

Using Teaching Routines with Classroom Network Technology to Support Self-Regulated Learning in Middle School Earth Science

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Motivation

High quality classroom activities can:

- Increase students' engagement in learning
- Increase willingness to review and revise ideas.
- Improve classroom assessment for teachers and students.
- Inspire self-regulated learning.

Contingent Pedagogies Project: Who Are We?

**** Visit our web site; search “contingent pedagogies” ****

- Curriculum and assessment developers
- Researchers who specialize in the study of assessment practices
- Staff/professional development specialists
- Classroom teachers at the middle- and high school level with some responsibility for teaching Earth Science
- Software engineers
- Subject matter experts

Contingent Pedagogies Project: What Are We Doing?

- **We are developing a set of *assessment resources* aimed at improving students' conceptual understanding of Earth science that**
 - Builds on the solid foundation of the *Investigating Earth Systems* curriculum
 - Includes questions designed to elicit *facets* of student thinking
 - Uses advanced classroom network technology to enable better feedback
 - Provides teachers with additional curriculum activities for “what to do next” based on assessments

Two Definitions

- **Assessments = ways of eliciting what students know and can do**
 - Not the same as testing or creating test-like questions
 - Interaction and self-reflection are key
 - Questions that “inform” teaching and learning more than they “hold to account”
- **Facets = ideas students bring from experience**
 - Some are strengths, some are problematic
 - Can be addressed through discussion, lessons, but have to be elicited first
 - Not the same as “misconceptions”

Investigating Earth Systems (IES)

- Curriculum organized around student investigations
- All development will support assessing concepts and skills from IES units
- 2 focal units for our development
 - *Rocks and Landforms*
 - *Dynamic Planet*

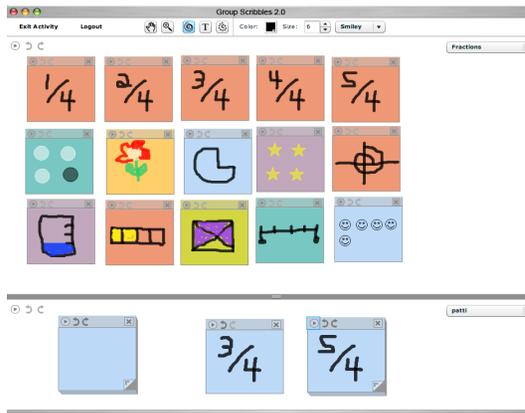


Classroom Technologies:



• Clickers

- Possibility for easy aggregation & interpretation of student responses
- Trade-off: You don't know what knowledge students can construct on their own, since multiple choice responses provide clues/enable guessing
- Can support in class at low cost



