

Guided Inquiry in the Lab: Learning How to “Do” Science



Science Program Lab Activity Research Team
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Highlights

1. Simple “cookbook” labs do not help students develop scientific autonomy in a lab setting.
2. On the other hand, lab activities that are too open-ended and without adequate scaffolding can confuse students and hinder learning.
3. **Carefully designed guided inquiry labs can help students develop necessary lab skills and scientific autonomy.**

Summary: The challenge of facilitating the development of student autonomy in the lab

For students in the Science program, fully engaging in the experimental process can be difficult because they are rarely given the opportunity to practice this. The experiments they are asked to complete are often simplistic, like a recipe.

Guided inquiry labs offer an interesting way to overcome this problem. These more open labs allow students to:

- Make choices
- Make decisions
- Adjust their approach

This increased responsibility allows students to improve their autonomy and develop their ability to think like expert scientists.

Gaps in student learning within the Science program

Consultation reports produced to inform the writing of the new Science program (Belleau, 2017; ÉduConseil, 2014) point to shortcomings in program graduates:

Identified Shortcomings:

- Applying the scientific method
- Solving complex problems
- Displaying autonomy
- Implementing a true problem-solving approach
- Making appropriate choices given specific contexts

Outcome:

- Lack of initiative
- Confusion and uncertainty when presented with open-ended problems
- Tendency to want to follow ready-made instructions
- Inability to formulate an action plan

Lab activities should be devoted to the development of scientific competency, not simply to demonstration.

Belleau report , 2017

Solution : Guided inquiry labs

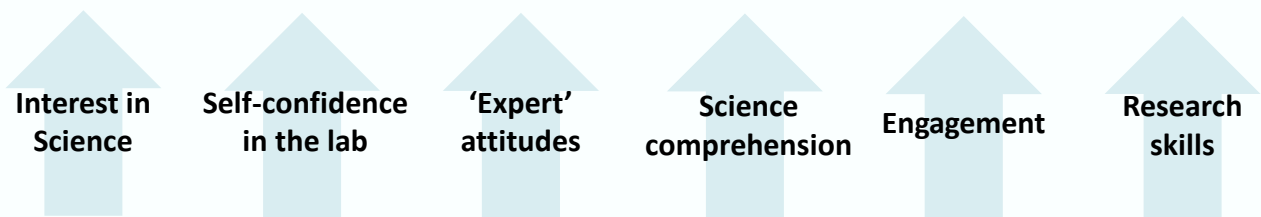
Summary of differences between the three possible levels of inquiry for lab activities

	Research Question	Experimental Method	Interpretation of Results
Level 1: Verification	Teacher	Teacher	Teacher or Student
Level 2: Guided Inquiry	Teacher	Student	Student
Level 3: Open Inquiry	Student	Student	Student

Appropriate level of inquiry for college studies

What the research literature says about guided inquiry labs:

Guided inquiry labs increase:



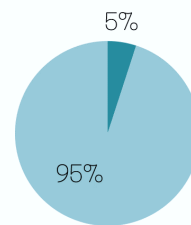
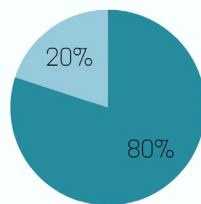
When the inquiry provides the necessary guidance to students:
Grades improve!

Guidance supports learning

Guided Inquiry

Open Inquiry

Students can be confused or uncertain



Grades increased
Grades decreased

Grades increased
Grades decreased

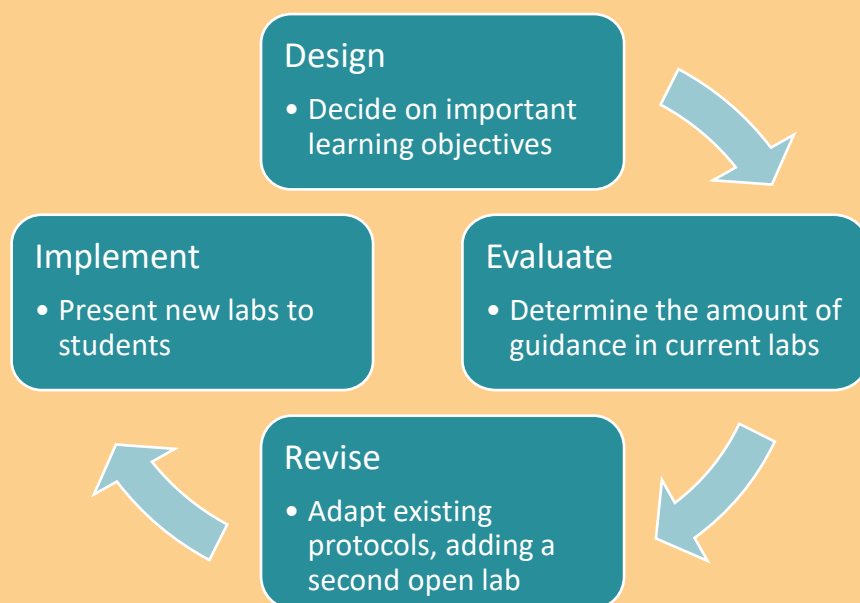
Recommendations for college teaching:

- 🕒 Encourage guided inquiry rather than open inquiry
- ♾️ Develop activities that extend beyond a single lab period
- 📖 Explicitly model disciplinary reasoning
- 📊 Gradually reduce scaffolding
- 🧩 Break down tasks into steps to reduce cognitive load
- 👥 Don't do it alone: work with colleagues to develop labs

Workshops to Help Develop Guided Inquiry Labs

Our next workshops will focus on developing more open labs. Would you like to be kept informed of the dates and details of these workshops? Sign up for our newsletter by emailing us at support@saltise.ca

Bring in your lab texts - Analyze your existing labs - Develop more open labs!



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Sources

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