Chapter XVI
Teaching Artful Expressions of Mathematical Beauty: Virtually Creating Native American Beadwork and Rug Weaving

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ABSTRACT

Students who may typically view mathematics as a sterile and disjointed subject are learning new skills and concepts using a suite of virtual design tools to create artful expressions. Students being instructed in the use of these tools can artistically explore artifacts illustrating several Native American cultures as they learn mathematical concepts and apply them to replicate the art or create their own interpretations. Readers of this chapter will gain insights into cultural definitions of “art,” “mathematics,” and “technology” in various Native American communities, culturally effective instruction for Native American students, the role of technology in enhancing mathematical understanding of students using Native American Art (bead and loom work, wampum, and rug weaving), and illustrative applications of technology connecting art and mathematics instruction using virtual design tools.

Primitive art, embracing all of the diverse traditions of native North America, remains mysterious to the contemporary Western mind, and in its mystery, its “otherness,” has lain much of its superficial allure. But the observer who looks beyond the exotic surface of so-called “primitive art” to the aesthetic complexity and the alternative philosophies underlying it sees a new potential, a vast store of untapped creative vision. Such art can have significance for our beleaguered civilization and frighteningly depersonalized world, offering hope and an expressive alternative. (Wade, 1986, p. 25)
INTRODUCTION: ART AS DEFINED BY CULTURE

There may not exist a suitable universal definition of “art” because of the difficulties of one person, community, or culture imposing their set of aesthetic standards on objects, actions, or activities created by people who share a different cultural practice and paradigm (Sturtevant, 1986). Art is defined by the culture creating it; ranging from the ornamentation of utilitarian objects, to decorative items for trade or sale, to artifacts created for sacred rituals. Art can be an expression of identity representing multiple social dimensions of a cultural community: a collective unity, an exclusive elite, or an individual rebel. An examination of any culture shows that the creation of art can often convey a sense of the people, their traditions and their values, even just by images alone.

Many scholars report that “Art” like “mathematics” is viewed as a verb rather than as a noun in many Native American cultures. According to this view, Art and math are not viewed as stand-alone subjects but rather seen as a process by which an item, artifact, skill, or technique is manifested. Haberland (Haberland, 1986, 121) explains, “The character of [indigenous] art can only be understood through its function within the life of [indigenous] peoples.” In many Native American cultures even items of daily use were/are artistically decorated or designed to describe personal and collective ownership, membership, and representation. Artful items were/are seldom duplicated as the artifact was often seen as very personal and in some cases sacred or at least spiritually representative of the relationship between seen and unseen forces and entities.

On the other hand, there are disadvantages to framing indigenous art as radically different than that of western art; particularly if that difference is characterized as highly localized or provincial. Colonialist discourse often claimed a broad cosmopolitan outlook for the colonizers and a narrow parochial view for indigenous people; this justified the colonists as parental guardians over the “children of the forest.” The contrast continues in our neo-colonial context. Appiah (1992 pp. 137-8), for example, describes a 1987 New York exhibition of African art in which a panel of nine experts were asked to comment on photos of all the various pieces. The curator notes one exception: she limited the only African artist, sculptor Lela Kouakou, to commenting on art from his own ethnic group (Baoule), because “field studies have shown that African informants will criticize sculptures from other ethnic groups according to their own traditional criteria...” Appiah then juxtaposes this limiting prohibition with commentary from one of the putative unbiased experts on the panel, billionaire art collector David Rockefeller: “I own somewhat similar things and I have always liked them.... It would look good in a modern apartment or home.” “I have to say I picked this because I own it. It was given to me by president Houphouet Boigny of Ivory Coast.” “The best pieces are going for very high prices.... And that’s a fine reason for picking the good ones rather than the bad.” Clearly Rockefeller is no less biased by the “traditional criteria” of his tribe--worship of money and home décor--than Kouakou would have been by his own criteria. The idea that indigenous art “can only be understood through its function within the life of indigenous peoples,” while western art speaks to a universal audience, is not as compelling as it may at first seem. Indigenous minds are not trapped in local frameworks: they too deal with universal themes of heart and mind. The German Bauhaus artists were famed for their use of Euclidean geometry; should we think any less of the fractals in African cornrows or logarithmic curves on Maori rafters?

These differing interpretations of art are shared to provoke the reader into questioning their own perspectives and relationships with art, math, and technology so they may better understand the purpose and necessity of teaching math from a dif-
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