

InTeGrate

*Interdisciplinary Teaching about Earth
for a Sustainable Future*



Lessons Learned from the InTeGrate Project: Supporting Postsecondary Faculty in Their Design of Curricular Materials Connecting Geoscience and Societal Challenges

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InTeGrate: STEP Center Goals

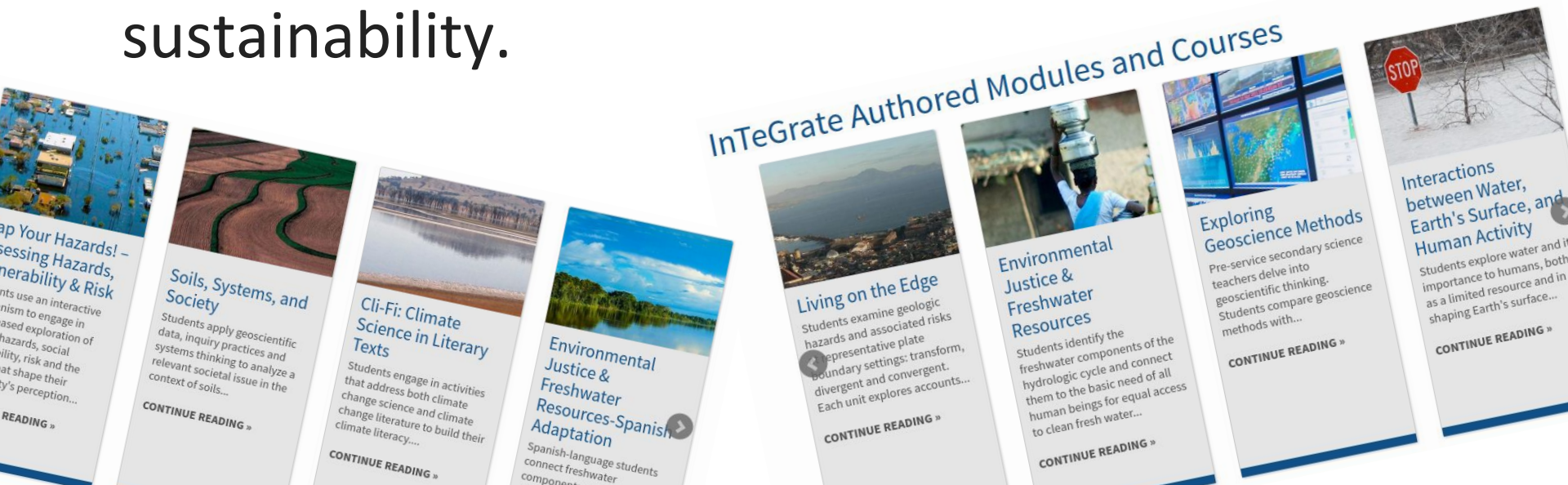
- To develop curricula that will dramatically increase Earth literacy of all undergraduate students
- To increase the number of majors in the geosciences and related fields who are able to work with other scientists, social scientists, business people, and policy makers to develop viable solutions to current and future environmental and resource challenges



InTeGrate: STEP Center Goals

To support development & dissemination of new model programs based on an understanding of current practice.

- Programs that engage students with interdisciplinary approaches to issues of sustainability.





InTeGrate: STEP Center Goals

- Achieving these goals requires a revolution in how geo-education is perceived and practiced, as well as the roles that learning about the Earth play in the broader curriculum in institutions of higher education.
- Connecting geoscience education to societal challenges has the potential to increase enrollment in geoscience and allied courses, thus strengthening the field while serving society.



