

Using Data We Already Have: An Analysis of Successful Student Behaviors in the Online Environment

Dr. Catherine Finnegan
Office of Information and Instructional Technology
Board of Regents of
University System of Georgia

Creating A More Educated Georgia



Student Online Activity

LOGON

RE-READ
LECTURE
NOTES

READ
MESSAGE

REPLY to
MESSAGE

CREATE NEW
MESSAGE

LOGOFF



Access Logs In CMS

- Access logs are created for each student in a course.
- Record actions taken while within course, i.e., content page viewed, tool page visited, discussion posted.
- Each action marked by unix time stamp.
- Originally captured in flat files, but new systems use relational databases.



Example of Access Log

Page Visited or Action Taken

Type of Page

Unix Time Stamp

Page Name

Syllabus/course_objectives.html

Notes

1029822891

Course Objectives

Syllabus/grading.html

Notes

1029822915

Grading

Syllabus/evaluation.html

Notes

1029823041

Evaluation

Syllabus/course_outline_assignments_unit1.html

Notes

1029823109

Course Outline and Assignments Unit 1

Syllabus/course_outline_assignments_unit2.html

Notes

1029823198

Course Outline and Assignments Unit 2

Syllabus/course_outline_assignments_unit1.html

Notes

1029823283

Course Outline and Assignments Unit 1

Syllabus/course_outline_assignments_unit3.html

Notes

1029823305

Course Outline and Assignments Unit 3

Syllabus/course_outline_assignments_unit4.html

Notes

1029823322

Course Outline and Assignments Unit 4



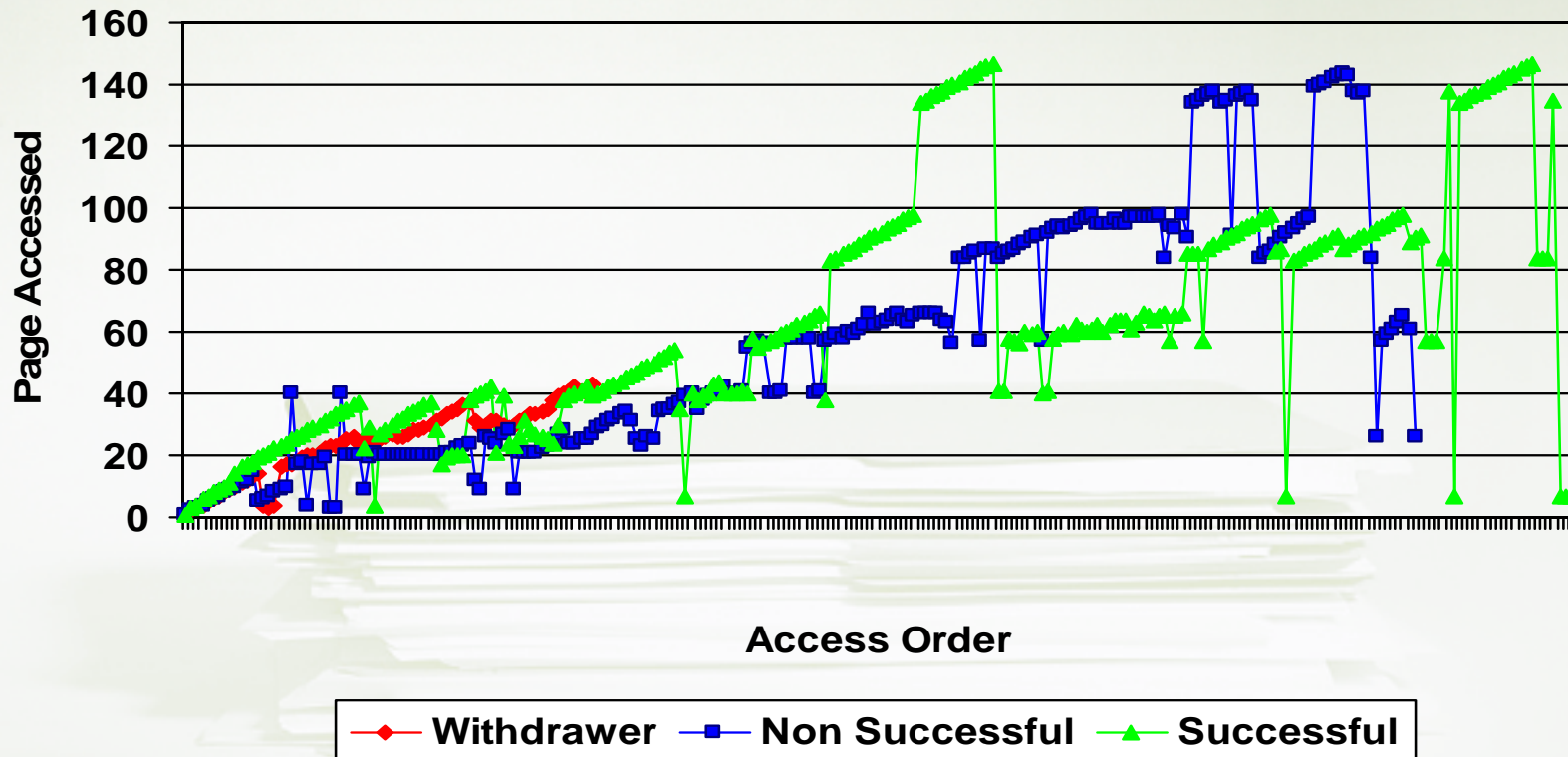
Emergence of a New Data Set



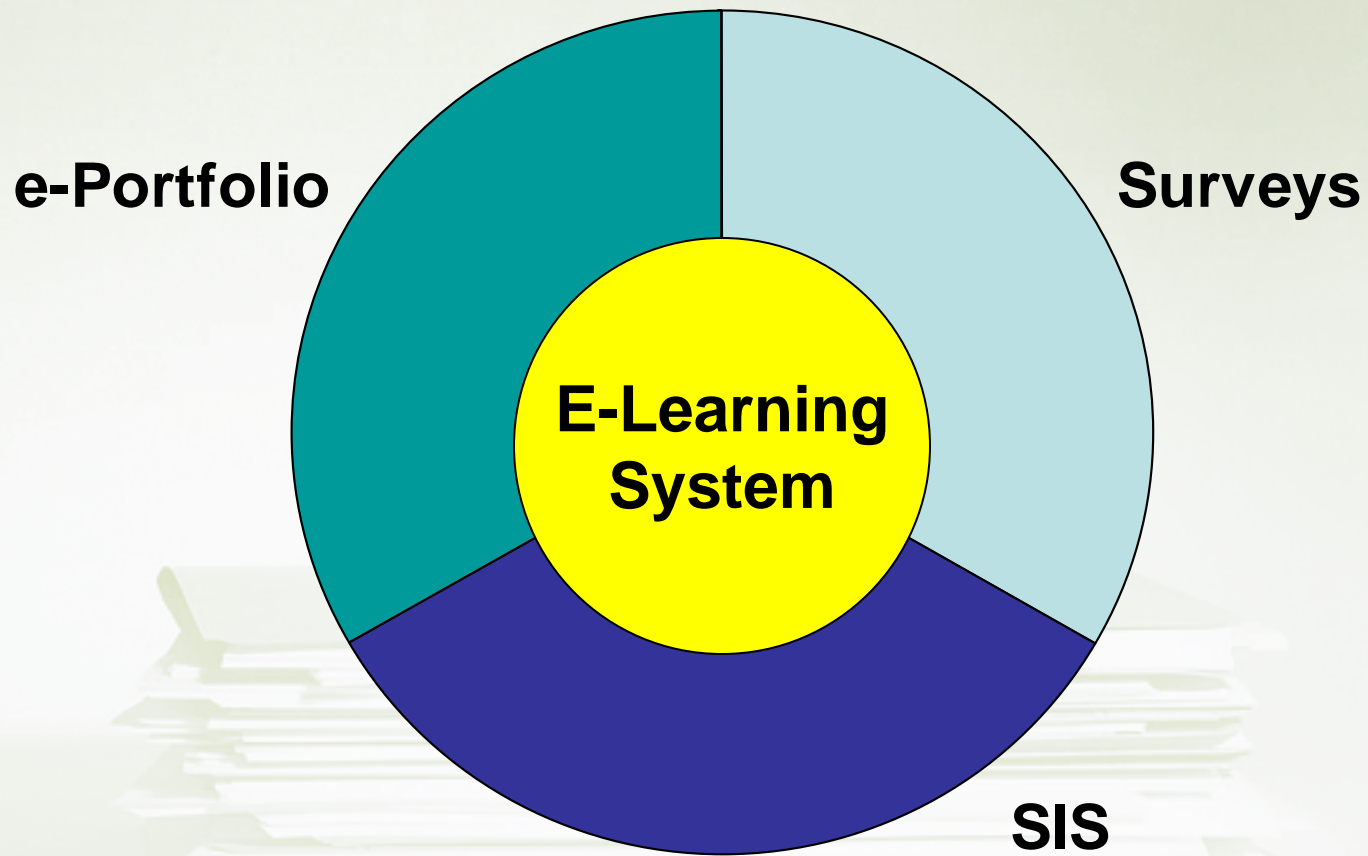
= Large Data Set

Patterns of Movement in Courses

Comparison of Withdrawing, Non-Successful and Successful Student Access Logs



Learning System In Assessment



Purpose of Study

- To learn more about student engagement in the online environment through an empirical analysis of participation in online courses.



