Exploring the Studio Format in an Upper-Division Optics Course: A First Look*

Frances Mateycik
N. Sanjay Rebello
Kansas State University

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Studio Optics

KSU 1st semester Optics is redesigned as a Studio
- 2 sessions per week x 2 hours each
- Short labs with minimal instructions
- "Messing about" emphasized rather than systematic lab procedure.
- Lecture interspersed with labs during each session

Research Goals

- Test usability of the Studio labs
- Observe student procedure during lab
- Gain insight into student reasoning during lab
- Determine suggestions to provide future TAs in Studio Optics

Research Plan

- Two teaching interviews sessions
- Each session ~ 50 minutes
- 1st session topic:
  - Single Slit Diffraction
- 2nd session topics:
  - Circular Diffraction
  - Poissons' Spot

Research Participants

- 12 Students Interviewed
  - 5 REU Students (Research Experience for Undergraduates)
  - 3 K State Physics Undergraduate Students
  - 4 K State Physics Graduate Students
- Level of Education Mixed
  - All have taken 1 yr Calculus Based Physics
  - 4 have taken an Optics course

Interview Materials

- Write up of Laboratory
- Large paper
- Large marker
- Calculator
- Text: Optics by Eugene Hecht, 4th Edition
- Green Laser
- Optics bench and accessories
Methodology (slide 1 of 2)

- Students work through lab with minimal comments from observers / interviewer
- Answer lab clarification questions from interviewee
- Asked that students explain their lab "notebook"

Methodology (slide 2 of 2)

- If students had apparent difficulty explaining their own write-up, interviews were guided toward fundamental concepts based upon their own observations / writing.
- Examples:
  - What is diffraction?
  - Could you show me how those two waves can add together? How they can cancel?

General Results

- Students approach activities using formulae and equations.
- Rarely understand the concept at a depth sufficient to address questions in lab.
- Appeared to follow an unwritten, systematic lab procedure

Future Analysis

- What is the students' conceptual understanding of single slit diffraction/Poisson's Spot?
- How do they use their resources (past classes, texts, real world experience, etc) during the interview/lab?
- What mindset do students activate when they approach the studio laboratory activity?

Relevant Literature


Thank You!

Frances Mateycik
mateyf@phys.ksu.edu
http://www.phys.ksu.edu/personal/mateyf