InTeGrate Materials

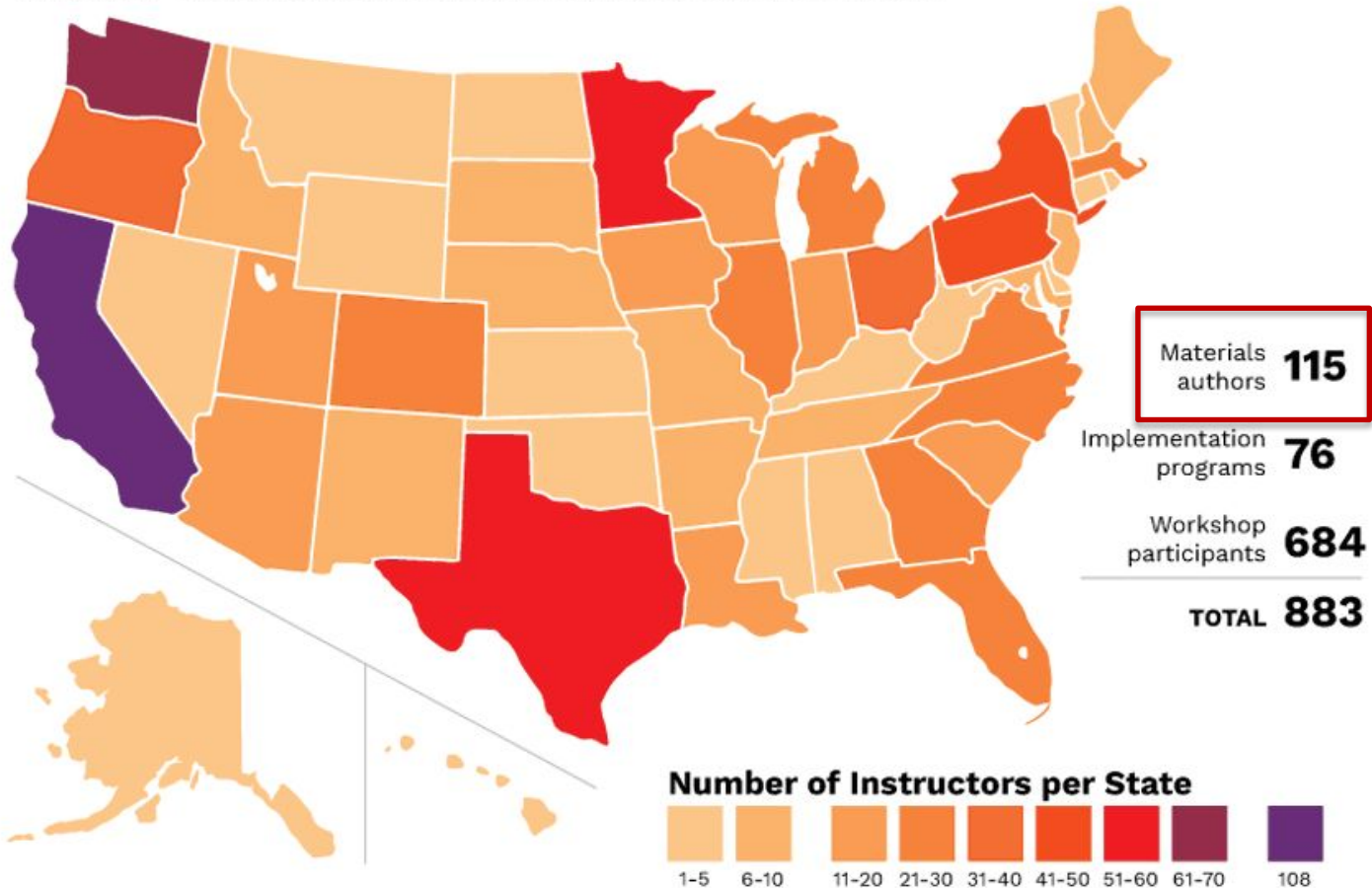
- Teach students about Earth-related grand challenges facing societies through an interdisciplinary approach
- Have students work with authentic and credible geoscience data
- Develop students' abilities to solve interdisciplinary problems, increase proficiency in applying geoscientific thinking methods, and advance systems thinking skills



