Assessing Success of Student-Oriented Faculty-Run Learning Centers at the University of Missouri-Rolla

http://lead.mst.edu/assist

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(UMR is now Missouri University of Science and Technology – all links in this PowerPoint have been updated from original presentation)
and
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UMR Office of Undergraduate Studies

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2 June 2007

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Assessing Success of Student-Oriented Faculty-Run Learning Centers at the University of Missouri-Rolla

- **Abstract**

It is sometimes difficult to convince some faculty and administrators about the efficacy of an innovation or change in educational approach to enhance student learning. Assessment tools may be limited; data may be direct or indirect; skepticism about change may be present. At UM-Rolla, physics faculty started to operate a student-oriented collaborative learning center as office-hours for a large engineering physics course. This session will discuss how and why this simple educational innovation has blossomed across campus over the past five years with 50 participating faculty in 12 departments.

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Learning Enhancement Across Disciplines (LEAD) Program

… provides learning assistance to students for their success and retention

- LEAD employs ~30 accomplished undergraduate Peer Learning Assistants (PLAs) who undergo extensive training
- Annual budget: $50K (including salaries and wages)
- Implements the “Seven Principles of Good Practice in Undergraduate Education” – UMR style

  http://lead.mst.edu/sevenprinciples/commentary.html
- Stresses student-centered learning, mastery of material, student responsibility and teamwork

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LEAD Course-Based Collaborative Learning Centers

LEAD Learning Centers

- » Collaborative learning with LEAD faculty on duty using modified Socratic techniques
- » 45+ faculty run ~30 learning centers in 12 departments
- » From *Spanish I* and *College Algebra* to *Fluid Mechanics* and *Intro Quantum Chem*
- » Approximately 40% of students in a course attend its learning center for ~3 hrs/wk

~700 students/week vote with their feet to find success through Learning Centers

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LEAD Learning Center (LC) Characteristics

- Operate during fixed hours each week for a specific course
  - » location chosen by faculty (generally in department bldg)
- Staffed by
  - » discipline-based faculty as office hours in an open environment
  - » accomplished, trained undergraduate peer instructors
- Facilitate and project learning-centered education
  - » more student-oriented, less teacher-centered
- Learning Centers directly promote ALL the
  - » *Seven Principles for Good Practice in Undergraduate Education*

Video: S&T Physics Learning Center in Operation (2m30s)

http://lead.mst.edu/media/LCintro2m30s.mpg

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A Masterful Move in Your Physics Education

LEAD Centers and LEAD Tutoring

(Learning Enhancement Across Disciplines)

Phys 23 Center:
T Th 2-4:30pm, 6-8:30pm,
129/130 Physics Bldg.

Phys 24 Center:
M W 2-4:30pm, 6-8:30pm,
129/130 Physics Bldg.

Phys 25 Center:
variable 11am-noon,
202 Physics Bldg.

Phys 31 Center:
T 9-11am, 6-8:30pm,
202 Physics Bldg.

Physics Tutoring:
M T W Th 7-9pm
204 Norwood Hall

teamwork

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The Beginnings

- The Physics Learning Center was established in 1997 for the course Engineering Physics I

(*www.campus.mst.edu/physics/plc*)

Video: Encouragement of group work (2m05s)

http://lead.mst.edu/media/LCformGroup2m05s.mpg

Video: Guide when needed but avoid hovering (1m25s)

http://lead.mst.edu/media/LCacrossRoomKibitz1m25s.mpg

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What assessment helps to promote a good educational innovation?

- Was the success of the Physics LC just due to the personality of its initiator (Bieniek)?
- How do you promote it?
- Is it TRANSPORTABLE?
- Is it sustainable?

Think-Pair-Share Question:

What reasons might faculty give for not trying out this form of learning assistance?

(see presentation at this conference by N. Simpson)

