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Student Success and Time Management in College Algebra

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Student success and time management in College Algebra

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MACON STATE COLLEGE

GEORGIA SCHOLARSHIP OF STEM TEACHING AND LEARNING CONFERENCE

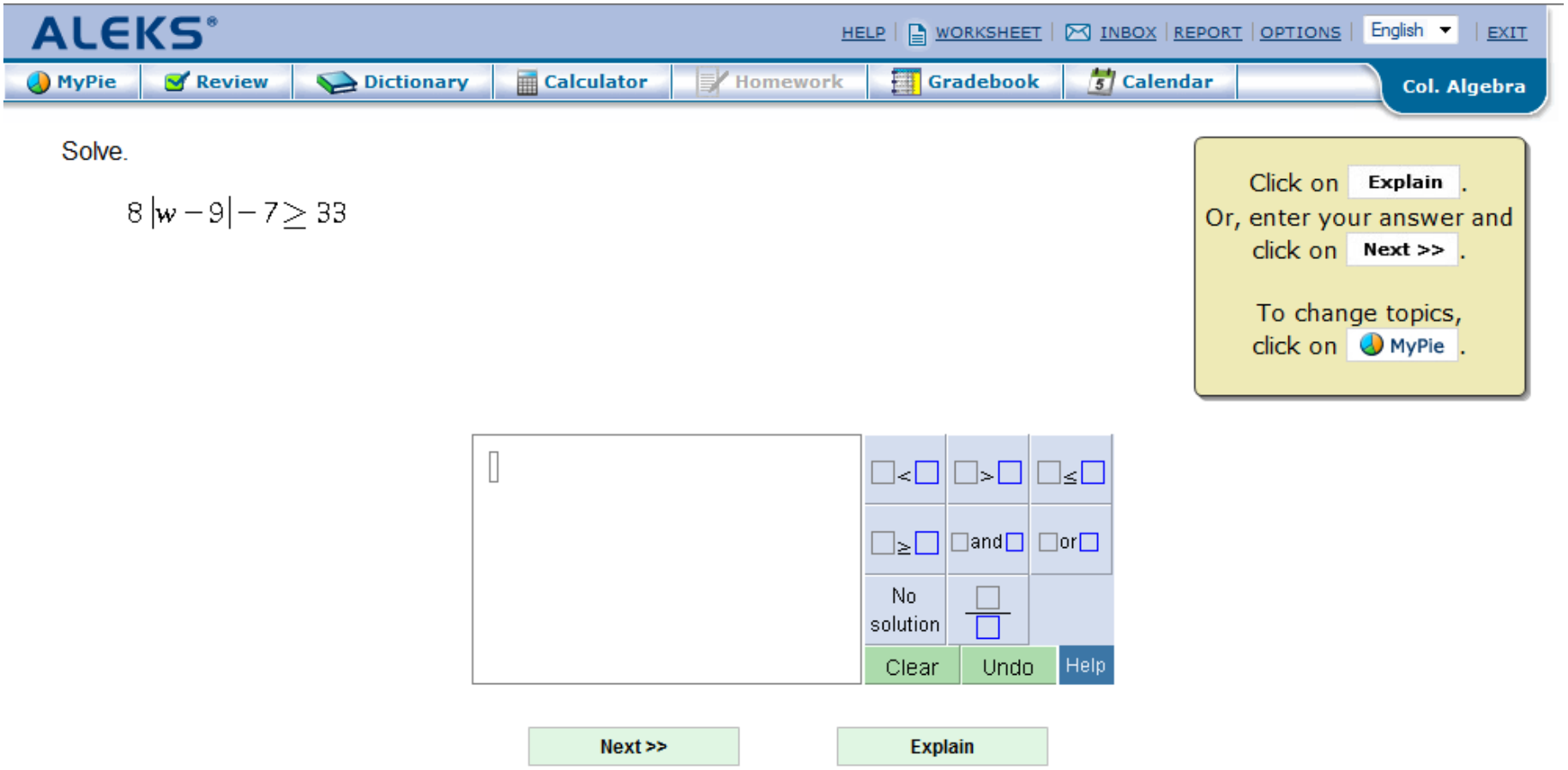
STATESBORO, GA

MARCH 9, 2012

What is Aleks®?

