Development and Validation: Teachers’ Perceptions of Computers Survey

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Background

Florida Digital Educator Summer Institutes

- **Purpose**
  - Train K-12 educators to integrate technology into the curriculum

- **Sponsor**
  - Florida Department of Education
  - Enhancing Education Through Technology (EETT)
Essential Conditions
Integration of Technology

Professional Development

Evaluation

Effective Technology Integration
Purpose of Study

- Validate the scores obtained from the *Perceptions of Computers Survey*

- Measure the changes that occur among teachers who participate in professional development

- Essential for policy makers and educators to make appropriate interpretations and decisions
Development

*Teachers’ Perceptions of Computers Survey*

- Paper and web form in 2000 (Hogarty & Kromrey, 2000; Hogarty, Lang, & Kromrey, 2003; Lang, Raver, White, Hogarty, & Kromrey, 2000)

- Recommended psychometric procedures (AERA/APA/NCME, 1999; Crocker & Algina, 1986; Dillman, 2000; White, Carey, and Dailey (2001)}
Development

- Constructs based on previous research studies and survey instruments used in the field
- Team of researchers with instructional technology and measurement & research expertise develop items
- Instrument pilot tested
- Revisions based on feedback and psychometric results
Development

- Paper format developed
- Web-based format developed
- Field tested (N=2156)
- Reliability between .74 and .92
- Exploratory Factor Analysis supported constructs
- Review and update of survey design, constructs, and items for 2006
Perceptions of Computers Survey

99 items that measure 8 Constructs

- Teacher Preparation for Technology Use
- Confidence and Comfort Using Technology
- General School Support
- Integration of the Computer into the Classroom
- Types of Software Used by Teachers to Complete School Related Activities
- Types of Software Used by Students to Complete School Related
- Perceptions of Computers and Technology
- Digital Educator Profile
Diverse Participants

- 475 Educators (n = 398 pre-survey)
  - K-12 teachers
  - Media specialists
  - Instructional technology specialists
  - Trainers
  - Administrators
- 19 school districts
- Reasons for participation
  - Grant requirement
  - Personal development
  - Graduate credits
## Perceptions of Computers & Technology

### Confidence And Comfort Using Technology

**Directions:** Please read the following statements and select the one response that best reflects your level of agreement.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have had adequate training in technology use.</td>
<td>1</td>
</tr>
<tr>
<td>I use computers effectively in my classroom.</td>
<td>2</td>
</tr>
<tr>
<td>I believe that technology enhances my teaching.</td>
<td>3</td>
</tr>
<tr>
<td>I believe that <strong>student use</strong> of technology enhances student performance.</td>
<td>4</td>
</tr>
<tr>
<td>I believe that <strong>my use</strong> of technology enhances student performance.</td>
<td>5</td>
</tr>
<tr>
<td>I feel prepared to use laptop computers in my classroom.</td>
<td>1</td>
</tr>
<tr>
<td>I feel prepared to create rubrics to assess multimedia projects.</td>
<td>2</td>
</tr>
<tr>
<td>I feel prepared to guide other teachers in planning and implementing lessons that incorporate technology.</td>
<td>3</td>
</tr>
<tr>
<td>I feel comfortable using computers for classroom instruction.</td>
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<tr>
<td>I feel comfortable assigning multimedia projects to my students.</td>
<td>5</td>
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</tbody>
</table>
Method

- Participants randomly separated into two groups
  - Group 1
    - Exploratory factor analysis
    - Reliability analysis
  - Group 2
    - Confirmatory factor analysis
    - Reliability analysis
- Reliability analysis post-survey items
Method

- Descriptive statistics to compare two groups
  - Participants
  - Responses to items
- Listwise deletion of missing data (n=125)
- Spearman correlation analysis to determine if items were related
Method

- Exploratory Factor Analysis
  - Principal axis factoring
  - Orthogonal solution with promax rotation
  - Kaiser’s Rule to determine number of factors
  - Examination of the skree plot to verify number of factors
Method

☐ Confirmatory Factor Analysis – in exploratory mode
  ■ Specify the model
  ■ Examine the Fit Indices
  ■ Examine the Model Modification Indices
  ■ Determine if items are functioning as predicted
  ■ Remove items if they have multiple correlated errors and load on more than one factor
  ■ Examine Model Fit Indices
  ■ Identify items for team to review, revise, delete, or replace
Results

- Exploratory Factor Analysis
  Confidence and Comfort Using Technology
  - Two factors explained 67.8% of variance
    - Comfort level
    - Belief about the benefits of technology
  - One factor explained 99% of the common variance (Hogarty et al., 2000)
Results

- Internal consistency reliability
  - Total survey ($\alpha = .978$, $CI95 .972 \text{ to } .983$)
  - Confidence and Comfort ($\alpha = .921$, $CI95 .903 \text{ to } .938$).

