

# **Hand-Held Technology in Mathematics Education at the College Level**

## **Abstract:**

Hand-held technology (graphing calculators, CAS calculators, and data collection devices) is widely used in United States Colleges and Universities. Usage is defined as the technology being used to teach mathematics or to do mathematics in the classroom. Of responding colleges, 85.1% report graphing calculators being used, 34% report CAS calculators being used, and 26.6% report data collection devices being used. Of reported faculty, 48% are using a graphing calculator, 7.9% are using a CAS calculator, and 3.5% are using a data collection device such as the Texas Instrument Calculator Based Laboratory (CBL).

## **Survey Process:**

A Hand-Held Technology in Mathematics Education Survey was sent to 2,330 colleges in the United States. The list of colleges was selected by using a full list of all colleges or universities in the US and eliminating all proprietary schools (like one-year or certificate business colleges, beauty schools, etc), specialized colleges (like nursing schools, mining colleges, etc.) and all special focus colleges (like seminaries, etc.). Branch campuses of universities were considered as two-year colleges. The survey was sent addressed to the mathematics department chair. It was sent in early February of 1998 and returns were accepted until the middle of April. Of the 2,330 surveys sent, 278 were returned from two-year colleges, 193 four-year colleges, 113 from universities, and 6 didn't specify. The total number of returns was 600, for a return rate of 26.9%. The survey measured usage within the faculty ranks at various mathematics levels. The total number of faculty reported in the results is 12,951; the total number of colleges reported in

the survey results is 600. Responding department chairs reported the number of faculty using hand-held technology at the developmental, college algebra, pre-calculus, statistics, and calculus content levels. Since each positive responding chair indicates college usage, the survey also measured the number of colleges using each form of technology – graphing calculators, CAS calculators, and hand-held data collection devices.

**Hand-Held use by Faculty:**

The results to the statement “Please indicate the number of your mathematics faculty (full-time and adjunct) currently at each math level listed (line 1), then indicate the number using the indicated hand-held technology to teach mathematics at these levels (lines 2 – 4).” are:

	Develop mental	College Algebra	Pre- calculus	Statistics	Any Calculus	Totals
Number of teaching faculty at each content level:	4099 (100%)	2489 (100%)	1703 (100%)	1493 (100%)	3167 (100%)	12951 <b>(100%)</b>
Number using a graphing calculator:	1001 (24.4%)	1412 (56.7%)	1184 (69.5%)	654 (43.8%)	1961 (61.9%)	6212 <b>(48.0%)</b>
Number using a CAS-based calculator (≈TI-92):	66 (1.6%)	127 (5.1%)	138 (8.1%)	100 (6.7%)	587 (18.5%)	1018 <b>(7.9%)</b>
Number using a data collection device (≈CBL)	55 (1.3%)	102 (4.1%)	98 (5.8%)	72 (4.8%)	126 (4.0%)	453 <b>(3.5%)</b>

## Hand-Held Use by College\*

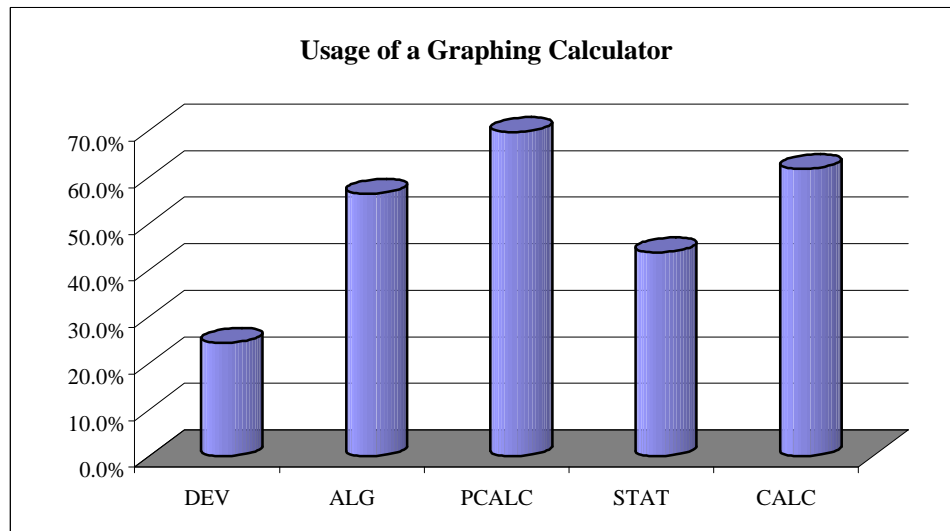
\*(Colleges/universities with one or more mathematics faculty using the indicated technology in the classroom.)

