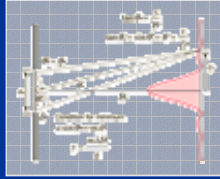


Exploring the Studio Format in an Upper-Division Optics Course:

A First Look*



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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

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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

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Research Plan

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

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Research Participants

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

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Interview Materials

- Write up of Laboratory
- Large paper
- Large marker
- Calculator
- Text: *Optics* by Eugene Hecht, 4th Edition
- Green Laser
- Optics bench and accessories

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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?¹
- What mindset do students activate when they approach the studio laboratory activity?²

¹(Hammer et al, 2002); ²(Ambrose et al, 1999)

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Relevant Literature

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3. Wittmann, M.C., Scherr, R. E. (2002) *Student epistemological mode constraining researcher access to student thinking: An example from an interview on charge flow, 2002 Proceedings of the Physics Education Research Conference*. Boise, ID: PERC Publishing.
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Thank You!

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