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Berkshire Wireless Learning Initiative Final Evaluation Report

Damian Bebell, Ph.D.

Rachel E. Kay

Technology and Assessment Study Collaborative
Lynch School of Education
Boston College

Appendix A

Construction and Statistical Qualities of the BWLI Student Survey Measurement Scales

A measurement scale is created by examining the strength of the correlation between the responses to individual survey items or questions. The magnitude of the relationship between the items is evaluated by examining how high each item loads on a single scale and how much variability among the original number of items is explained by the created scales. For example, consider a scale created from the three items in Table A1. Each item represents some measure of how students use technology to present information to their class. When analyzed using principal components analysis, we find evidence that the three items, which were partially designed and written to form a scale, hang together and account for 66% of the variance in the individual item responses. The larger the percent of variance explained the more confident we can be that the scale is capturing the information in the individual items.

Table A1: Students use of technology to present information in class scale

	Factor Loadings
In the past year, how often did you use a computer in school to create a PowerPoint presentation?	.789
In the past year, how often did you use a computer in school to create graphs or tables?	.821
In the past year, how often did you present information to the class?	.834
Variance explained:	66.4%
Cronbach's Alpha:	.743

The values of the factor loadings range from 0.789 to 0.834 and represent the correlation between the individual item and the scale. The percent of variance explained, the size of the factor loadings, and the value of Cronbach's alpha support the creation of a "present information to the class" scale.

When items have been identified that form a meaningful scale, each subject's score on the scale must be calculated. One way in which this can be done is to create a summated scale score. A summated scale score is formed by computing the sum or average for each person of all their responses to the items that make up the scale. Another way to calculate a subject's score on the measurement scale is to create a factor score. Unlike a summated scale score, the factor score is computed based on the loadings of all the variables on the scale. A standardized factor score has a mean of zero and a standard deviation of 1. Individuals with high values on the items with high factor loadings will receive high positive factor scores.

For all scales created using the BWLI student survey data, principal component analysis was used. In addition, three criteria were applied when developing scales:

- a. the scale had to account for at least 45% of the variance in the item level responses;
- b. the minimum factor loading for any item comprising the scale was 0.5;
- c. the items comprising the scale had to relate to a sensible theoretical construct.

Following are the survey items and related statistical information for each of the student survey scales used in the BWLI analyses of student achievement. First scales documenting students use of technology are presented, followed by scales concerning students home use as well as attitude towards 1:1 computing and ability to use computers.

Table A2: Scales for technology use at school

	Factor Loadings
Writing and Research	
In the past year how often did you use a computer in school for reading/language arts?	.825
In the past year how often did you use a computer in school to write first drafts?	.815
In the past year, how often did you use a computer in school to edits papers?	.754
In the past year, how often did you use a computer in school to find information on the Internet?	.658
Variance explained:	58.3%
Cronbach's Alpha:	0.737
Solving Problems	
In the past year, how often did you use a computer in school to work with spreadsheets/databases?	.750
In the past year, how often did you use a computer in school to solve problems?	.800
In the past year, how often did you use a computer in school to analyze data?	.848
Variance explained:	64.5%
Cronbach's Alpha:	0.708
Presenting Information	
In the past year, how often did you use a computer in school to create a PowerPoint presentation?	.789
In the past year, how often did you use a computer in school to create graphs or tables?	.821
In the past year, how often did you present information to the class?	.834
Variance explained:	66.4%
Cronbach's Alpha:	.743
Class-related Activities	
In the past year, how often did you use a computer in school to play educational computer games?	.652
In the past year, how often did you use a computer in school to takes notes in class?	.729
In the past year, how often did you use a computer in school to keep track of dates and schedule/calendar?	.655
In the past year, how often did you use a computer in school to access a teacher's website?	.779
Variance explained:	49.8%
Cronbach's Alpha:	.624

Table A2: Scales for technology use at school (continued)

	Factor Loadings
Teacher Use of Computers	
In the past year, how often did your teacher use a computer in reading/language arts class?	.881
In the past year, how often did your teacher use a computer in social studies class?	.858
In the past year, how often did your teacher use a computer in math class?	.869
In the past year, how often did your teacher use a computer in science class?	.885
Variance explained:	76.2%
Cronbach's Alpha:	0.704
Communication	
In the past year, how often did you use a computer in school to send or receive email?	.874
In the past year, how often did you use a computer in school to email a teacher?	.874
Variance explained:	76.4%
Cronbach's Alpha:	0.691

Table A3: Scales for technology use at home

	Factor Loadings
Writing and Research	
On a typical day, about how many minutes do you use a computer at home to search the Internet for school?	0.870
On a typical day, how many minutes do you use a computer at home to write papers for school?	0.906
On a typical day, how many minutes do you use a computer at home to work on school projects?	.895
Variance explained:	79.4%
Cronbach's Alpha:	0.869
Multimedia Use	
On a typical day, how many minutes do you use a computer at home to create or maintain a website?	.787
On a typical day, how many minutes do you use a computer at home to create music or video projects?	.808
On a typical day, how many minutes do you download music or video from the Internet?	.789
Variance explained:	63.2%
Cronbach's Alpha:	0.700
Communication	
On a typical day, how many minutes do you use a computer at home to chat/IM?	.835
On a typical day, how many minutes do you use a computer at home to email?	.796
On a typical day, how many minutes do you use a computer at home for video or teleconferencing (Skype)?	.566
On a typical day how many minutes do you use a computer at home to use a social networking site (MySpace or Facebook)?	.566
Variance explained:	58.6%
Cronbach's Alpha:	.757
Recreational Home Use	
On a typical day, how many minutes do you use a computer at home to search the Internet for fun?	.698
On a typical day, how many minutes do you use a computer to create music or video projects?	.734
On a typical day, how many minutes do you use a computer to download music or video?	.811
On a typical day, how many minutes do you use a computer to shop online?	.688
Variance explained:	53.9%
Cronbach's Alpha:	.704

Table A4: Scales for student beliefs and abilities around technology

	Factor Loadings
Student Beliefs	
Agree/disagree: having a laptop in school made learning new things easier.	0.870
Agree/disagree: having a laptop in school made learning new things more fun.	0.906
Variance explained:	86.4%
Cronbach's Alpha:	0.842
Student Perceived Abilities	
How well are you able to write papers using a computer?	.676
How well are you able to communicate using email?	.597
How well are you able to record and analyze data using a spreadsheet?	.645
How well are you able to find information using the Internet?	.561
How well are you able to create multimedia presentations?	.673
How well are you able to type accurately?	.647
How well are you able to separate facts from opinions when using the Internet?	.702
How well are you able to take notes using a computer?	.658
Variance explained:	41.8%
Cronbach's Alpha:	0.783