InTeGrate Reach

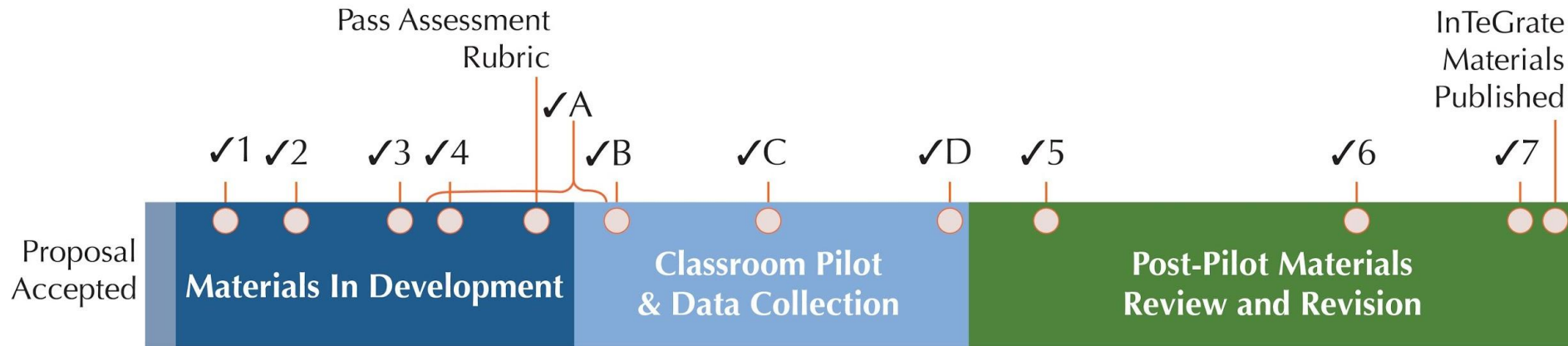
Distribution of Module/Course Authors + Implementation Programs + Workshop Participants

includes all 50 states, Puerto Rico, India, and Micronesia





Two Year InTeGrate Materials Development Timeline



Phase 1

- Checkpoint 1: Learning outcomes/assessment at face-to-face meeting
- Checkpoint 2: Assessment consultant informal review (~50% complete)
- Checkpoint 3: Assessment consultant scores materials using rubric
- Checkpoint 4: Three assessment consultants score materials



Materials Development Rubric

Six Major Parameters

1. Overarching Goals (5 sub-elements)
2. Learning Objectives and Outcomes (5 sub-elements)
3. Assessment and Measurement (5 sub-elements)
4. Resources and Materials (6 sub-elements)
5. Instructional Strategies (5 sub-elements)
6. Alignment (2 sub-elements)