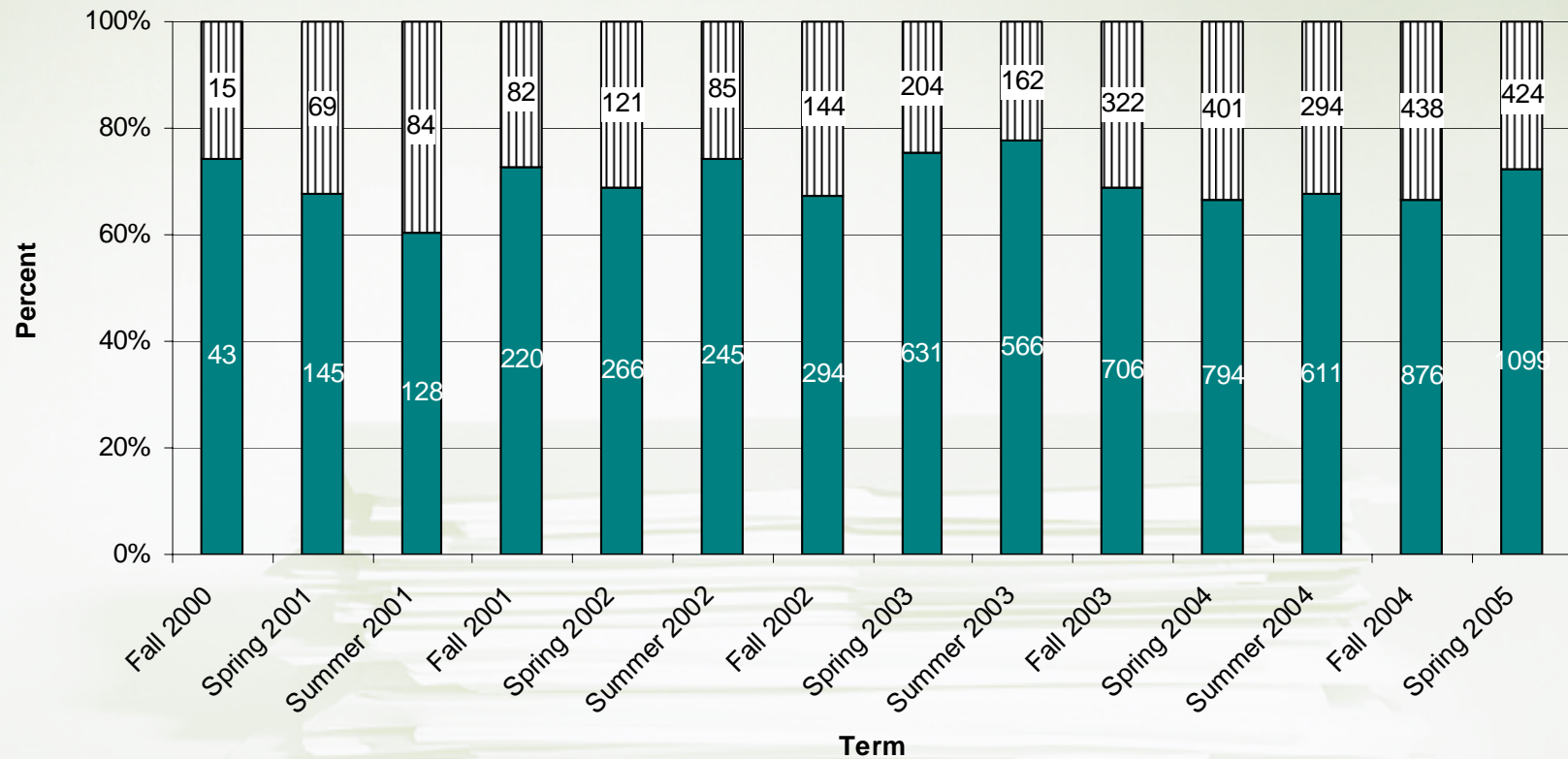
Research Setting

- eCore
 - Fully online general education courses
 - Courses taught since Fall 2000
 - Taught by faculty who may not have participated in course development
 - Students from across University System enroll at six institutions
- Higher rate of withdrawals and non-successful completion



Overall eCore Enrollment: Fall 2000 - Spring 2005

Withdraw and Complete



Research Population

- 13 sections across the three courses over 3 terms
 - ENGL 1102, HIST 2111, GEOL 1011
 - Fall 2002, Spring 2003, Summer 2003
- 423 students enrolled
 - 137 withdrawers
 - 72 non-successful completers
 - 214 successful completers
- 74% female, 25% minority, 38% upper division students, and less than 10% transient students



Research Questions

- What is the relationship of online student participation to persistence?
- What is the relationship of online student participation to achievement?
- Are there differences in persistence and achievement by academic background and demographic variables?



Definitions

- Persistence
 - Remaining in course throughout a semester; not withdrawing through official means.
- Achievement
 - Receiving a transferable grade in a course; generally A, B, or C
- Participation
 - Engaging in activities that may lead to learning
 - Viewing course content
 - Reading discussions
 - Creating new discussion posts
 - Responding to discussion posts



Methodology

