



## **Student Home Access and the Digital Divide: An Exploratory Analysis of Laptop Computer Access with Take- Home Privileges Versus Restrictions to Use Only in School**

By Gerald Knezek, & Rhonda Christensen

Institute for the Integration of Technology into Teaching & Learning  
University of North Texas

---

### **Abstract**

Seventh grade students from a typical Middle School participating in Maine's learning with laptop program, the Maine Learning Technology Initiative, were asked to complete Computer Attitude Questionnaires during early June 2003. This study compares the 15 students without home computer access to the 159 students with either a computer at home or permission to take the MLTI laptop home. Since the research question of interest was whether students without computer access at home would exhibit lower (less positive) attitudes and skills, only indices with significantly ( $p < .05$ ) lower values for students without home access are discussed in this report. Students without home access to a computer were lower ( $p < .05$ ) on the following scales: Attitude Toward School; Self Concept; Email Skills; and Total Computer (Technology) Skills. Digital equity has been achieved for all seventh and eighth grade students in Maine public schools -- at least during the time the students are in school. However findings from this study imply that having some students granted permission to take their laptops home while others are not, may in fact perpetuate the digital divide.

### **Introduction**

All seventh grade students in a public middle school in Maine were asked to complete Computer Attitude Questionnaires during early June 2003. Fifteen were found to not have permission to take their laptops home and also not have access to any other computer at home. The remaining 159 had access to a computer at home. Of these remaining 159, 69 had both permission to take their school-issued laptop at home and access to another computer at home while the remaining 90 had access to another computer at home although they did not have permission to take their school-issued laptop away from school. Analyses in this report are based upon a comparison of the 15 students with no home access to the 159 students with at least one form of home computer access.

### **Instrumentation**

The Computer Attitude Questionnaire (CAQ) was administered online to gather data for this study. The main body of this instrument contained nine scales composed of multiple Likert-type items (Strong Agree to Strongly Disagree), plus one set of paired-comparisons items (Part 8) and selected technology self-efficacy items (measuring confidence in competence) from the Technology Proficiency Self Assessment questionnaire (Ropp, 1999) and the Key Instructional Design Strategies (KIDS) Technology Innovation Challenge Grant evaluation instrument. The ten CAQ attitude scales (Parts 1-10) with their 5 technology proficiency additions (Parts 11-15) were:

1. Computer Importance
2. Computer Enjoyment
3. Computer Anxiety
4. Motivation/Persistence
5. Study Habits
6. Empathy
7. Creative Tendencies
8. Paired Comparisons/Computer Preference (not examined in this analysis)

9. Attitude Toward School
10. Self Concept
11. Frequent Technology Use (items from the Key Instructional Design Strategies Technology Innovation Challenge Grant )
12. TPSA Email (from the Technology Proficiency Self Assessment for teachers)
13. TPSA WWW
14. Graphics Skills (from TPSA), and
15. Technology Skills – Total (from TPSA).

Acceptable reliability and validity for these scales has been previously established (Knezek, & Christensen, 2000?).

## Results

Since the research question of interest was whether students without computer access at home would exhibit lower (less positive) attitudes and skills, only indices with significantly ( $p < .05$ ) lower values for students without home access discussed in the remainder of the this report. As shown in Table 1, on four of the nine CAQ Likert scales, seventh grade students who had no access to computers outside of school were significantly lower than those who had permission to take their laptops home and/or had access to another computer at home. Students without home access to a computer were lower ( $p < .05$ ) on the following scales:

- Attitude Toward School
- Self Concept
- Email Skills
- Total Computer (Technology) Skills

This is graphically displayed in Figure 1. The 15 students who did not have permission to take a laptop home and also did not have access to another computer at home were lower on overall computer skills and especially email skills. They were also lower on attitudes toward school and self concept. The average effect size<sup>1</sup>, which is a standardized measure of impact of an educational intervention, is .53 across these four scales. This is in the range of a ‘moderate’ negative effect due to not having computer access at home, according to guidelines provided by Cohen (1969).

Table 1.. Impact of Computer Access Restricted to School

	Take Home Laptop and/or		Effect Size	SDNoHome	SDHome	1 Tail t	Prob
	No Access Outside School	Other Home Access					
CAQ Attitude Toward School	2.51	2.88	0.48	0.82	0.73	0.035	
CAQ Self Concept	3.42	3.74	0.49	0.61	0.7	0.045	
CAQ Email Skill	3.33	3.97	0.62	1.06	1.01	0.01	
CAQ Total Skill	3.35	3.74	0.55	0.69	0.74	0.03	
Samples	15	159					

