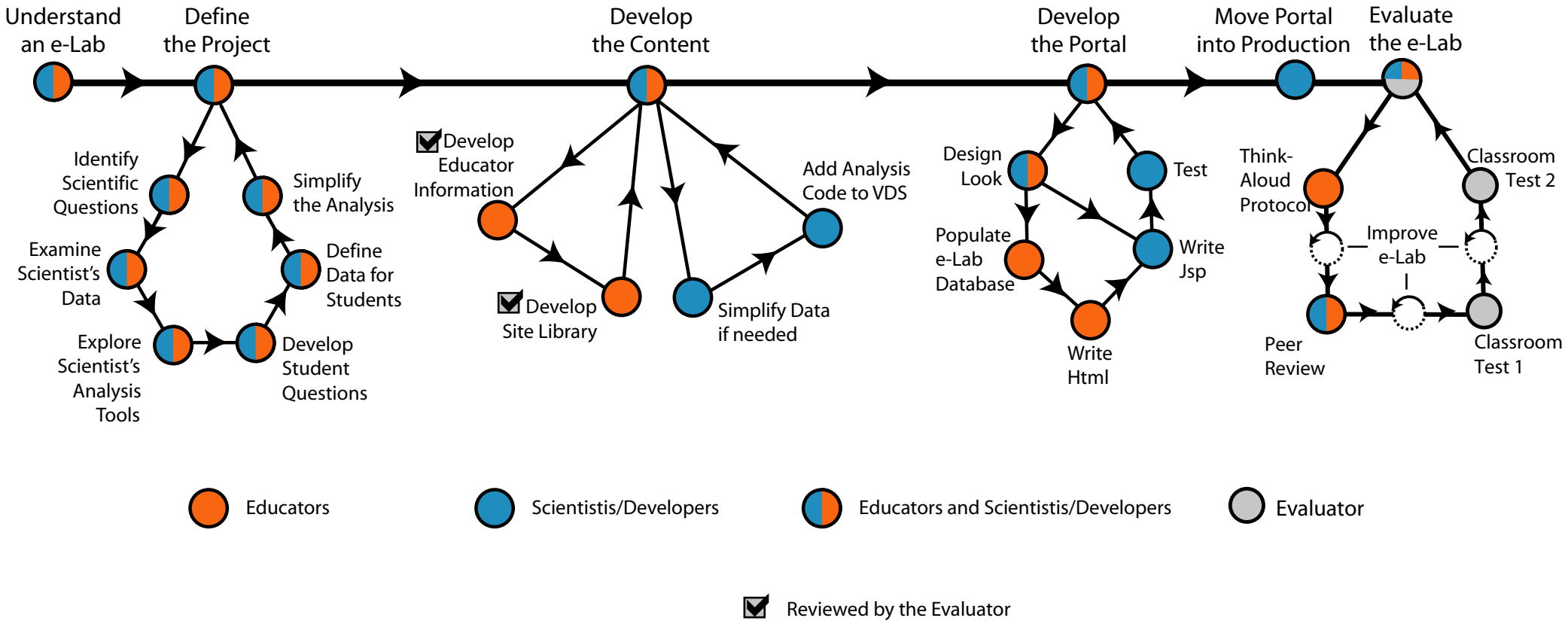
Workflow for Making an e-Lab



Understand an e-Lab

Scientist/Techie View
Architecture and Implementation:
Served from a centralized server

- Common e-Lab database and tools
- Virtual Data System and Chiron
- Java Server Pages / Java Beans

Student / Educator View

- Project Page
- Educator Side
- Student Side
  - Data and Analysis
  - Library
  - Logbook
  - Posters
  - Assessment

