

CAN KIDS LEARN BY THEMSELVES USING TECHNOLOGY AND WHAT DO THEY LEARN?

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Abstract

This study presents the method and results of an experiment conducted to investigate whether kids (5-8 years) can use technology to learn in such unsupervised learning conditions. This study also assesses the skills and understanding that children develop through unsupervised technology exposure. The study, carried over 6 months, focused on two primary schools (School 'A' and School 'B') both found in Mauritius. Both quantitative and qualitative approaches were adopted to collect data for this investigation. The qualitative data focused on interviews with kids, examination of the students' work on PCs, observation in their ability to explore an interface, use a mouse, keyboard and the Internet. The quantitative data provide information which is easy to analyze statistically and fairly reliable. Descriptive statistics and charts have been used to analyze the quantitative data. It has been found that kids who had access to computers and Internet-based resources both at school and at home can self – educate themselves, but only to some extent because there will come such a moment when they will need a facilitator for guidance.

Keywords: Technology, Self-learning, e-Learning, Computer-based Instruction

Introduction

There is no doubt that Information and Communication Technology (ICT) skills are important assets for children to develop in today's world. As such, children are now being raised in a world of interactive media that is far different from that of their parents and grandparents. Nowadays, computer technology for children is a source of learning and entertainment. It has been observed that children are able to learn to use computers and the Internet on their own, irrespective of their social, cultural or economic backgrounds (Mitra and Rana, 2001). The press labeled these experiments, first conducted in 1999, as "Hole in the Wall" experiments because the experimental arrangement consisted of computers built into openings in brick walls in public spaces. The experiments were first conducted in Kalkaji, a suburb of New Delhi, India. A computer was connected to the Internet and embedded into a brick wall near a slum. It was reported that most of the slum children were able to use the computer to browse, play games, create documents and paint pictures within a few days. Since this finding encouraged the researchers, they replicated this approach in a number of remote and disadvantaged areas across India with almost identical results. These experiences gave credibility to the belief that given the facilities, groups of children in such settings could learn to use computers and access and benefit from Internet resources on their own. The experiments were described by Mitra and Rana as "minimally invasive", a term borrowed from surgery (Mitra and Rana 2001; Mitra 2003), and indicative of minimal human intervention. The well-constructed "Hole in the Wall" experiment by Mitra (2001) indeed

proves that children can teach themselves as well as their friends in the same surrounding. Even in slum areas where children are not well educated the use of technology like computer and Internet was made easy and without the intervention of a teacher to show them. However, there are certain limitations to learning alone or from peers even in an environment where technology and resources are available. This study investigated whether technology can help our Mauritian children (5 – 8 years) to learn through self-instruction and what knowledge and skills they develop through unsupervised ICT use.

The study aimed at answering the following research questions:

- 1.Does technology help children to learn better?
- 2.What knowledge and skills do children acquire through unsupervised ICT use?
- 3.To what extent can children use computers to learn things on their own?
- 4.Can children continue to use computers to acquire skills and knowledge without assistance?

Research Methodology

A case study was carry out in this research as it provides an extensive coverage of the problem and it will provide justification as to why the findings and conclusion can be accepted or rejected. Both quantitative and qualitative approaches were adopted to collect data for this investigation. These approaches will help the researchers identify how children use a computer, to what extent they can use a computer to learn and what are the skills and knowledge they develop when they use computers to learn on their own. The context of this research is geared at underlying the relationship, in terms of cooperation, between teachers, students and parents within 2 southern primary schools in Mauritius. The qualitative data focused on interviews with children, examination of the students' work on PCs, observation in their ability to explore an interface, use a mouse, keyboard and the Internet. The quantitative data (for example: marks obtained in pre-tests and post-tests as well as results obtained from questionnaires) provide information which is easy to analyze statistically and fairly reliable. Descriptive statistics and charts have been used to analyze the quantitative data.

Participants & Sampling

Two primary Government schools in Zone 3 were chosen, School 'A' and School 'B' both found in the south. Two schools were chosen instead of one because firstly, the validity and reliability of the respondents can be enhanced as their answers could be compared. The results from both schools could then be analyzed carefully hence making the results more valid and reliable.

School	Number of parents	Number of GP teachers	Number of ICT teachers	Number of children (Standard I –III)
School 'A'	15	10	1	60
School 'B'	15	10	1	60

Table 1: Number of participants involved in both schools

Data collection tools

For the purpose of this study, as mentioned earlier, several data collection tools would be administered to gather data from the participants, Table 2.

