claimed by Professor David Buckingham; Head of the Centre for the Study of Children, Youth and Media at the Institute of Education (2005) "schools are becoming increasingly irrelevant to the modern child

as a result of their failure to embrace the digital media." He explains that outside school, children are engaged in a constant whirl of media and yet in many schools they are taught little more than the rudiments of information retrieval.

Conversely, the home experience complemented computer school experience, some children commented that what they learned at home they used at school and others said that what they learned at school they used at home. Groundwater-Smith et al. (2000) discussed that "transferring skills between environments appears to create a potential for greater learning." As it has been suggested that "children learn better when there is congruence between the learning environments in their homes and in their schools." (Toomey 1989) Therefore, schools should make a positive use of the range of the ways in which children use ICT at home.

Most teachers agreed that the existence of computers at home has a positive influence on the educational process. Dale, Robertson, and Shortis (2002) said, "Children who use a computer at home are more enthusiastic, competent and confident when using one in school." Parents support this positive impact of accessing home computer, they appreciate that bringing computers to home may benefit their children's education and future. Although children are not gaining access to and are not developing skills in the use of ICT for authentic tasks, but are mainly using computers for fun.

Other researchers such as Downes (1997) and Sutherland et al (2001) highlighted the gap between children's preferred use of computers at home and their restricted or boring use at school, while proposing that home use is neither simple nor uniform phenomenon, but has the potential for a variety of appropriations, uses and constructions that are not always reflected in school experiences.
At home children learn to use ICT by having a variety of meaningful tasks available to them and having lots of time for engaging in the process of playing, doing, exploring, experimenting, discovering and modeling, which is hugely beneficial, whereas at school, there are restrictions of resources, time and rules about

playing. ICT school use is heavily teacher directed in order to achieve syllabus outcomes in the key learning areas. So the pupils are told 'not to fiddle' with the school computers and if you have a problem ask, don't try to fix it your self and they don't have a lot of time for practicing the skills which are taught. Those who don't have computers at home miss out on being able to try things out for themselves and transferring skills between home and school computing environment. The practice of using software only once at school is contradicting the way in which children learn at home through playing a game or using the software over and over again and so their learning will be fairly directed.

Teachers must distinct between students according to their home use of ICT. When they are introduced to students at the beginning of the year, they tend to assess the ICT capability of the students to identify the students who are using computers at home. This consideration will influence their lessons especially during the practical part. A teacher's expectation that students are skilful computer users may disadvantage those who haven't had the chance to acquire these skills.

As a result, the ICT curriculum has to accommodate the technology development in the outside school context which the students are living in, and as Sanger (2001) discussed "the need for the reappraisal of the structure of schooling to meet the needs of individual learners". Indeed the recognition by schools, of skills and knowledge acquired outside of the classroom will be an important factor in ensuring that pupils remain motivated to learn. For example, an increasingly rich experience of technologies at home is likely to lead to many pupils entering school with a variety of ICT skills. To prevent such pupils from becoming frustrated and disaffected, these skills will need to be recognized and developed in appropriate programmes of study.

In addition to the potentiality of edutainment in controlling the ICT suite, closing the gap between the ICT home use and school use, Edutainment can enhance creating computational thinking in children; especially remembering the sequence of commands

of performing a specific task in computer applications. Although teachers refer to the difficulty in understanding computationally abstract concepts to the material being taught and not teaching method, enhancing the teaching methods with edutainment may overcome this problem. More than ever if children are engaged in the process of designing the edutainment material. Although children showed pleasure and enthusiasm in providing their own feedback about resources related to the ICT lesson, yet results showed children are not involved in selecting learning tools process and teachers didn't express their care about that.

Conclusion

Children are required to apply their ICT know-how in other lessons, but little emphasis has been placed on how they are taught ICT. This paper discusses the current teaching practices and techniques used in teaching ICT curriculum in primary schools and the main obstacles in teaching it.

Simi-structure interviews with teachers and ICT coordinators in addition to classroom observations were the main research methods availed through visiting ten primary schools in Coventry during the autumn term of 2005.

The main results were as follows; Firstly, ICT is being taught either through supporting other curriculums or using the traditional teaching method, accordingly there is a need to investigate new pedagogies of teaching ICT.

Secondly, most of the teachers claimed that the unavailability in the market of an interactive multimedia educational CD-ROMs, edutainment or e-learning materials is the reason behind not using them in teaching or learning the ICT curriculum. So such materials needs to be produced and further examination should be made on their influence on teaching and learning ICT curriculum.

In addition, some of the teachers were not convinced to use online materials in teaching children and assumes that the children will not like it without any evaluation study of the effect of such material on children. Therefore, a research has to be conducted

on a participatory design approach to the development of such material and its evaluation.

Thirdly, the obstructions of teaching ICT in primary schools such as the limitation of teachers ICT knowledge, difficulties in class management, lack of assessment, and the gap in the children's ICT usage in school versus home are correlated factors that should be considered when studying the effect e-learning on teaching ICT in primary schools. Moreover, the gap between home and school ICT usage is one that needs to be corrected through standardisation and quality control if all students are to receive a good grounding in ICT.

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