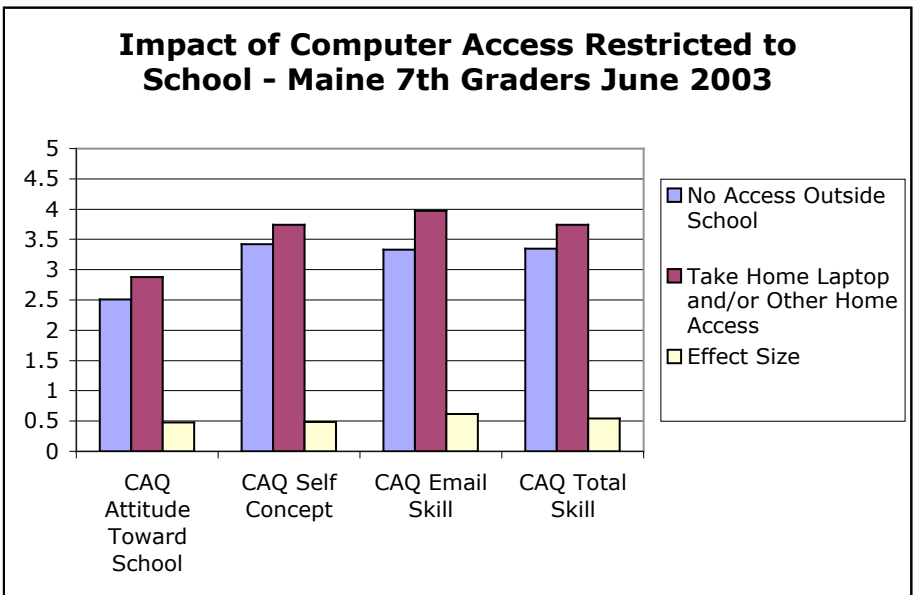


Figure 1. Effect of No Home Computer Access on Maine Learning Technology Initiative (MLTI) 7<sup>th</sup> Grade Students in 2003.

## Discussion

1. Generalizability. Would these findings hold true across many/all Maine schools? This is an interesting research question that merits further study.

2. Causation. Does the negative direction of the relationship between lack of home computer access and computer skills, self concept, and attitudes toward school exist because students could not take their laptop home or is there some other factor (perhaps home/family environment) that created low self concept and also made the parents decline to let the students take their laptops home? At this point we simply do not know. Probably a qualitative study is warranted to answer the question of why.

3. Directionality of effect for computer skills. The isolated issue of directionality of effect for lower computer skills in students without home access would appear to be logically in the direction of simply lack of time on task for mastery of computer skills causing lower skills among students without computer access at home. It seems less plausible to contend that lower computer skills in students cause lower home access. However, it is possible that a third factor not assessed in this study (eg. socioeconomic status) might cause both.

4. Directionality of effect for attitudes toward school and self concept. Since directionality of effect in the form of lower computer access causing lower computer skills is a plausible explanation, we as researchers might conjecture that the other effects with similar patterns are also in the direction of lack of home access influencing attitude toward school and self concept. Or, to rephrase the conjecture from another perspective, there is ample research to support a hypothesis of directionality in this area, in that students from unsettled home environments sometime blossom when they have even one thing for which they can feel is the best there is, and which they view as their own. Perhaps there would have been many more students in this data set with low self concept if it had not been for their ability to feel they had ownership in a sophisticated tool (due to take home permission) that put them on learning par with all their classmates, enhanced their self concept/self esteem and increased their attitudes toward school. Further research is needed in this area.

## Implications of Findings

Digital equity has been achieved for all seventh and eighth grade students in Maine public schools -- at least during the time the students are in school. However findings from this study imply that having some students granted permission to take their laptops home while others are not, may in fact perpetuate the digital divide. The negative impact appears to be not only in the form of lower computer skills for students with no computer access at home, but also in the form of less positive learning dispositions among this group of students. Further research with a larger sample is needed to confirm if this trend holds true across the entire State of Maine.

## References

- Cohen, J. (1969). *Statistical power analysis for the behavioral sciences*. New York: Academic Press.
- Knezek, G., & Christensen, R. (2000). *Refining best teaching practices for technology integration: KIDS Project findings for 2000-2001*. Denton, TX: University of North Texas Institute for the Integration of Technology into Teaching & Learning.
- Ropp, M. M. (1999). Exploring individual characteristics associated with learning to use computers in preservice teacher preparation. *Journal of Research on Computing in Education*, 31(4), 402-424.

---

### The Maine Learning with Laptop Study



The Maine Learning with Laptops Study's mission is to conduct a scholarly study of the integration of learning technology into Maine's setting of one-to-one student to computer access. MLLS is a collaborative project of the Maine Center for Meaningful Engaged Learning at the University of Maine at Farmington and the Institute for the Integration of Technology into Teaching and Learning at the University of North Texas.

Mike Muir, Principal Investigator  
mmuir@maine.edu  
<http://www.mcmel.org/MLLS>

