

Using POGIL to teach Computer Programming

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What is POGIL?

POGIL: Process Oriented Guided Inquiry Learning originated in college chemistry departments in 1994.

Students work together in small groups of 3-4 with assigned roles on instructor designed guided sets of questions. There is no lecture. Instructor acts as a facilitator.

What is Guided-Inquiry Learning?

It is the recapitulation of the scientific method. Students are guided by instructor designed materials based on the Learning Cycle of

- Exploration
- Concept invention
- Application

What are the Processes?

The process skills include both cognitive and affective processes that students use to acquire, interpret, and apply knowledge.

- Teamwork
- Oral and Written Communication
- Team Management
- Information Processing
- Critical Thinking
- Problem Solving
- Assessment

What are the types of questions?

Exploration: Includes Directed questions e.g. What is the data type of var x in line 2?

Concept Invention: Concepts are introduced e.g. Is it possible for two objects to have different values for the same property? Why?

Application: Programming problem in a new context

What are the typical roles?

There are four typical roles: manager, recorder, spokesperson and reflector. Roles are flexible and can be modified to suit your class and style.

I generally use 2-3 students in a team with the roles of recorder who writes on the worksheets, the spokesperson who asks questions to the instructor during the activity, and coder who writes code/operates the computer.

Why am I using POGIL to teach coding?

While teaching Javascript in my web development class, I noticed that many students were able to complete a programming project but are unable to explain fundamental details about the code. As a result, I started to use worksheets that let students analyze a program in great detail with mostly directed questions. This led me to find POGIL.

I decided to use POGIL in my Computer Programming II class where students have great difficulty connecting the Object-Oriented Programming (OOP) concepts to OOP Java code. POGIL seemed like a fit as students can learn the code while discovering the concepts.

How do I use POGIL?

I do not use POGIL for all classes or for all topics. I choose to use it when I think it will be most beneficial for student learning. I use POGIL in two ways:

1. Full POGIL with no lecture for teaching OOP coding and concepts
2. Light POGIL. Guided-inquiry with lecture. Students can work in teams (with roles) or individually (with think-pair-share). Using it for teaching selected topics in Javascript and SQL.

Resources

- Main Computer Science POGIL site with excellent sample activities for many CS topics:
<http://cspogil.org/Home>
- General POGIL Site:
<http://www.pogil.org/>
- Training Workshop: POGIL Regional 3-day workshop is offered in four locations across the US. Check dates and exact location at
<http://www.pogil.org/workshops-events/events>

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