- Aleks is a problem based teaching system with the following characteristics and advantages:
  - Algorithmically generated questions with written explanations.
  - Free response only (no multiple choice!)
  - Full integration of the textbook in PDF; links to available videos.
  - Individualized instruction plan based on periodic assessments using an emporium style classroom.
  - Students are forced to engage in a spiral learning path.
  - Cost per semester is less than a textbook.
  - Keeps a record of students' activity in the system.

What is Aleks?



What is Aleks®?

ALEKS®

HELP | WORKSHEET | INBOX | REPORT | OPTIONS | English | EXIT

MyPie | Review | Dictionary | Calculator | Homework | Gradebook | Calendar | Col. Algebra

Print

Solving an inequality involving absolute value

Solve.

$$8\,|w-9|-7 \geq 33$$

Click on the following for more information:
"Absolute Value" and "Number Line".

Step 1:
We must isolate the absolute value expression on the left-hand side of the inequality.

To do this, we first add 7 to both sides.

$$8\,|w-9| \geq 40$$

More Details

Then, we divide both sides by 8.

$$|w-9| \geq 5$$

Step 2:
We now use the following rules to solve this absolute value inequality. (Assume $c > 0$.)

- $|A| < c$ is equivalent to $-c < A < c$.
  $|A| \leq c$ is equivalent to $-c \leq A \leq c$.

More about

Additional Resources

Algebra and Trigonometry, 2nd Ed. Coburn

Chapter 1: Equations and Inequalities

> chapter 1 PDF - Sections 1.1 - 1.6 [21.3 M]

Section 1.3: Absolute Value Equations and Inequalities

video > Exercise Video 3

video > Exercise Video 4

video > Lecture Video 1

Supplementary Resources

Literature and Demographics

- The National Council of Teachers of Mathematics (NCTM) states that computers are powerful tools for teaching mathematics (NCTM News Bulletin, October 2007).
- *The Principles and Standards for School Mathematics* (NCTM, 2000) states that
  - the "power of technology makes it possible and necessary to reexamine what mathematics students should learn as well as how they can best learn it" (p. 25).
  - The use of technology can also provide teachers with the opportunity "to examine the processes used by students in their mathematical investigations as well as the results, thus enriching the information available for teachers to use in making instructional decisions" (p. 26).

Survey (Fall 2010)

- 52 students from 5 classes completed the survey.
- 48 graduated high school, 3 received a GED, and 1 student was joint enrolled.
- The majority of students are considered traditional.

Age	% of students
18 – 24	86.5%
25 – 30	1.9 %
31 - 40	5.8 %
Over 40	5.8 %

Survey (Fall 2010)

- Students come with varied high school backgrounds:

Highest Level Course	% of students
Pre-Algebra	1.9%
Algebra I	5.8%
Algebra II	15.4%
Algebra III	3.8%
Geometry	7.7%
Trig/Pre-Calculus	25%
Statistics	19.2%
Calculus	13.5%
Discrete/Integrated	7.7%

