Chapter 34
Understanding How Images and Attitudes Toward Scientists and Science Contribute to Science Identities:
Investigating How Images Drawn by Elementary, Middle, and High School Students Reflect Their Attitudes

Donna Farland-Smith
The Ohio State University, USA

Toni Ledger
Middlesex Community College, USA

ABSTRACT

In this study, a modified Draw-A-Scientist Test (mDAST) and an Attitude Toward Science Survey (ATS) were analyzed. Results revealed that students' (N=127) drawings of scientists were not consistent with students' attitude toward science in grades 5, 9, and 12. Attitudes toward science continued to decline while student drawings became more positive in respect to where they were drawing scientists and what activities scientists were doing in grades 9 through 12. Most importantly, the fact that students' perception of the appearance of scientists did not change from the end of elementary school to the end of high school suggests the severity and longevity of these images. The findings of this study reinforce the significance of ATS and perceptions of scientists in conjunction with the interest of science-related careers.

DOI: 10.4018/978-1-5225-3832-5.ch034

INTRODUCTION

The National Science Board publishes the most current data on trends in science and technology in the United States (National Science Board, 2014). This data helps the public understand who is entering the science field and at what rate. For example, from 1993 to 2010, growth occurred in both the proportion of workers with a highest degree in an S&E field who are women (increasing from 31% to 37%) and the proportion of women in S&E occupations (increasing from 23% to 28%) (National Science Board, 2012). While the authors realizes there are influences on the career choices people make, this study will focus on parents, media, and schools, and, in particular, how and if these influences impact attitudes toward science and perceptions of scientists at various school levels. It is hoped that this information will help teachers and researchers alike understand the how's and why's of career interest.

Recent data appears to suggest the United States, as a country, is making progress attracting girls to high-level science and math courses (National Center for Education Statistics, 2009) although some studies (Hadjar & Aeschlimann, 2015) indicate that overall girls are still selecting "gender typical" careers. Girls have also made gains in terms of performance when compared with boys at middle and high school levels (National Center for Education Statistics, 2009). The National Center for Education Statistics (2009) shared these promising results, considering years of gender gap in the educational attainment of women; however, the number of girls who are training to become scientists and engineers remains low (30%), while the number of jobs requiring science and engineering is growing.

The choices boys and girls make to enter science careers happens long before they graduate from college, which makes understanding their attitudes toward science and their perceptions of scientists of utmost importance. Even though most recent efforts focus on attracting girls into science-related careers, understanding what motivates both genders is beneficial. National Science Board (2012) reveals that gaps concerning Advanced Placements (AP) courses narrowed somewhat during the relatively short period of time from 2009 to 2011. The white-black gap decreased from 36 to 34 points. The white-Hispanic gap fell from 30 to 26 points. The proportion of male and female students in the class of 2012 taking mathematics and science exams varied by subject.

It becomes even more interesting to examine students involved in Advanced Placement Courses. Black and Hispanic students were underrepresented among AP exam takers. Male students were more likely than female students to take AP courses, including calculus BC (59% versus 41%), physics B (65% versus 35%), and both physics C courses (about 75% versus 25%). However, female students were more likely than male students to take AP exams in biology (59% versus 41%) and environmental science (55% versus 45%). Black students made up about 15% of the 2012 graduating class, but they represented less than 8% of students taking any AP mathematics or science exams. Hispanic students made up about 18% of the class of 2012, but their representation among AP exam takers ranged from a high of 15% for environmental science to a low of 8% for calculus BC and 7% for physics C: electricity/magnetism. The gap between low- and high-performing students dropped from 89 to 87 points.

Performance disparities in mathematics and science were evident among different demographic groups at grades K, 4, and 8. Some score gaps narrowed over time, however. At grades K, 4, and 8, students from low-income families or homes where the primary language used was not English had lower mathematics and science scores than their peers from more advantaged backgrounds (National Science Board, 2012). Black, Hispanic, and American Indian or Alaska Native students performed substantially lower than their white and Asian or Pacific Islander counterparts. Gender differences in achievement were generally small and favored boys in most cases. Among black students, however, girls performed better. Some

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