- Access log for each student in each section imported into Excel.
- Student coded as successful completer, non-successful completer or withdrawer.
- Sequence of content pages visited compared against expected sequence.
- Number of content pages viewed, discussion posts viewed, original posts created and follow-up posts created were calculated.
- Time (seconds, hours) on tasks was calculated.



Overall Course Activity

- 198,000 discussions read
- over 99,000 content pages viewed
- over 5,500 original discussion posts
- 9,500 follow-up discussion posts
- over 300,000 total coded activities



Frequency of Student Participation for Withdrawers, Successful Completers, and Non-successful Completers

	Withdrawers (N=70)	Successful completers (N=214)	Non-successful completers (N=70)
Student Behavior Variable	Mean	Mean	Mean
Number of content pages viewed	60.07	383.81	194.64
Number of discussion posts viewed	129.50	800.76	252.09
Number of original posts	2.70	22.63	11.43
Number of follow-up posts	3.13	42.02	8.51



Duration of Student Participation for Withdrawers, Successful Completers, and Non-successful Completers

	Withdrawers (N=70)	Successful completers (N=214)	Non-successful completers (N=70)
Student Behavior Variable*	Mean	Mean	Mean
Hours spent viewing discussion pages	2.69	19.18	6.24
Hours spent viewing content	2.01	20.25	8.74
Hours spent creating original posts	.08	.87	.39
Hours spent creating follow- up posts	.17	1.35	.29