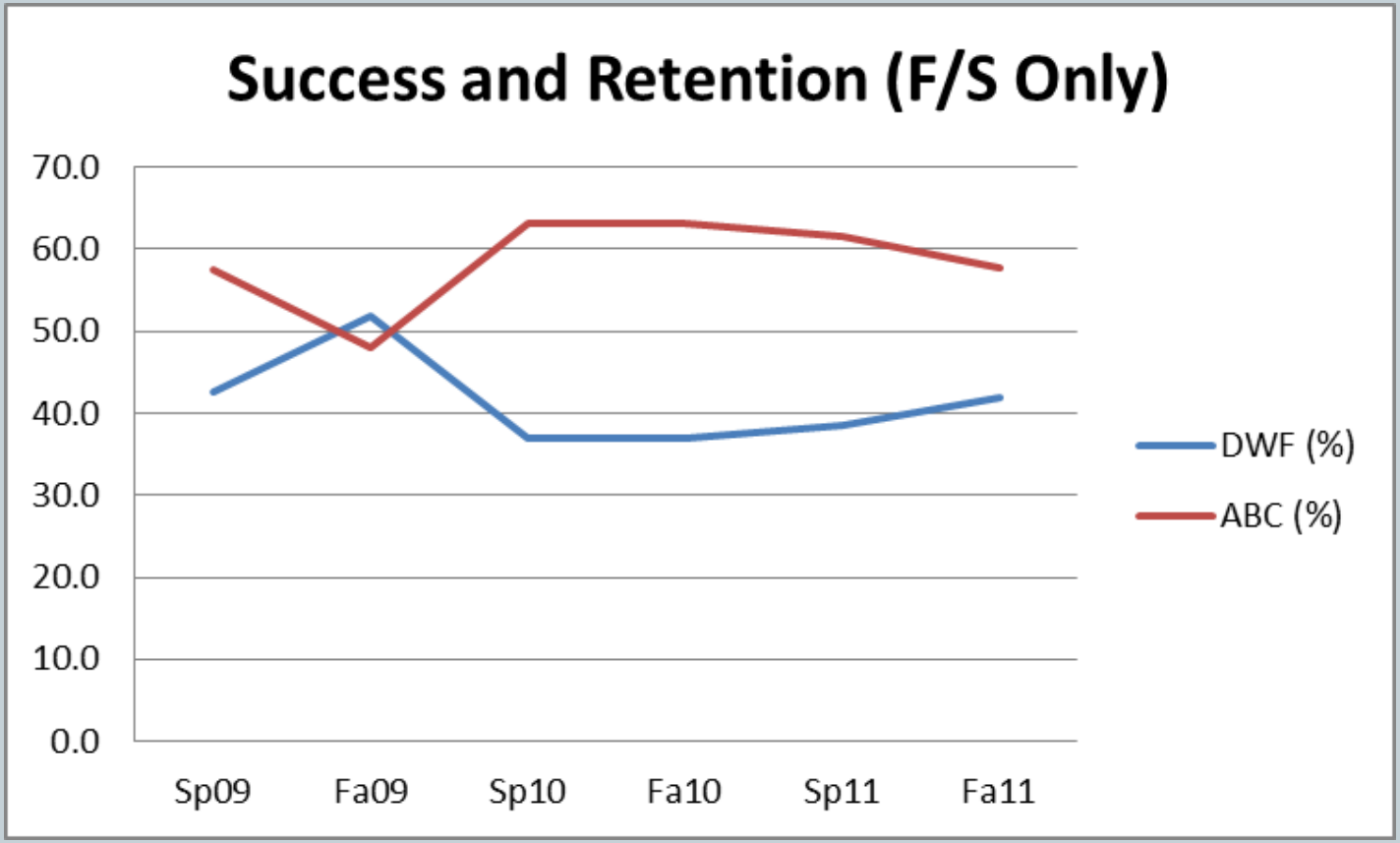
Course Grade in Last Math Class Taken in High School	% of students
A	32.7%
B	32.7%
C	23.1%
Did not remember	11.5%

Survey (Fall 2010)

Previous Math Class Taken in College	% of students
None	30.8%
Math: 99 and 1101	1.9%
Math 1101	42.3%
Math 1200	1.9%
Math: 1101 and 1200	7.7%
Math 1111 once	7.7%
Math : 99, 1101, 1200, 1111 (once)	1.9%
Math: 99, 1101, 1111(twice)	1.9%
Math: 1101, 1111 (once)	1.9%
Math: 2008, 1111 (twice)	1.9%

Success Rates (Spring '09 to Fall '11)

- Aleks sections start in Spring 2010.