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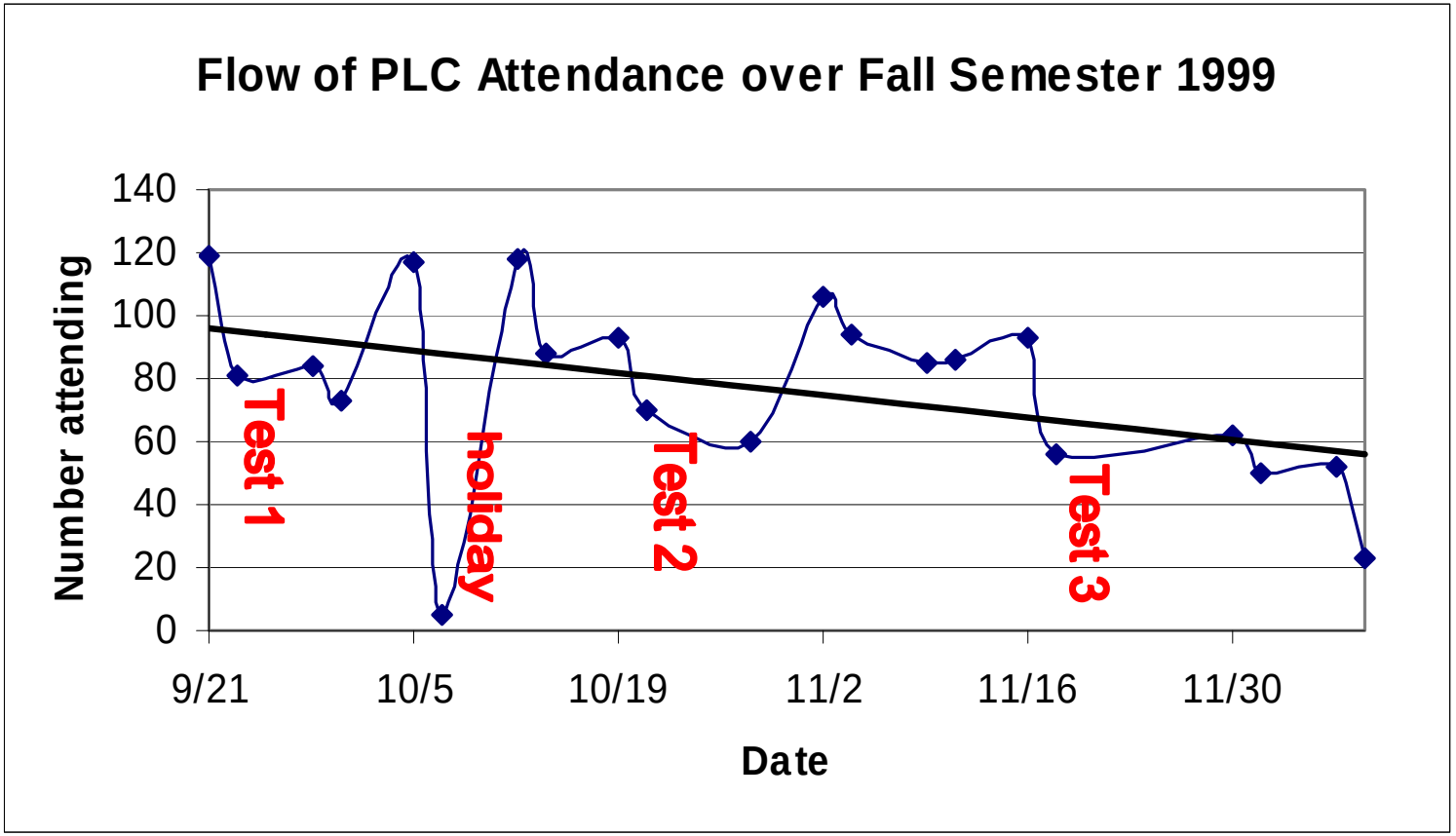
~40% of Students Voluntarily Used the Physics Learning Center (Engr Phys I) (note dips are just BEFORE tests)



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Impact of Physics Learning Center on Student Performance

Engineering Physics I for Fall 1999 (242 students)**

% Attending PLC:	40%	course GPA 2.9
% Non-attending PLC:	60%	course GPA 2.3

increase of GPA **0.6 out of 4.0**

Engineering Physics II for Fall 2005 (54 students in 2 rec secs)

% Attending PLC:	30%	course GPA 3.2
% Non-attending PLC:	70%	course GPA 2.3

increase of GPA **0.9 out of 4.0**

**In Fall 1999, the students in Engr Phys I who regularly attended the Physics Learning Center had the same average performance expectation (ACT+high school rank) percentile as those who were non-attending (82 ± 1 %).

