

Proposal Title: Using LED technology to teach Additive color mixing Theory

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1. Background: Rationale for Overall Project

In a growing world where energy consumption will steadily be rising, a "new" illuminant is peeking over the horizon: Light Emitting Diodes. For years, they were mostly indicator lights on electronic equipment, but within the past decade, advances in their lumens per watt ratio have thrust this energy saving light source into our daily lives (traffic lights, auto tail lights, flashlights, etc.) and into the world of entertainment lighting. The LED fixtures consume less than a tenth of the energy of incandescent lamps and last for hundreds of thousands of hours- hundreds of times longer than incandescent lamps. A stage lighting fixture powered by LEDs consists of a concentrated cluster of one-watt Light Emitting Diodes, of which an equal amount are blue, red and green, the three primaries used in Additive color theory.

When teaching the additive color mixing system, students invariably confuse the subtractive and the additive theories, because they often are first exposed to pigments of color in art classes. I have time and again demonstrated, with three separate lights housing blue, green and red plastic filters, that all three pointed from the same direction will create a white light. But the result is a timid yellow- because of incandescent lamps and because the primary gel colors are really not accurate. Today's LEDs are super white and bright. Demonstrating the additive color system and LEDs to our students will afford them perhaps a close up familiarity with tomorrow's light bulb and should make the theory of mixing colored light a fun and creative exercise.

2. Description: Part of the Project to be done under ACS funding

I intend build a series of assignments that challenge students to use the additive color theory to re-create standard, commercially manufactured 'gel' colors and to create new ones. I can see adding a component to three of my courses (Stagecraft, Lighting Design, and Advanced Lighting Design).

3. Timeline: Deliverables/Milestones for ACS Funded part of project

I do not have any theatrical designs contracted for summer, 2006; thus I will have ample time to test and research the capabilities of an LED fixture. I should be able to incorporate this technology into my courses beginning in the fall of 2006. I intend to offer a demonstration of the color mixing pedagogy to the 2007 ACS Drama Workshop. I have attended three Workshops and demonstrated automated lighting technology at the 2004 ACS Drama Workshop at Trinity University. I am also considering a Powerpoint Teaching Assignments with LEDs, which would be made available to any ACS faculty or students.

4. Technology: Technical Requirements for the Project

I have been researching the available LED fixtures, many of which require a separate controller. There are now a number of LED lighting fixtures with in the budget on the market, the automated Coemar fixture (I-wash LED) would be a

good fit because we own a compatible controller that runs off of a Windows XP system.

5. Other Support: Institutional and/or Outside Support for Project

Once the process of selecting the most appropriate LED fixture has been completed, I may need to augment our Control system (Whole Hog PC) with the programming wing, in order to make it as accessible to non-technical-savvy learners. These issues can be accomplished by the end of Spring semester, 2006. I have several students who have expressed interest in continuing research into LED technology; we are thinking of applying for further Southwestern University resources in order to thoroughly study and analyze this emerging technology. We might apply for a Mundy or Jones Fellowship to compensate for the time and energy spent exploring LED technology.

6. Learning Outcomes: How the Project will enhance Teaching/Learning

I am excited about the possibility of incorporating today's technology into my courses. Color theory (especially additive- light) is one of the most difficult subjects to understand, without concrete demonstrations. Our students deserve to experience and to be enriched by the fantastic learning tools that are now within our reach. I hope to teach and inspire other teachers about the huge learning opportunities LED technology will offer lighting designers. I, too, will personally benefit from the freedom of creativity that this technology offers to the experienced and inexperienced designer.

7. Curriculum: How the Project will be integrated into the Curriculum

As stated above, the abstract nature of Additive color theory will be somewhat demystified when the beginner can actually see the three primary colors of light and can actually manipulate the primaries in a nearly infinite manner. I imagine that I will create a series of assignments that gradually increase their knowledge of color mixing. The student will be able to reproduce certain standard gel colors and will then be challenged to create their own.

8. Assessment: How the Project will be evaluated

I think that I will try to involve one or two interested lighting students in the initial phases of this Summer 2006 process. From them, I can more accurately gauge what sorts of learning possibilities the LED technology can provide. If I do employ a student as a teaching assistant during my initial incorporation of this visualization software, I will expect to get the student's point of view during the period of the course itself and I will ask the students enrolled in the course to evaluate the use of the technology at the end of the semester. I will also ask for feedback from ACS faculty, either at the ACS Drama Workshops or through individual contact.

9. Dissemination: How the Project will be shared with ACS Colleagues

After I have taught Lighting Design in Spring 2006, I would like to offer a session at the ACS Drama Workshop for interested faculty. The Workshop could be two-fold: informational (demonstrating the LED color mixing technology) and educational (sharing strengths and weaknesses of my early pedagogical choices). I also will make my pedagogy available to other interested faculty by adding a powerpoint file of the assignments and perhaps also add superior student accomplishments as these opportunities arise.