

Scaffolding Teacher Effectiveness in Mathematics and Science

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Moving from Standards to Practice Conference

What does effective inquiry-based instruction look like and how do we measure it?



Session Overview

- Inquiry and Standards
- View/Discuss Instruction in Mathematics and Science
- EQUIP Overview
- EQUIP App and .pdf
- Resources



Mathematics Lesson

- In the short video segment that follows, please note the nature of the interactions and the depth of thinking.



EQUIP Overview

- EQUIP—Electronic Quality of Inquiry Protocol
- 19 indicators—4 constructs: target inquiry-based instruction and is linked to student achievement.

Instruction (How do I lead?)

Discourse (How do we interact?)

Assessment (How does instruction influence achievement and how does achievement influence instruction?)

Curriculum (What guides teaching and learning?)



EQUIP Background

- Five years of development, testing, and refining.
- Useful for teachers, educational leaders, and researchers.
- Addresses both the CCSSM and NGSS.



Inquiry and Standards

- How does inquiry fit CCSSM and NGSS?
 - Inquiry even more critical than before to achieve mastery of new standards with students.
 - Telling can no longer be primary instructional approach.



How about student achievement?

- Research shows that EQUIP scores predict student achievement.
- Approximately 40-60% of the variance of student achievement can be predicted by the teacher performance using EQUIP. True for both content and process scores.
- **Simply Put—When you improve on EQUIP, learning increases!!!**



Quick overview of app

App will be available free
at Apple store in late March.



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I. Teacher Description

Save

Welcome

**EQUIP**

Start Observation

Open Saved Observation >

About >

Resume Observation

Build: 010713#3

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I. Teacher Description

Save

Start

Teacher G

Tap to select

Teacher E

Tap to select

Highest D

Tap to select

Years Of E

Tap to input

Grade Lev

Tap to select

Discipline

Tap to select

If Other

Tap to input

Intervention Year

Tap to select

9 Weeks

Tap to select

Observer

Tap to input

School

Tap to input

Level

Tap to select

District

Tap to input

Teacher

Tap to input

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I. Teacher Description

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Teacher Gender	Male
Teacher Ethnicity	Caucasian
Highest Degree Earned	Masters
Years Of Experience	25
Grade Level	7
Discipline	Science
If Other	Tap to input

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II. Student Description

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Number of Students in the Class	20
Males	12
Females	8
Caucasian	10
African American	8
Latino	2
Other	0

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III. Lesson Details

[Save](#)

Lesson Start Time	Jan 8, 2013, 7:04 AM
Lesson Linked to Intervention	Yes
Scheduled Visit	Yes
Lesson Title	Newton's Third Law
Objectives Visible	Yes
Standards Present	Yes
Standards	6-4.2

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IV. Time Usage Analysis Codes

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Time	Activity	Organization	Student Attention to Lesson	Cognitive	Inquiry Instruction Component	Assessment
0 - 5	1	S	M	3	1	1
5 - 10	3	S	H	2	2	2
10 - 15						

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V. Lesson Descriptive Details

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Time:**Classroom Notes of Observation:****Comments:**

4

12 students were actively engaged in the experiment.
8 students were confused.

The students who were confused became disruptive. Possibly better scaffolding would have addressed the management problem.

Tap to
Edit

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VI. Instructional Factors

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Construct	Pre-Inquiry	Developing Inquiry	Proficient Inquiry	Exemplary Inquiry
11. Instructional Strategies	Teacher predominantly lectured to cover content.	Teacher frequently lectured and/or used demonstrations to explain content. Activities were verification only.	Teacher occasionally lectured, but students were engaged in activities that helped develop conceptual understanding.	Teacher occasionally lectured, but students were engaged in investigations that promoted strong conceptual understanding.
12. Order of Instruction	Teacher explained concepts. Students either did not explore concepts or did so only after explanation.	Teacher asked students to explore concept before receiving explanation. Teacher explained.	Teacher asked students to explore before explanation. Teacher and students explained.	Teacher asked students to explore concept before explanation occurred. Though perhaps prompted by the teacher, students provided the explanation.
13. Teacher Role	Teacher was center of lesson; rarely acted as facilitator.	Teacher was center of lesson; occasionally acted as facilitator.	Teacher frequently acted as facilitator.	Teacher consistently and effectively acted as a facilitator.
14. Student Role	Students were consistently passive as learners (taking notes, practicing on their own).	Students were active to a small extent as learners (highly engaged for very brief moments or to a small extent throughout lesson).	Students were active as learners (involved in discussions, investigations, or activities, but not consistently and clearly focused).	Students were consistently and effectively active as learners (highly engaged at multiple points during lesson and clearly focused on the task).
15. Knowledge Acquisition	Student learning focused solely on mastery of facts, information, and/or rote processes.	Student learning focused on mastery of facts and process skills without much focus on understanding of content.	Student learning required application of concepts and process skills in new situations.	Student learning required depth of understanding to be demonstrated relating to content and process skills.