Data compiled by R. Bieniek & A. Pringle, UMR Physics

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Time for Success in Math

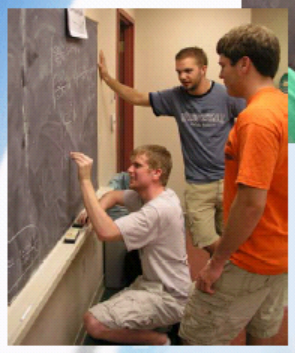
through

LEAD Tutoring

and

LEAD Centers

(Learning Enhancement Across Disciplines)



Math 2, 3, 4, 6 Tutoring:
T Th 5:30-7:30pm, Norwood-204

Math 8, 14, 15, 21, 22 Tutoring:
T Th 6-8pm, Norwood-208

Math 4 Center:
M 4:30-5:30pm, W 4-5pm, Th 6:30-7:30pm, CSF-G5D/E

Math 8, 14 Center:
M T 6-7pm, W Th 5:30-6:30pm, CE-313/314

Math 15 Center:
W 5-9pm, Th 4-6pm, Rolla-G4/5

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So, can the Physics LC be replicated? Compare the Calculus II Learning Center.

Eng Physics I LC

Calculus II LC

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Self-reporting survey of student usage of learning assistance

Usage and Ratings

Several sources of learning assistance are listed below. Please indicate which types are available for this course. Then give the average number of **hours per week** that *you are actually utilizing each one* ***currently***. *If you are not regularly using a particular type at this time, just put a* **zero** *(0)*. Please also rate the usefulness of each form of assistance to you in **mastering material** in this course.

Use a ***0, 1, 2, 3, 4*** **rating scale** with ***4*** **=** very useful or very good *to* ***0*** **=** not useful

There are no "right" or "wrong" answers, just your own candid responses.

	Is this type of learning assistance available to you in this course? *Circle one below*	**How many hours/WEEK do you typically use this type of learning assistance in this course?**	**What rating do you give this type of learning assistance for gaining mastery over course material?**
	Y = Yes *N = No* *D = Don't know*		*4 = very useful* *0 = not useful*
1. Faculty in his/her office	Y N D	_____	_____
2. Course Learning Center (LC) (in the department's building)	Y N D	_____	_____
3. Course tutoring	Y N D	_____	_____

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Typical data of student usage

LEAD Learning Centers, Winter 2004						
Fall 2002 Department – Course with a Learning Center	# of faculty participating in lieu of office hours	# students enrolled in class	% Students completing survey	% Students who regularly attended Learning Center*	Average Hrs/Wk	Rating of usefulness for mastery (out of 4.0)
Physics 23 – Engineering Phys I	5	364	70%	57±9%	3.9	3.4
Physics 24 – Engineering Phys II	4	231	60%	36±9%	3.2	3.7
Physics 21 – General Phys I	1	45	NA			
Physics 25 – General Phys II	1	25	NA			
Physics 31 – College Phys I	1	24	NA			
Basic Eng 50 – Statics	5	189	8%	14±11%	3.3	4
Chem E 145 – Chem Process Mat	1	52	NA			
Chemistry 1 – General Chem I	1	139	65%	18±4%	1.3	3.2
Civ Eng 230 – Fluid Mechnaics	1	45	82%	64±6%	2.8	3.9
Civ Eng 234 – Water Resource Eng	1	33	85%	79±6%	4.6	3.6
Comp Sci 153 – Data Structures I	2	92	NA			
Comp Sci 158A – Discrete Math	1	24	88%	22±1%	2.1	2.6
IST 151 – Intro Data Struc & Apps	2	40				
IST 211 – Web Develop & Design	1	53				
Met 121 – Metallurgy for Eng	1	123	62%	5±1%	1.3	3.6
ME 211 – Linear Systems	2	76	78%	75±9%	1.3	2.1
ME 227 – Thermal Analysis	1	35	23%	61±39%	1.8	3.9
ME 231 – Thermofluid Mech I	1	42	17%	58±42%	1.4	3.9
Totals and Weighted Averages	32	**1632**	56%	**38±7%**	**2.9**	3.3

* At least one hour/week around 12th week of class. Plus number is usage by students completing survey on day it was administered; minus is usage based on total enrollment, conservatively assuming that ***all*** regular attendees filled out survey.

