

## Chapter 4

# Development of a Scale to Measure Attitudes toward Information Technology

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### ABSTRACT

*Educators, and business, and political leaders are increasingly recognizing that computing is a new basic skill necessary for economic opportunity and social mobility. U.S. President Obama has announced a new initiative, “Computer Science For All” to empower a generation of American students with the computer science skills they need to thrive in a digital economy (2016). Employers seek technical computer specialists who can write software and invent new applications, but American universities are only training enough students to fill about 40% of the projected 1.1 million technology and computing jobs expected by 2024 (National Center for Women and Information Technology, 2016). Moreover, a lack of gender parity within the U.S. technology industry has long been viewed as a critical problem, detracting from innovation and prosperity. Pursuit of information technology (IT) majors depends, to a great extent, on students’ attitudes toward IT. This study developed an Attitude toward IT Scale with a gender subtext to measure certain attitudes toward IT, held by college students. The norm group consisted of mostly freshmen enrolled in 2011 ( $N = 373$ ), at a large four-year public university in Illinois. Reliability and validity of the 30-item Scale were examined by using Cronbach’s alpha and a principal components factor analysis with orthogonal rotation using varimax with Kaiser normalization; the rotation converged in seven iterations. Results of data analyses showed that overall reliability is high (0.85), and factor analyses revealed five orthogonal factors with high coefficient alphas—factors that represented relevant attitude constructs. This Scale may be used by educators at the senior high school and college levels to evaluate the effectiveness of different teaching/learning strategies in promoting positive student attitudes toward IT, and in improving learning among students. The Scale is unique in that it includes attitudes toward gender equality of opportunity in IT.*

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## INTRODUCTION

Advances in information technology (IT) are among the most powerful forces bearing on the economy (Davenport, 2013). IT applications continue to impact medicine, finance, manufacturing, and numerous other sectors of society. Companies that use IT often make complementary innovations in their organizations and in the services they offer. Both IT and IT-enabled organizational change are important components of the skill-biased technical change (MacCrory et al., 2014). Knowledge of advanced computing has the potential to prepare students to apply and innovate upon 21st-century technologies.

Several information systems studies have identified attitude as one of the strongest factors influencing successful IT use in any organization (Beaudry & Pinsonneault, 2010). Successful use of IT in a business depends not only on the technology itself, but also on the levels of skills and expertise of the employees using the technology (Botha et al., 2014). However, these authors noted that though the skills of an individual can be improved by proper training, the attitudes of a user towards the technology will affect his/her willingness to learn about the technology, the decision to use the technology, and the actual uses to which the technology is put. The challenge of meeting the demand for skilled and willing IT professionals is addressed by examining factors that affect choice of post-secondary major and retention in computing related fields. It is therefore important to pay attention to relevant attitudes toward IT that obtain in young adults as they complete secondary education and enter into post-secondary education.

The importance of attitude in this endeavor is underscored by a consideration of the nature of attitudes. Attitude is often used to understand and predict people's reaction to an object or change and how behavior can be influenced (Fishbein & Ajzen, 2010). Perhaps the most influential definition has been one given by Allport (1935): "An attitude is a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related" (p. 810).

The most recent Taulbee survey of top-ranked North American computing, engineering, and technology programs suggests that women may account for just 15% of the undergraduate student body, and a miniscule 0.4% of first-year women college students list computing as a probable major (Misa, 2010). A study done by Morgan et al. (2013) found that the occupational plans of high school seniors are strong predictors of initial college major selection. Numerous research studies have uncovered reasons women in particular have not chosen computing: negative stereotypes, an unattractive/hostile culture, misperceptions of the discipline, lack of role models and/or mentoring support, and low confidence (Beyer et al., 2003; Katz et al., 2006; Shaw and Stanton, 2012). In relation to gender differences in computer-related attitudes in general, research has shown that male students have more positive attitudes towards computers — including greater liking, than female students (Bebetsos & Antoniou, 2009). Therefore, the shortage of skilled IT professionals may be due in part to negative attitudes toward IT in young adult females, and efforts to improve those attitudes are much needed.

Labor economists have persistently observed a gender gap in computing-related majors as well as employment and wages within the IT industry, which also works against efforts to recruit greater diversity into the field by perpetuating a more homogeneous (masculine) image of the field thereby creating a cycle of discouraged participation by women. Many studies have researched the reasons why women students do not complete a program of study in computing-related majors; these reasons pertain to social dynamics and the need to mitigate cultural norms that are not particularly friendly to women (Broad and McGee, 2014). The underrepresentation of women undermines the competitiveness of the computing labor force by limiting the range of perspectives of its participants (Sax, 2012).

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