Children and the Internet – A Preliminary Study in Uruguay

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Abstract

Since 2007, almost every child in Uruguay has a laptop connected to the Internet. We investigated possible changes that such exposure to IT may have had on the children's ability to read, understand, search and analyze information. This paper reports the results of experiments carried out in 4 schools in and around Montevideo. The experiments consisted of children attempting to answer 'deep' questions in groups, children attempting to read beyond their expected levels in Spanish and English, and whether children would read better in groups than individually. The paper describes the design and limitations of these experiments, the results and their possible interpretation. It is suggested that children in groups can perform better at 'hard' problems than they can individually. It may be the opposite for 'easy' problems. It is suggested that the children studied in Uruguay are as good or better at reading than the corresponding standard recommended in the UK/USA. They are also shown to be capable of researching effectively using the Internet. The study raises several new research questions.

1. Introduction

El Plan Ceibal is a national Uruguayan initiative to implement the "1 to 1" model to introduce Information and Communication Technologies (ICT) in primary public education (http://www.ceibal.org.uy/). It has been in operation since approximately 2007. As a result, almost every child in Uruguay's primary schools has a laptop and a free Internet connection, as do all primary school teachers.

We decided to investigate the effects these computers have had on the children's reading comprehension, information searching and information analysis skills.

2. Backgound

In the early days of eLearning, instructional material, mostly in the form of text available on a computer screen was prevalent. It was supposed that individual learners would be capable of learning from this environment and, indeed, that this would transform distance learning. Such misconceptions, and the resultant learning disasters, persisted for years (Hara and Kling, 1999).

Collaborative and group learning has been researched since the 1970's (see for example, Blumenfeld et. al. 1996). Computer Supported Collaborative Learning (CSCL) is a relatively recent field of great interest. 'The inclusion of collaboration, computer mediation and distance education has problematized the very notion of learning and called into question prevailing assumptions about how to study it." (Stahl, Koschmann, & Suthers, 2006).

CSCL amongst children became possible only when computers became available to children and when Internet bandwidths became useable for audio visual media and entertainment. Research on CSCL and children is relatively recent (see, for example, Crook 1998). Regular interaction of children, computers and the Internet brings in a new perspective to eLearning. The 'Hole in the wall' experiments (Mitra et.al, 2005; Mitra and Rana, 2001) consisted of computers embedded into walls of slums and villages and used by unsupervised groups of children.

These experiments showed that children in groups can learn to use computers and the Internet on their own, with no prior knowledge and with none or very little literacy.

Subsequent experiments showed that such groups of unsupervised children can attain educational objectives by themselves, in the absence of schools (Inamdar, 2006). Children have been shown to learn algebra by themselves (Nicaud et al, 2004). Several instances of educational progress have been measured (Dangwal, 2005) and the process by which such unsupervised and self organised learning happens, have been described (Dangwal and Kapur, 2008).

This body of research seems to show that children in unsupervised groups can:
- Learn to use computers and the Internet on their own
- Use the Internet to search for information, read, understand and evaluate what they have found
- Answer questions about curricular subjects they have not been taught
- Compensate for inadequacies in the quality of school teaching (Mitra et al, 2008)

Based on these results, it is reasonable to expect significant changes in the children of Uruguay.

In what follows we describe a set of experiments to evaluate, or at least detect, these changes.

3. *Experimental design and limitations*

Due to limitations in time and finances, the experiments were planned over a three day period (in June 2011) in four schools in and around Montevideo. We, therefore, do not have data from the rest of Uruguay. 78 children, between 9 and 11 years old (average age 10, all from grade5), from the four schools participated in the study. This sample size, though not large, does give us an indication of the direction in which future measurements need to be made.

The experiments consisted of the following:

1. Children would form self organized learning environments (SOLEs) and find answers to questions posed by us. A SOLE consists of a learning space, such as a classroom with the furniture rearranged to enable groups of 3-5 children to interact with a computer and the Internet. They are given a question to research. Children select their own groups, can change groups if they wish to, can talk to each other and across groups. Groups can look at each other's work. At the end of a given time period, usually between 30 and 45 minutes, each group would make a presentation on their findings.
2. Children would read and answer questions from reading materials at the USA grades 1, 3 and 5. Other grades were not selected due to constraints of time. We chose tests from the United States for the US system's grades 1, 3 and 5. They were selected from www.superteacherworksheets.com.
3. The reading exercises would be carried out by children individually and also in groups.
4. The reading exercises would be carried out in Spanish as well as English. We used the English texts and questions translated into Spanish for this purpose.

