Helping student and teachers feel comfortable with the ISLE approach

Eugenia Etkina
Rutgers University
eugenia.etkina@gse.rutgers.edu

Slides are at https://docs.google.com/presentation/d/1Bm-Ir4AqhCFkUyxZK_IVcXJimKNY9Pqjxu2sd07y7rU/edit#slide=id.gf6cbc3886c_0_149

First, let’s review what the ISLE approach is and how it works (quickly)

Describe what you observed in simple words and propose several “crazy ideas to explain what you observed


KIRKLAND
Signature
ORGANIC
STRAWBERRY SPREAD
Whole
Milk
KIRKLAND
Trader Joe's Organic Preserves are

WatAir Dew Harvesting System Provides Safe Drinking Water

Reflect on how we figured out where the water comes from

-Observe some phenomena

Form hypothesis (ideas)

We threw away the bad ideas?Those whose predictions were falsified

Tested the ideas individually

What can be new or different in this approach? Why would it be hard for students or teachers?

Students don’t like to be wrong so can be hesitant in putting ideas forward, as well as teachers being resistant to allowing students to learn through doing.

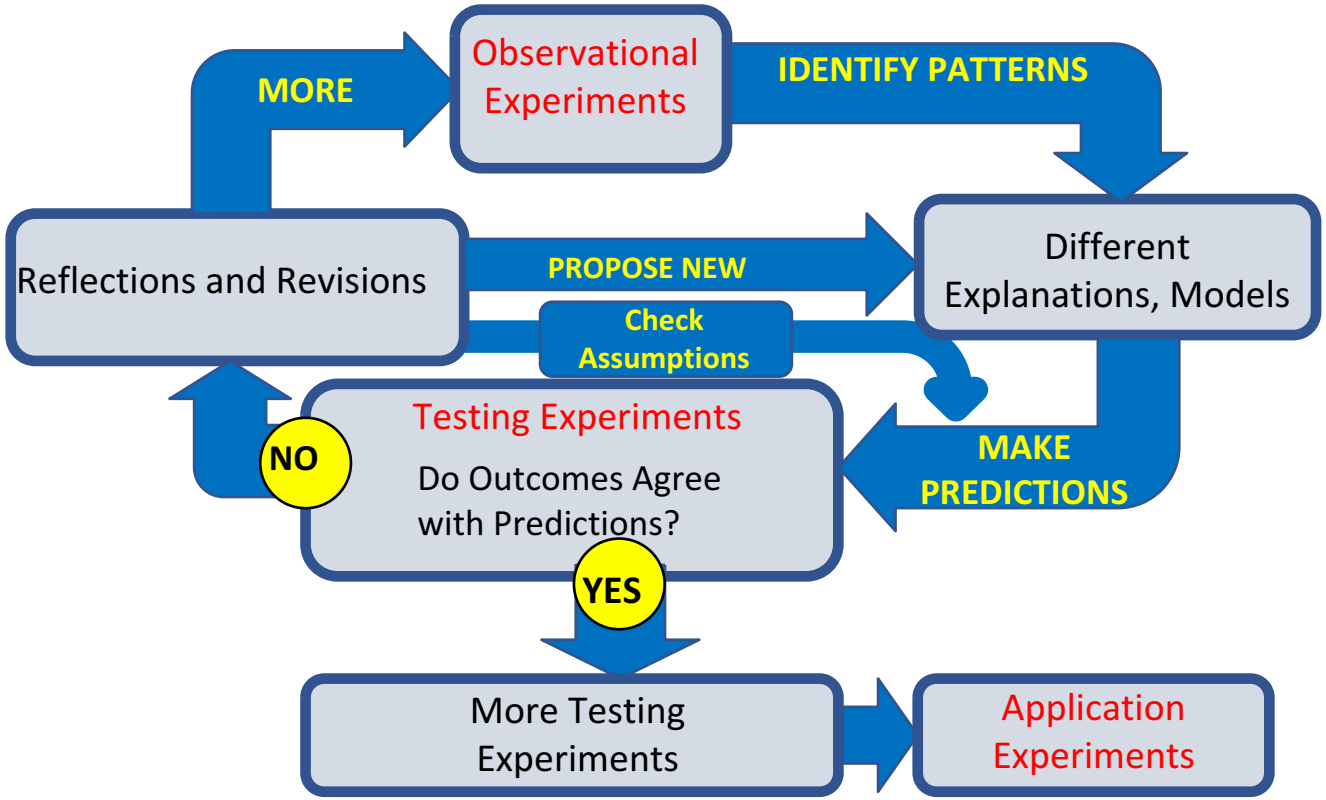
Sheehan: students who have already had exposure to physics think of “puzzles” like this boring and useless, and are convinced they already “know” all this.

