Effectiveness of Technology use by Mathematics Students

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Effectivenes of Tech. @ Middle/High School Level

1. ALEKS- Computer Based Learning
2. Laptops(PC Tablets)- Distribution to students
3. Spreadsheets- teaching algebra
4. TI NSPIRE- Calculators

Effectiveness of using ALEKS

- ALEKS- (Assessment and Learning in Knowledge Space)
- Internet based tutoring and assessment program
- Research Study (2013)- 253 students; 6th-7th grade; 2 after school groups
- Experimental (A/I ALEKS) vs Control (Expert Teachers)

ALEKS-A/I

Results of Aleks vs Teacher

1. Test Scores- Not Significant
2. Involvement/Engagement- Not Significant
3. Conduct/Behavior- Not Significant
4. Assistance Needed- Significant

Table 1
Means and standard deviations by condition for 5th grade and 6th grade TCAP student involvement, conduct, and assistance needed.

	ALEKS		Teacher	
	M	*SD*	*M*	*SD*
5th grade TCAP	46.19	19.16	43.98	17.14
6th grade TCAP	42.16	18.33	39.05	17.18
Involvement	1.77	.36	1.75	.37
Conduct	1.62	.44	1.63	.42
Assistance	.05	.11	.65	.27

Effectiveness Laptop/PC Tablets

- Research Study (2014)- One High School's 1:1 Computer Adoption
- South Louisiana High School grades 9-12
- Laptops were issued to 640 students; 40 teachers
- Data- Observational records/interview notes
- 4 research professors from McNeese St Univ. in Lake Charles, LA

Results of Laptop Study

- Table 1 Student Focus Group (Advantages)

Table 1
Significant Findings: Student Focus Groups

Topic	Significant Findings
Advantages	Eco-friendliness.
	Greater organization and efficiency.
	Access to Internet tools, like Google and research databases.
	Greater communication with teachers and peers, especially in cases of absences or need for reinforcement/clarification.
	Meeting needs of visual and verbal/auditory learners.
	Reduced weight of backpacks and quantity of materials required per course.
	Enhanced college preparedness, especially because Moodle and Internet database use are nearly ubiquitous.

Results of Laptop Study

- Table 2 Student Focus Groups (Challenges)

Topic	Significant Findings
Challenges	Computer malfunctions and quirks (e.g., slow connectivity to Internet, lost connection while using the Internet, updates run on computers at inopportune times, crashing without warning). Distractions during class (e.g., temptation to play games on computer, doodle with the stylus). Lack of diligence in charging batteries overnight. Less challenging courses than in traditional classroom without technology. Lost class time from one period to the next because student access restrictions not lifted from prior class. Academic dishonesty (e.g., students emailing answers to other students). Student reticence to technology and preference for traditional pen-and-paper approaches.

Results of Laptop Study

- Table 3 Teacher Focus Group (Advantages)

Table 2
Significant Findings: Teacher Focus Groups

Topic	Significant Findings
Advantages	Better efficiency in the classroom and for homework.
	Internet is great tool for learning.
	Better organization via OneNote and Moodle.
	Students learn responsible computer use.
	Students monitored and kept on track by programs like DyKnow and Respondus (www.respondus.com; exam creation tool).
	Students prepared for work and college through use of Microsoft PowerPoint and email.
	Students and teachers benefit from less paperwork.

Results of Laptop Study

- Table 4 Teacher Focus Groups (Challenges)

Challenges	Durability of tablets and styli. Short battery life. Tablets updating or restarting with no real warning, interrupting class time and students' abilities to work. Internet connectivity often slow or interrupted. Students not self-disciplined enough to stay on track without monitoring. Reticence to learn technology. Lack of professional development and ongoing instructional support. Students not diligent about checking email or Moodle for updates and information. Lack of consequences for damaged property.

Conclusion of Laptop 1:1 effectiveness

- The idea of flipped classroom
- Instruction shifted from teacher center to student center
- Technology-rich approaches to content resulted in more engagement from students

Effects of using spreadsheets in secondary schools

- Study (2011)-10th grade algebra students
- Spreadsheet based purposeful activities (quadratic functions/graphs)
- Two Groups- Experimental (42 students) and Control (40 students)

Results of using spreadsheets

- Low performers- Not Significant
- High performers- Not Significant
- Medium performers- Very Significant

TI NSPIRE Calculator

- Research- Effect of TI-Nspire graphing calculator use on student achievement
- Study- Concept of functions- Experimental and Control Group
- 4 teachers; 2 classes each; 2 week period; 90 minute classes