Ideally, each child should have gone through each of the 4 experiments above. However, this was not feasible due to time, suitability and time-tabling problems. We then decided to conduct one or more of the experiments where possible.

Photo 1. A group in a SOLE

4. Schools and experiments

Primary schools in Uruguay are identified by number. Our experiments were carried out in schools numbered 28, 31, 70 and 136. These schools are nearly identical in size and the demographics of the populations they serve. This is useful in our context where not all the experiments can be carried out in all the schools. Since the schools are similar, it would be reasonable to expect that the results of an experiment carried out in one school would be similar to what we would have obtained if we had carried it out in the others.

The schools we had selected serve children from middle class backgrounds, with working parent(s). While the homes where the children come from are not poor, they do have severe constraints on finance.

School 31:

This is the first school where the experiments were conducted. The first experiment consisted of the question, 'How did the world begin? How will it end?'. The children were at this point learning about the solar system. The experiment was conducted in a SOLE format (Mitra, 2009). This consisted of the children forming groups of 3, 4 or 5 of their choice. Each group then researched the question using one computer, to ensure that discussions take place. The children are also allowed to talk to other groups and look at other's work (see http://sugatam.wikispaces.com/Papers+and+Articles, 'Method ELSE for schools where children teach themselves'). At the end of 30 minutes, the groups make a presentation of their findings. One child is elected by the children as the 'policeman' to maintain law and order and generally help everybody.

In school 31, the children's reports ranged from the Big Bang Theory to the ultimate demise of the Earth when the Sun expands to engulf it. They had clear comprehension and had rejected alternative theories based on theology and other schools of thought.

After this they were given a grade 5 level text to read in groups. Of the 26 children present 13 were given 4 copies of the text in English, while the other 13 were given 4 copies of the same text in Spanish. The English and Spanish groups were separated so they could not interact.

School 28:

Here 19 children constructed a SOLE of 5 groups and researched the question, 'Why do we slip on a wet pavement but not on a dry one?'. After 30 minutes the groups reported their findings. The children's answers covered the basics of friction, Newton's third law of action and reaction and they went on to electrostatic forces as the cause of friction. They were fluent readers and clear speakers and seemed to have understood the concepts at the elementary level, as reported by their teacher.

Next the children were given a grade 3 Spanish text to read, individually and answer the comprehension questions at the end.

School 70:

Here 21 children constructed a SOLE of 5 groups and researched the question, 'Why do we dream?'. After 30 minutes, the children's research reports covered the neurology of dreams (the brain and neural activity continues during sleep) and went on to the psychology of dreams including the work of Freud and Jung. They seemed to have enjoyed this question and were willing to work on it for more time.

Next, 9 children worked in groups while the rest worked individually on a grade 1 level text in Spanish. They answered questions on the text. Individuals handed in one answer sheet each while the groups handed in one answer sheet per group.

School 136:

Here 26 children constructed a SOLE of 6 groups and researched the question, 'How do we remember? Why do we forget?' After 30 minutes, the children's reports ranged from neural network connections to the nature of memory, long and short term memories and brain's ability to categorize information by importance.

Next, 12 children formed 3 groups and were given a grade 3 text in Spanish, while the others were given the same text individually. Each group handed in one answer sheet, while the individuals handed in one answer sheet each.

Photo2. Reading comprehension exercise

5. Results

The results are summarized in table 1.

	School 28		School 31		School 70		School 136	
	Individual	Group	Individual	Group	Individual	Group	Individual	Group
Grade 1 text Spanish					92.9 (n=12)	82.5 (n=9)		
Grade 3 text Spanish	48.3 (n=19)						72.7 (n=14)	82.3 (n=12)
Grade 5 text Spanish				40 (n=13)				
Grade 5 text English				7.5 (n=13)				

Table 1. All scores are out of 100. Each score reported here is the average for the answer sheets submitted for that exercise

6. Discussion

It would have been ideal if we could have carried out all of the experiments in all of the schools studied. However, this was not possible due to constraints of time and timetabling.

We could have conducted one single experiment in all the schools. However, our purpose was not to compare the schools but to study the effect of computer use and collaborative work on reading comprehension. A single experiment, with a single grade of text, would not have given us any idea of the performance across different grades of texts. We would also not have been able to compare English and Spanish reading scores.

Keeping these difficulties in mind, we decided to administer different tests in each of the schools. For example, grade 1 Spanish text was only tried in School 70, while grade 5 English text was only tried in School 31, and so on.