Scoring

3 points: rubric element pervasively addressed in module/course materials

2 points: rubric element addressed in majority of the module/course materials

1 points: rubric element addressed in some of the module/course materials

0 points: rubric element not addressed in the module/course materials



Materials Development Rubric

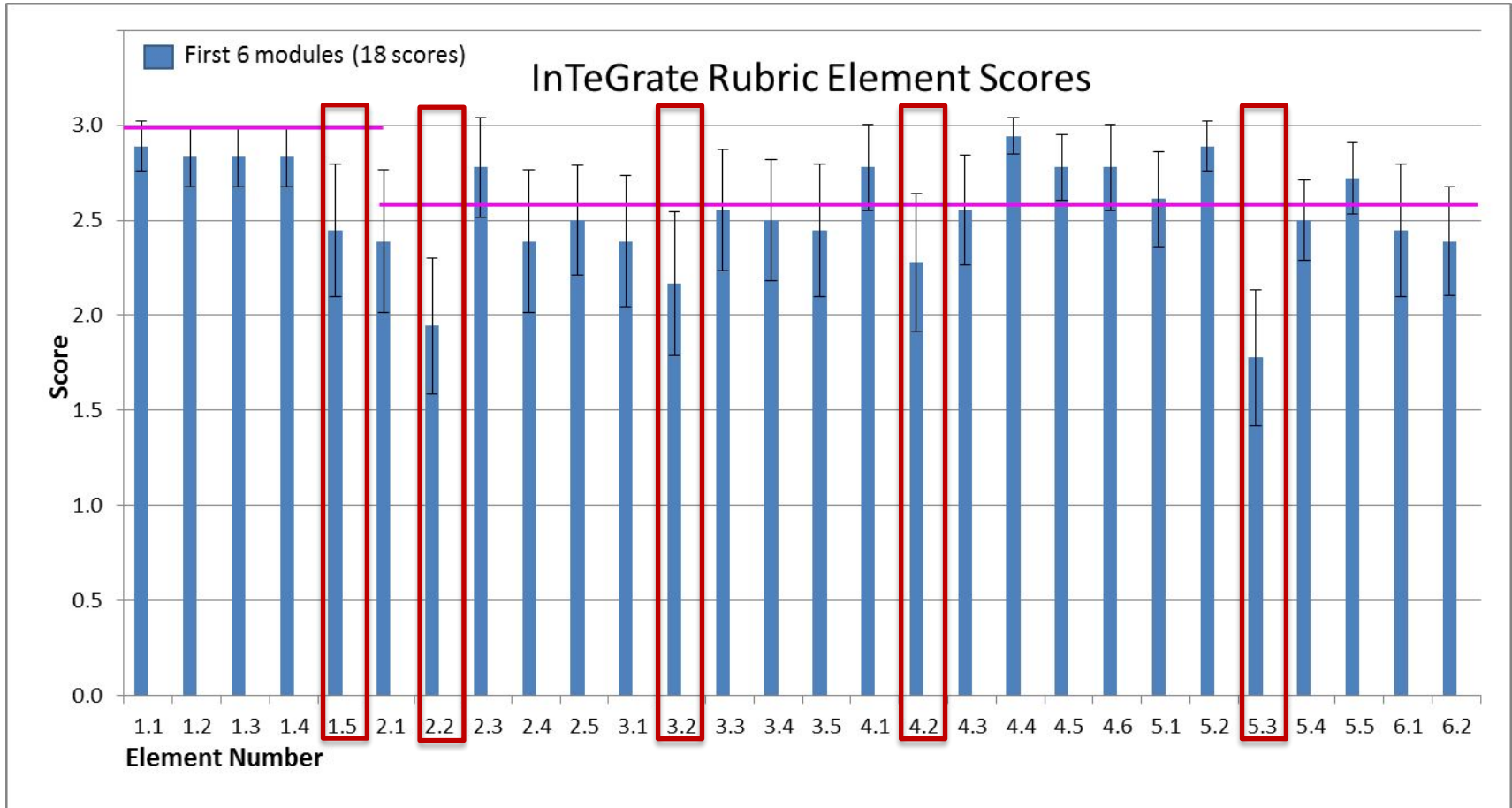
Checkpoint 4: Materials Development Scoring

- Three-person review (scores assigned for each sub-element by each reviewer)
 - Materials Assessment Consultant
 - Two other Assessment Team members
- If two of the three scores matched, matching score assigned to sub-element
- Review team phone conference if major discrepancies
- **Passing score = 100% for guiding principles; 85% for all other major categories**



