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Using technology in higher education: The influence of gender roles on technology self-efficacy

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ABSTRACT

The present study examines the relationship between technology self-efficacy among university students and gender roles. Previous research has based differences in technology self-efficacy on biological sex and found significant differences. University students were asked to complete a survey dealing with gender roles and technology self-efficacy. The current study shows that gender roles, specifically masculinity, is the source of this difference in technology self-efficacy, and not biological sex alone. Further, masculinity predicts technology self-efficacy above and beyond what can be explained by other contributing factors such as previous computer hassles and perceived structural technology support.

1. Introduction

Great scientific advances have prompted the development of technologically driven teaching strategies in university settings (Surry, Ensminger, & Haab, 2005). Integration of instructional technology is one of the most important issues for educational reform (American Psychological Association, 2008; Peng, 2006). Although the use of technology in learning has been shown to increase intrinsic motivation, enhance critical thinking and develop a more global perspective (Speaker, 2004), many students do not learn the skills needed to master technology as quickly as others (McCoy, 2010). This is concerning because the perceived ability that students have when using technology is a vital aspect in their frequency of use of technology.

Technology use in its many forms is continuing to grow in schools, businesses and homes. However, the progression towards expanded use has not always moved as quickly. In a 1987 study, 58% of teenagers aged 14–18 had never used a computer (Durndell, Macleod, & Siann, 1987) and in 1993, only 27% of children indicated that they used a computer at home (Dorman, 1998). In a more recent census, 68.7% of households used the internet at home (US Census Bureau., 2009) and 83.9% of students used a computer on a weekly basis to complete assignments (Sax, Astin, Korn, & Mahoney, 2003). Although the use of technology has increased overall, there continues to be differences between segments of our population (e.g., minority, women, older) reporting less computer use than others (Lebens, Graff, & Mayer, 2009; Levin & Barry, 1997; Yardi & Bruckman, 2012).

The goal of the current research is to investigate what factors lead to differences in computer self-efficacy between men and women. Specifically, we propose that gender roles, a variable that affects the attitudes and expectations of men and women, mediate the relationship between sex and computer self-efficacy. Based on modern theories of gender roles (Wood & Eagly, 2002) and self-efficacy (Bandura, 1982), we suggest that technology self-efficacy relies less on biological sex and more on societal based gender norms. Specifically, we propose that educators and researchers need to look beyond biological sex and use gender as a factor to understand how students' perceive their own ability and attitude in regards to the use of technology in the classroom.

2. Literature review

2.1. Technology self-efficacy

There have been a number of studies that have investigated the acceptance or rejection of technology (e.g., Cooper, 2006; Dorman, 1998; Durndell et al., 1987; Huffman & Huffman, 2012; Young, 2000) and perceived technological ability (e.g., Arthur, 1991; Coffin & MacIntyre, 1999; Peng, 2006). One reason frequently given for a student's negative perceptions of technological ability in the classroom is that they suffer low technology self-efficacy (Igbaria & Iivari, 1995). Self-efficacy is defined as the "generative capability in which cognitive, social and behavioral sub-skills must be organized into integrated courses of action to serve innumerable

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purpose" (Bandura, 1982, p. 391). In other words, self-efficacy is the personal belief a person maintains as to how well they can perform a task. Technology self-efficacy is the belief that one has the sufficient and correct abilities and skills to be successful when dealing with a technology related task (McDonald & Siegall, 2001). Since self-efficacy in general is related to actual behavior (Bandura, 2012) it is important in trying to understand whether students will be likely to use technology in support of their education.

In addition to the relationship between self-efficacy and behavior, technology self-efficacy is important for several additional reasons. Many students are entering college and the workforce without basic computer knowledge or skills (Isman & Celikli, 2009). This lack of experience with technology directly affects the students' level of technology self-efficacy (Gist & Mitchell, 1992; Isman & Celikli, 2009) and those with lower technology self-efficacy are more likely to experience higher levels of anxiety related to technology use in both the classroom and workplace (Shu, Tu, & Wang, 2011). Further, technology self-efficacy has been shown to be a significant predictor of a student's future academic and career trajectories (Vekiri & Chronaki, 2008). Both of these issues could have unintentional consequences. That is, if there are sex or gender differences in technological self-efficacy, then women or less masculine people are more likely to have lower performance and/or the resultant lower paying jobs.