6.1 The SOLE experience

In each of the schools, we noticed that the children had excellent searching skills. They were able to read web pages in Spanish and were capable of summarizing the main findings. We have observed similar behavior in schools in England, when children are allowed to research in groups and are used to the idea of doing so. Using the SOLE approach would appear to be an effective method of self-organized instruction in Uruguay.

The children are confident of their ability to use computers and the Internet and would frequently solve each other's technical problems.

6.2 English

Children who cannot read English at all, were able to score 7.5% when attempting to read in groups. In a group of 4, when one child is unable to understand a word, others attempt to guess. Sometimes they would use English to Spanish dictionaries. This raises an important research question: 'Is reading comprehension in groups higher than in the individuals comprising the group?'

When asked whether they liked working in groups with one computer, the children agreed enthusiastically. When asked why, one child said, 'Four brains are better than one'.

6.3 Reading comprehension in Spanish:

In school 28, the average individual score for reading a grade 3 text was 48.3%, while in school 31, when reading a grade 5 text in groups, the average score was 40%.

Once again, the data seems to hint at the fact that group reading comprehension is higher than individual. While the schools where this data was collected were different, the demographics of the area and the children were similar, as we have described in the design section above. We could not test school 28 for group reading comprehension.

In school 70, the average of individual reading scores for a grade 1 text was 92.9, while the group reading score for the same text was 82.5. This would seem to contradict the findings from the group scores in school 136. Upon investigation we found that the children thought the grade 1 text was too easy for them. The groups became listless and answered carelessly or at random. Individuals finished very quickly and went on to do other things. This raises a research question, 'Are individuals more effective at doing 'easy' tasks than groups?' Could it then be that the task of reading grade 5 text in school 31 was challenging enough for the groups to perform almost as well (40%) as the individuals did with grade 3 text in school 28 (48.3%)?

One of us (SM) has worked on the SOLE methodology in England for several years. It is interesting to note that when the group approach is explained to children, particularly that there is no competition at all ('we will all try to get to the answer together') and they are asked 'Would you like to try a hard question or an easy one?', they often say 'very hard!'. However, when they are told to research silently and by themselves, they ask for an easy question. There is fear of individual failure, which is generally absent in groups.

Does the difficulty level of the task given affect the performance of the groups in an inverse way (the harder the task, the better the performance)? The depth with which the children researched the 'hard' questions in the SOLEs in all the schools seems to indicate this. We could frame this as a research question, 'Are groups of children able to perform tasks that are beyond their current individual capabilities?'

In school 136, the average individual reading score was 72.7 while the average group score was 82.3, for a grade 3 text. Once again, given a moderately challenging task, the groups had performed better.

7. Conclusion

The 'hole in the wall' experiments of 1999-2004 (Mitra et al, 2006) continues to interest educators all over the world. In these experiments, computers were embedded into walls of slums and villages of India for use by unsupervised groups of children. It was reported that groups of children can learn to use computers and the Internet on their own, irrespective of who or where they are, or even what language they know.

The data from Uruguay seems to indicate the reasons why the hole in the wall experiments produced the results they did. At the time of the hole in the wall experiments, it was not possible to give each child a computer; laptops were expensive and not common at all. These circumstantial reasons prompted children to work in groups and figure out what was considered impossible at that time - computers, operating systems, applications and the Internet. If children in groups have capabilities higher than their individual capabilities, as indicated by the data from Uruguay, we have an explanation for the results of these earlier experiments.

Reading comprehension of children who participated in this study is clearly between grade 3 and grade 5. This is close to key stage 3 in the British system (http://www.oup.com/oxed/pdf/GradeEquivalents.pdf). The testing for key stage 3 is done at age 14 in the UK (http://www.bbc.co.uk/schools/parents/national_curriculum_key_stages/) . The Uruguay children seem to have met, and perhaps exceeded, the UK standards.

Since there are no schools in Uruguay without computers, it is not possible to answer the question, 'what would have happened if schools did not have computers?'

While, in the absence of control groups, it is impossible to say whether this achievement is due, at least in part, to the laptops owned by the children, there is some indirect evidence that this may be the case. Measurements conducted by the authors in northeastern England, with English speaking children, indicated that the children of year 5 (10-11 year olds) were at a reading key stage of 2. These children are from a financially disadvantaged area and have access to computers mostly in their school and not at home. This is lower than the observed scores in Uruguay. This raises the question whether owning a computer and reading off its screen all the time will improve reading comprehension in children.

We suggest on the basis of the above study that exposure to computers over the last several years has improved the confidence levels, reading comprehension and information searching skills of the children of Uruguay.

Self organised learning amongst children could form the basis of new approaches to eLearning as well as open and distance education in the future.

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