0. Title
“Investigating Material Culture: How Academic Museums Stimulate Interdisciplinary Educational Experiences.”

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0. Abstract
Museum exhibitions are a specific strategy of interdisciplinary instruction. This research explores the development of exhibitions at the Goldstein Museum of Design at the University of Minnesota as university academics are the initial beneficiaries of interdisciplinary experience through the challenge of shaping exhibition content and learning goals.

1. Introduction
Interdisciplinary work in academia has a relatively recent history in universities, with educational thinkers such as Moran (2002) and Holley (2009) building theories and definitions. Holley, in particular, considered interdisciplinary education as a way to denote the “degree of integration between various disciplines of knowledge” (2009, p.4). More critical to the research presented here is her definition that “interdisciplinary education typically (although not always) uses the collaborative engagement of researchers from multiple fields,” and that this is different from cross-interdisciplinary work (2009, p.4). While the work on interdisciplinarity has focused on discussions between and among academic disciplines, the same work overlooks the academic museum for its fundamental purpose as a site of interdisciplinary work. Holley’s distinction is vital as exhibitions, especially those in art and social sciences, may often seem interdisciplinary when they are, in fact, cross-disciplinary. In this article, we propose that not only are academic museums places of interdisciplinary learning for exhibition visitors but that the creation of exhibitions is most robust when curatorial research and exhibition development is, itself, interdisciplinary. The construction of the interdisciplinary exhibition is an interdisciplinary activity in itself which enables multiple academic disciplines to produce new research.

2. Exhibitions and Learning Design
Discussions of learning design overlook museum exhibitions as a process of design which results in an educational product or experience. Learning design research appears to consider exhibitions as site-specific holders of information from which educators develop learning products and experiences (Laurillard, 2007), a three-dimensional object-centered book if you will. The development of exhibitions as a process of design and communication, however, has long been studied outside academia by museum-based educators, exhibition designers, and audience researchers. Research on the design and impact of exhibitions as learning experiences or products is well documented and ongoing (Borun et al., 1997; Hein, 1998; Falk and Dierking, 1999; Allen, 2004; Cooner, 2011; Perry, 2012).
For exhibition visitors and designers, learning in exhibits occur when engaging with the materiality of the topics and ideas articulated through the objects. Insights are achieved through studying the material culture resident in the exhibited objects. Identified by scholars in the mid-1980s, material culture is the study of the materiality of society, as well as a name for the objects which that society produces (Prown, 1982; Yonan, 2011; Woodward, 2016). Using material culture as a way of understanding is the central component of the museum experience.

Using object-based learning in university classrooms is significantly less frequent, and, as such, there is no published literature on the role of material culture in interdisciplinary education. We contend, however, that the very study of objects fosters interdisciplinary understanding. For example, studying woven cloth may include agriculture and climate (fiber source), chemistry (dye processes), technology (loom and weaving techniques), cultural history (surface design and use), and human factors (shaped cloth, if used as apparel). Given that the study of objects fosters interdisciplinary understanding, it follows suit that exhibitions do as well.

3. The Goldstein Museum of Design and Interdisciplinarity of Academic Museums

The most common type of academic museum is the university art museum, but some universities are home to more than a single kind of museum. The University of Minnesota, Twin Cities in Minneapolis and Saint Paul is home to several academic museums covering art, natural history, the sciences, and, uniquely, design.

The Goldstein Museum of Design (GMD) develops exhibitions with faculty and curators that encourage interdisciplinary educational experiences by imbuing their exhibitions with a range of interpretive foci grounded in material culture. GMD is named for UMN professors Harriet and Vetta Goldstein whose related art textbook *Art in Every Day Life* (1925) was used in classrooms across the country. Influenced by the instructional concepts of Frank Parsons (Parsons School of Design) and Arthur Dow (Teachers College of Columbia University), the Goldstein sisters developed a new vision of design at the University of Minnesota and helped launch the Midwest as a design powerhouse. GMD cultivates object-based teaching, scholarship, and inspiration for students, faculty, and researchers. Such research and scholarship always begin with direct engagement with the collection of over 34,000 objects, each of which conceptualizes a component of design.

4. Case Studies

As design, itself, is interdisciplinary, interdisciplinarity is an embedded element of the very fabric of GMD. If GMD exhibitions are not interdisciplinary, then the topic is not being fully engaged by the exhibition curators. In addition to design fields, topics have included innovation and creativity, prototyping, the impact of social change on housing, gerontology, rural issues, security, climate change, sex trafficking, biomimicry, sustainability, and others. GMD exhibitions as wide-ranging as 2010's *How Secretaries Changed the 20th-century Office: Design,*
Image, and Culture and the 2015 exhibit America’s Monsters, Superheroes and Villains picked up on several of these topics.