2.1.1. Sex differences and technology self-efficacy

Overall, researchers have demonstrated that males have more positive attitudes toward computers when compared to females (Coffin & MacIntyre, 1999; Whitley, 1997). Males appear to report lower levels of anxiety around technology (Coffin & MacIntyre, 1999; Cooper, 2006), more comfort in using computers (Young, 2000) and are shown to be more knowledgeable about all aspects of computers (Durndell et al., 1987). However, there has been some research that reports no sex differences (Compton, Burkett, & Burkett, 2003; Havelka, 2003), or even some that reported positive outcomes for females (Colley, Gale, & Harris, 1994; Compton et al., 2003; Ray, Sormunen, & Harris, 1999), yet these findings are much less common. It should also be noted that research has shown that this digital divide or "computer gender gap" (Young, 2000, p. 205) is an international phenomenon and that the differences between men and women's self-efficacy and attitude toward computers is consistent throughout the world (Cooper, 2006). We propose that sex differences continue to exist in relation to technology self-efficacy.

Hypothesis 1. Biological sex is related to technology self-efficacy such that men report higher levels of technology self-efficacy than women.

2.1.2. Gender roles as an explanatory variable between sex and technological ability

Although it appears that there are differences between males and females computer self-efficacy, there is less known about why these differences may occur. We suggest that it is the influence of gender roles with which males and females are exposed that affects their perceptions of their technological ability. That is, we propose that gender is a more appropriate construct to assess than biological sex in examining differences in technology self-efficacy. Biological sex is generally viewed as the biological differences in males and females of a species. Gender however is defined as "cultural and is the term to use when referring to men and women as social groups..." (American Psychological Association, 2001, p. 63). The term gender also refers to those behaviors that are culturally appropriate to males or to females (Unger, 1979). Gender then becomes a matter of a social phenomenon and an accumulation of experiences rather than simple biology (Unger, 1979).

Gender is divided into social roles pertaining to both males and females. Gender roles are an important variable because they provide a better designation of one's sexual identity and they better describe attitudes and behaviors (Adler, Kless, & Adler, 1992). Gender role theory states that gender roles are used to place men and women in different social structures and provide expectations for each sex to have characteristics that equip them for tasks their sex usually performs in their society (Wood & Eagly, 2002). For example, the needed skills, motives and values to accomplish tasks generally completed by women are incorporated into the female gender role. Over time, these roles become engrained into a given society and guide social behavior (Eagly, Wood, & Diekman, 2000). Gender can be expanded to include assumptions made by others about a particular gender or self-imposed ideas about how a man or woman should function in a given society (Unger, 1979). Men are typically associated with being more skilled with technology. We propose that the gender role of masculinity (usually more associated with the male sex) is key to understanding technology self-efficacy. Individuals who are masculine are usually associated with traits such as independence, self-confidence, aggressiveness, and achieving (Thompson & Pleck, 1986).

Sex and gender have been used synonymously in many research studies surveying technology and technology self-efficacy (Coffin & MacIntyre, 1999; Compton et al., 2003; He & Freeman, 2010); however, sex and gender are very different terms that if not treated separately can yield widely discrepant research outcomes. Gender differences can be seen in some educational subject matters in which people's expectations are influenced by sex. For example, reading and writing are often seen as a feminine dominated domain while math, science and sports are perceived as being more masculine dominated (McGeown, Goodwin, Henderson, & Wright, 2011). It is important to note that these differences are not due specifically to the biological sex of the individual, but instead to the gender roles attached to their sex. In a study of students and reading, differences were found in masculine and feminine gender roles pertaining to motivation while no differences between males and women were found (McGeown et al., 2011). We propose that similar results can be found outside the study of motivation and reading and can be applied to the perceived ability and use of technology.

Lazarus and Folkman's (1987) theory of emotion gives an appealing explanation for why people accept or reject technology and provides some insight in understanding gender differences related to technology self-efficacy. Lazarus and Folkman (1987) proposed that emotions can be divided into two parts. During the first component, or primary appraisal, a person determines whether or not the task or object is a threat or challenge. The secondary appraisal leads to the individual asking if there are any actions that can be taken to improve the situation or the relationship with the object or task. This primary and secondary appraisal system can be applied to the use of technology with the distinction most evidently seen in the initial appraisal of technology. Men view computers as something to be commanded while women view computers as something to be used (Ray et al., 1999). This difference in view directly affects the primary appraisal of technology, as men do not view a computer or other parts of technology as a threat. Coffin and MacIntyre (1999) offered one explanation for this phenomenon. They proposed that this non-threatening perception of technology is due to men being more motivated by extrinsic goals and therefore are naturally more encouraged by initial contact with technology. When men do not see technology as a threat, their secondary appraisal is focused on improving their relationship with technology and not coping with it. Women, on the other hand, view technology negatively during