Data collection instrument	Purpose of the instrument
Pre-test in classroom and /post-test in the ICT lab	To check whether computers help children to learn better as compared to traditional classroom methods
Interviews with students	To determine whether the students have access to technology at school/home and if so, to what extent are they familiar with using it and what do they use a computer for?
Observations with students by means of a checklist	To analyze what knowledge and skills do children acquire through unsupervised ICT use.
Observations with students + record time taken by means of a Gantt chart	To examine to what extent children can use computers to learn on their own
Questionnaires and Interviews with teachers and parents	To check if children can continue acquiring skills and knowledge without assistance

Table 2: Data collection instruments and their purposes

Pre-tests and post-tests with students

Two equivalent tests were carried out, one to be administered as a pre-test in the classroom and the other one as a post-test (carried out after 2 days) in the ICT lab under the supervision of the researchers. The tests results were then compared and students' views about both types of assessment being carried out were video-recorded. A description of the tests is detailed in the Table 3.

Class	Written class-test (supervised by the researchers in class)	Practical test (monitored by the researchers in ICT lab)
Standard I	Drawing and coloring of shapes using colored pencils and rulers	Similar exercise by using Paint (researcher opens the program for children)
Standard II	Labeling of body parts using pencils and erasers	Similar exercise by using a drag and drop activity found on an interactive CD (researcher opens the activity for children)
Standard III	Activities on Food and Health	Similar exercise by using activities found on interactive CD (researcher opens the activity for children)

Table 3: Description of the activities involved in pre-tests and post-tests

Interviews and observations with students

First and foremost, a pre-study investigation (in the form of an interview) on students' usage of computers was designed with a view to determining whether the students have access to technology at school/home and if so, to what extent they are familiar with using it and what do they use a computer for. Moreover students were being observed in order to investigate what knowledge and understanding do children acquire through unsupervised ICT use.

Investigating children's use of ICT

Children of different ages are in at their different phases of development and appropriate research methods should be considered. One of the methods commonly used is drawing. It is easy for children to express themselves through drawing than through writing or speaking, as they may have difficulty discussing abstract concepts (Bruckman and Bandlow, 2002; Druin, 2002). When allowing children observe other children using technology, for example, Druin (2002) found that children seemed to take more effective

notes of their observations through drawings combined with small amounts of text, rather than text descriptions only. This is why simple free drawing tasks using Paint have been applied successfully to study children's knowledge and understanding of ICT. Students were observed over a period of 2 months (6 weeks) in the school ICT lab. The observation was carried out depending on the availability of the ICT lab.

Questionnaire and Interviews with teachers and parents

An interview was carried out with 30 parents and 10 teachers from both schools. The main purpose of the interview was to depict information on whether children can continue acquiring skills and knowledge without assistance.

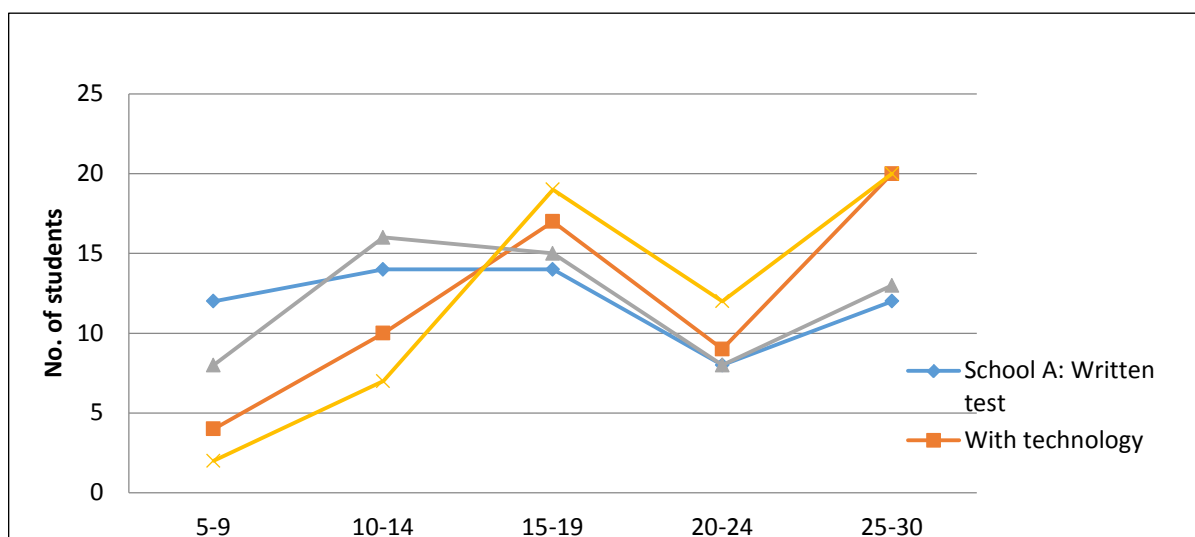
Assumptions and Limitations of the study

Since ICT is taught as a subject at school from Standard I itself, this study presumes that the selected children already have a basic notion of the names of different hardware components (mouse, keyboard, and monitor). It is also assumed that children can manipulate a mouse and a keyboard and are already familiar with programs like Microsoft Word and Paint.

