Efficient Faculty-Run Collaborative Learning Centers for Student Success

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LEADing the Way to Student Success: S&T’s Learning Enhancement Across Disciplines Program

... provides proactive learning-success support for all students in foundational courses

- Offers faculty-run Learning Centers and peer tutoring that:
  - are welcoming with no stigma implied
  - promote student-centered learning
  - increase understanding of course material
  - enhance analytical and proficiency skills
  - validate mastery

- Empower students through personal achievement and assured confidence (Bandura’s validated self-efficacy, producing greater motivation and effort)

- “You have the ability to succeed; we will guide & assist you”

- LEAD employs ~30 accomplished undergraduate Peer Learning Assistants (PLAs) who undergo extensive training in pedagogy and leadership
Free walk-in LEAD Peer Tutoring

• Conducted by accomplished undergraduate Peer Learning Assistants (PLAs), paid and trained by LEAD
• Provides 4 – 8 hours/week of peer tutoring at scheduled days & times for 25-30 large-enrollment foundational courses
  – prior semesters archived at lead.mst.edu/assist/archive.htm
• Always includes:
  Chem 1 – 3  Comp Sci 54,74,78  Math 2 – 22
  MechE  219,227  Physics 21 – 35

Advantages of tutoring
• Quiet, calm environment
• Focused personal attention by trained undergrad peers

Disadvantages or barriers
• Low level of camaraderie, socialization
• Only a relatively few students are helped
• No interaction with faculty
• Little social interaction with others
Effective use of your office hours: run a LEAD Learning Center!

- Students are generally loath to enter the office lair of a faculty member for a variety of reasons
- Have office hours (~2 hours/week) in an open “inviting” environment of a LEAD Learning Center
- NOT recitations sections or “help sessions”
- Rather Learning Centers offer collaborative “guided learning”
- Reasons to do it: you will see
  - the homework done, lessening your need to prep
  - gain insight into student misunderstandings & difficulties
  - have fun interacting with greater numbers of students
  - have less complaints and issues from students
  - You will project that YOU CARE about your students
- The Physics Learning Center in operation
Course-Based Faculty-Run Collaborative LEAD Learning Centers at Missouri S&T

- Collaborative learning with LEAD faculty on duty as office hours using guided-learning techniques
- 45+ faculty run 35+ learning centers in 12+ departments
- Minimal disruption of department infrastructure
- Financial cost is ZERO except for any (low cost) undergrad assistant on duty with a faculty member
- From Elementary Russian and Financial Accounting to Electromechanics and Quantum Chemistry
- 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 these effective learning communities
LEAD Learning Center 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 undergrad peer instructors (for large courses) who benefit from pre-professional leadership and pedagogy training
- Facilitate and project learning-centered education
  - more student-oriented, less teacher-centered
- Utilize **social dynamics & camaraderie** for learning success
- Directly promote best practices for student learning
  - *Seven Principles for Good Practice in Undergraduate Education* ([http://lead.mst.edu/sevenprinciples/commentary.html](http://lead.mst.edu/sevenprinciples/commentary.html))

**Students who regularly participate do significantly better**

Data collected in physics, chemistry, and mathematics clearly demonstrates positive impact on student performance and grades
LCs implement the Seven Principles for Good Practice in Undergraduate Education

http://lead.mst.edu/sevenprinciples/commentary.html


– Encourage student-faculty contact
– Encourage cooperation among students
– Encourage active learning
– Give prompt, frequent, informative feedback
– Emphasize time on task
– Communicate high expectations
– Respect & encompass diverse talents & learning styles
The Seven Principles with modified call to action

• **Principle 1: Encourage student-faculty contact**
  – Frequent student-faculty contact is a key factor in student motivation, involvement, and learning. Faculty concern helps students get through rough times and continue to strive for success. *Devise methods that actively and successfully promote student-faculty contact with both individual students and larger groups of students.*

• **Principle 2: Encourage cooperation among students**
  – Learning is enhanced when it is more like a team effort than a solo race, and working cooperatively with others often increases students’ involvement in their own learning. Sharing ideas and responding to others can sharpen thinking and deepen students’ understanding of the material at hand. *Take positive, proactive steps to ensure that meaningful and effective cooperative learning takes place among groups or teams of students.*
The Seven Principles with modified call to action