2 Passed 1st try
2 minor revisions
2 major revisions

Initial Cohort



1.5 Systems Thinking

3.2 Criterion Referenced

5.3 Metacognition

2.2 Grading Rubrics

4.2 Materials Link



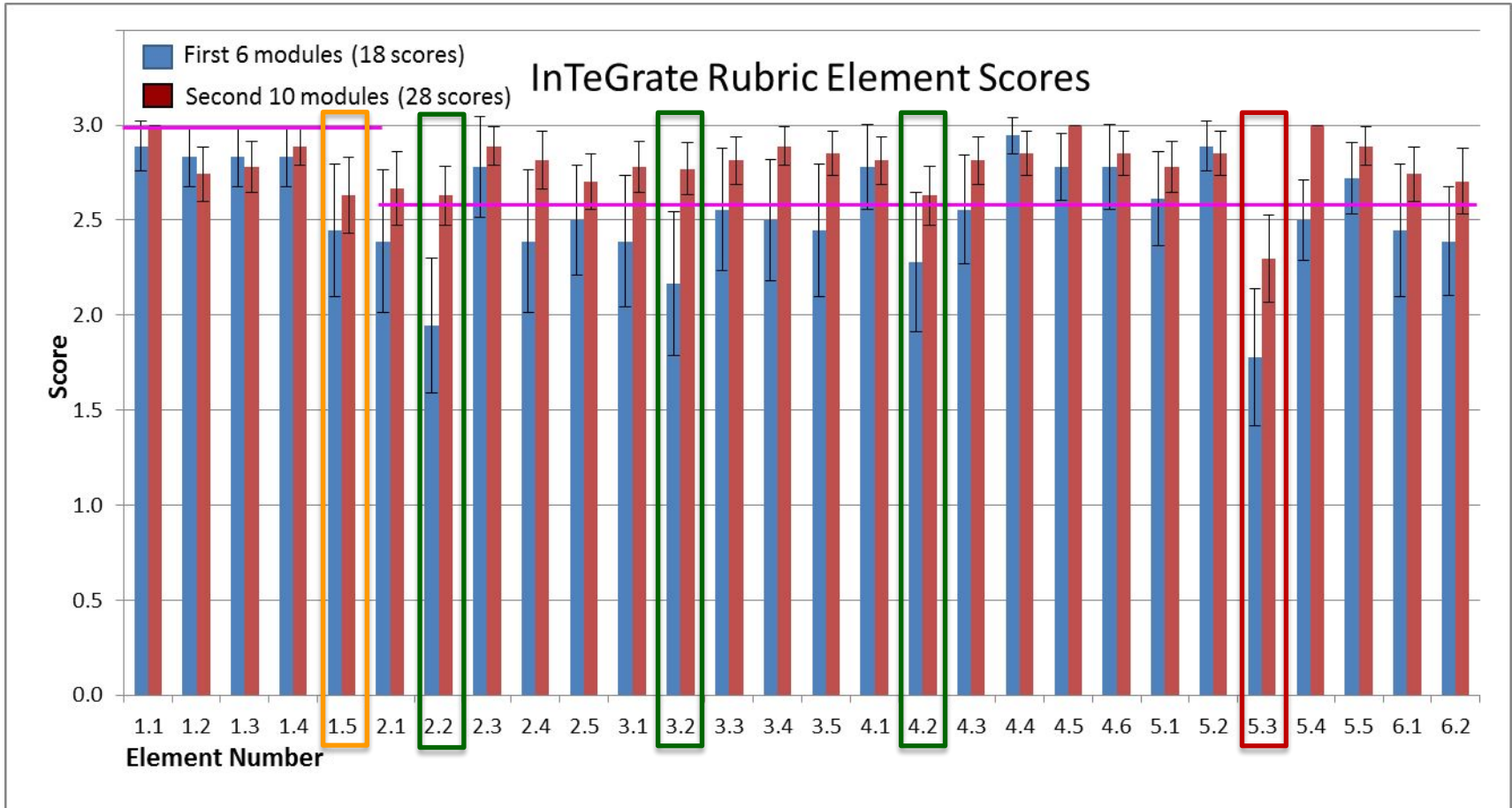
Professional Development

- Assessment team discussed areas where module teams needed more support and co-scored some materials
- Future cohort authors' meetings were aligned to touch on major rubric elements
- Developed series of PD Webinars
 - Using the Materials Development Rubric
 - Developing Assessments and Grading Rubrics
 - Incorporating Systems Thinking
 - Implementing Metacognition Strategies