Coming up with possible explanations-- they might feel that they’re already supposed to know something technical

Forming hypotheses/proposing testing experiments (they might feel “incompetent”)

Anne: I can't type of on the slide … but students seem used to being told what is "correct" and wait to hear it from the instructor.

The Investigative Science Learning Environment (ISLE) process



Etkina and Van Heuvelen, 2001, 2007; Etkina, 2015

piano

flute

guitar

hockey

cycl

basket

taich

Volley

Javig

Cook

Expertise activity (on the whiteboard)

Your task is to create a learning cycle showing what you had to do to become an expert in what your field

Use the whiteboard tool, draw the cycle and take a screenshot to post on your team’s slide.

Team 1: Experts in music, photography

Who can see what you share here?

1. Motivation (e.g., a finished product to emulate/be able to create, a person you admire who does it, joy of doing it)

2. Do a lot of it!!!!
2.1 Working through difficulties
2.2. Structure (? ideally :))

3. Learn from experts (either by watching/reading or taking lessons)

4. Doing the thing you set out to be able to do

5. Look for feedback

Mouse Text Draw Stamp Arrow Eraser Format Undo Redo Clear Save

Who can see what you share here?

Practice feedback correction

Instruction

Inspiration

Opportunity

Access

Plan + build up

Copy from Expert

Join a team

Learn from failing/Aging

Learn instructions "how to play"

Create a cycle

Inspiration → opportunity

Team 3 Experts in cooking, sewing

At first we observed gaining interest and motivation

There was many faceted gain on a personal level and practical level

started with something easier almost like an apprentice with a more seasoned person

There was perseverance especially at the beginning, not being stopped by mistakes.

with helpful feed back from experts took risks and tried more

with time improving became another motivator

Built-in elements of the ISLE approach that help your students overcome resistance (not necessarily in the order of importance)

1. Creating a community of learners
2. Not using fancy language describing observational experiments
3. Clear expectations through rubrics (see scientific abilities rubrics) and immediate feedback through self-assessment
4. Experiments that have feedback built into them.
5. “No punishment” resubmission policy - multiple opportunities for everyone
6. Pep talks about the brain and future life
7. Discussions of fixed and growth mindsets
8. Continuous reflections and teacher acknowledgments of specific progress
9. Sharing of personal struggles and sharing of everyone’s struggles
10. Affirmations
11. “Building up” your students

Important things to do to balance frustration

1. Do not skip “the need to know” - make it your own
2. Try to connect “the need to know” to your students’ lives EVEN in college.
3. Make sure the students are familiar with all the resources that we offer.
4. Spend time teaching them “interrogation method” for textbook reading (Chapter 1 OALG). Assign interrogation activities for class work and homework.
5. Have equipment on the tables for students to hold and manipulate even for paper-and-pencil problems.
6. Appropriate “time for telling” - not too late and not too early.
7. Kinestetic activities.

Helping instructors

1. The feeling that a change is needed is the necessary condition for change (reflection).
2. Understanding why the ISLE approach is superior to everything else (I firmly believe in it).
3. Understanding the details of the approach and feeling confident (studying our materials carefully as if you never studied physics).
4. Having an opportunity to observe how ISLE works in a classroom (if you are doing it, invite your colleagues to watch your class).
5. Having administrative support for change (up-down or down-up approach).
6. Having a community (our Facebook group and the local community at your school).