More Literature

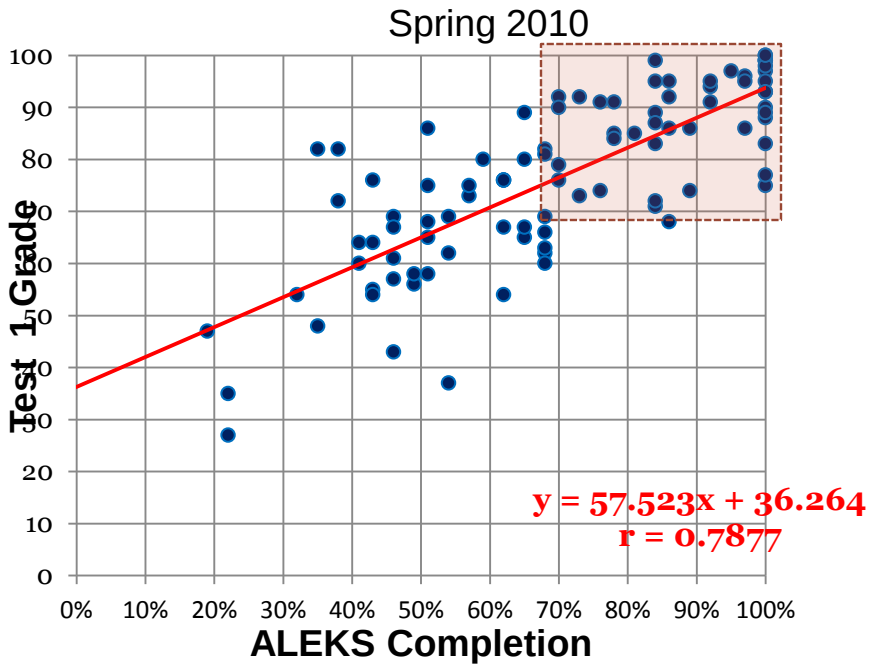
- Hersh, in a presentation to the AAHE National Assessment Conference stated that “value added learning assessment enables the continuous improvement of student learning,” and “timely and appropriate assessment provides feedback to students to improve their learning” which makes assessment “an inextricable part of the teaching/learning process.”
- Schmidt and Werner stress the importance of a goal-oriented and motivation-centered program of study. They also reference the “Gantt Learning Schedule” as a possible way to implement such a program.

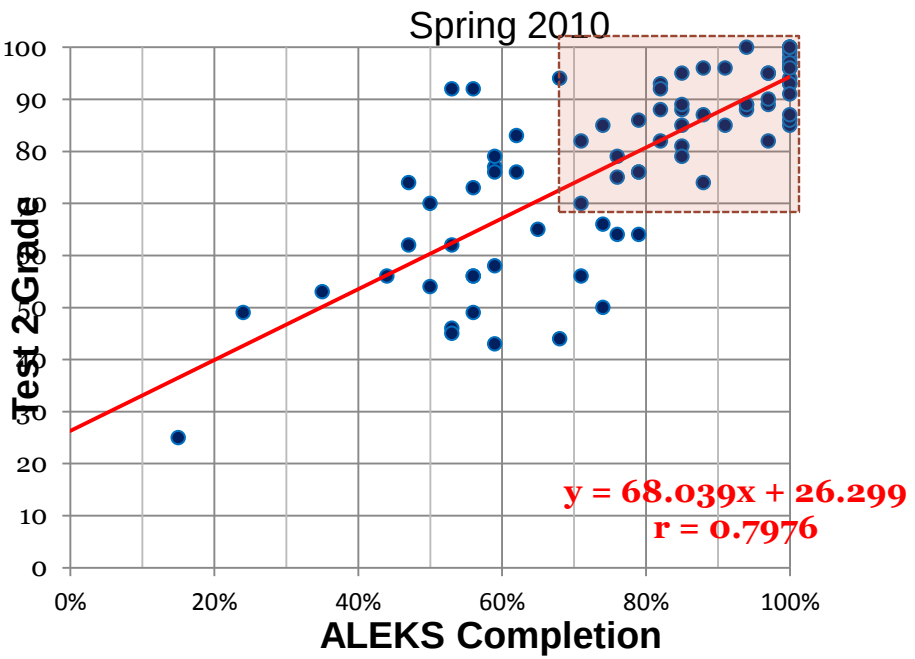
Analysis of Topic Completion versus Success

THERE IS A STRONG POSITIVE CORRELATION BETWEEN COMPLETION OF TOPICS IN ALEKS AND TEST SCORES.