38% of 1632 students = 620 students per week using LCs for ~3 hrs

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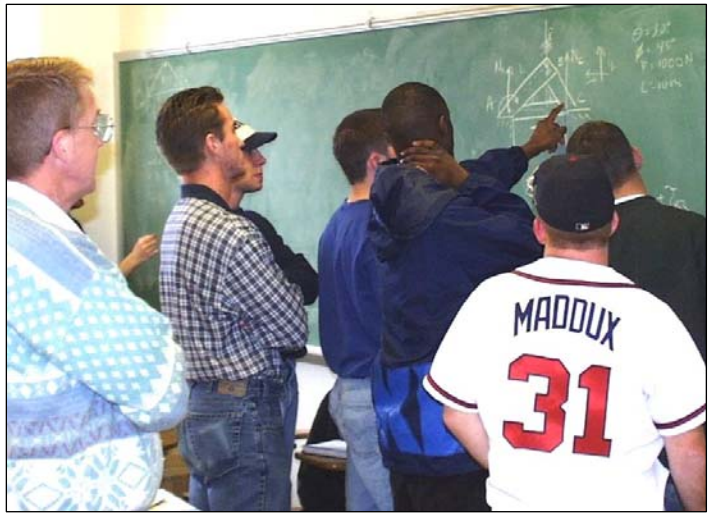
Unposed photos of Cooperative Learning and Social Dynamics in the intro Physics, Math, Chemistry Learning Centers



Offer:

Cookies
Pop corn
Easy access & EGRESS

Zero or small % points

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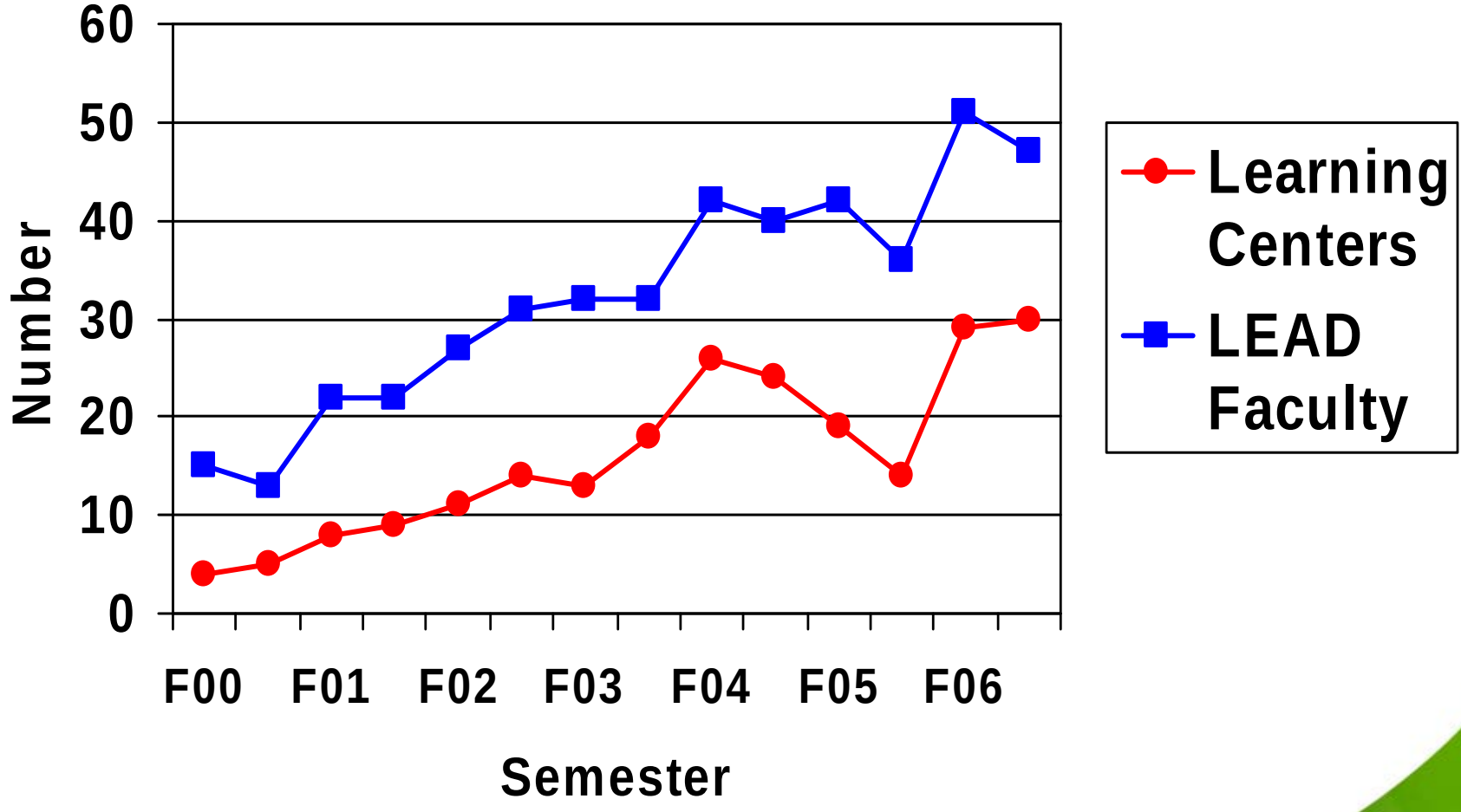
LEAD Learning Centers and LEAD Faculty Associates