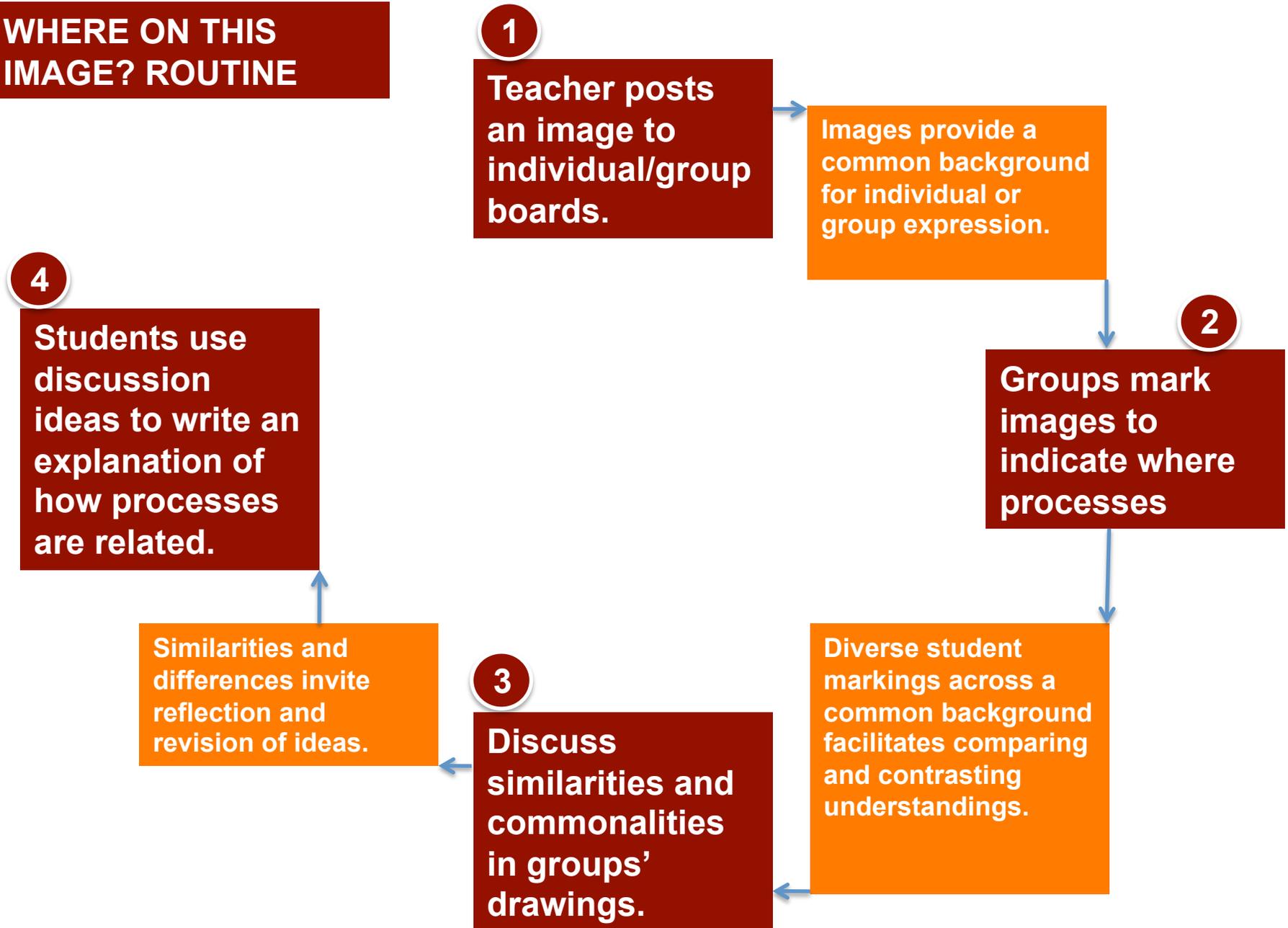
GroupScribbles

- Possibility for more open-ended tasks and collaborative learning opportunities
- Trade-off: Must devise strategies to help teachers aggregate results
- Can support in lab at low cost, in class at a higher cost (short-term); may not be able to support long-term

