PROCESS-ORIENTED GUIDED INQUIRY LEARNING

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WHAT IS POGIL?

POGIL combines:

Process - Oriented Learning

Guided Inquiry Approach

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Employment Criteria

Your team has been assembled as an employment committee for your institution and charged with filling a new position. The Human Resources Department requests a list of the top ten criteria that a successful candidate will need to meet.

- *Individually* identify four criteria in the form of characteristics or skills you see as essential for this position.

- *As a team*, share these and develop a ranked list of the top ten criteria your committee will use in the selection process.

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Sample Responses

What qualities do students need to be competitive in the marketplace?

• Knowledgeable
• Good problem solvers
• Communication skills
• Self-Motivated
• Management Potential

What issues do you consider when preparing to teach a course?

• Textbook to use
• Topics to cover
• Quality of lectures
• Homework to assign
• Questions for exams
• How to assign grades

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PROCESS-ORIENTED CLASSROOM

Students work in small groups on specially designed activities intended to develop mastery of both course content and key process skills.

TARGETED PROCESSES

- Information Processing
- Problem Solving
- Teamwork
- Assessment
- Critical Thinking
- Communication
- Management

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Guided Inquiry Learning

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Conventional Pedagogy

- Teaching is telling
- Knowledge is facts
- Learning is recall


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Information Processing Model

Constructivist Model of Learning

“Learning is not the transfer of material from the head of the teacher to the head of the learner intact, [but] the reconstruction of material in the mind of the learner.”

“It is an idiosyncratic reconstruction of what the learner...thinks she understands, tempered by existing knowledge, beliefs, biases, and misunderstandings.”

-A.H. Johnstone


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New Paradigm

- Knowledge results only through active participation in its construction.
- Students teach each other and they teach the instructor by revealing their understanding of the subject
- Teachers learn by this process...by steadily accumulating a body of knowledge about the practice of teaching.

Teaching is enabling.

Knowledge is understanding.

Learning is active construction of subject matter.

Guided Inquiry Approach

- Students work in groups
- Students construct knowledge
- Activities use Learning Cycle paradigm
- Students teach/discuss/learn from students
- Instructors facilitate learning

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Learning Cycle
(Karplus, Piaget)

- Parallels the scientific method
- Being wrong is a stage on the way to being more right
- Ideas do not appear in your brain fully formed
- Learning is a process wrought with effort, frustration and error

Analysis of Student Outcomes
What is “success”?  

• We define “success” as the achievement of a grade of C- or higher (ABC)
• “Lack of success” includes grades in the D range, F, and withdrawals (DFW)
• More detailed grade distributions will be shown, but analysis will be based on this definition of “success”
• Statistical significance is determined by chi-squared analysis using these two groupings: ABC and DFW
POGIL General Chemistry at Franklin & Marshall College

- Sections of about 24 students
- “Lecture” F1990 - S1994: n = 420
- Students randomly placed Fall semester
- Students designate preference Spring semester (but not guaranteed to get their choice)
- Same instructors “before” and “after”

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POGIL General Chemistry at Franklin & Marshall College

8 years of data (n = 905)

Lecture

POGIL

Data from classrooms of Moog, Farrell and Spencer
Chi-squared = 40.9  alpha < 0.005

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POGIL Organic Chemistry at “2nd Tier” Liberal Arts College

• Two sections - one “lecture”, one POGIL - taught at the same time
• Students randomly placed in sections
• Common exams - prepared and graded by both instructors

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POGIL Organic at “2nd Tier”
Liberal Arts College

1998-1999, n = 40

Lecture         POGIL

- A: 20%             - A: 29%
- B: 35%             - B: 35%
- C: 27%             - C: 24%
- D,W,F: 33%         - D,W,F: 12%

Randomized enrollment, different instructors, single exam given concurrently, prepared and graded by both instructors

Chi-squared = 7.1      alpha < 0.01
POGIL Organic I at Large Public University

- Two sections - one “lecture”, one POGIL - taught at the same time
- Students randomly placed in sections
- Midterm exams (not part of study) created and graded independently
- Final exam (studied) created solely by “lecture” instructor

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Organic I at Public University
Withdrawals and Common Final Exam Scores, Fall 2000

Lecture n = 109
47% Withdrawal

POGIL n = 75
12% Withdrawal

Top Half Average 65 pts.

Top Half Average 66 pts.

(Organic I Average Attrition = 38%)

Chi squared = 19.1
Alpha <0 .005
GI Organic at 1st Tier Liberal Arts College

• This one is complicated
• Comparison is of grades in a single section of Organic II
• Some students took Organic I with GI
• Some students took Organic I with “lecture”
• Not all students from Organic I enrolled in this section of Organic II

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Coverage Issue

Is Guided Inquiry Organic I preparation for Organic II Lecture?
Performance in Org II
(of those enrolled in Section X)

• Traditional Org I:  16 ABC  3 DFW
• POGIL Org I:  13ABC  1 DFW
• Chi-squared =  0.8
• No significant difference in “success”
Conclusions

• Students achieved greater “success” in POGIL classes
• Students were prepared for subsequent course taught in traditional style

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WHAT CAN THE POGIL PROJECT DO FOR YOU?

• Introductory One Day Workshops
• In-Depth Three Day Workshops
• On Site Visits and Consultancies
• Ongoing Support and Advice via Phone and Email

– PROCESS - ORIENTED GUIDED INQUIRY LEARNING

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UPCOMING ONE DAY WORKSHOPS

• Mar. 13  Towson University, MD

• Apr. 24  Grand Valley State Univ., MI

• mid-July BCCE, Iowa State University, IA

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3 DAY WORKSHOPS SUMMER, 2004
(tentative)

- June 3-5  Stony Brook University
  New York City campus
- June 24-26  Univ. of Redlands, CA
- July 26-28  Christian Brothers College, Memphis, TN
- Aug 5-7  University of New Hampshire

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AVAILABLE MATERIALS

- Printed full-course activities
- Printed modular activities
- Web-based activities
- Quantum states CD

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