Result of TI NSPIRE Study

- Pre-Test- CG (Non-Calc) mean score was significantly higher than EG (TI NSPIRE)
- Post-Test- statistically significant; EG (TI NSPIRE) mean score being higher than CG (Non-Calc)

Review of Literature

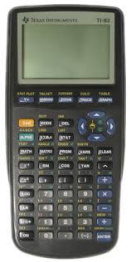
- The emergence of technology (Calculators and Computers) has changed the way math is both done and used. (Ellington, 2006; Thorpe, 1989; and Kieran,1992)
- Research shows that students can effectively use calculators as an instructional tool for math. (Choi-Koh, 2003; Colgan, 1993; Drijvers and Doorman, 1996)
- Other studies have shown how graphing calculators and spreadsheets use has ENGAGE students to higher level thinking skills. (Dessort, DeRidder, Chorleen, and Ellington, 1999; Ellington 2006)

College

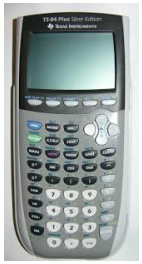
- Calculators
- Apps in Android
- Apps IOS, Android, PC
- Personal Computer
- PC-Tablets
- Internet Web based Programs

Calculators

According to research, the TI 83-84 calculators are very effective for basic math computations, graphs, graphing tools. TI-83 and TI-84 calculator are used only for upper level math classes.