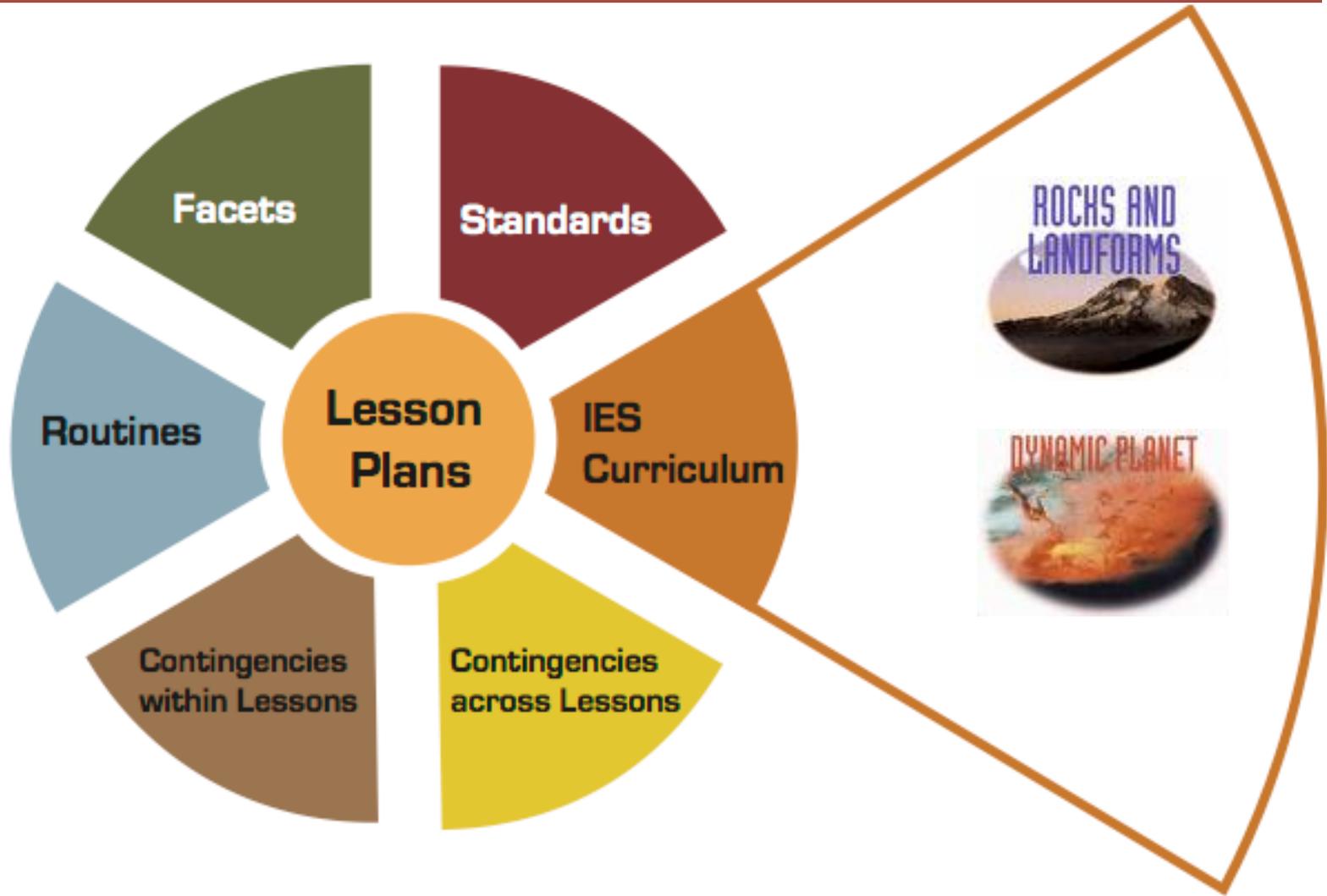
Teaching Routines

- A sequence of teaching moves you can repeat, regardless of the subject topic
- Most teachers have routines that they repeat; doing so helps manage the flow of work and establish norms for student participation
- Routines have three key purposes:
 - To increase student opportunities to **communicate**
 - To **motivate** students to participate and learn
 - To provide the teacher with **feedback** to use to adjust instruction

WHERE ON THIS IMAGE? ROUTINE



Lesson Plans



Sample Lesson: Ring of Fire

Group Scribbles Starter Lesson

Ring of Fire

Group Scribbles Starter Lesson

Materials

- Group Scribbles server (on teacher's computer or SRI's Group Scribbles server)
- Teacher's computer with web browser and GS Starter Lesson - "Ring of Fire"
- Projector connected to teacher's computer
- Student computers with web browser and Group Scribbles
- Group Scribbles "Flash Card"

TECHNOLOGY: 
Group Scribbles

Setup requirements

1. Start the GS server by double-clicking start-gs-server on desktop (assuming the teacher's computer is running the GS server)*
2. If this is your first time using GS, create accounts (see the Group Scribbles Guide for details)
 - Launch the GS Admin tool in a web browser (double-click GS Admin on desktop)
 - Log in with the admin account
 - Create a teacher account and associated classroom
 - Launch Group Scribbles in a web browser (double-click GS (local) on the desktop)
 - Log in with your teacher account
 - Create student accounts for your classroom (via Launch Teacher Tools)
3. Log in to Group Scribbles with your teacher account
4. Create a new activity called "Ring of Fire" (via Launch Teacher Tools)
 - Create 3 boards: Volcanoes, Earthquakes, and Fault Lines
 - On each board, upload the background image: <http://groupscribbles.sri.com/images/backgrounds/map-pacific.jpg>



Collaborative Marking of Locations of Earthquakes on a Map

Group 2 - Earthquakes



Draws the location of earthquakes (using blue circles) and labels major earthquakes by the location (country, state, or city) and year the earthquake occurred (e.g., San Francisco-1906 & 1989, Alaska-1964, Tokyo-1923, Indonesia-2004).



Assessing How Students Connect the Concepts

Ring of Fire

Step 5: Groups share their boards

When each group has finished their boards, we'll view and discuss them. Project each group's board from the teacher's computer. You can also see all of the boards at once by arranging the layout of Group Scribbles to view up to 4 boards at one time.

(To view up to 4 boards: On the right, you'll see a gray line with a "thumb" in the middle. ¶ Drag this thumb to the left and an empty board area appears. In the board menu, select another board. You'll see a similar "thumb" ¶ between the top and bottom pane that can be dragged. See the GS Guide for more information.)

Step 6: Class discussion about the "Ring of Fire"

Have the students review the three maps and ask the class the following questions:

1. Based on the various maps, what patterns do you see? (Answer: Earthquakes and volcanoes tend to follow the fault lines around the Pacific Ocean).
2. Why are volcanoes and earthquakes common in some areas but not in others? (Answer: Earthquakes and volcanoes typically occur at plate boundaries).
3. What conclusions can you make about where plate boundaries are located? (Answer: Plate boundaries can usually be identified by the presence of fault lines, volcanoes, and earthquakes).

Measured Assessment: Year 1 Findings

- GS supports paired, small-group, and class level social structures for learning.
- Making available supplemental resources will make the technology more valuable for teachers.
- Design process must consider teachers' favored approaches to curriculum use.
- Need to reduce technology set-up time for teachers.

Current/Next Steps in the Project

- Testing interactive assessment activities in 8 classrooms in CA, CO, and VA
- Developing and testing facets of student thinking
- Creating professional development materials to support teachers in using technologies and facet-based questions with students
- 2010-11: Testing the materials in a 20-teacher field trial

Tell me, I forget
Show me, I remember
Involve me, I understand

Chinese Proverb

- Source: M.P. Driscoll (2002)