Statistical Analysis

- T-test for persistence and participation
 - Completers and Withdrawers
- Multiple Regression for achievement and participation
 - Successful and Non-Successful Completers



Differences in Student Participation by Frequency of Activity between withdrawers and Completers

<i>T-test</i> (<i>N</i> =354)	Withdrawers (<i>N</i> =70)		Completers (<i>N</i> =284)		<i>t</i>	<i>p</i>	
	Mean	<i>SD</i>	Mean	<i>SD</i>			
Student Behavior Variable							
Number of content pages viewed	60.07	60.11	337.18	212.09	-19.12*	.00	
Number of discussion posts viewed	129.50	200.91	665.52	771.57	-10.37*	.00	
Number of original posts	2.70	3.60	19.87	25.69	-10.84*	.00	
Number of follow-up posts	3.13	5.21	33.76	77.87	-6.57*	.0	

$p < .01$



Differences in Student Participation by Duration of Activity between Withdrawers and Completers

<i>T</i> -test (<i>N</i> =354)	Withdrawers (<i>N</i> =70)		Completers (<i>N</i> =284)		<i>t</i>	<i>p</i>
	Mean	<i>SD</i>	Mean	<i>SD</i>		
Student Behavior Variable**						
Hours spent on viewing discussion pages	2.69	5.36	15.99	18.62	-10.40*	.00
Hours spent on viewing content	2.01	2.67	17.41	23.04	-10.41*	.00
Hours spent on original posts	.08	.21	.75	1.13	-9.20*	.00
Hours spent on follow-up posts	.17	.35	1.09	2.58	-5.78*	.00