NOTE: WE WILL FOCUS ON TESTS 1 AND 2

Spring 2010 Correlations



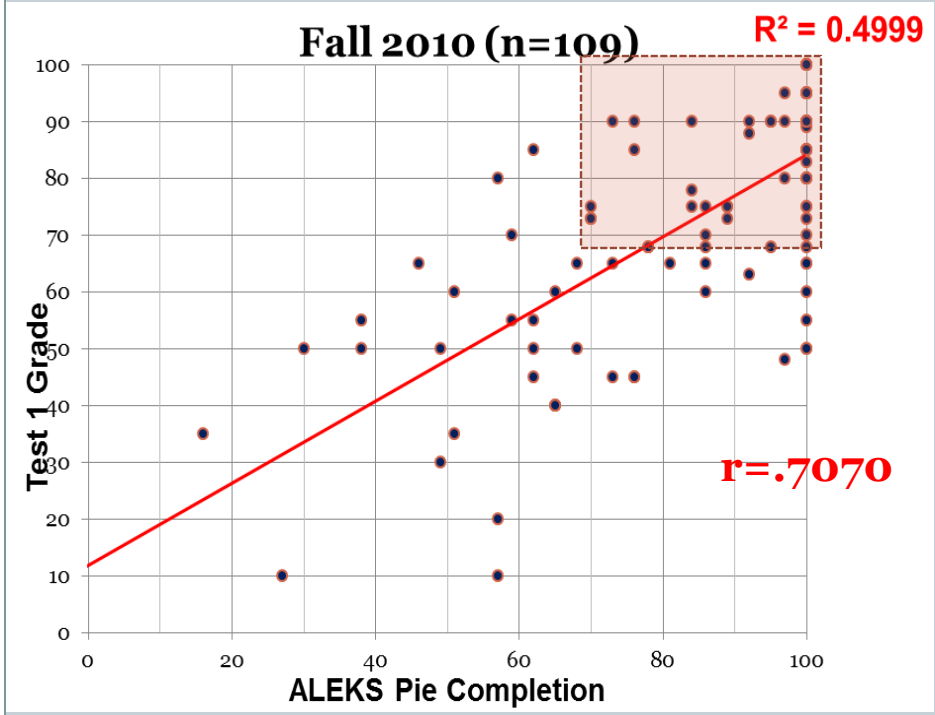


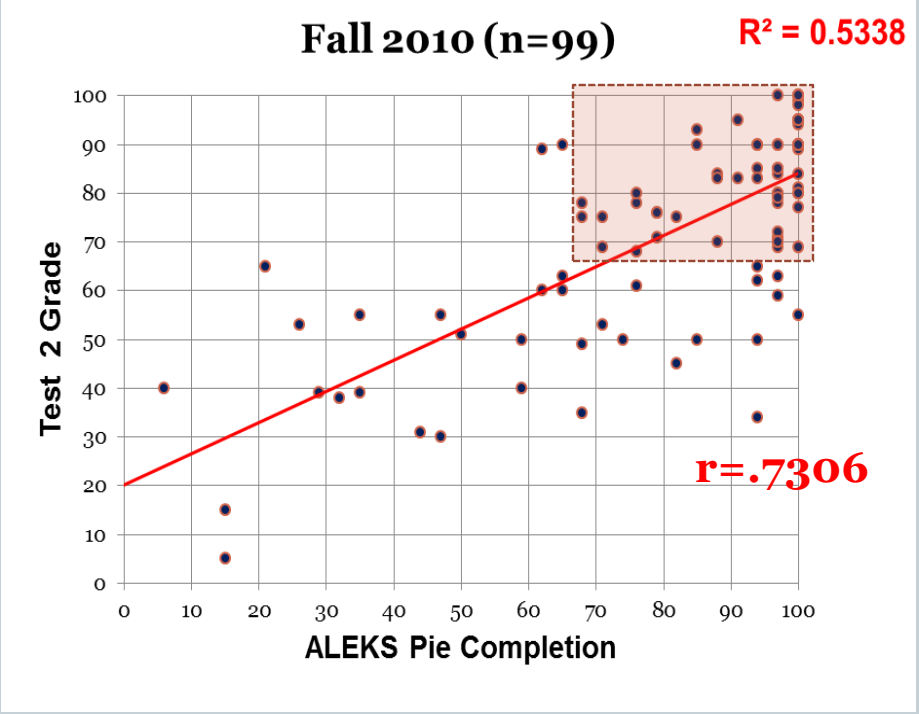
Spring 2010 Summary

Test 1	Percentage scoring a “C” or higher on the test
ALEKS completion	
< 70%	33.3%
≥ 70%	98.0%
≥ 90%	100%

Test 2	Percentage scoring a “C” or higher on the test
ALEKS completion	
< 70%	40.7%
≥ 70%	91.1%
≥ 90%	100%

Fall 2010 Correlations





Fall 2010 Summary

Test 1 ALEKS completion	Percentage scoring a "C" or higher on the test (4 sections)
< 70%	12.0% = (3/25)
≥ 70%	76.2% = (64/84)
≥ 90%	83.3% = (50/60)

Test 2 ALEKS completion	Percentage scoring a "C" or higher on the test (4 sections)
< 70%	0.0% = (0/24)
≥ 70%	78.7% = (59/75)
≥ 90%	83.9% = (47/56)

Spring and Fall 2011 Summary

- Correlation coefficient remains high:
  - Between .63 and .75
- Percentages inside “70-70” box similar to fall 2010:
  - Between 69% and 86% for those with completion > 70%
  - Between 82% and 93% for those with completion > 90%

Conclusions

- There is a strong correlation between completion and test scores.
- Students who complete at least 70% of their ALEKS objectives tend to be successful on the corresponding exam.
- The number of students reaching 70% or better completion is increasing.
- We would like to decrease the number of students outside the “70-70 box.”

Question

Why do some students fail even after completing a high percentage of the ALEKS objectives?

- Finishing a lot of topics just before the test (cramming).**
- Failure to practice under test-like conditions.
- Using outside help (friends/family/websites) when completing topics.
- Not seeking help from the instructor when needed.
- ALEKS may not be a suitable learning method for certain types of students.

