Arizona Teacher's Excellence Coalition RTOP Video 1: RTOP rating by K. Falconer / R. Benford
NAU PHS101 Fall 2001 D. MacIsaac AAPT PIPS Curriculum Light & Color L7.1

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
- starting the clip (0;13) the instructor referred back to previous student experiences, and related refraction and colour

2) The lesson was designed to engage students as members of a learning community. (0) 1 2 3 4
- this lesson was completely teacher-centered, with no evidence of community

3) In this lesson, student exploration preceded formal presentation. (0) 1 2 3 4
- NO student exploration was seen

4) This lesson encouraged students to seek and value alternative modes of investigation or of problem solving. (0) 1 2 3 4
- students did no investigation or problem solving; they sat in the dark and watched

5) The focus and direction of the lesson was often determined by ideas originating with students. (0) 1 2 3 4
- students provided NO input, direction or focus in this lesson

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 light and color as a K-8 topic. Addition of colored light and filters are insightful and not consistent with pigment mixing experience.

7) The lesson promoted strongly coherent conceptual understanding. 0 (1) 2 3 4
- the presentation itself followed a logical progression, starting with a prism, diffraction grating, then primary and finally complementary filters; but no effort was made to make this structure explicit to students, who were not given the opportunity to organize the structure themselves.

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

9) Elements of abstraction (i.e., symbolic representations, theory building) were encouraged when it was important to do so. 0 1 (2) 3 4
- the instructor pointed out the patterns in nature due to primary and complementary filters (7;32); however, these ideas were not student-developed

10) Connections with other content disciplines and/or real world phenomena were explored and valued. 0 1 (2) 3 4
- the instructor mentioned the use of RBG synthesis for television color and CMY synthesis for printing. IF something is observed, it must be at least rated 1. The instructor also demonstrated phenomena instead of simply lecturing about them. More real world examples could have been incorporated into the lecture.

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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
- students did not do anything but watch these phenomena

12) Students made predictions, estimations and/or hypotheses and devised means for testing them. (0) 1 2 3 4
- students made no predictions, estimations or hypotheses. There was no testing of ideas.

13) Students were actively engaged in thought-provoking activity that often involved the critical assessment of procedures. (0) 1 2 3 4
- students were entirely passive, they sat in the dark and watched the lecture. No student procedural criticisms were offered or encouraged.

14) Students were reflective about their learning. (0) 1 2 3 4
- there was no evidence of student reflection. Silence is insufficient.

15) Intellectual rigor, constructive criticism, and the challenging of ideas were valued. (0) 1 2 3 4
- few ideas were ventured by the students. No ideas were challenged. Correcting a factual error (7;56) is not really constructive criticism or a meaningful challenge to an idea.

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
- students did not share their ideas with their classmates. Communication implies the negotiation of meaning; when the instructor answered a question for clarification (5;40) this was not student communication of their ideas. Alternative ways of articulating ideas were not encouraged.

17) The teacher's questions triggered divergent modes of thinking. 0 (1) 2 3 4
-there was at least one divergent question, and if a behavior occurs at least once in a lesson it must be scored at least as one point.

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
- there was no talk amongst students. Student-instructor dialog (answering questions) is not scored for this item.

19) Student questions and comments often determined the focus and direction of classroom discourse. (0) 1 2 3 4
-the instructor determined the entire direction of this lesson with no student input

20) There was a climate of respect for what others had to say. 0 1 (2) 3 4
- the instructor did solicit ideas on theory, and did not just call for rhetorical input. He asked a student to repeat her idea to the whole class, and accepted a correction on the color of a filter (7;56). When a student pointed out that the green filter lets some yellow light through (6;50), the instructor responded "yes".

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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
- the teacher's questioning strategy involved student participation, but students provided no direction to the questions. Since students did answer and participate, you must score at least 1.

22) Students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence. 0 (1) 2 3 4
- a student did provide the theory that a filter only let through one color of light, but more student speculation could have been arranged.

23) In general the teacher was patient with students. 0 (1) 2 3 4
- the instructor did show some wait time for questions, so score at least a 1

24) The teacher acted as a resource person, working to support and enhance student investigations. (0) 1 2 3 4
- there were no student investigations

25) The metaphor "teacher as listener" was very characteristic of this classroom. (0) 1 2 3 4
- there was no attempt by the instructor to check initial student knowledge, or incorporate student ideas into the lesson, or to assess final student undertanding of the material

Scores by section and total RTOP score for this vignette:

Section	Score
LESSON DESIGN AND IMPLEMENTATION	01
CONTENT-Propositional Knowledge	13
CONTENT- Procedural Knowledge	00
CLASSROOM CULTURE-Communicative Interactions	03
CLASSROOM CULTURE-Student/Teacher Relationships	03
Total Score	**20**

Instructor's Comments:

This clip should not be considered an accurate portrayal of how the PIPS curriculum is intended to be taught, and should not be used to assess the PIPS curriculum in any way.

When student are attentive and interpreting this topic, considerable student confusion usually results since colored light adds quite differently than standard pigments (all light colors add to white; adding all available pigments typically produces a muddy brown). These students did not show any conceptual discomfort in this clip, which I found disturbing and indicated students were not recognizing conceptual discrepancies or undergoing disequilibrium or accommodating new ideas. Students were simply accepting new classroom facts, without comparing facts to their own real-world experiences. The instructor should expect students to inappropriately revert to their pigment-mixing experiences when describing the mixing of colored light. The lesson was technically appealing, but conceptual learning probably did not take place.

While this lecture uses an attractive in-class demonstration and seems very instructive, it was actually very didactic and teacher-centered. RTOP video clip 1 was extensively edited and the class situation was intensely manipulated with the express goal of producing a seductive, attractive, exciting and interesting clip from a very poor learning situation – the clip basically amounts to a lecture in the dark. Meaningful student-student and student-teacher interactions have been excised from the clip, and these lie at the heart of "reformed teaching". The intent is to challenge the viewer to reflect upon the goals, intents and philosophy of RTOP in a teaching context, and from this refine the viewer's critical appraisal of science and math teaching. We can have situations readily accepted as "good teaching" that score very poorly on RTOP – and not every worthwhile lesson will score well on RTOP. RTOP critically assesses science and math teaching in a particular way, and this "cooked" video clip is intended to draw the viewer into the kind of conversation that exposes the RTOP philosophy of student-centered classroom practice.

If you scored this clip highly; please go back and review the instrument before proceeding to the next video clip – most instructors score too generously and must be encouraged to become more critical. If you scored this clip poorly, congratulations – you are already a critical evaluator of science and math educational situations and you are possibly correctly interpreting the RTOP instrument. If you first scored the clip high, then lowered your score after discussion and reflection, you're in exactly the right place. Carry on to the next clip, and please -- be critical. Carefully consider the level of constructivism and inquiry used in the classroom when using the RTOP instrument.