Technology and Learner Motivation in Library Instruction: A Study of Personal Response Systems

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What best describes your position?

A. Learning Technologist
B. Librarian/library worker
C. Teaching/Learning Center worker
D. Academic Administrator
E. Academic Technologist
F. CIO
G. Teaching/Research Faculty
H. Other
Opinion

Clicker technology in library instruction enhances student motivation to learn

A. True
B. False
Which of these terms is NOT part of Keller’s ARCS Model of Motivational Design?

A. Attention
B. Relevance
C. Control
D. Satisfaction
Literature Review

Extensive research on positive effects of PRS (Clickers) on learning outcomes, particularly in large lecture classes –

• Mayer, et al
  • PRS enhances questioning methods
  • promotes academic performance

• Gauci, et al
  • PRS fosters active learning
  • increases student motivation and engagement
Literature Review (cont)

Limited but growing body of literature on effect of PRS in one-shot library instruction sessions –

• **Barbara Petersohn’s pilot study**
  - PRS in library instruction sessions leads to moderate increase in learning outcomes
  - specifically describes advantages of PRS in planning events of instruction

• **Emily Dill**
  - cautions against placing too much faith in the ability of PRS technology to improve learning outcomes
  - Anecdotal observation that PRS stimulates greater student engagement.
One-shot Library Instruction

- **Purpose:** prepare students to find and use information for research
- **Context:** course-integrated; professor initiated;
- **Challenge:** library skills of students unknown - difficult to determine knowledge gaps, activate prior knowledge, design instruction for specific learner needs
1. Do clickers increase motivation to learn in one-shot library instruction sessions?

2. If so, does increased motivation lead to better learning outcomes?
Keller’s ARCS Model of Motivational Design

Four general requirements for motivation to learn:

- Attention
- Relevance
- Confidence
- Satisfaction
Obtain and sustain the student’s *Attention*

- Novelty of technology gains attention early (clickers)
- Potential for spot quiz encourages sustained attention (clickers)
- Discussion of responses maintains attention (clickers)
Student believes that instruction is *Relevant* to personal goals or motives

• Pre-test establishes accountability for content and need for engagement (pre-test)
• Content is tailored to needs of Psychology researchers (pre-test)
• Discussion of class responses enables students to articulate their own research experiences (clickers)
Students have an appropriate level of *Confidence* that they will master the content

- Pre-test introduces objectives (pre-test)
- Feedback from discussion helps to clarify fuzzy concepts (clickers)
- Pre-test reveals knowledge gaps (pre-test)
- Ability to compare results with peers affects confidence (clickers)
Student experiences *Satisfaction* from successful completion of learning activity

- Realization that newly learned skills will contribute to research success
- Discussion of class responses to clicker questions gives students sense of control of their own learning (Clickers)
Methodology

• Pilot study in the fall.
• Gathering additional data this semester.
• Measuring motivation based on Keller’s ARCS model with a self reporting reactionnaire.
• Measuring ACRL based learning outcomes with pre- and post-tests.
Composition of classes

• Three 300 level Psychology Research Methods classes in spring semester, 2010.
  – Condition 1: 32 students
  – Condition 2: 30 students
  – Condition 3: 33 students
Composition of Classes

• College
  – 85% Arts and Letters
  – 9% Business
  – 5% Science/Engineering

• Year
  – 26% Sophomores
  – 43% Juniors
  – 30% Seniors
Conditions

• All classes:
  – ARCS-Based Reactionnaires (written)

• Condition 1
  – Clicker pre-test/clicker post-test

• Condition 2
  – Written pre-test/written post-test

• Condition 3
  – No pre-test/written post-test
ARCS based Reactionnaires
(5-point Likert scale)

• This class held my **attention**.
• The information presented in this class will help me complete my research paper (**relevance**).
• As a result of this class, I am **confident** that I can find resources for my research paper.
• This class helped me acquire a useful skill set for research in psychology (**satisfaction**).
Pre- and Post-Test Questions

Association of College & Research Libraries (ACRL)

*Psychology Information Literacy Standards*

- **Standard One – 2.c.** – Understands the role of *peer review*...
- **Standard One – 3.a.** – Understands that scholarly material can be obtained beyond local holdings (*interlibrary loan*).
- **Standard Two – 2.a.** – Uses appropriate Psychological terminology for searching databases...using keywords, synonyms, and *controlled vocabulary*...
- **Standard Two – 2.b.** Creates and uses effective search strategies..., such as *Boolean operators*...
Additional Information

- Year in school
- Prior library instruction
Condition One

• Clicker pre-test and post-test
  – We expect highest scores on ARCS motivation reactionnaire.
  – We expect greatest improvement between pre- and post-tests.

