Shining a Light on Learning: Investigating the Role of Lighting and Material Choice in Classroom Design

Hannah Matthews, Professor Jeannine Vail
College of Visual Arts and Design: Interior Design, University of North Texas
Honors College, University of North Texas

Introduction

Despite advancements in education design and modern classroom technology, professional practice lacks standardized finish guidelines that prioritize student needs. This research examines how finish standards are developed and what factors influence design decisions through a literature review, interviews with design professionals, and classroom observations. It raises questions about whether professional practice is driven more by cost considerations than functionality and whether finishes contributing to Visual Stress (VS) are more affordable than those designed to mitigate it. Given that reading in highly illuminated environments can cause visual distortions, headaches, anxiety, and an earlier onset of visual fatigue and concentration difficulties in around 12-14% of individuals (Loew, 2017, p. 90), this study also considers how lighting and material choices impact student comfort and performance.

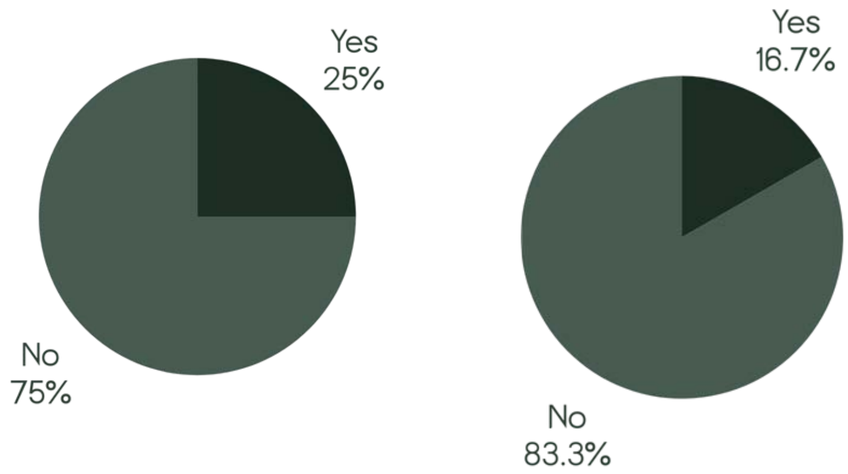
Plastic Laminate Table-top Finishes:

Methodology

Mixed-methods approach using literature review, interviews, observations, and lighting measurements to assess whether classroom finishes prioritize student needs over aesthetics and budget.

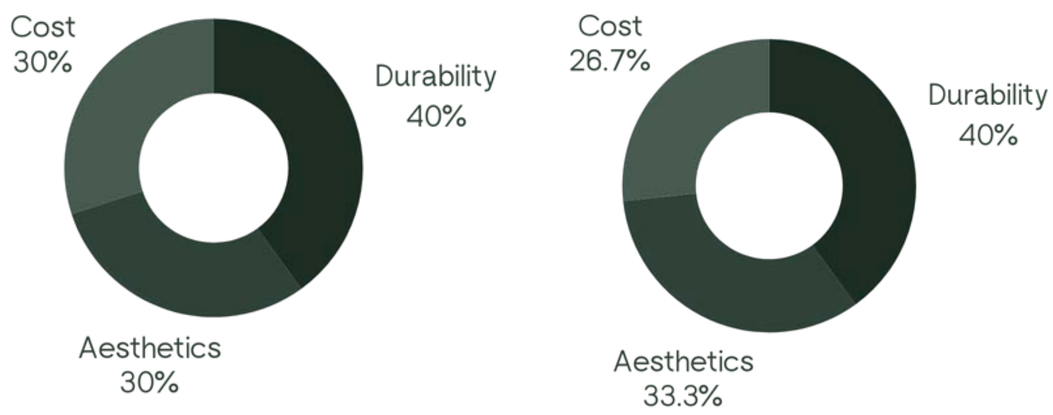
- Participants/Sample
  - Informal Poll with 6 Design professionals & 8 university staff
  - UNT classrooms with Wilsonart laminates
- Materials/Instrument
  - Light meter (lux & color temp.)
  - Wilsonart laminate samples
  - Observation checklist
- Procedure
  - Literature review
  - Classroom observations
  - Survey and Interviews
  - Data collection
- Data Analysis
  - Quantitative: Lux readings vs. standard
  - Comparative: Finish reflectance & usability
  - Qualitative: Interview insights
  - Findings: Cost vs. student-centered design

Figure 1: Does your department use any formal guidelines or tools to assess visual comfort (e.g., UGR, luminance measurements) in classrooms?



Univeristy Facilities Team | Local Industry Designers

Figure 2: What factors are most important when selecting materials for classrooms?



Univeristy Facilities Team | Local Industry Designers

Classroom Observations

Bldg	Room	LX DOWN (10)	LX DOWN (0)	CT DOWN (10)	CT DOWN (0)	Natural Light?	Table Finish
ART	282	340	73	3800	9600	Yes	Light
ART	265	200	140	5600	9500	Yes	Medium
ART	260	175	51	4200	1100	Yes	Light
ART	255	250	190	6900	7600	Yes	Medium
BLB	5	70	0	2830	0	No	Dark
BLB	65	120	50	2830	2800	Yes	Dark
BLB	70	105	0	3100	0	No	Dark
BLB	140	127	54	4200	4400	Yes	Dark

IES recommends an average of 431 LUX and 3500-4000 CCT for classrooms

Findings

- Both the ART and BLB buildings deviate from campus finish standards, despite being newer constructions.
- Finish selections appear to be based on activity type rather than being standardized across all classrooms or tailored to students' needs.
- Lighting conditions and table finish choices interact, with lighter finishes generally correlating to brighter environments.
- Design priorities observed (durability & aesthetics) align with early survey and interview findings, reinforcing the idea that practical concerns outweigh strict standardization in real-world applications.

Conclusion

This outcome raises key questions about how classroom design impacts student health and learning outcomes. How can table finishes that reduce glare improve comfort and focus? What is the cost difference between these materials, and is investing in better finishes worth the expense for student well-being and academic performance? These questions are central to my research, which aims to determine how material and lighting design can be standardized to enhance student outcomes.

Key References

Illuminating Engineering Society. (n.d.). Standards. Illuminating Engineering Society. https://www.ies.org/standards/

Loew, S. J. (2017). Reading conditions in schools: a review of fluorescent lighting, ultra-white paper, unexplained learning difficulties, and visual stress in the classroom. Journal of Psychology and Education, 12(2), 85-94.

Watts, C. supporting the reading experience of higher education students with visual stress. quality, adaptability and sustainability in times of change, 17.