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Growth of LEAD Learning Centers

	Fall 2001	Fall 2006	over 5 yrs
# Learning Centers	8	**29**	***260 %***
# Departments	5	**12**	***140 %***
# LEAD Faculty	22	**51**	***130 %***

Data indicates that students who regularly attend Learning Centers do better in course grades

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Current LEAD Learning Centers (Fall 2006)

General Chem I	Data Structures I	Elementary Fluid Mech
Intro Quantum Chem	Discrete Math (Comp Sci)	Water Resource Engr
Engr Phys I	College Algebra	Linear Systems Mech Engr
Engr Phys II	Calculus I with Analyt Geo	Thermal Analysis (Mech E)
College Physics I	Calculus II with Analyt Geo	Thermodynamics (Mech E)
Chem E Materials Balances	Calculus I for Engineers	Dyanmics (Mech E)
Chem E Fluid Flow	Calculus II for Engineers	Machine Dynamics (ME)
Elec Engr Circuits I	Engr Mechanics-Statics	Elementary Spanish I
Digital Systems Design	Mechanics of Materials	Spanish Reading & Comp
Intro Data Struct & Apps	Engineering Dynamics	

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What next after usual suspsects?

- Use new faculty programs (e.g., UM New Faculty Teaching Scholars) to generate interest in doing an efficient, effective, and noticeable “thing” in pedagogical best practices.
- Early-career faculty may experiment out of respect and *quid pro quo* for new faculty developer who devoted so much effort for new faculty success.
- Develop some assessment ammunition so that new faculty can “buy in” with good conscience.

UM NFTS
Course Design Retreat
(May 2007)

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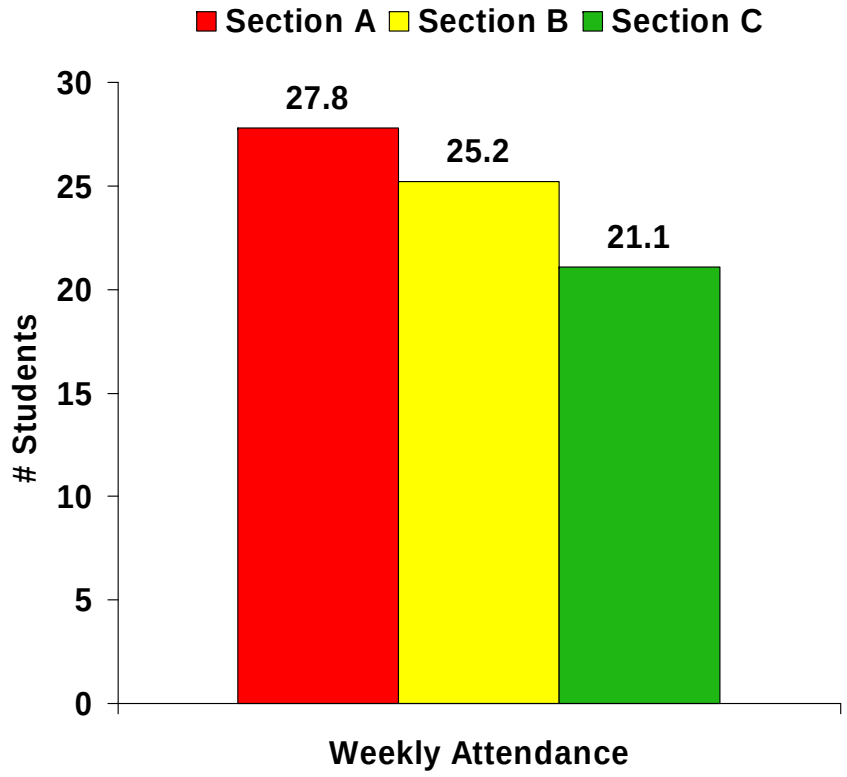
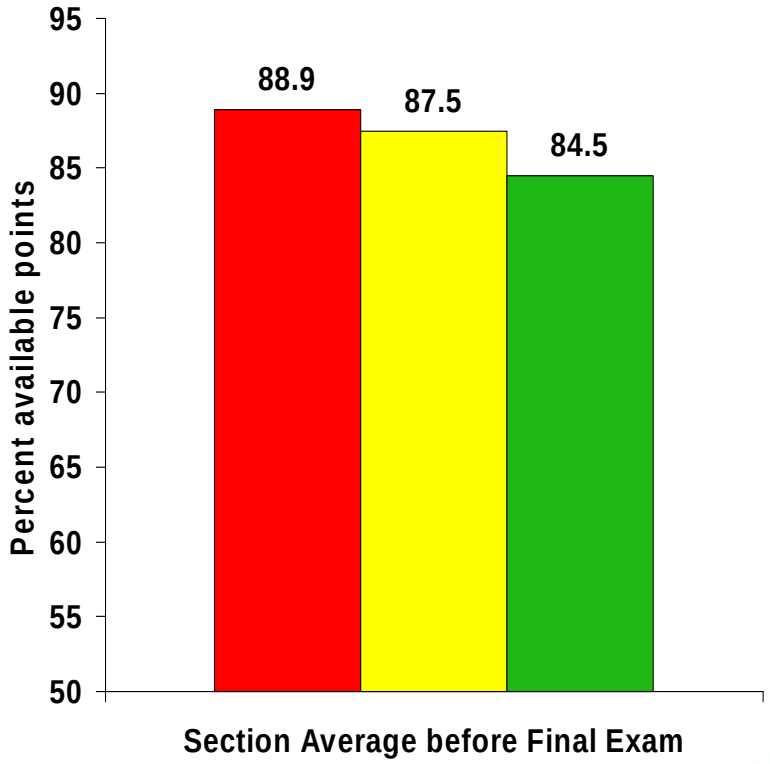
Calculus II for Engineers (Spring 2006): Average Weekly LC Attendance (%) correlated to Course Performance





