Arizona Teacher's Excellence Coalition RTOP Video 2: RTOP rating by K. Falconer / R. Benford
NAU PHS101 Fall 2001 D. MacIsaac AAPT PIPS Curriculum Batteries & Bulbs E1

III. LESSON DESIGN AND IMPLEMENTATION

Never Occurred — Very Descriptive

1) The instructional strategies and activities respected students' prior knowledge and the preconceptions inherent therein. 0 1 2 3 (4)
- this lesson requires students to hypothesize by writing, drawing and discussing their ideas of how the circuit works BEFORE getting a chance to try the apparatus (3;34)

2) The lesson was designed to engage students as members of a learning community. 0 1 2 (3) 4
- although students did discuss their findings in small groups, the instructor presented the answer to the problem of the complete circuit rather than allowing students to present their ideas to the entire class, discuss their findings as a class and validate their ideas.

3) In this lesson, student exploration preceded formal presentation. 0 1 2 3 (4)
- this is the introductory activity for this unit. There was NO formal presentation of circuit theory whatsoever.

4) This lesson encouraged students to seek and value alternative modes of investigation or of problem solving. 0 1 2 3 (4)
- students were given apparatus and asked to "make the bulb light" and "describe the circumstances necessary" to make this happen. They could do the activity as they chose, and were not instructed how to do the activity.

5) The focus and direction of the lesson was often determined by ideas originating with students. 0 1 2 (3) 4
- the instructor lost a point because he overtly set the agenda rather than asking the students how they'd like to solve the problem. He could have started by showing a bulb and asking students to explain the phenomena, then to test and defend their explanations to score 4.

IV. CONTENT: Propositional Knowledge

Never Occurred — Very Descriptive

6) The lesson involved fundamental concepts of the subject. 0 1 2 3 (4)
- this is a science course for pre-service elementary teachers; the Arizona Academic Science Standards specify simple circuits as a K-9 topic. The circuit concept is basic to the study of electric phenomena.

7) The lesson promoted strongly coherent conceptual understanding. 0 1 2 (3) 4
- lost a point because students did not have an opportunity for whole group discussion AFTER the instructor summary. Group discussions are often good concept-builders and can expose persistent misconceptions.

8) The teacher had a solid grasp of the subject matter content inherent in the lesson. 0 1 2 3 (4)
- no instructor factual errors in presentation or answering questions (see RTOP video 1 vignette analysis).

9) Elements of abstraction (i.e., symbolic representations, theory building) were encouraged when it was important to do so. 0 1 2 (3) 4
- good use of drawings, props and concrete examples, but a stronger explanation linking concrete examples to abstract concepts would be beneficial.

10) Connections with other content disciplines and/or real world phenomena were explored and valued. 0 1 2 3 (4)
- students are working with an everyday phenomenon, and the instructor describes applications and circumstances from every day life (17;00-18:30)

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IV. CONTENT: Procedural Knowledge

Never Occurred — Very Descriptive

11) Students used a variety of means (models, drawings, graphs, concrete materials, manipulatives, etc.) to represent phenomena. 0 1 2 (3) 4

- to receive a 4, we would have to observe students articulating their final ideas of what closed circuits were.

12) Students made predictions, estimations and/or hypotheses and devised means for testing them. 0 1 2 3 (4)

- students explicitly made, wrote down, drew and explained hypotheses to their group

13) Students were actively engaged in thought-provoking activity that often involved the critical assessment of procedures. 0 1 2 (3) 4

- lost one point because students did not explicitly perform a critical assessment of the bulb-lighting procedure. Students did not explicitly consider the validity of the process they used to answer the question.

14) Students were reflective about their learning. 0 1 2 (3) 4

- there was not enough explicit encouragement for student reflection on their learning. Discussing questions such as "How do we know this?" "How can we be sure?" "What does this tell us about what we know?" would raise this to a 4.