Measurements for Time-Management
Steven Wallace

**HOW STUDENTS COMPLETE THE ALEKS OBJECTIVES SEEMS TO BE IMPORTANT.

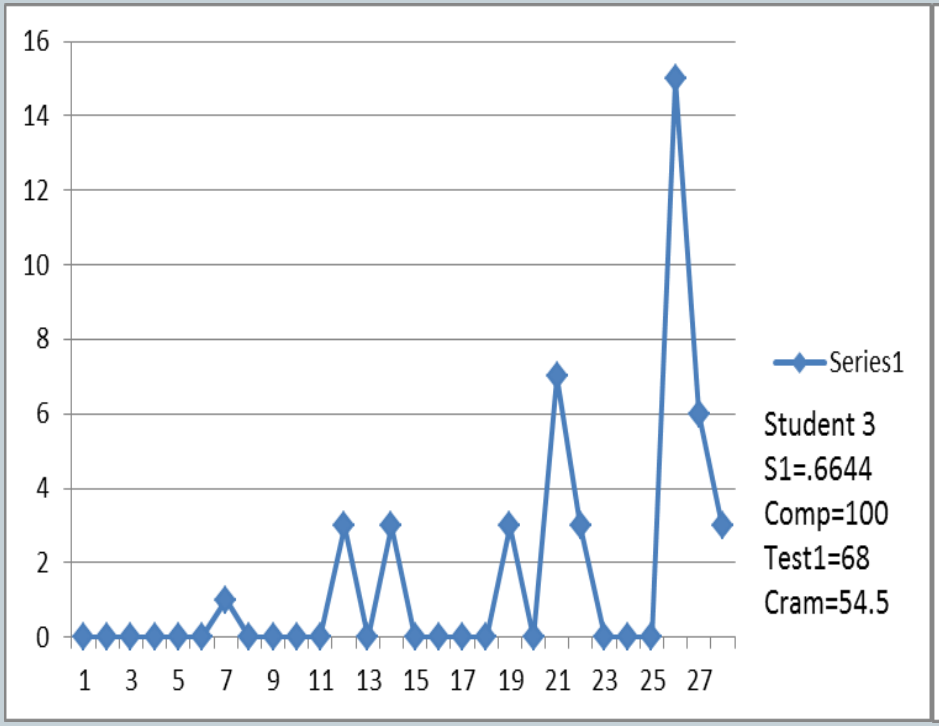
"CRAM FACTOR:"

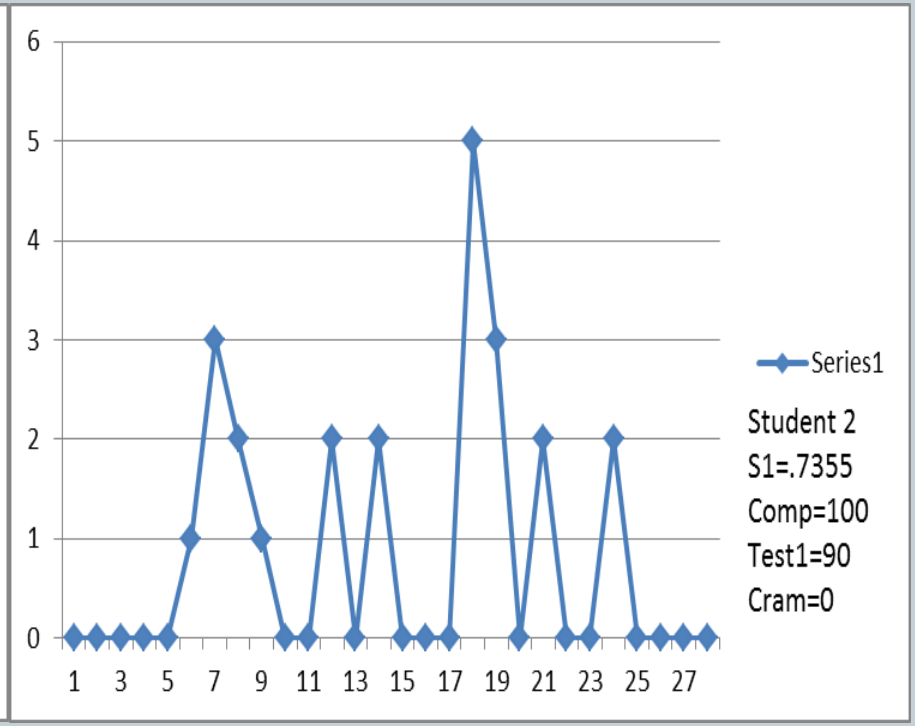
TOPICS (3 DAYS BEFORE A TEST) / TOPICS (4 WEEKS BEFORE A TEST)

"TIME MANAGEMENT NORM:"

$$S_1 = 1 - \left(\frac{1}{T\sqrt{2}}\right)\sqrt{\sum (t_{i+1} - t_i)^2}$$

Examples: Fall 2011





Properties of S1

Proposition:

The "time management norm,"

$$\boldsymbol{S_1 = 1 - \left(\frac{1}{T\sqrt{2}}\right)\sqrt{\sum(t_{i+1} - t_i)^2}},$$

satisfies the following properties:

(1) $0 \leq S_1 \leq 1$,

(2) $S_1 = 1$ if and only if $T = t_j$ for some j,

(3) $S_1 = 0$ if and only if $t_i = t_j$ for all i and j (or $T = 0$).