Here, we explore three case studies have been selected to examine the range of interdisciplinary within the development of these exhibitions.

In the first case study, the exhibition Flights of Fancy was deliberately interdisciplinary from its origin. It used objects to describe the intersections of nineteenth- and twentieth-century clothing design, feather structure and use by the bird, environmental policy, and song-bird conservation. Flights of Fancy explored the historical and contemporary use of feathers in western fashion and addressed questions related to the meanings and connotations that are associated with this aesthetic. People have admired the rich colors and soft appearance of feathers for thousands of years. They can evoke femininity, exoticism, and luxuriousness. In European fashion, the use of feathers dates from the 16th century when they were used to adorn hats and fans. By the late 19th century, feathered hats were an essential fashion item. However, this trend led to the controversial endangerment of several bird populations and, in extreme cases, to extinction. The objects displayed in the exhibition highlighted the beauty of birds and the somewhat ironic beauty of dress adorned with their feathers. Some objects walked a line between lovely and harsh with the underlying awareness of that many birds sacrificed for fashion. A timeline of policy and legislation that protected song-birds followed this impact of the overuse of feathers by milliners. Students and other museum visitors were invited to explore the design, legal, and ecological concerns embedded in historical objects.

GMD’s curator and a graduate student in apparel studies primarily used objects from GMD’s collection to develop Flights of Fancy. They engaged scientists and educators from the UMN’s Raptor Center (part of the College of Veterinary Medicine) to include their knowledge about feather structure and identifying the types of feathers on a bird, and a timeline of legislation passed to protect species from overuse and extinction. They also engaged curators of the UMN Bell Museum of Natural History for information about the specific species represented by the feathers in the hats, ultimately adding selected taxidermied specimens and Audubon prints to the exhibition. Interestingly, this interdisciplinary collaboration was informative to the staff of the Raptor Center, most of whom were unaware of the precipitating factors in fashion that led to the development of the protective legislation.

In this second case study, the exhibition became more interdisciplinary as a result of the guidance of the museum staff towards that end. The exhibition Mixteca Stonecutting Artistry: Sixteenth-century Ribbed Vaults of Oaxaca, Mexico, focused on three churches in the Mixteca region of southern Mexico constructed during the sixteenth century with complex late-Gothic ribbed vaults. The churches are San Pedro y San Pablo Teposcolula, Santo Domingo Yanhuitlán, and San Juan Bautista Coixlahuaca. This exhibition explored the unique connection between Mixtecan master masons and European geometry. Texts and objects featuring stereotomy (the
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... analysis of solutions used in the vaults’ construction highlighted building techniques. This exhibition positioned these buildings in the global context of architectural history while reflecting on the transmission of building design from Europe to Mexico. The guest curator, a scholar in 16th-century Mexican church construction, who was also a UMN architecture professor, focused primarily on the construction materials and techniques of 16th-century Mexican stonecutters. GMD encouraged him to broaden the exhibition to include the cultural translations and transformations which needed to occur for 16th century New World stonecutters to adapt their traditions to meet European construction demands. As a result of this focus, the professor and his students consulted researchers in Mexican cultural history to add context and social impact to the exhibition. Constructing the exhibition allowed this professor and, subsequently, his students to address the cultural environment of the Mixteca master stonemasons, the social challenges they overcame to create the churches, and recognize their engineering solutions to the creation of unique stone volumes never before seen in that part of the world.

In the third case study, *Gendering Architecture, Architecting Gender*, student-curators were engaged with interdisciplinary thinking in the development of the exhibition. In *Gendering Architecture, Architecting Gender*, the Women in Architecture Student Organization (WIASO) developed an examination of female architects throughout history as well as contemporary female architects often neglected or erased from mainstream media and architectural curricula. By looking at architectural movements from a critical, feminist perspective, they were able to re-center history around marginalized identities of the women and begin to redefine what it means to be an architect. This exhibition is very close to meeting Holley’s (2009) definition of cross-disciplinary, rather than interdisciplinary. *Gendering Architecture, Architecting Gender* is interdisciplinary; however, as the research goes beyond using the lens of feminist theory to consider architecture. The development of this exhibition included research into social and business histories, the impact of critical response, and the factors contributing to the development of the architectural canon, including media and publishing.

4. Conclusion

The academic museum exists in the realm of the university or college landscape, an environment of often distinct pursuits that are encouraged to interact, but for which there is often no clear path to do so. The natural interdisciplinarity of museum exhibitions in this context provides a perfect opportunity for that sharing of information to occur. While the museum guest is often the focus of this exercise in communication and material culture, curators and organizers are the initial beneficiaries of this experience through the challenge of shaping the content to achieve public learning goals.
5. References