Results from pre/post tests

The results are displayed by means of a line graph. The results obtained show that students have worked very well in both tests but there is a slight improvement in the performance of the students when they used technology to do the post test.

Figure 1: Graph showing the results obtained following the written tests in school A and B



Following the Pre-study investigation (in the form of an interview), it was found that all students from both schools have access to a computer and they can manipulate a PC. 68% students from school A and 80% students from school B have a PC at home. Further it was found that in school A, 40% would use a PC almost everyday, 43% would use a PC at least once a week and 17% would use it rarely. In school B, 50% would be using it everyday, 40% once or twice a week and 10% will be using the PC rarely.

The results in the bar chart show the tasks for which the students from both schools would normally use a PC for.

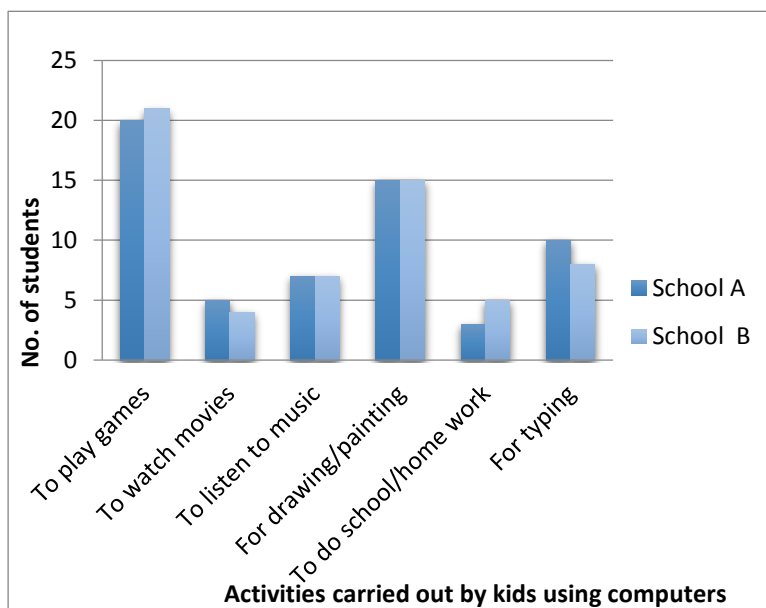


Figure 2: Bar chart showing how students from School A and B use a computer

The bar chart shows that children use computers mostly to play games and draw/paint. But they also use them to type, do school/homework, listen to music and watch movies. Since after playing games, students like to draw/paint, free drawing tasks using Paint have been given to children in order to study their knowledge and understanding of ICT use. This activity was carried out over a period of 3 weeks and the availability of the ICT lab.

	Description of the activity (1 hour)
Weekly Schedules	Task: Free drawing using Paint
Week 1: Standard I from both schools	Bring students to the ICT lab
Week 2: Standard II from both schools	Provide each student with a computer
Week 3: Standard III from both schools	Ask students to open Paint and to start drawing whatever they want
	Meanwhile, the researcher walked around and recorded observations by means of a checklist found in Appendix D

Table 4: Table showing description of the activity ‘Free drawing using Paint’

Observations during the practical session

During this activity, the researchers discovered that working out this activity in the ICT lab was a challenging and novel experience for the children. The findings were broken into two tables. The main reason of doing so was because children who already have computers at home were found to be more versatile with using computers as compared to those who don’t have, Table 5.

Pupils who have access to computers BOTH at school and at home	Pupils who have access to computers at school ONLY
Students who have access to computers both at school and at home could follow the instructions easily. They seemed to be familiar with instructions like "open the program Paint. BUT it should be noted that around 35 students (58%) could not open the program ‘Paint’ by them. The researcher had to intervene.	Children who have access to computers at school only encountered lots of difficulties to follow the instructions. The computer vocabulary was largely unfamiliar to them. They were not acquainted with instructions like "open the program Paint" even though instructions were given by using the mother tongue. The instructor had to guide the children and provide help at different times.

