Using a Web-based Classroom Interaction System to Enhance Student Learning

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Classroom Interaction Systems

PRS (Personal Response System)
- Multiple-choice questions
- Instructor feedback
- No student feedback

PDA (Personal Digital Assistant)
- Various question types
  - Multiple choice
  - Short answer
  - Ranking tasks
  - Likert scale
- Question sequences
  - Branched (answer-based)
  - Randomized set
- Two-way interaction
  - Feedback to/from students

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Research Questions

- Did course performance (as measured by course grades) improve with PDAs relative to PRS?
- Did more frequent users of PDAs perform better than less frequent users?
- What were students’ attitudes toward the impact of PDAs on their learning?

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Research Context & Participants

- Elementary Education Majors
  - Very few have experience with technology
- Classroom Interaction System
  - Fall 2003 (N=63) PRS
  - Fall 2005 (N=87) PDA
- Pedagogy
  - Peer Instruction during lecture
  - Learning Cycle in Activities Center

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Data Sources

- Course grades with PRS: Fall 2003 (N = 64)
- Course grades with PDA: Fall 2005 (N= 87)
- Data logs of PDA use: Fall 2005 (N=87)
- Student Survey: Fall 2005 (N=87)
Course Performance: PRS vs. PDA

Course GPA with PDA greater than with PRS (p<0.036)

<table>
<thead>
<tr>
<th>COURSE GRADE</th>
<th>% OF STUDENTS</th>
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<tbody>
<tr>
<td>A or B</td>
<td>PRS 48% / PDA 52%</td>
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<tr>
<td>C, D or F</td>
<td>PRS 61% / PDA 39%</td>
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</tbody>
</table>

Course Performance vs. PDA Use

Students using PDAs more often scored higher grades

ANOVA (N=87) : p-value < 0.030

<table>
<thead>
<tr>
<th>PDA USAGE</th>
<th>MEAN COURSE GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>Responded to fewer than one-third of PDA questions</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>Responded to between a third and two-thirds of PDA questions</td>
</tr>
<tr>
<td>HIGH</td>
<td>Responded to more than two-thirds of PDA questions</td>
</tr>
</tbody>
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Student Survey Ratings

Percent who agreed or strongly agreed

- Responding to questions in class using the hand-held computers was useful to my learning (63%);
- Interacting with other students while discussing the questions in class was useful to my learning (61%);
- The hand-held computers help the instructor clarify what we do not understand (79%);
- This experience with hand-held computers has made it more likely that I will use this type of technology in my own teaching (85%).

Conclusions

- Did course performance improve with PDAs relative to PRS?
  - Yes. Statistically significant improvement in course grades with PDA vs. PRS for same course, similar students.
- Did more frequent users of PDAs perform better than less frequent users?
  - Yes. More frequent users of PDAs secured higher course grades than less frequent users.
- What were students’ attitudes toward the impact of PDAs on their learning?
  - A majority of students strongly or very strongly agreed that PDAs positively impact their learning.

Limitations & Future Work

- Correlation is not causality
  - PDA use correlation with higher performance does not imply PDAs cause higher performance.
- Investigate how PDAs are used, not just how often they are used
  - Certain ways of using PDAs may be more beneficial to student learning than others.

THANK YOU

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