15) Intellectual rigor, constructive criticism, and the challenging of ideas were valued. 0 1 2 (3) 4

- critical discussion within groups was very good, but a point was lost because there was no cross-group or whole class critique

V. CLASSROOM CULTURE: Communicative Interactions

16) Students were involved in the communication of their ideas to others using a variety of means and media. 0 1 2 (3) 4

- lost a point due to lack of whole-class discussion and group-to-group negotiation of ideas.

17) The teacher's questions triggered divergent modes of thinking. 0 1 2 (3) 4

- although the teacher asked divergent questions and offered open-ended explanations to the whole class, we did not observe the instructor asking divergent questions to groups of students

18) There was a high proportion of student talk and a significant amount of it occurred between and among students. 0 1 2 3 (4)

- this lesson was mostly student talk

19) Student questions and comments often determined the focus and direction of classroom discourse. 0 1 2 (3) 4

- lost a point because the instructor could have included more student input determining the initial direction of class discourse

20) There was a climate of respect for what others had to say. 0 1 2 (3) 4

- good work, but groups of students could have shared their ideas and considered the ideas of other groups before testing this predictions. Again, this lesson did not involve students sharing ideas to the entire class.

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V. Student/Teacher Relationships

		Never Occurred				Very Descriptive
21)	Active participation of students was encouraged and valued.	0	1	2	(3)	4

- missed the 4 because students could have taken a greater role in constructing and validating the final explanation of a closed circuit

22)	Students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence.	0	1	2	(3)	4

- while this was valued within groups, it was not discussed within the whole class

23)	In general the teacher was patient with students.	0	1	2	3	(4)

- the instructor did not tolerate unwanted behavior (0;26) but provided ample opportunity for students to explore on their own terms

24)	The teacher acted as a resource person, working to support and enhance student investigations.	0	1	2	(3)	4

- while there is considerable evidence of teacher interactions with groups (the instructor and one assistant could be seen in the background providing support for groups), we did not hear enough of these interactions to judge their quality. We can only score what we directly observe in any lesson.

25)	The metaphor “teacher as listener” was very characteristic of this classroom.	0	1	2	3	(4)

- during the class the teacher was listening to the students, and did not dominate group interactions

Scores by section and total RTOP score for video vignette #2:

Section	Score
LESSON DESIGN AND IMPLEMENTATION	18
CONTENT-Propositional Knowledge	18
CONTENT- Procedural Knowledge	16
CLASSROOM CULTURE-Communicative Interactions	16
CLASSROOM CULTURE-Student/Teacher Relationships	17
Expert RTOP Rater's Final Score for this Video Clip:	**85**

Instructor's Comments:

RTOP video clip 2 was chosen and edited to reflect a high RTOP score: the lesson was built around a classic touchstone investigative cooperative learning activity that introduced a new topic. Raising this score would require more whole-class interaction. More whole class interaction is challenging to achieve in a group of this size but nevertheless it is possible using methods such as circle whiteboarding. This clip shows how the predict – observe – explain (POE) cycle with extensive student personal recall and negotiation can be conducted, and these cycles are showcased in the AAPT Powerful Ideas in Physical Science (PIPS) curriculum.

This kind of instruction is markedly different from the standard chapter-a-week, "mile-wide-and-inch-deep" traditional college physics and physical science instruction. If the idea of "reformed teaching" appeals to you, one way to start is by introducing instructional units by hands-on student exploration and extended discussion, perhaps including whiteboarding, and definitely including whole class discussion. Deliberately try to maximize your RTOP score by 'teaching to the test' (or in this case, the instrument). My pre-service physics student teachers have found approach this quite useful.

The third video clip will show more typical instruction than the first two clips, which have painted a very broad picture. In particular, the third and following clips refine some of the specific reasoning for choosing intermediate RTOP score values. Clips beyond the first two are best viewed and discussed after you have tried to RTOP your own instruction and reflected on what "reformed teaching" practices might look like in your own classroom. Video clips 1 and 2 are intended to be sufficient to start you thinking about how you can use the RTOP instrument to critically appraise and refine science and math teaching practices. The remaining clips discuss details in RTOP instrument scoring that will not become important until after you have tried generating your own scores on real instruction.