Once the program was launched, the children started to draw and color by using the tools available. BUT some (63%) asked questions like: How to erase, how to insert text, where is the color toolbar.... etc. Here again, the researcher had to provide help.	During the working session, some children were found to be timid, unsure or insecure about their computer abilities. Since they did not use computers on a regular basis, the researcher had to provide help at each step.
Students enjoyed drawing things like: shapes, cars, houses, and seaside. Once their drawing was over, some asked researcher how to open a new page. So, the researcher helped the children once again.	Children liked to use the objects found in the toolbar to draw shapes. Similarly, here also children liked to draw houses and schools.

Table 5: Table showing observations made during the practical session of the ‘Paint activity’

As mentioned above, students were observed over a period of 2 months (6 weeks) in the school ICT lab. During Weeks 1 -3, students were observed in terms of their ability to use Microsoft Word. Here also, the researchers devised a list of tasks so as not to make the children get distracted from the task. The tasks shown on Table 6 were as follows:

Standard I
Write their names
Insert shapes (circle, square, rectangle and triangle)
Write simple sentences: I am in Standard one. Researcher observed children by means of a checklist found in Appendix D

Table 6: Table showing activities carried out by Standard I children on Microsoft Word

Standard II
Write their names
Insert & color shapes
Write short sentences (i) Rita is a good girl. She is in Standard II. Researcher observed children by means of a checklist found in Appendix D

Table 7: Table showing activities carried out by Standard II children on Microsoft Word

Standard III
Insert& color shapes
Write the names of the shapes
Write a short paragraph: I am in Standard III. Researcher observed children by means of a checklist found in Appendix D

Table 8: Table showing activities carried out by Standard III children on Microsoft Word

It was observed that in this activity, children can teach themselves as well as their friends in the same surrounding. But most of them needed help from the researchers. For example, while typing sentences, 63% of students from school ‘A’ and 58% students from school ‘B’ asked the researchers how to leave a space after each word. Moreover, 60% children from school ‘A’ and 53% students from school ‘B’ did not know how to capitalize the letters. Additionally, 57% students from school ‘A’ and 51% students from school ‘B’ did not know how to move from one line to another.

Finally, during weeks 4-6, students were observed in terms of their ability to use the Internet. It should be noted that since only a few computers were equipped with Internet facilities, all 20 students from each class could not work at the same time. Special arrangements were made so that all students can get access to the Internet. The researchers devised a list of tasks so as not to make children get distracted from the task. The tasks were as follows:

Standard I
Since the children are too young, the researcher types the following URL in the address bar: http://www.cookie.com/
Researcher then asked children to click on any activities shown since all activities have been designed for 5-7 years old
Researcher observed children by means of a checklist

Standard II
Same as above

Standard III
Since Standard III children are more mature than Standard I & II children, They were asked them to type whatever they wished in the search bar.
Those who have not used the Internet before, the researcher typed the following URLs of some learning websites for them so as not to let them get distracted from the main task. http://www.cookie.com/
Here again, researcher observed children and provided help when needed

Table 9: Table showing activities carried out by Standard III children on the Internet

Following the above activities, it was found that most children like to play games on the Internet with a percentage of 75% for school A and 70% for school B. Through this observation, it has also been found that with a very limited technical knowledge of Internet use, the children involved in this study were able to perform various activities on the learning websites. Children learned mainly through experimentation as well as by observing others and sometimes by sharing knowledge with each other. Children who used Internet at home easily carried out more complicated tasks such as closing an application and re-opening another one.

Findings from interviews with teachers and parents

Summary of questions during the interview with parents –School ‘A’ and School ‘B’

1. Do you have a computer at home?	YES - 75%	NO - 25%
2. What does your child do with a computer at home?	55 % - play games 35% - draw/paint 10 % - others (music, type, watch cartoons)	
3. Can children use computers to learn by themselves ?	2 % said Yes 98% said No	
4. Can children continue use computers to acquire skills and knowledge without assistance?	95% parents said No 5% parents said Yes	

Table 10: Table showing questions and answers from parents following the Interview

Main questions during the interview with teachers –School ‘A’ and School ‘B’

1. Have you ever used technology in your class?	YES - 95%	NO - 5% (Why: Due to time constraint, loaded syllabus and lack of Internet facilities)
2. Can children use computers to learn by themselves ?	15 % said Yes 85% said No	
3. Can children continue use computers to acquire skills and knowledge without assistance?	3 % said Yes 97 % said No	

Table 11: Table showing questions and answers from teachers following the Interview

Discussion

Research question 1: “Does technology help children to learn better?”