Data compiled by M. Bohner and E. Akin, UMR Math

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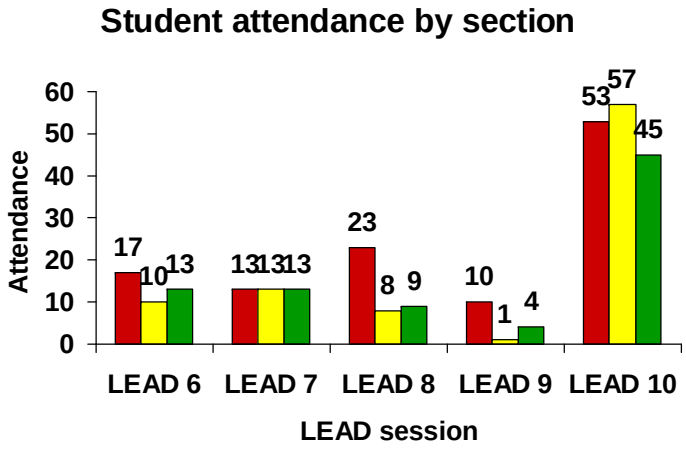
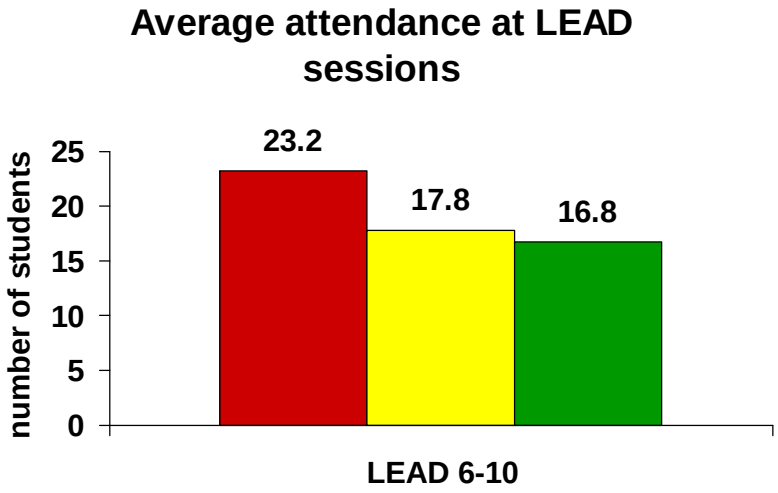
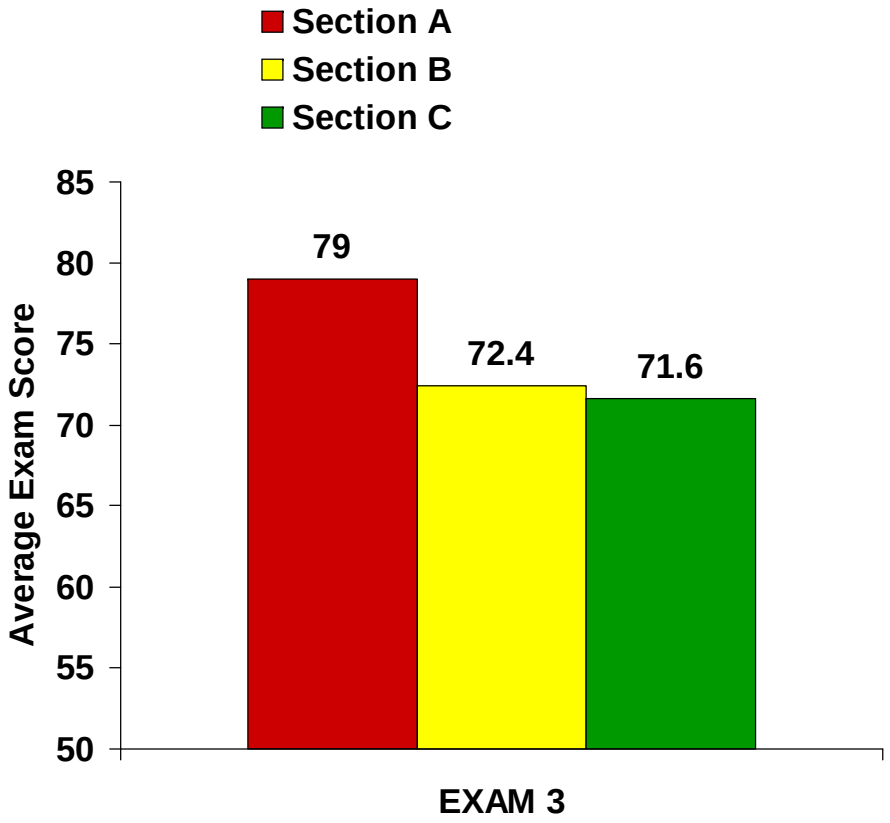
Micro-analysis of usage of Calc II LC before Exam 3 (Sp 2006)