TI-83  Used for basic math calculations and graphing

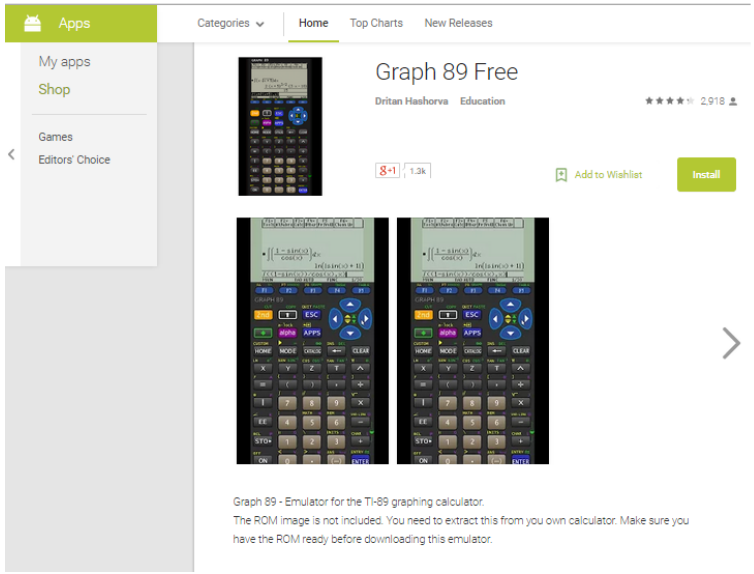
TI-84

 http://mathbits.com/MathBits/TISection/Openpage.htm

TI-89  Use mainly by Math major and Engineers

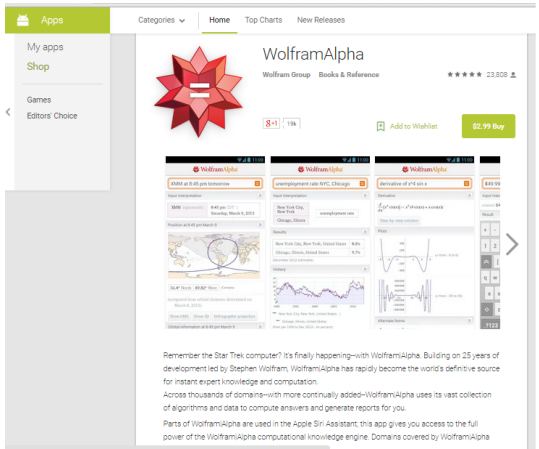
Apps in Android

Graph89

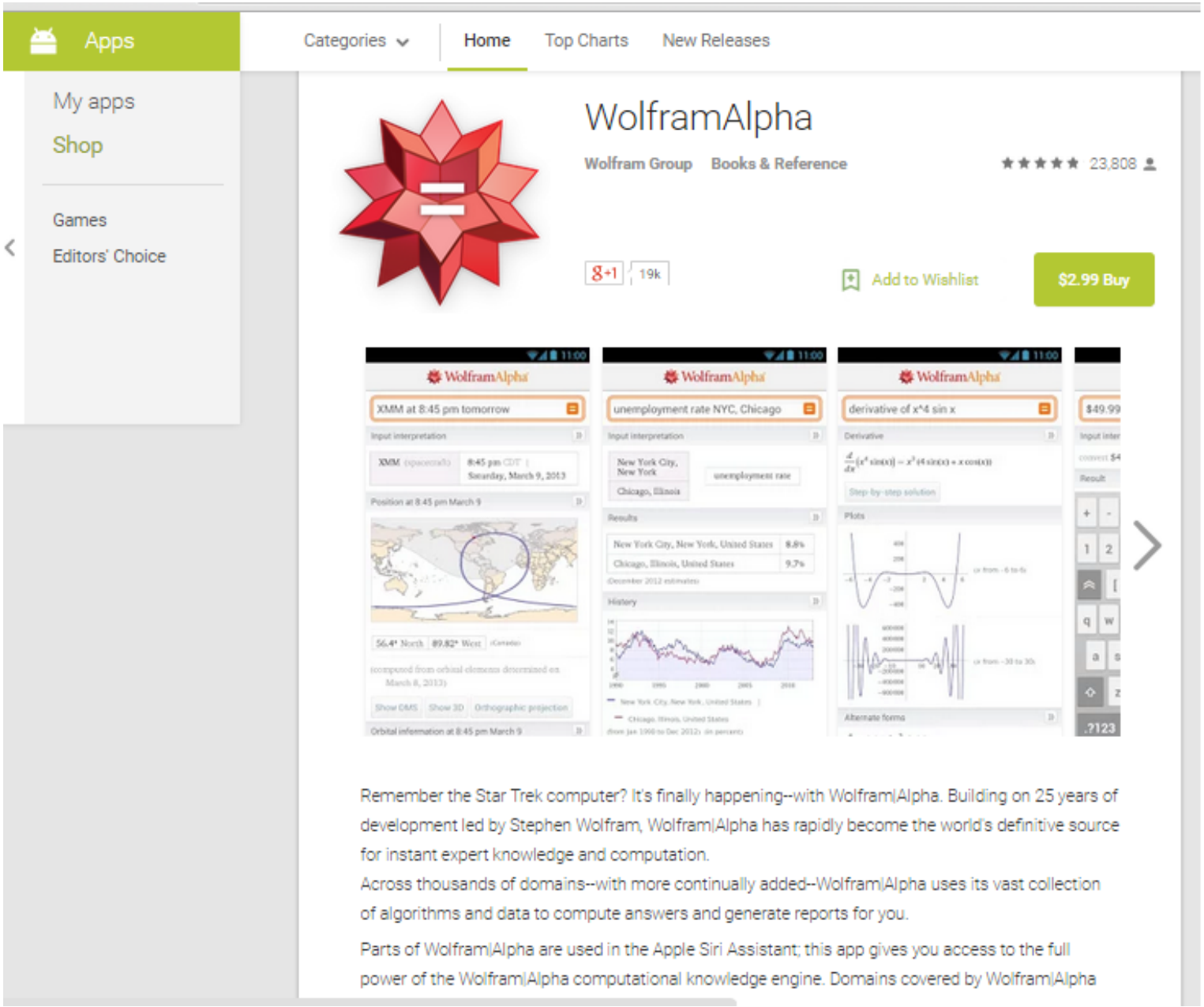


TI-83-84 in Android

Wolfram Alpha

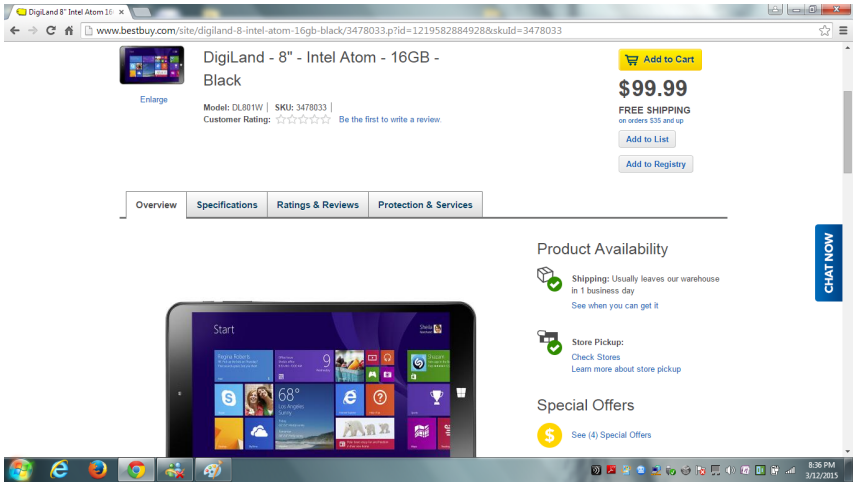


Apps in IOS and Personal Computer



Personal Computer

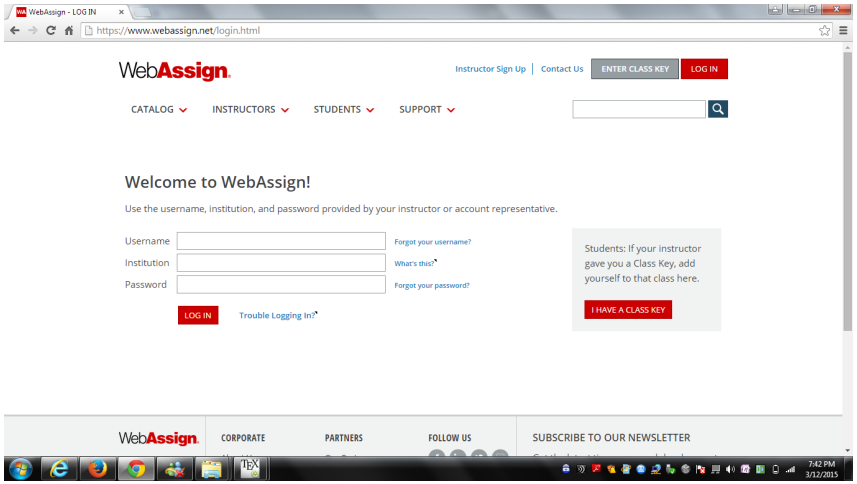
Personal Computers are very effective for math purposes. Some PC can be very expensive. Epcc at Rio Grande has purchased PC-Tablets for students to check out.



Uses for PC-Tablet include Matlab, excel, mini-tabs for statistics, Wolfram Alpha

Internet Web base Programs

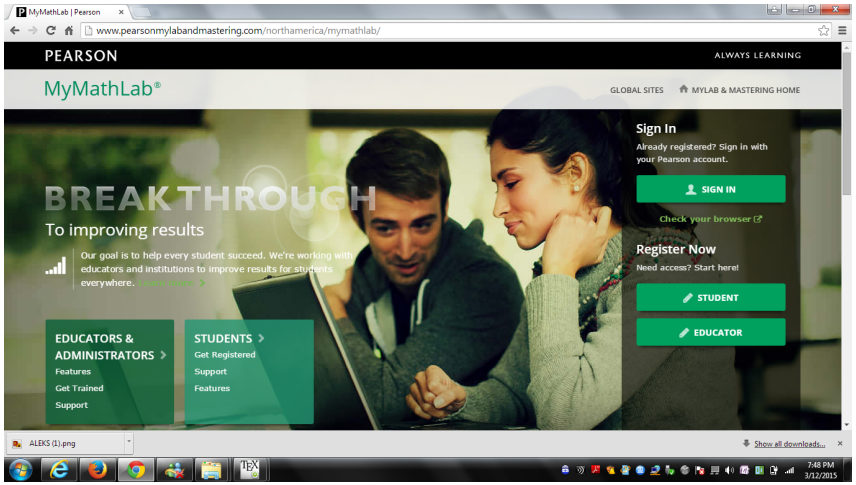
ALEKS



Webassign

Websites-Continue

MyMathlab



Math Emporium

Effectiveness of websites

- ALEKS- Comparison of results in Basic Algebra 1 from traditional programs in Fall 2010 to ALEKS program in Fall 2011 show significant improvement. The percentage of students getting an A doubled from 17.1 percent to 34.8 percent. The percentage of students achieving an A,B or C rose from 62.5 percent to 71.1 percent.

- Math Emporium-• increased the percentage of students successfully completing a developmental math course by 51 percent on average (ranging from 10 to 135 percent) while reducing the cost of instruction by 30 percent on average (from 12 to 52 percent), and • increased the percentage of students successfully completing a college-level math course by 25 percent on average (from 7 to 63 percent) while reducing the cost of instruction by 37 percent on average (from 15 to 77 percent)

Effectiveness of websites-Continue

- Math Emporium at EPCC- This program has enabled students to complete their DE math; 66 percent are successful from the students who do not drop.
- MyMathlab- On the research there was no strong evidence that MyMathlab was more effective than traditional math classes.
- Webassign- On the research there was no strong evidence that MyMathlab was more effective than traditional math classes.

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