How Does Culture Shape Students’ Perceptions of Scientists? Cross-National Comparative Study of American and Chinese Elementary Students

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Abstract

For decades, researchers have been convinced that one stereotypic image of scientists existed among children worldwide (Chambers, 1983; Chiang & Guo, 1996; Fung, 2002; Maoldomhnaigh & Hunt, 1988; Newton & Newton, 1992, 1998; She, 1998; Song, Pak, & Jang, 1992). This study, however, moves beyond that stereotypic image and examines students’ perceptions of scientists. The purpose of this study is to illustrate that students are influenced not only by the personal images they hold of scientists, but also by cultural impressions and the style of the science courses they experience in school. By combining a contemporary perspective and a creative method of analyzing student perceptions, a theoretical understanding of how students interpret scientists and their work was developed. Elementary school children (N = 1,350) in the United States and China were enrolled in this study, and drawing exercises were utilized to provide new evidence and a fresh perspective regarding the way students perceive scientists. Based on the findings of this research, more American students included the traditional image of a science laboratory with chemicals in their pictorial depictions of scientists, while Chinese students included robots in their drawings. While students in both countries demonstrated misconceptions about scientists, this study identifies those misconceptions as significantly different, yet inherently related, to students’ individual cultures, contrary to previous studies. This study also demonstrates that a child’s environment can be influenced by their existing culture, and thus learning, or perceiving the role of scientists, can be directly influenced since each classroom is a culture of its own. Finally, this study demonstrates that a child’s sense of who can be a scientist, where scientists work, and what scientists do is influenced by cultural experiences. Today, with fewer students pursuing science careers, these findings are especially noteworthy.

Introduction

A child’s development and capacity for learning is related directly to the symbolism and the culture of the country in which the child lives. Bruner (1996) labeled this effect culturalism. Education is just a small part of how cultures invest in future generations, yet a vital part. It is within this cultural context that schools become more than curriculum and textbooks, and more about the broader context of how they plan to educate children. The focus of this study is to examine how cultures influence young
students and how cultures help students to construct images of the world around them—based on how students pictorially illustrate their perceptions of scientists.

This researcher contends that students undergo a specific process when developing perceptions of scientists and that process is intimately related to one’s culture. It is a process that begins with children viewing scientists with positive or negative associations from within their culture. Students typically look to culture and people within their immediate environment to help reinforce or redefine their perceptions while synthesizing their own ideas. As children mature, they begin constructing personal perceptions of scientists, which are unlikely to change until they have personal contact with a scientist or experience a situation that causes a change in perceptions. For these reasons, students in different cultures are best examined in a cross-national comparative study in order to isolate which cultural factors help shape perceptions of scientists and which do not.

While educational researchers often discuss the significance of one’s culture in relation to children and education, culture has never previously been linked in terms of how children perceive scientists. By understanding how cultures influence young students’ perceptions about scientists, educators will be better able to create classrooms and curriculum that will help inspire student interest in the sciences and scientists at a time when those interests are waning in the United States. If we can examine what factors contribute to students’ perceptions, then perhaps we in the United States can create cultures that influence students’ perceptions of scientists in a positive way. In an effort to conduct a thorough and comprehensive evaluation of how students perceive scientists and the impact of culture on those perceptions, children from a community in the United States and from a community in China were selected for this study.

**Students and Their Ideas About Scientists**

For many years, versions of the Draw-A-Scientist Test (DAST) have been used as a tool to assess students’ attitudes and perceptions about scientists (Barman, 1996, 1997; Chambers, 1983; Finson, Beaver, & Crammond, 1995; Mason, Kahle, & Gardener, 1991). Students taking the DAST are asked to draw a scientist. The resulting drawings typically reflect a cartoon-like view of the scientist—a person with crazy hair and thick glasses, working alone and isolated from others because of social awkwardness (Barman, 1996, 1997; Chambers, 1983). It is notable that illustrations of this sort are very similar across ages, settings, and grade levels—at least when one single drawing of a scientist at work is analyzed (Barman, 1997). This stereotypic image of the scientist gained worldwide status from a number of international studies (Chambers, 1983; Chiang & Guo, 1996; Fung, 2002; Maoldomhnaigh & Hunt, 1988; Newton & Newton, 1992, 1998; She, 1998; Song, Pak, & Jang, 1992). Newton and Newton (1992) brought attention to the commonality of scientist pictures by observing children across cultures and the perceptions those children developed at early ages. Through the use of the DAST and other DAST-like protocols, children in a variety of cultures appear to perceive scientists with stereotypic commonalities, such as a lab coat, glasses, and chemicals, in the traditional manner. There also appeared to be similarities in the number of stereotypic indicators included in the drawings as students grew older as well as a predominant perception of scientists as male (Barman, 1997; Fung, 2002). Thus, with previous scoring mechanisms, children from different cultures appeared to be very similar both in their portrayal of scientists and the way these perceptions changed as children progressed through school, regardless of their geographic location.