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VII. Discourse Factors

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Construct	Pre-Inquiry	Developing Inquiry	Proficient Inquiry	Exemplary Inquiry
D1. Questioning Level	Questioning rarely challenged students above the remembering level.	Questioning rarely challenged students above the understanding level.	Questioning challenged students up to application or analysis levels.	Questioning challenged students at various levels, including at the analysis level or higher; level was varied to scaffold learning.
D2. Complexity of Questions	Questions focused on one correct answer; typically short answer responses.	Questions focused mostly on one correct answer; some open response opportunities.	Questions challenged students to explain, reason, and/or justify.	Questions required students to explain, reason, and/or justify. Students were expected to critique others' responses.
D3. Questioning Ecology	Teacher lectured or engaged students in oral questioning that did not lead to discussion.	Teacher occasionally attempted to engage students in discussions or investigations but was not successful.	Teacher successfully engaged students in open-ended questions, discussions, and/or investigations.	Teacher consistently and effectively engaged students in open-ended questions, discussions, investigations, and/or reflections.
D4. Communication Pattern	Communication was controlled and directed by teacher and followed a didactic pattern.	Communication was typically controlled and directed by teacher with occasional input from other students; mostly didactic pattern.	Communication was often conversational with some student questions guiding the discussion.	Communication was consistently conversational with student questions often guiding the discussion.
D5. Classroom Interactions	Teacher accepted answers, correcting when necessary, but rarely followed-up with further probing.	Teacher or another student occasionally followed-up student response with further low-level probe.	Teacher or another student often followed-up response with engaging probe that required student to justify reasoning or evidence.	Teacher consistently and effectively facilitated rich classroom dialogue where evidence, assumptions, and reasoning were challenged by teacher or other students.

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VIII. Assessment Factors

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Construct	Pre-Inquiry	Developing Inquiry	Proficient Inquiry	Exemplary Inquiry
A1. Prior Knowledge	Teacher did not assess student prior knowledge.	Teacher assessed student prior knowledge but did not modify instruction based on this knowledge.	Teacher assessed student prior knowledge and then partially modified instruction based on this knowledge.	Teacher assessed student prior knowledge and then modified instruction based on this knowledge.
A2. Conceptual Development	Teacher encouraged learning by memorization and repetition.	Teacher encouraged product- or answer-focused learning activities that lacked critical thinking.	Teacher encouraged process-focused learning activities that required critical thinking.	Teacher encouraged process-focused learning activities that involved critical thinking that connected learning with other concepts.
A3. Student Reflection	Teacher did not explicitly encourage students to reflect on their own learning.	Teacher explicitly encouraged students to reflect on their learning but only at a minimal knowledge level.	Teacher explicitly encouraged students to reflect on their learning at an understanding level.	Teacher consistently encouraged students to reflect on their learning at multiple times throughout the lesson; encouraged students to think at higher levels.
A4. Assessment Type	Formal and informal assessments measured only factual, discrete knowledge.	Formal and informal assessments measured mostly factual, discrete knowledge.	Formal and informal assessments used both factual, discrete knowledge and authentic measures.	Formal and informal assessment methods consistently and effectively used authentic measures.
A5. Role of Assessing	Teacher solicited predetermined answers from students requiring little explanation or justification.	Teacher solicited information from students to assess understanding.	Teacher solicited explanations from students to assess understanding and then adjusted instruction accordingly.	Teacher frequently and effectively assessed student understanding and adjusted instruction accordingly; challenged evidence and claims made; encouraged curiosity and openness.

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IX. Curriculum Factors

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Construct	Pre-Inquiry	Developing Inquiry	Proficient Inquiry	Exemplary Inquiry
C1. Content Depth	Lesson provided only superficial coverage of content.	Lesson provided some depth of content but with no connections made to the big picture.	Lesson provided depth of content with some significant connection to the big picture.	Lesson provided depth of content with significant, clear, and explicit connections made to the big picture.
C2. Learner Centrality	Lesson did not engage learner in activities or investigations.	Lesson provided prescribed activities with anticipated results.	Lesson allowed for some flexibility during investigation for student- designed exploration.	Lesson provided flexibility for students to design and carry out their own investigations.
C3. Integration of Content and Investigation	Lesson either content-focused or activity-focused but not both.	Lesson provided poor integration of content with activity or investigation.	Lesson incorporated student investigation that linked well with content.	Lesson seamlessly integrated the content and the student investigation.
C4. Organizing & Recording Information	Students organized and recorded information in prescriptive ways.	Students had only minor input as to how to organize and record information.	Students regularly organized and recorded information in non-prescriptive ways.	Students organized and recorded information in non-prescriptive ways that allowed them to effectively communicate their learning.

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X. Summative Overviews

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**Summative
view of
Instruction**

3

**Summative
view of
Discourse**

2

**Summative
view of
Assessment**

3

**Summative
view of
Curriculum**

2

**Overall view
of Lesson**

Lesson was proficient in many areas, but the weaker discourse resulted in an overall 2.

2

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X. Summative Overviews

Save

**Summative
view of
Instruction****3****Summative
view of
Discourse****2****Summative
view of
Assessment****3****Summative
view of
Curriculum****2****Overall view
of Lesson**

Lesson was proficient in many areas, but the weaker discourse resulted in an overall 2.

2**Success**

Saving the record was successful

OK

Science Lesson

- Observe the classroom discourse during the video segment. Note successful/unsuccessful interactions.



Instructional Videos

- Four science and four math videos
- Purpose:
 - Provide assortment of instructional practices
 - Assist inter-rater reliability among reviewers
 - Provide model for instruction



Uses for EQUIP

- Evaluation—Individual or Program
- Formative—Establishing growth trajectories for individual teachers
- Formative—Establishing professional development targets for groups



EQUIP resources

- EQUIP found at: www.clemson.edu/iim (under research and evaluation tab)
 - .pdf can be downloaded
 - 20 minute webinar is available
 - App will be at Apple store by late March.



Video Resources

- All videos and scoring available at:
www.clemson.edu/iim/lessonplans
- Free access to lesson plans and videos
- Code scoring sheets:
 - For Science: 1nquirysci (where 1 is the #1 not i)
 - For Math: 1nquirymath (where 1 is the #1 not i)



Questions

What needs
further clarification?



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