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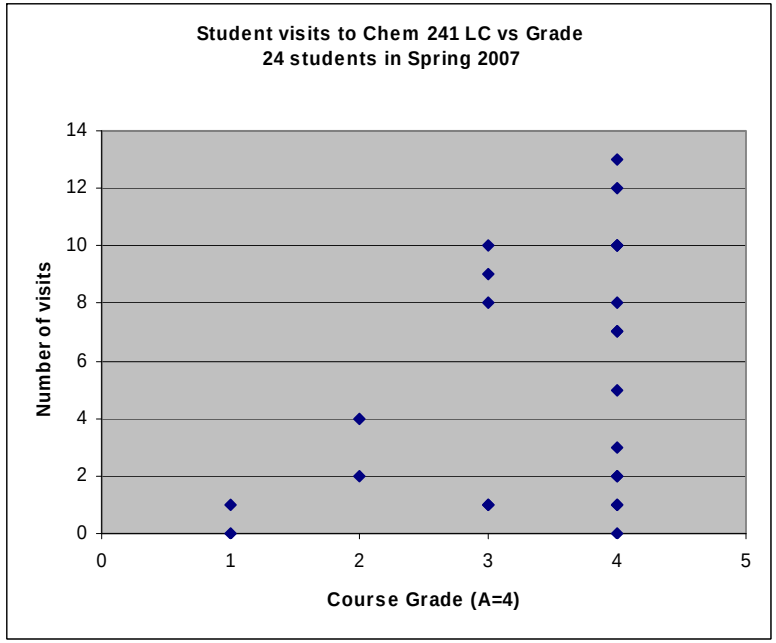
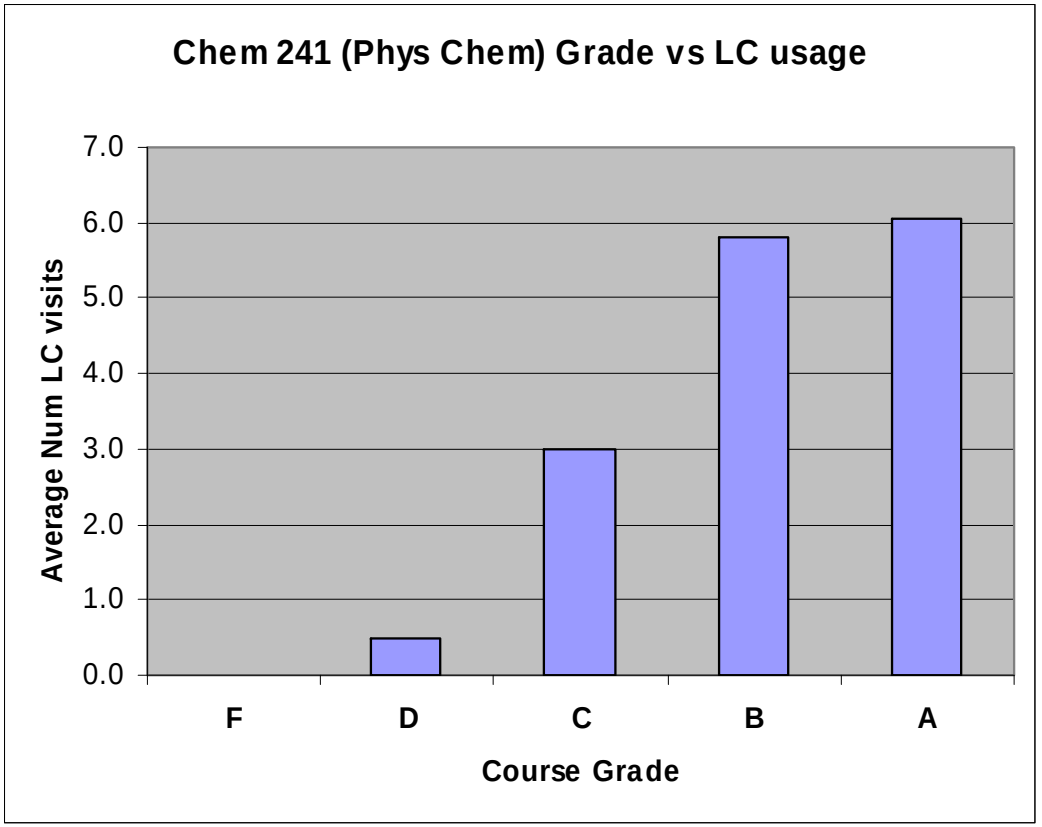
Assessing/Promoting Impact of an LC: Example of Chem 241 LC (Sp 2007)