Second Cohort

7 Passed 1st try
1 minor revisions
2 major revisions



1.5 Systems Thinking

3.2 Criterion Referenced

5.3 Metacognition

2.2 Grading Rubrics

4.2 Materials Link

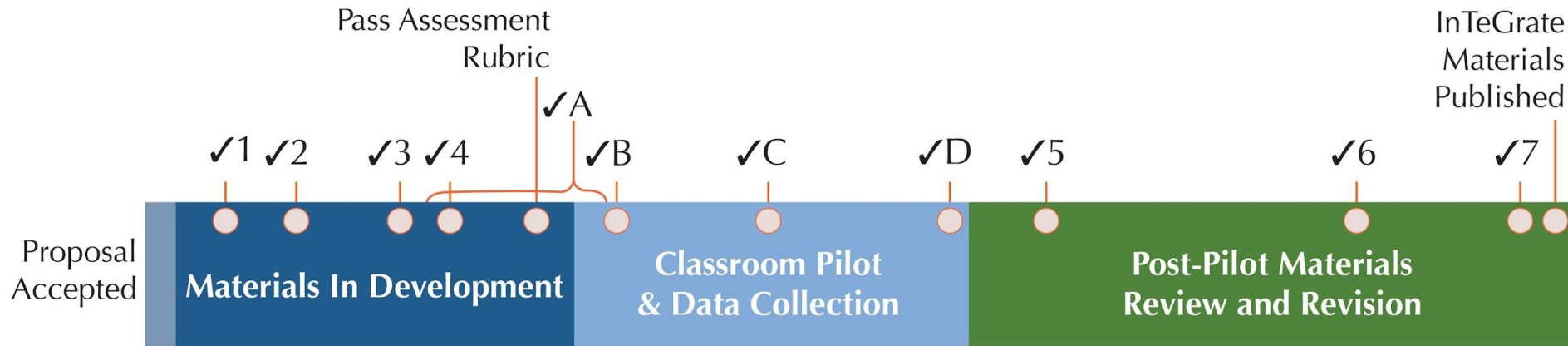


Why is Metacognition so difficult?

- Deals with students' abilities to self assess and monitor their own learning
 - **Knowledge** of procedures that affect own learning
 - **Regulation** or selection of appropriate learning strategies
- Students (and faculty) often not aware they are engaging in these activities
- Generally not emphasized in curricular materials familiar to most faculty



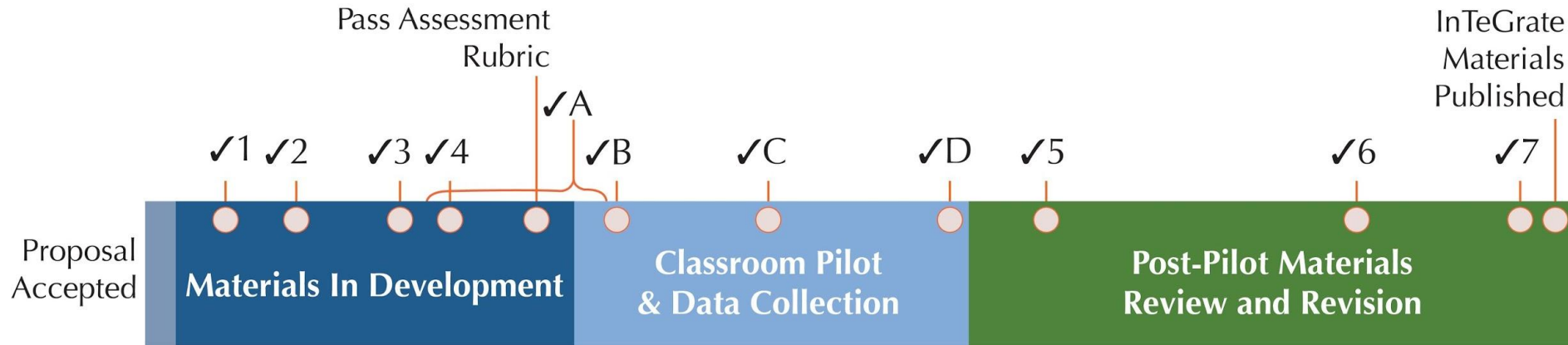
Two Year InTeGrate Materials Development Timeline



Phase 2: Classroom Pilot: Authors pilot materials in their own classroom and collect data that supports the evaluation of the team's materials, anecdotal information to be included on their instructor stories pages and the project's overall goals.



Two Year InTeGrate Materials Development Timeline



Phase 3: Post-Pilot Materials Revision: Author team uses data collected to make meaningful revisions to module/course materials.



Conclusions

- Use of a materials development rubric with active coaching is an effective combination
- Many faculty members could benefit from professional development
 - **Systems thinking**
 - Grading rubrics with defined criteria
 - Aligning materials, resources and assessments
 - **Metacognition**