Computer-aided learning for children in multi-user environments

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Field Research: May-August 2005

- Interviews & Observations of Schools using APF software
- Non-random cluster selection of schools
- Selective recruitment of respondents
  - 9 observations
  - 130 interviews – range 3 min – 180 min
    - 18 schools
    - 15 HTs / HMs
    - 28 subject teachers
    - 7 computer teachers
    - 27 students
    - 15 parents
    - 4 VEC/Panchayat
    - 21 community
    - 5 government
    - 8 administrators/agency

Children in Cuttack running an OPEPA CD with a tracing game
### Socio-economic, project stage variation

<table>
<thead>
<tr>
<th>Location</th>
<th>Language</th>
<th>Landscape</th>
<th>Child Labour</th>
<th>Poverty</th>
<th>APF involvement</th>
<th>CALC</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kogadu</td>
<td>Multilingual</td>
<td>Hilly</td>
<td>Minimal</td>
<td>Moderate</td>
<td>I &amp; C</td>
<td>Developed</td>
<td>Estates</td>
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<td>Coastal</td>
<td>Minor</td>
<td>Moderate</td>
<td>I &amp; C</td>
<td>Developed</td>
<td>SF, AL</td>
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<tr>
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<td>Moderate</td>
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<td>I &amp; C</td>
<td>Developed</td>
<td>AL, Fishing</td>
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<tr>
<td>Bellary</td>
<td>Monolingual</td>
<td>Arid plains</td>
<td>Moderate</td>
<td>Dire</td>
<td>I &amp; C</td>
<td>Developed</td>
<td>AL, Livestock, Mines</td>
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<tr>
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<td>Arid plains</td>
<td>Serious</td>
<td>Dire</td>
<td>I &amp; C</td>
<td>Developed</td>
<td>AL</td>
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<tr>
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<td>Agricultural</td>
<td>Moderate</td>
<td>Dire</td>
<td>I &amp; C</td>
<td>Developed</td>
<td>Handlooms, AL</td>
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<tr>
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<td>Coastal</td>
<td>Minimal</td>
<td>Moderate</td>
<td>I &amp; C</td>
<td>Nascent</td>
<td>AL</td>
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<tr>
<td>Mumbai</td>
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<td>Urban</td>
<td>Minimal</td>
<td>Minimal</td>
<td>None</td>
<td>Developed</td>
<td>CL</td>
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<td>Urban</td>
<td>Minimal</td>
<td>Moderate</td>
<td>Content</td>
<td>Nascent</td>
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<td>Forest</td>
<td>Minor</td>
<td>Dire</td>
<td>Content</td>
<td>Nascent</td>
<td>Tribal, AL</td>
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<td>Coastal</td>
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<td>AL</td>
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</tbody>
</table>
High school computer center: Pondicherry

This is a computer center from Abishekapakkam in Pondicherry – these typically seat between 3-6 children per PC – notice that the teacher has little involvement in the actual class functioning. The aggressive users (often standing) in this case are students from senior classes sneaking in for extra time.
In Baripada, Mayurbhanj district in Orissa, the local school has three computers, to be spread over 500 students – this numerical equation is not uncommon, consequently, as many as 10 students can be using one computer simultaneously – notice the interactive work here
Other Research

- Profiling of
  - Parents
  - Dropouts
  - Headmasters
  - Computer teachers

Dropouts are from the poorest families and imp. wage earners

Caste issues, selective education of children

Headmasters critical for success, but least invested

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Observations: Social

- Enthusiasm, despite lack of understanding of computing
- Public school demand / Computers vs. English language
- Village community endorsement not adequate stability indicator
- Timetables highly improvisational
- Significant handholding needed from implementing agency
- Likelihood of household spillover impacts of ICTD (other research substantiates)
- High absorption even in highly disadvantaged settings
Observations: Curricular

Teacher Difficulties (and student difficulties, largely):
- English (Pondi, Karnataka)
- Geometry (Orissa, Karnataka)
- Labs

Student Benefits
- Match concepts fractions / LCM
- Geography (Pondicherry CD popular even in Orissa)

CALC adaptive, learning pace varies highly
- Reinforcement of classroom standings in CCs
- Children easily tire of narrative content and want to move to interactive stuff
Seating patterns

No conclusive evidence, but enough to merit further investigation

Using the ANOVA test for Statistical Significance we find:
- The correlation between the position occupied by the student during the computer class and
  - the **student’s family’s economic position** is statistically significant to over 95.1%
  - and to a **student’s performance in class** is statistically significant to over 99.8%

<table>
<thead>
<tr>
<th>Seating Position</th>
<th>L2</th>
<th>L1</th>
<th>T</th>
<th>R1</th>
<th>R2</th>
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<tbody>
<tr>
<td>Class Performance</td>
<td>1.50</td>
<td>2.00</td>
<td>2.68</td>
<td>1.95</td>
<td>1.50</td>
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<tr>
<td>Economic Affluence</td>
<td>2.00</td>
<td>2.36</td>
<td>2.68</td>
<td>2.24</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Position and Family Affluence

Class Size: 21

LEFT
SD=0.66

RIGHT
SD=0.83

CENTER
SD=0.48

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Position and Classroom Performance

Class Size: 21

LEFT
SD=0.82

RIGHT
SD=0.86

CENTER
SD=0.48
Shuffling seating

Children in positions R2 is the smart kid in class, R1 is average, and C and L1 were among the poorer performers – C being the poorest according to the teacher. Before the seating intervention, R2 was the most active, controlling the mouse and running ahead with the game – all the three remaining were inattentive. There was no dialogue.
Future Plans: Interaction Design

Developing regions have unique problem of multiple-users to a single screen, while most CALC is designed for single user environments

QUICK FIX RECOMMENDATIONS UNDER CURRENT SYSTEM

- Shuffling students on an experimental basis
- Single set of instructions per active class, streamlined instead of self-paced

DESIRABLE CURRICULAR CHANGES

- Quick modules that deal with one specific problem
- Intelligent software, adaptive to number of users, and ability of each user
- Split screen options
- Multiple input devices or shared keyboards
Thanks

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