Time-Management Norm vs. Test Scores

Spring 2011 Test 1	Test 1 Average / Median
S1 Norm	
< .5	55% / 48%
≥ .5	74% / 76%
≥ .7	72% / 74%

Spring 2011 Test 2	Test 2 Average / Median
S1 Norm	
< .5	63% / 73%
≥ .5	80% / 81%
≥ .7	86% / 87%

Fall 2011 Test 1	Test 1 Average / Median
S1 Norm	
< .5	55% / 58%
≥ .5	70% / 75%
≥ .7	72% / 75%

Fall 2011 Test 2	Test 2 Average / Median
S1 Norm	
< .5	68% / 62%
≥ .5	80% / 85%
≥ .7	77% / 81%

Summary for Spring 2011 Test 1

- The time management norm S_1 together with the "cram factor" are pretty good predictors of success.

Test 1 ALEKS completion if S1 > .5 and Cram < 20%	Percentage scoring a "C" or higher on the test
< 70%	28.6% = 2/7
≥ 70%	78.1% = 25/32
≥ 90%	80% = 24/30

Test 1 ALEKS completion if S1 > .5 and Cram >= 20%	Percentage scoring a "C" or higher on the test
< 70%	33.3% = 1/3
≥ 70%	62.9% = 22/35
≥ 90%	75.0% = 12/16

- Mean/Median (78.5/84) for S1>.5 and Cram<20%
- Mean/Median (64.3/65) for S1<.5 and Cram>20%

Summary for Spring 2011 Test 2

Test 2	Percentage scoring a "C" or higher on the test
ALEKS completion if S1 > .5 and Cram < 20%	
< 70%	N/A
≥ 70%	83.9% = 26/31
≥ 90%	91.3% = 21/23

Test 2	Percentage scoring a "C" or higher on the test
ALEKS completion if S1 > .5 and Cram > 20%	
< 70%	66.7% = 2/3
≥ 70%	71.4% = 20/28
≥ 90%	72.2% = 13/18

- Mean/Median (81.5/86) for S1>.5 and Cram<20%
- Mean/Median (63.5/64) for S1<.5 and Cram>20%

Summary for Fall 2011 Test 1

Test 1 ALEKS completion if S1 > .5 and Cram < 20%	Percentage scoring a "C" or higher on the test
< 70%	12.5% = 1/8
≥ 70%	70% = 35/50
≥ 90%	86.7% = 26/30

Test 1 ALEKS completion if S1 > .5 and Cram > 20%	Percentage scoring a "C" or higher on the test
< 70%	0% = 0/5
≥ 70%	61.8% = 21/34
≥ 90%	69.2% = 18/26

- Mean/Median (70.8/75) for S1>.5 and Cram<20%
- Mean/Median (50.5/58) for S1<.5 and Cram>20%

Summary for Fall 2011 Test 2

Test 2 ALEKS completion if S1 > .5 and Cram < 20%	Percentage scoring a "C" or higher on the test
< 70%	0% = 0/7
≥ 70%	89.1% = 41/46
≥ 90%	91.4% = 32/35

Test 2 ALEKS completion if S1 > .5 and Cram > 20%	Percentage scoring a "C" or higher on the test
< 70%	28.6% = 2/7
≥ 70%	85.7% = 24/28
≥ 90%	90.9% = 20/22

- Mean/Median (79.6/85) for S1>.5 and Cram<20%
- Mean/Median (67.5/62) for S1<.5 and Cram>20%

References

Hersh, Richard; "Assessment and Accountability: Unveiling the Student Learning Factor," AAHE Nat. Assessment Conf. in Denver 6-15-2004.

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