- The Item-Total Statistics identified one item for revision

  *I believe that student use of technology enhances student performance.*
# Results

*Exploratory Factor Analysis: Rotated Factor Pattern and Structure Matrices for Confidence and Comfort Using Technology*

<table>
<thead>
<tr>
<th>Factor and Item</th>
<th>Pattern Matrix</th>
<th>Structure Matrix</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Factor</td>
<td>Factor</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Comfort Level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel prepared to guide other teachers in planning and implementing lessons that incorporate technology</td>
<td>1.017</td>
<td>-0.157</td>
</tr>
<tr>
<td>I feel prepared to use laptop computers in my classroom</td>
<td>0.882</td>
<td>0.041</td>
</tr>
<tr>
<td>I have had adequate training in technology use</td>
<td>0.779</td>
<td>-0.061</td>
</tr>
<tr>
<td>I feel comfortable using computers for classroom instruction</td>
<td>0.767</td>
<td>0.164</td>
</tr>
<tr>
<td>I feel prepared to create rubrics to assess multimedia projects</td>
<td>0.760</td>
<td>-0.030</td>
</tr>
<tr>
<td>I feel comfortable assigning multimedia projects to my students</td>
<td>0.678</td>
<td>0.196</td>
</tr>
<tr>
<td>I use computers effectively in my classroom</td>
<td>0.622</td>
<td>0.203</td>
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# Results

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<tr>
<td>Beliefs about the Benefits of Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I believe that my use of technology enhances student performance</td>
<td>-0.079</td>
<td>0.942</td>
</tr>
<tr>
<td></td>
<td>0.543</td>
<td>0.889</td>
</tr>
<tr>
<td>I believe that technology enhances my teaching</td>
<td>0.11</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>0.605</td>
<td>0.822</td>
</tr>
<tr>
<td>I believe that student use of technology enhances student performance</td>
<td>-0.018</td>
<td>0.705</td>
</tr>
<tr>
<td></td>
<td>0.448</td>
<td>0.693</td>
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Results

- Confirmatory Factor Analysis Model Fit Indices
  - $\chi^2 (N = 34, 181) = 92.632, p<.000$
  - Comparative Fit Index (CFI) = 0.95
  - Tucker Lewis Index (TLI) = 0.94
  - Root Mean Square Error of Approximation (RMSEA) = 0.072 (CI90 = 0.074, 0.192)
  - Standardized Root Mean Square Residual (SRMR) = 0.052
Results

- Confirmatory Factor Analysis
  Model Modification Indices

- Remove item
  *I have had adequate training in technology use*
Results

- Confirmatory Factor Analysis Model Fit Indices = Improvement
  - $\chi^2 (N = 26, 181) = 50.384, \ p = .0028$
  - Comparative Fit Index (CFI) = 0.98
  - Tucker Lewis Index (TLI) = 0.97
  - Root Mean Square Error of Approximation (RMSEA) = 0.072 (CI90 = 0.041, 0.102)
  - Standardized Root Mean Square Residual (SRMR) = 0.038
Results

Confirmatory Factor Analysis
Teachers’ Perceptions of Computers Survey
Confidence and Comfort

- I use computers effectively in my classroom
- I feel prepared to use laptop computers in my classroom
- I feel prepared to create rubrics to assess multimedia projects
- I feel prepared to guide other teachers in planning and implementing lessons that incorporate technology
- I feel comfortable using computers for classroom instruction
- I feel comfortable assigning multimedia projects to my students
- I believe that technology enhances my teaching
- I believe that student use of technology enhances student performance
- I believe that my use of technology enhances student performance
Results

- Reliability over time

- Reliability of identical items (n=217)
  - Pre-survey ($\alpha = .915$, CI95 .897 to .931)
  - Post-survey ($\alpha = .914$, CI95 .896 to .930)

- Hogarty et al. (2000) ($\alpha = .91$)
Limitations

- Convenience sample
- Results of the survey were not available from every participant
- Survey was long
  - Many did not complete pre-survey
  - More did not complete post-survey
- Self-report method
- Responses from administrators and technology specialists were included with teachers’ responses
## Conclusions

*Items identified for review and potential revision for Confidence and Comfort Using Technology Factor.*

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Conclusions

- Validation of instruments used to measure constructs for evaluation and research is an on-going process
- On-going and future research
  - Assessment of state wide FDE program
  - Predictive validity of Teachers’ integration practices
  - Concurrent validity
  - Convergent validity
Educational Importance

- Access to free, validated survey instrument for measuring teachers’ attitudes and perceptions toward integrating technology
- State policy-makers and decision-makers in K-12 institutions can obtain valuable teacher feedback
- Improve quality measurement for research
- Teachers can self-assess
Contact Information

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