Two studies have shown that when ICT technologies have been used as an integrated part of the curriculum, students become highly engaged for longer periods of time, higher achievement in academic and less behavior problems (Cooper & Brna, 2002). It has been observed that there is a slight improvement in the performance of the students in terms of marks obtained when they used technology to do the post-test. Some of the benefits noted by the researchers when using computers with the children were that students were more excited when they received computer-based instructions.

- The amount of time required to do the activities on the computers were less compared to the time spent in the pre-test.
- With computers, students became more independent learners.
- Contrary to initial fears, computers do not isolate children. Rather, they serve as potential catalysts for social interaction. Children prefer to work with a friend rather than alone, and they make new friends around the computer.

Research question 2: Knowledge and skills acquired through unsupervised ICT use by means of Drawing and painting using Paint

For most children, the first contact with the computer is through some sort of game, and children play computer games very often. From the interview carried out, it has been found that children like to play games Pinball, Solitaire, Internet games (car games, Barbie games, angry birds’ games, etc). To examine what knowledge and understanding do children acquire through unsupervised ICT use; free drawing tasks using Paint have been given to children in order to study their knowledge and understanding of ICT. The findings from this study on the use of computers by children on their own suggest that even though children had access to computers both at home and at school, they required helps. On the other hand, children who had little access to computers also required helps at each step. It was therefore not surprising that most of the participants demonstrated very little technical knowledge about computers. However, it should be noted that despite their lack of knowledge about computers and its uses, drawings using ‘Paint’ often suggest that they have an active interest in using computer. For example, many of the participants, with the help of the researchers, have been able to create some nice drawings.

Research question 3: To what extent can children use computers to learn things on their own?

When children used Microsoft Word, the researchers observed that children can teach themselves as well as their friends to certain extents. However, it is also true that the children would eventually get stuck and they would seek helps in order to carry out some particular tasks like (capitalization, line spacing, etc).

As mentioned earlier when using the Internet, even with a very limited technical knowledge, the children involved were able to perform various activities. More complicated tasks such as closing an application and re-opening another one was carried out by children who are exposed to Internet at home. Here also, children needed help. It was found that students from Standard V and VI only have access to Internet at the school. So, it was obvious that the children needed someone to guide them through this process. From observation, it was clear that the children can self-educate themselves, but only to certain degrees. The fact that children can teach themselves cannot be denied since learning is a natural process which a child adopts since birth. But eventually, from this observation, it has

been found that children do need a teacher to facilitate the learning process when using the Internet.

Research question 4: Can children continue use computers to acquire skills and knowledge without assistance?

Some parents (2%) who agreed that children can use computers to learn by themselves believed that since the children regularly have access to their PC at home, they can be left alone to learn by themselves. On the other hand, the other parents (even those who do not possess a computer at home) believed that children are too young to be left alone with a computer. They need someone to guide them. 5 % of parents interviewed, believed that if easy applications such as Paint, Microsoft word are concerned, then children can be left alone to learn by themselves. Parents were of the view that a kid does need a teacher or a parent to facilitate the learning process as he grows older, but with time and practice, the child will be ultimately responsible for teaching himself.

Teachers commented that humans are curious by nature; and it is this curiosity that often leads children to learn by their own. When using technology to learn, the learning approach is different as it encourages children to explore, learn and enjoy. They can develop their creativity and build certain autonomy by using the computer to learn by themselves. In the end, they will be happy that they have been able to come up with something constructive without the help of an adult. Their cognitive aspects would also develop through this approach. 3% teachers believe that given time and practice, children can learn things on their own. 97% of teachers interviewed believed that children, despite their abilities to learn on their own, would eventually need the presence of facilitators for their smooth learning cycle since they are too young.

Conclusion

From Dr. Sugata Mitra's experiment, it has been proven that children can teach themselves in one way or the other. They learnt by themselves and by working in groups through interactions and curiosity thus discovering things on their own. It is thought that children learn quicker on their own but within a classroom, under the teacher's supervision, the children tend to get into another sort of learning mode where they will be frequently asking questions like "What should I do now?" and they expect the teacher to answer. Through this study, we have seen that children can learn and develop skills such as using a mouse, keyboard, typing, drawing, coloring, playing as well as exploring an interface. This study also showed that children using technology to learn by themselves in an unsupervised environment is not always a success as they may have difficulty in learning on their own especially when they do not know how to use a program. As such, leaving children alone to learn with technology whether at home or at school may lead them to go astray and think in the wrong way. It is agreeable that curiosity is an important trait of a genius because it makes the mind active instead of passive; observant of new ideas. However, there will come such a moment when they will need a facilitator for guidance because it is the role of teachers to determine what the best actions are to help enhance the learning process for a particular.

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