Research in Arts Education (2025), 50, 36-73.
DOI:10.6622/RAE.202512_(50).0002

A STEAM Educational Research on Integrating Bamboo Weaving Crafts Into Composition Design Curriculum

Chiu-Hsueh Liu[1]

Summary

This study addresses the issues of repetitive course content and low learning motivation in basic design education in the College of Design at a university of science and technology in Taiwan. It proposes an innovative model that integrates traditional bamboo weaving crafts into the plane composition course in a STEAM (science, technology, engineering, arts, mathematics) framework. Participating in this research were students of the Creative Product Design track in the Department of Visual Communication Design, a group requiring cross-domain competencies covering material–technique–aesthetic structure. The curriculum used a triadic co-construction teaching model, involving collaborative participation by bamboo weaving artisans, design instructors, and students. Following the 6E instructional phases—Engage, Explore, Explain, Engineer, Enrich, Evaluate—the course combined bamboo culm ecology, bamboo material properties, GeoGebra geometric computation, and bamboo weaving techniques to design real-life problem scenarios using local Taiwanese objects such as gift basket or bamboo coasters. Through hands-on practice involving pressing, lifting, locking, and weaving patterns, students transformed abstract concepts of point, line, and plane into perceptible material experiences, progressing from two-dimensional images to semi-three-dimensional structural generation.

We used an action research methodology, with quantitative questionnaires and qualitative interviews to evaluate effectiveness. Results showed a significant positive correlation between course satisfaction and STEAM instructional feedback ($\rho = 0.617$, $p < .001$), effectively resolving the course repetition issue for 80.6% of students. Qualitative analysis revealed that students

[1] Assistant Professor / Bachelor Programme for Indigenous People, College of Design, National United University

 Paper accepted October 9, 2025

innovated, including semi-relief structures, dynamic visuals, and gradient patterns. The teaching sequence was also adjusted: digital painting template first, hands-on practice second, supplemental drawing last. This aligned better with students' cognition and creativity than traditional workflows. Artisans were surprised by the novel patterns students produced, indicating that material interaction stimulates innovation. Overall, this study demonstrates that factors such as the thickness, color, and flexibility of split bamboo can transition students from two-dimensional thinking to semi-three-dimensional structural thinking, thus enriching the course content. Students' attitudes shifted from detachment to identification; the students were more motivated to learn, and were more sensitive to cultural issues. This model not only deepens foundational design education but also offers new opportunities for modernizing traditional crafts and preserving local culture.