British Journal of Educational Technology *Vol 37 No 2 2006* 295–298
doi:10.1111/j.1467-8535.2005.00514.x

Colloquium

Impact of Minimally Invasive Education on children: an Indian perspective

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Introduction

Education, formal or informal, aims at imparting knowledge or skills. Formal educational settings are characterised by conventional and traditional institutionalised features, such as rigidity and fixed ways of planning, ordering, and controlling, whereas, nonformal education refers to any organised educational activity outside the formal educational system.

The Minimally Invasive Education (MIE hereafter) occupies a distinctive and unique place in the educational learning system. MIE demonstrates a special case of the interplay of information technology (computers) and learning processes and emphasises the role of self-directed and participatory learning. Establishing a new pedagogy, based upon continuous research, it indicates that it is adaptable and modifiable to both the formal and informal settings.

MIE in the last few years has emerged as an educational method that is adaptable to demands of the situation and provides an alternative educational approach in contemporary times. It is likely to have far reaching results for developing nations, where achieving mass levels of literacy is of great concern.

Minimally Invasive Education

The pioneering research by Mitra (1999, 2000) when one PC was embedded in a wall facing a slum in Kalkaji, New Delhi and ongoing investigations (Mitra, 2003; Inamdar, 2004) have clearly indicated that 'groups of children when provided appropriate resources will attain computer literacy with minimum intervention'. The present discussion highlights the results obtained from locations covered under NIIT-IFC project. Funded by International Finance Corporation and implemented by NIIT Ltd (2002–2004), this project covers diverse regions (culturally, linguistically, and geographically) of India. At present, more than 100 computers have been placed in 26 locations all over India. Further, these experiments are being replicated in South Africa, Cambodia, and Egypt and help in endorsing the universal relevance of MIE.

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Research results

We share the salient results of the NIIT-IFC project as obtained on a national level in India as well as the current ongoing research programmes. The primary objective of the research was to establish an MIE learning model. This model aims to show that if appropriate resources are provided, computer literacy is possible for large numbers of children (between 8 and 14 years of age). One salient outcome is computer literacy as a consequence of collaborative learning.

Computer literacy

The measurement of computer literacy of children at MIE learning stations required an innovative and simple approach. It had been observed that children associate the icons with their functions. They form their own vocabulary for naming the icons they understand and use. Keeping this factor in mind, Icon Association Inventory was devised to measure the ability of the children to recognise and associate some of the commonly used icons with their functionality.

The inventory has been made independent of the name or the application associated with the icon. There are 77 icons, clustered in six broad categories based on their functionality. They are the Desktop, Excel, Generic, Internet, Paint, and Text format (The GUI Icon Association Inventory and MIE; Mitra, 2003). The test was administered on the day of inauguration, on the third day, on the seventh day, and then every month thereof.

Assessing the learning curve over an extended period of time solved the primary concern of measuring the learning process through icon recognition. Logistic function was fitted and it showed that children started with prior knowledge of 12.69 %, which translates into recognising 6.65% of the total icons. However, on the ninth month they recognised 43.07% of the total icons, which means that they achieved 85.98% of their potential. According to the model, there still is a further scope of learning computer literacy on their own, which is recognising 47.363% of the icons.

Throughout the research period large variations (in standard deviations) were witnessed while plotting the learning curve. These deviations could be a result of the difference in the pace of learning. There might have been some children who learned faster than the others.

Collaborative learning

MIE learning stations are public learning stations that provide children with the opportunities to decide when, how, and what to learn. Children form their own social networks at these learning stations, which facilitate information to percolate from the perceived leader(s) to various learners.

Children have free access to computers but they are not provided with any teacher, instead, they learn by operating in groups, that is, learning through peers who, by trial

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and error and/or observation, construct knowledge about it. In other words, they learn by 'collaborating or by shared cognition' (Bathla, 2002).

Second, the MIE environment encourages peer group learning, which enhances the level of aspiration (goal setting behaviour) among children (Bathla, 2002; Cappelle, Evers & Mitra, 2004).

MIE experiments consist of providing computers to children in safe, public locations such as a school playground or even outside school. We draw attention to the following salient issue: through such public learning stations MIE provides 'access to state-of-the-art personal computers to several thousand children in urban and rural India. The computers are placed outdoors, usually mounted on walls and, hence, often referred to as "Hole-in-the-wall" '.

This wide coverage is of great relevance and consequence:

- It enables contact and exposure to a large number of school children, particularly to those who are unable to attend regular school.
- In terms of infrastructure costs, it is much less than what is required to set up a computer laboratory.
- Also, content need not be curriculum-based, rather it leans more towards edutainment, that is, a medium that provides education through fun games (television, books, software).

Computers have the distinct attribute of a 'scaffolding' tool. It enables young children to learn basic computing skills in a social environment taking into cognizance the child's learning style. A child is curious by nature; he or she has a natural instinct to make sense of the world around him. The need to explore on their own is a strong motivating aspect that provides the necessary impetus to go ahead with learning. In a classroom situation the child is often a passive learner, but given a computer in a natural setting, the child comes forth as an active learner.

The results above have been obtained from completely unsupervised sites. If such learning stations are integrated in the formal education system or with projects addressing issues of street children, child labour, dropouts. etc, where the focus is on imparting the problem solving and other important life skills, then its impact on the academic performance can be measured effectively.

It is common knowledge that India is a multilingual and multicultural society. If such results can be observed in India, the likelihood of replication of such impact is possible in other countries.

Conclusion

The discussion above is based on the results derived from the performance in the informal settings, where the intervention was limited to providing relevant hardware and

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software. The project is being replicated in four schools now and it would be possible to study the direct impact of technology on academic performance.

The MIE approach, being cost-effective, can be useful in both the developing and underdeveloped countries to address the problem of illiteracy and digital divide. It has the potential to become an effective medium of providing economically disadvantaged children (both school-going and out of school children) with the opportunities to enhance their learning and other useful skills.

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