Data supplied by K. Woelk, UMR Chemistry

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Using good teaching ratings can backfire when promoting educational best practices

The Chronicle of Higher Education Tuesday, **May 29, 2007**
http://chronicle.com/daily/2007/05/2007052901n.htm

Method of Using Student Evaluations to Assess Professors Is Flawed but Fixable, 2 Scholars Say by DAVID GLENN

Mr. Greenwald presented an analysis of the student ratings of more than 14,000 courses given at his university from 1997 to 2001. He was especially interested in exploring how average course ratings varied by department. Courses in U. Washington's dance department, for example, typically received high student evaluations, while **chemistry, physics, and mathematics** courses tended to rate poorly.

Not surprisingly, Mr. Greenwald said, he found that 70 percent of the variance in departments' average course-evaluation scores could be explained by differences in students' grades.

Recent knee-jerk interpretation: Faculty who give easy grades get high teacher ratings, while tough faculty don't.

WITHOUT pondering such questions as: are higher teacher ratings related to how easy the grades are, or are higher grades a function of the teaching quality reflected by the ratings.

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Using assessment data to promote open-environment collaborative learning centers

- Work with a faculty member who has a reputation as a “tough” teacher (i.e., one with a reputation of “holding up standards”).
- Pitch to a few target faculty [friends] who will be responsive to a good idea with rudimentary assessment data without becoming skeptics who repeatedly ask “But what about …?” or “How do you know that …?”.
- Think of them as paratroopers for the idea into departments.
- Assure departments that the innovation will not cause internal disruption BUT will display participating members as proactive about student success.
- Demonstrate that students actually use the approach.
- Spread the word and get adherents through New Faculty Programs.
- If there are “errors” in implementation, show the associated faculty a real-time working example and comment in general as to why it is working (“Oh! OK.”)
- Develop data that shows the approach improves student achievement to go beyond usual suspects and perhaps generate administrator interest/support.
- Be aware that some faculty might be turned-off if there is too much educational data presented – unless there is extreme control of identical conditions and populations (like behavior of electrons or machines).

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QUESTIONS??

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