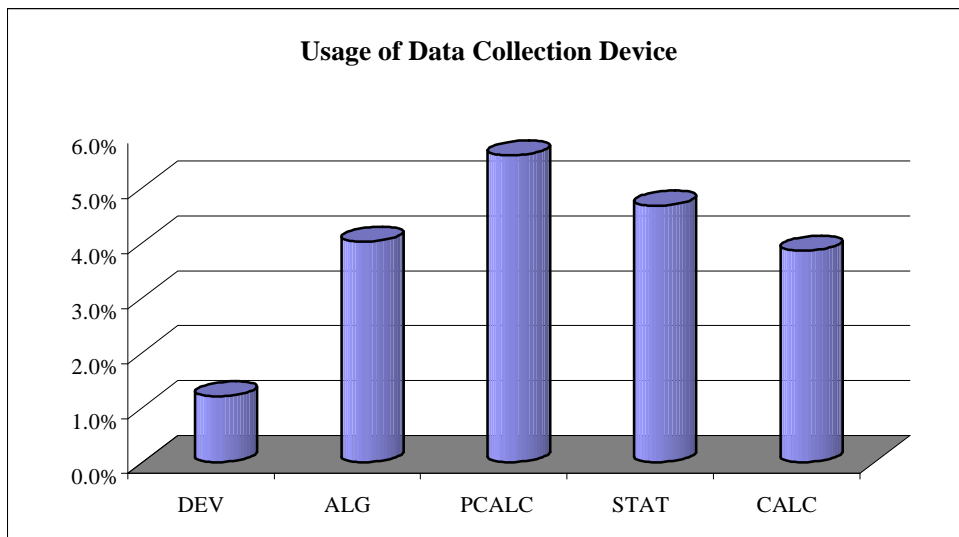
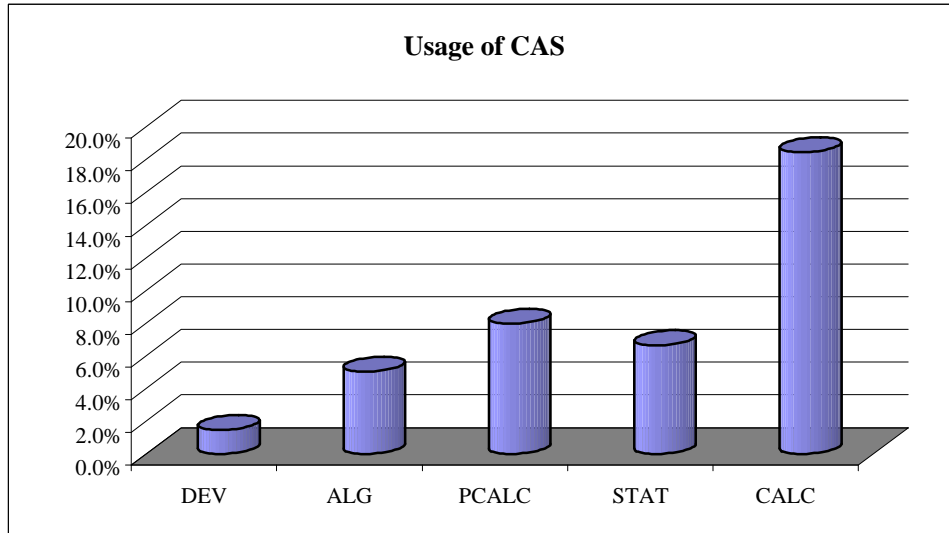
College Type	Using hand-held graphing technology	Using hand-held CAS technology	Using hand-held data collection technology
Two-Year Colleges	93.2%	37.1%	29.1%
Four-Year Colleges	77.7%	31.6%	11.9%
Universities	77.0%	29.2%	19.5%
Totals	85.1%	34.0%	21.6%

Average number of faculty using hand-held technology per colleges/universities.

	Number using hand-held graphing technology	Number using hand-held CAS technology	Number using hand-held data collection technology
Average number of faculty using technology per college/university.	10.3	1.7	0.8

## Graphical Representation of Faculty Data by Technology Level





		% of all respondents
% of DEV using a graphing calculator	24.4%	Graphing Calculators 48.0%
% of ALG using a graphing calculator	56.7%	
% of PCALC using a graphing calculator	69.5%	
% of STAT using a graphing calculator	43.8%	
% of CALC using a graphing calculator	61.9%	
% of DEV using a computer algebra system	1.6%	CAS 7.9%
% of ALG using a computer algebra system	5.1%	
% of PCALC using a computer algebra system	8.1%	
% of STAT using a computer algebra system	6.7%	
% of CALC using a computer algebra system	18.5%	
% of DEV using a data collection device	1.3%	CBL 3.5%
% of ALG using a data collection device	4.1%	
% of PCALC using a data collection device	5.8%	
% of STAT using a data collection device	4.8%	
% of CALC using a data collection device	4.0%	