Common Elements

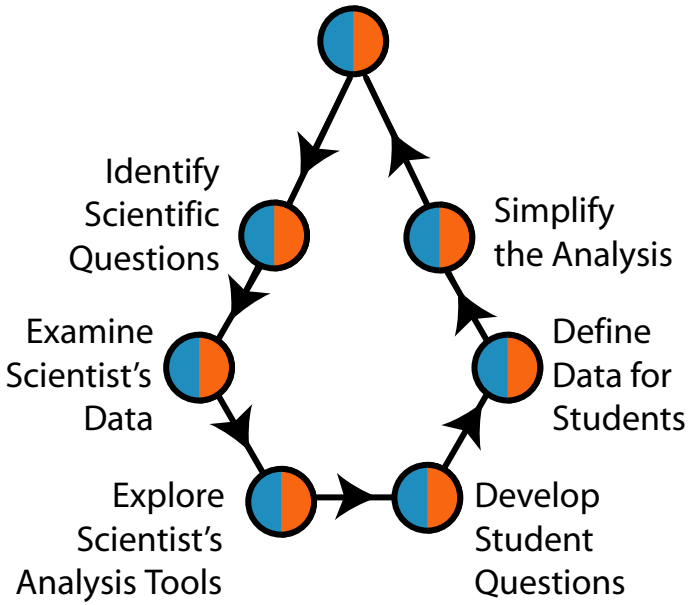
User Registration
Library: Study Guide (Milestones), References,Glossary Items
Logbook, Comments
Workflows, Execution, Search, Plots, Annotations

 Educators

 Scientistis/Developers

 Educators and Scientistis/Developers

Define the Project



Scientists and educators meet together to understand how to translate the scientist's research tools and data into a student-centered research experience.
They identify
- what kind of research questions students can answer.
- how to make the data accessible to students.
- narrow down the analyses students can do.
- limit the input parameters; visualize an interface.

Educators
- experiment with tools and data with students
- optionally work with data with local tools (Excel)

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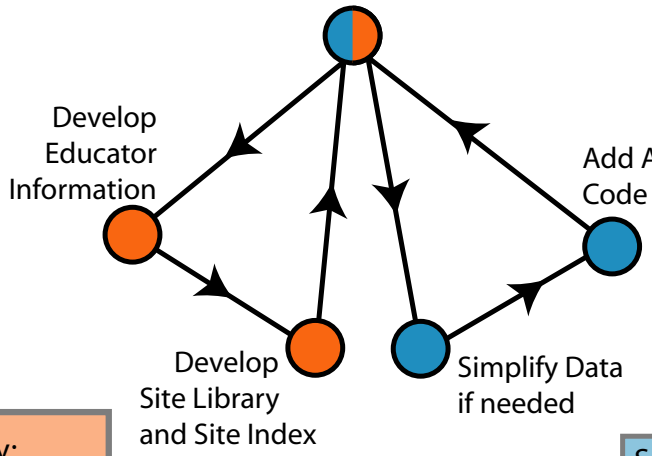
Develop the Content

Educators develop content for the teacher portal:
- Home
  Learner Outcomes ☑
- Rubric
- Standards
- Classroom Notes



Scientists/developers add the analysis code to the Virtual Data System. They define and test the transformations and derivations for the analyses students will do in the portal.

Educators develop content for the Library:
- Study Guide
  Milestones ☑
  References
- Resources (Online resources, glossary, tutorials)

Educators develop pre-test and post-test ☑

Scientists/developers filter data to include important features for student research.

Educators

Scientistis/Developers

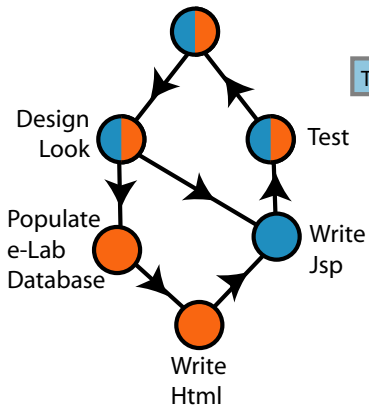
Educators and Scientistis/Developers

☑ Reviewed by the Evaluator

Develop the Portal

Determine the common look for e-Lab (graphics, CSS)

Add to the e-Lab Database
- Milestones
- Any default research groups



Test portal over and over!

Write jsp pages including data analysis pages using java beans provided in the e-Lab toolkit.

Tailor include files to use e-Lab specific CSS and graphics.

Convert teachers pages to jsp pages.

Write individual pages for each reference and glossary using template.

Take content for educators and put into templates for educator portal.
- Home
- Rubric and Learning Outcomes
- Classroom Notes, etc.