• **Principle 4: Give Prompt, Frequent, Informative Feedback**
  – Students who know where they stand in a course are better able to gauge their strengths, their weaknesses, and what they must do to succeed. To reach their full potential, students require appropriate feedback about their current level of personal understanding and mastery of course content. *Provide students with frequent assessments of their achievement level and offer them specific suggestions as to how they can improve their performance.*

• **Principle 5: Emphasize Time on Task**
  – There is no substitute for time on task—the time students spend actively engaged with course material. Learning to manage one’s time effectively is critical for success in the classroom, yet many students struggle to acquire and maintain this important skill. *Devise course strategies that ensure students spend productive time on their coursework, and hold them accountable for learning the assigned material.*
Unposed photos of Cooperative Learning and Social Dynamics in the introductory Physics, Math, & Chemistry Learning Centers

Suggestions

Cookies
Pop corn

Appropriate operating days/hours

Easy access & EGRESS

Zero or small % points for participation
Effectiveness of Learning Processes

Confucius (400 BC):

- What I hear, I forget.
- What I see, I remember.
- What I do, I understand.

Silberman (1996):

- What I hear, I forget.
- What I hear and see, I remember a little.
- What I hear, see, and ask questions about or discuss with someone else, I begin to understand.
- What I hear, see, discuss and do, I acquire knowledge and skill.
- What I teach to another, I master.

Silberman (Active Learning, 1996), based on work of psychiatrist William Glasser
There are so many problems but Chemistry has solutions.

**Learning Enhancement Across Disciplines**

SPRING 2009
**LEAD Centers:**
Chem 1:
Tu W 3-4:30 pm
126 Schrenk Hall

Chem 3:
M 4-6 pm
139 Schrenk Hall

Chem 444 (Spectroscopy):
M 2:30-4:00 pm
208 Norwood Hall

Chem 455 (Chem Spectroscopy):
Tu 4-5:30 pm
104 Eng Mgmt

**SPRING 2009 LEAD Tutoring:**
Chem 1 & 3
Tu Th 7-9 pm
208 Norwood Hall

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EE & CpE

**LEAD Centers**

- **Elec Engr 153 (Circuit Analysis II):**
  - W 4 – 6pm
  - 104 EE Bldg.

- **Elec Engr 271 (Electromagnetics):**
  - M/W 6 – 7:30pm
  - 102 EE Bldg.

- **Comp Engr 213 (Digital Systems Design):**
  - Tu 4:30 – 6pm
  - 103 EE Bldg.

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*Many of life’s failures are people who did not realize how close they were to success when they gave up.*

- Thomas Edison
Chemistry 1 Learning Center in Operation

• Students working together, one joins them (1 min, 16 sec)

• Learning Center removes stigma of seeking “help” (31 sec)

• Student realizes advantages of LEAD when repeats course (52 sec)

• The joy of personal achievement and success (10 sec)
Are LCs transportable to other institutions?

UN Las Vegas Physics

UNLV’s PLC
The Physics Learning Center
BPB 249

HOURS:
Tuesday 3-5 PM (Prof. Farley on duty)
Wednesday 1-3 PM (Prof. Provac on duty)
Wednesday 3-5 PM (Prof. Kwong on duty)
Physics 151 (General Physics I – algebra-based physics)
Physics 152 (General Physics II – algebra-based physics)
Physics 180 (Physics for Scientists and Engineers I – calculus-based mechanics)
Physics 181 (Physics for Scientists and Engineers II - calculus-based electricity and magnetism)
Physics 182 (Physics for Scientists and Engineers III – calculus-based thermo, optics, intro to modern physics)

Students in any of these courses can come to the Physics Learning Center.

www.physics.unlv.edu/plc/schedule

UC Berkeley Astronomy

TALC: The Astronomy Learning Center

The Astronomy Learning Center is a large, collaborative “office hour” where students work on their homework assignments in an informal group setting. TALC is staffed by GSIs who serve as guides, rather than tutors, helping student groups with their homework problems. In addition to supervised group work, students may discuss difficult concepts in their conceptual understanding of lecture and reading topics with the GSIs and their peers.