$p < .01$ **seconds converted to hours for data presentation

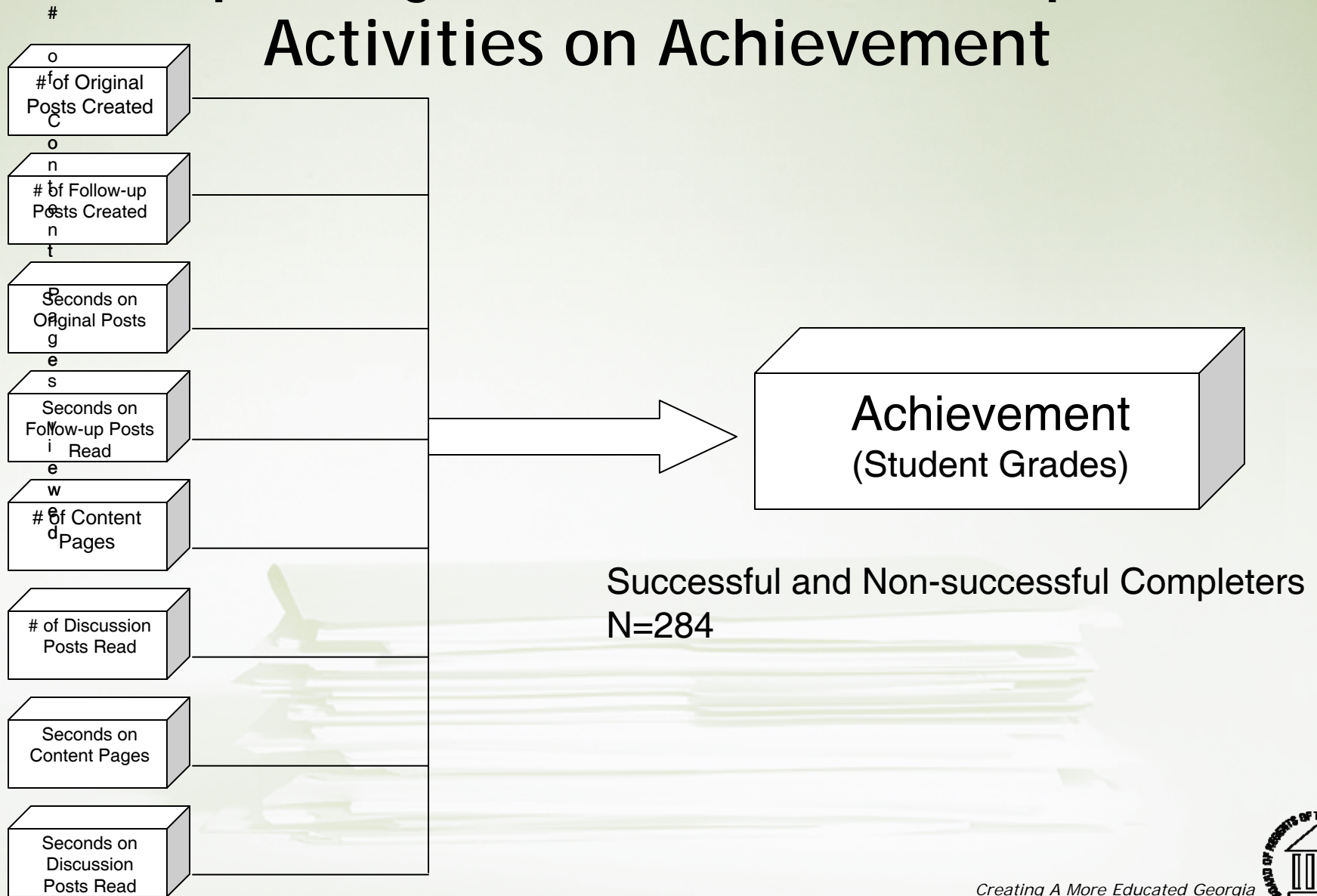


Results of T-test: Persistence & Participation

- Completers had more frequent activity and spent longer on task on all 4 measures.
- Withdrawers spent significantly less time and had less frequent activity than completers on all 4 measures ($p < .01$).



Multiple Regression Model for Impact of Activities on Achievement



Multiple Regression Analysis Summary for Student Participation (N=284)

Variables	<i>B</i>	<i>SE B</i>	β
Number of discussion posts viewed	.000	.00	.21*
Number of content pages viewed	.002	.01	.32*
Number of original posts	.005	.00	.09
Number of follow-up posts	.000	.00	-.02
Seconds on viewing discussion pages	.000	.00	.22*
Seconds on viewing content	.000	.00	.01
Seconds on creating original posts	.000	.00	-.04
Seconds on creating follow-up posts	.000	.00	-.05

Note: $R^2 = .31$.

* $p < .01$



Bivariate and Partial Correlations of Variables with Student Grade

Variables	Correlation between each variable and student grade	Correlation between each variable and student grade after controlling for all other variables
Number of discussion posts viewed	.35*	.16*
Number of content pages viewed	.42*	.26*
Number of original posts	.18*	.09
Number of follow-up posts	.24*	-.01
Seconds on viewing discussion pages	.37*	.16*
Seconds on viewing content	.33*	.08
Seconds on creating original posts	.17*	-.03
Seconds on creating follow-up posts	.24*	-.03

* $p < .01$



Conclusions

- Students who spend more time viewing content and participating in discussions are more likely to persist.
- Frequency and duration of content pages and discussions viewed are excellent predictors of student success.
- Withdrawers and non-successful completers did not participate while enrolled to any meaningful degree.
- Data collected in elearning and other systems can be used to improve academic analytics.
- New sources of data offer opportunities to study perennial questions from different perspectives.



Future Directions

- Review additional courses longitudinally.
- Review of other data collection components including day, date, mail and assessments.
- Review of individual student behavior over time and between courses.
- Review of impact of faculty participation on student achievement.



Questions?

- Catherine Finnegan:
catherine.finnegan@usg.edu
- Presentation available at:
 - <http://alt.usg.edu/publications>
- Article available:
 - Morris, L.V., Finnegan, C., and Wu, S. "Tracking Student Behavior, Persistence, and Achievement in Online Courses", *The Internet and Higher Education*, Volume 8, Number 3, 2005.