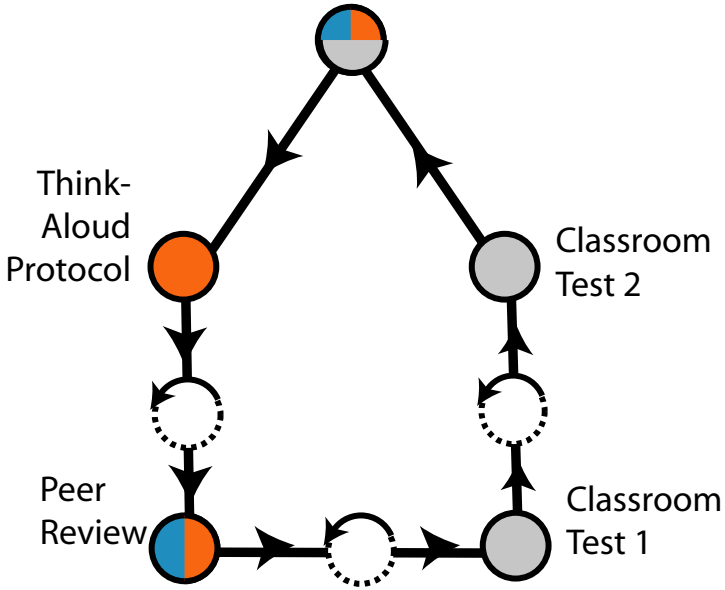
Educators

Scientistis/Developers

Educators and Scientistis/Developers

Evaluate and Improve the e-Lab

Perform Think -Aloud Protocol with individual students.



Observe and analyze results from a large group of average students.

Peers review site using a rubric to identify any improvements needed.

Observe and analyze results from a small group of advanced students.

Each stage may create changes that need to be made to the e-Lab before going on to the next stage.

Educators

Scientistis/Developers

Educators and Scientistis/Developers

Evaluator

The full procedure for evaluation is documented in the following table from the grant proposal.

1.6 Part B. Effectiveness of I2U2 e-Labs and Learning Community Activities (Professional Development)

Research/Evaluation Matrix: On the following matrix each evaluation activity is related to a program goal/evaluation study question and expected outcomes related to the activity. Respondents and who is responsible for collecting the data are identified and evaluation criteria and/or purpose of the activity is described. The chart is arranged by development stage: first, product development, then ongoing assessment.

I. Product Development

Goals - Study Questions	**Expected Outcome(s)**	**Activities to Achieve Goals**	**Who Collects** Evaluators analyze data	**Evaluative Criteria/Purpose**
To what extent are e-labs user-friendly, appropriate for intended users, and to what extent do they contribute to the teaching of curriculums/standards?	*Developers* gain an understanding of the extent to which: Teachers and students can easily use e-labs[1] Materials (including online) are written for the appropriate use of the intended audience.	*Think-aloud protocol* Use protocol with two people at least three times during the development process or until there are no obvious glitches.	Developers conduct protocol and share summary to outside evaluators. (Developers will be trained to use the protocol.)	Get feedback to eliminate any obvious glitches. Evaluators report findings to all developers for overall quality control.
To what extent are e-labs viable classroom materials?	*Developers* gain an understanding of the extent to which: Materials are written for the appropriate use of the intended audience. e-labs contribute to curriculums and address standards.	*Expert review* Review by other e-lab developers, PIs, expert teachers (including selected fellows) and outside evaluators	Reviewers share reviews with outside evaluators who compile data.	Get feedback and suggestions from experts; outside evaluators provide information for developers continuing to work on and improve e-labs.
To what extent are e-labs user-friendly, appropriate for intended users, and to what extent do they contribute to the teaching of curriculums/standards? To what extent are learning objectives (LOs) achieved? To what extent are e-labs	*Developers* gain an understanding of the extent to which: Materials are written for the appropriate use of the intended audience. e-labs contribute to student learning.	*Classroom beta testing* (a. small and b. production scale) a. Pre- and post-tests, posters, rubrics, logs with high-achieving students b. Pre- and post-test, poster monitoring, bug tracking with all students	a. Ten to twelve QuarkNet fellows and three to four LIGO teachers provide summary data to outside evaluator. b. QuarkNet fellows and selected participants in 15-20 classrooms provide data to outside evaluator. Developers report	a. Developers check LO achievement and use feedback to make adjustments before production-scale testing. b. LO achievement should be reached by at least 60 percent of students; developers eliminate glitches.