• Why?
  – Clickers will gain and sustain their Attention.
  – Pre-test establishes the Relevance of the class content.
  – Seeing the class scores anonymously will affect their Confidence.
  – Seeing scores immediately will be more Satisfying.
  – Discussion of results will be more Satisfying.
Condition Two

• Paper pre- and post-tests
  – We expect slightly lower scores on the ARCS reactionnaire.
  – We expect a smaller improvement in test scores (between pre- and post- tests)

• Why?
  – Less technology to gain/sustain Attention.
  – Pre-test establishes the Relevance of the class content.
  – Cannot identify problem areas (Confidence).
  – Unable to view/compare test results (Satisfaction/Confidence).
Condition Three

• No pre-test/paper post-test
  – Expect lowest scores on ARCS reactionnaire
  – Expect lowest scores on post-test

• Why?
  – No pre-test OR technology to gain their Attention.
  – No pre-test to establish Relevance.
  – No technology or pre-test to foster discussion (Satisfaction).
  – No pre-test to establish Confidence.
Results & Discussion
Round 2

• In progress!
  – We have new data for classes in condition 1 and 3

• Changes to design:
  – Individual case-level tracking of test scores & ARCS reactionnaire
  – Reactionnaire administered before post-test
Data & analysis - Aspirations

- ANOVA for post-test scores & ARCS scores between all 3 groups as well as grade levels and prior instruction
- T-tests between pre- & post-tests for conditions 1 and 2
- Question-level analyses (Boolean, peer-review, etc.)
Issues

• Sample sizes need to be larger for each condition
• Need Condition 2 data
• Crosstabulation shows significantly more sophomores in Condition 3
• Issue with one of the post-test questions – confusion about validity of data, but left in for this presentation
Results (for now)

• Mostly t-tests between conditions 1 & 3
• Student’s t-test developed by William Sealy Gosset as a cheap way to monitor the quality of stout while he was working at Guinness in Dublin

http://www-history.mcs.st-andrews.ac.uk/Biographies/Gosset.html
Descriptive

• Breakdown
  – N = 62
    • 34 sophomores
    • 16 juniors
    • 12 seniors
  – Prior library instruction?
    • Yes: 37
    • No: 25
Test Scores: Condition 1

- No significant difference between pre- and post-tests for condition 1 (no improvement – in fact, the class did worse on the post-test)
  - Pre-test class mean: 2.93
  - Post-test class mean: 2.83
Test Scores:
Condition 1 vs. Condition 3

- Students in Condition 1 did not perform significantly better on the post-test than did students in Condition 3 (-.45).
  - T-test \((p = .058)\)
  - Condition 1 mean score: 2.77
  - Condition 3 mean score: 3.22
Test Scores: Other Factors

- T-test on prior class vs. post-test score is significant (p < .05)
- Students who indicated having a prior class in library instruction scored lower (-.5) on the post-test
- Means:
  - Prior instruction : 2.2
  - No prior instruction: 2.7
ARCS

- Analysis so far shows no significant difference between conditions for any of the ARCS ratings.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Attention</th>
<th>Relevance</th>
<th>Confidence</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (clickers)</td>
<td>3.63</td>
<td>4.37</td>
<td>4.23</td>
<td>4.13</td>
</tr>
<tr>
<td>3 (control )</td>
<td>3.91</td>
<td>4.44</td>
<td>4.03</td>
<td>4.28</td>
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</tbody>
</table>
Satisfaction

• T-test on prior class vs. satisfaction score is significant (p < .05).
• Students who indicated having a prior class in library instruction reported (-0.32) less satisfaction.
• Means:
  – Prior instruction: 4.08
  – No prior instruction: 4.40
Attention

• T-test on prior class vs. attention score is significant (p < .05).

• Students who indicated having a prior class in library instruction had lower (-.45) attention scores.

• Means:
  – Prior instruction: 3.59
  – No prior instruction: 4.04
Attention

• Bivariate correlation shows a significant ($p < .05$) negative correlation ($r = -.20$) between student year and self-reported attention rating.

• (Lazy seniors.)
Attention

• Bivariate correlation of data shows that attention scores correlate positively and significantly (p < .05) with the total post-test scores for all conditions (r = .20).

• Students who indicated that the class held their attention actually scored better on the post-test.
Attention

- Interestingly, bivariate correlation shows that attention correlates positively ($r = .60$) and significantly ($p < .05$) with the post-test scores for students in condition 1 (clickers) who indicated no prior library instruction.
- No such correlation in any other group.
- Could have implications for first-year studies classes.
<table>
<thead>
<tr>
<th>Condition 1 (clickers) Prior instruction</th>
<th>Condition 1 (clickers) No prior instruction</th>
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<tbody>
<tr>
<td>Condition 3 (no pre-test) Prior instruction</td>
<td>Condition 3 (no pre-test) No prior instruction</td>
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Attention and post-test score

<table>
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<tr>
<th>Condition 1 (clickers)</th>
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<tr>
<td>Prior instruction</td>
<td>No prior instruction</td>
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<tr>
<th>Condition 3 (no pre-test)</th>
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</thead>
<tbody>
<tr>
<td>Prior instruction</td>
<td>No prior instruction</td>
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Conclusions

• Study in progress – need more cases to analyze.
• If clickers raise self-reported motivation and/or post-test scores for the group that uses them, we may be able to say that attention, etc. aroused by the technology is useful for one-shot instruction sessions and can help students better retain library information.
• We’ll see if paper pre-testing is just as effective.
• If no advantage, clickers might be better used in different contexts
Potential impact on instruction

• Clickers can:
  – Help instructors identify areas that need improvement and modify teaching methods
  – Allow instructors to tailor instruction on the fly
  – Provide an easy means of formative & summative evaluation for classes
  – Foster discussion in classes or encourage participation
Potential future study directions

• Re-iterations of this study can:
  – Allow us to compare motivation using other technologies (cell phones, etc.) and conditions
  – Inform instructional design of library classes with learner and context analyses, clarifying learner needs, and selection of appropriate instructional technology
Questions?

- Contact us
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  - Methodology:
    - Cheri Smith – csmith@nd.edu, (574) 631-4271
  - Data analysis and results:
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References


