ABSTRACT. Nearly 5,000 self-generated science-related K–12 students’ questions, classified into seven science subjects, were used to quantitatively measure the gender gap in science interests and its change with age. In this data set, a difference between boys’ and girls’ science interests did not exist during early childhood, but increased over 20-fold by the end of high school. Furthermore, the gap widened in a stereotypical manner, with girls being increasingly interested in biology and boys more interested in physics and technology. This method could be applied for identifying and comparing the gender gap in science interests between different populations based on different data sources.

KEY WORDS: biology, gender gap, interest, physics, quantitative, students’ questions methodology

INTRODUCTION

The wealth of data regarding boys’ and girls’ interests in science suggests that boys, in general, are more interested in science than girls (Gardner, 1998; Miller, Slawinski Blessing, & Schwartz, 2006). However, the sweeping generalization of boys being interested in science while girls are not is rather superficial. An analysis of MadSci.org, an Internet-based Ask-A-Scientist site, for example, demonstrated a decade-long (1996–2006) dominance of female interest in science among kindergarten to grade 12 students (Baram-Tsabari, Sethi, Bry, & Yarden, 2009); in fact, in many developing countries, girls have the same positive attitudes and interest in science that boys do (Sjøberg & Schreiner, 2005).

A persistent stereotypical gender gap was reported, however, between girls’ and boys’ interests within science: numerous studies have shown that, while physics and technology prove significantly less interesting to girls than to boys, biology is of greater interest to girls than to boys and chemistry is liked, to a similar extent, by both genders. These findings (or parts thereof) have been repeated in several countries, including Scotland (Stark & Gray, 1999), Australia (Dawson, 2000; Kahle, Parker, Rennie, & Riley, 1993; Woodward & Woodward, 1998), the USA (Burkam, Lee, & Smerdon, 1997; Farenga & Joyce, 1999; Jones, Howe, & Rua, 2000), England (Murphy & Whitelegg, 2006; Osborne & Collins, 2001; Spall, Barrett, Stanisstreet, Dickson, & Boyes, 2003), Italy (Falchetti, Caravita, &
Sperduti, 2007), Israel (Baram-Tsabari & Yarden, 2005; Friedler & Tamir, 1990; Trumper, 2006), Turkey (Yerdelen-Damar & Eryilmaz, 2009), Germany (Hoffmann, 2002), and Japan (Scantlebury, Baker, Sugi, Yoshida, & Uysal, 2007), and in international studies, such as TIMSS (Mullis, Martin, Fierros, Goldberg, & Stemler, 2000), “Science and Scientists” (Sjøberg, 2000), and “Relevance of Science Education” (Busch, 2005; Jenkins & Nelson, 2005; Lavonen, Juuti, Uitto, Meisalo, & Byman, 2005; Schreiner, 2006; Sjöberg & Schreiner, 2002). This gender gap in focus of interest is also apparent among female students who are interested in science and intend to continue studying it (Murphy & Whitelegg, 2006; Zohar, 2003). Interest affects the ability to learn. Research indicates positive relationships between interest and a wide range of learning indicators (Pintrich & Schunk, 2002) through its contribution to students’ connection with the content, as well as maintenance of that connection for a sufficient time (Ainley, Hidi, & Berndorff, 2002).

Interest also affects the willingness to learn. Adolescents’ decisions concerning the content and direction of their educational training are strongly influenced by the topic-related interests they have developed (Krapp, 2000). Therefore, along with other reasons, girls’ lack of interest in physics results in their under-representation in advanced physics classes. Indeed, despite nearly 30 years of effort to engage girls in physical sciences and engineering, the choice of a science discipline remains highly gender-dependent (OECD, 2006; Osborne & Dillon, 2008), and girls rarely choose a career in these disciplines.

Some researchers have suggested that the basis for these stereotypically gendered interests is an inborn trait rendering most girls hard-wired for empathy, while most boys are predominantly hard-wired for understanding and building systems (Baron-Cohen, 2003). Other studies, however, have not found any such difference (Barres, 2006; Guiso, Monte, Sapienza, & Zingales, 2008; Haworth, Dale, & Plomin, 2008; Linn & Hyde, 1989; Spelke, 2005). A recent analysis of the Program for International Student Assessment results, for example, suggests that the gender gap in math scores, which historically favors boys, disappears in countries with more gender-equal cultures (Guiso et al., 2008).

Kelly (1978) divided the explanations for gender differences in achievements into three categories, which are also suitable for classifying engagement-related differences: cultural, attitudinal, and educational.

Cultural explanations include the masculine image of science, especially physics, and lack of female role models and their image in science in the media, lack of experiences outside of school, parent-gendered beliefs, peers’ views during puberty, girls’ perceived low