TALC is held in Room 254 of Evans Hall and Room 544 of Campbell Hall. The Fall 2009 TALC hours are:

- Astronomy 7A
  - Wed 5-7
  - 264 Evans
- Astronomy 10
  - Wed 7-9
  - 264 Evans
- Astronomy C10
  - Wed 7-9
  - 264 Evans
- Astronomy 160
  - Wed 7-9
  - 264 Evans
- Astronomy 162
  - TBA

Documents
- TALC: Individualized Assistance Through Collaborative Learning—2002 Teaching Effectiveness Award winning essay
- The Tao of TALC—Guidelines for GSIs teaching effectiveness in the learning center environment
- Rules of TALC—Guidelines for students

Last Changed Date: 2009-09-15 5:16:07 -0700 (Wed, 09 Sep 2009)

astro.berkeley.edu/resources/campbell/talc
~40% of Students Voluntarily Used the Physics Learning Center (Engineering Phys I) (note dips are just BEFORE tests)
Impact of a Learning Center (LC): Engineering Physics 1 (Fall 2010)

Engineering Physics I grade as function of LC attendance by % students shown

Number of Physics Learning Center visits (Fall 2010)

Average grade out of 4

0-5: 62%
6-10: 11%
11-15: 13%
16-20: 15%
Chemistry 1 Learning Center (F 2010)
course grade vs. LC attendance

Average % Grade

Sessions Attended
Learning Enhancement Across Disciplines
Learning Centers and Faculty Associates

Records:
Most Faculty: 59 (Fs 2011)
Most LCs: 45 (Fs 2011)
Most Depts: 15 (Fs 2011)
## 45 LEAD Learning Centers in Fall 2011

<table>
<thead>
<tr>
<th>College Algebra</th>
<th>General Chem I</th>
<th>General Physics I</th>
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<tbody>
<tr>
<td>Calculus II for Engineers</td>
<td>General Chem II</td>
<td>General Physics II</td>
</tr>
<tr>
<td>Discrete Math for Comp Sci</td>
<td>Intro Quantum Chem</td>
<td>Engineering Physics I</td>
</tr>
<tr>
<td>Structural Design</td>
<td>Physical Chemistry II</td>
<td>Engineering Physics II</td>
</tr>
<tr>
<td>Engr Fluid Mechanics A</td>
<td>Physical Polymer Chemistry</td>
<td>College Physics I</td>
</tr>
<tr>
<td>Engr Fluid Mechanics B</td>
<td>Chem E Material &amp; Energy</td>
<td>Classical Mechanics</td>
</tr>
<tr>
<td>Water Resources Engineering</td>
<td>Chem E Thermodynamics I</td>
<td>Microeconomics</td>
</tr>
<tr>
<td>Nuclear Fuel Cycle</td>
<td>Chem E Thermodynamics II</td>
<td>Mine Industry Economics</td>
</tr>
<tr>
<td>Transport in Metallurgy</td>
<td>Thermal Analysis</td>
<td>Managerial Accounting</td>
</tr>
<tr>
<td>Elementary Spanish</td>
<td>Dynamics</td>
<td>Intro Computer Engineering</td>
</tr>
<tr>
<td>Spanish Reading &amp; Comp</td>
<td>Machine Dynamics</td>
<td>Digital Circuit Design</td>
</tr>
<tr>
<td>Elementary Russian</td>
<td>Mech Eng Thermodynamics</td>
<td>Circuit Analysis I</td>
</tr>
<tr>
<td>Russian Readings Sci &amp; Lit</td>
<td>Intro Physical Geography</td>
<td>Circuit Analysis II</td>
</tr>
<tr>
<td>Russian Phonetics</td>
<td>Structural Geology</td>
<td>Electromechanics</td>
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If you would like to consider offering an efficient Learning Center for your course and want tips for running an successful one, please check out http://lead.mst.edu/media/studentsupport/lead/documents/LCpracticaltips.pdf

or

please contact Ronald Bieniek, Director of LEAD

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