



Gender and attitudes toward technology use: A meta-analysis



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ABSTRACT

Gender difference in the attitude toward technology use has long been a concern in education. The last meta-analysis on this issue covered the empirical studies up to about 20 years ago. Since then, technology use has increased exponentially, and many more empirical studies have examined this issue, but showed inconsistent findings. As a result, there is a lack of clear understanding about if such gender difference still persists. The purpose of this research is to re-examine this issue by meta-analyzing the empirical research studies on this issue in the last two decades, and to examine the potential moderators that may have contributed to the heterogeneity of the research findings. A total of 50 articles from 1997 to 2014 were identified and used in this meta-analysis. The findings indicated that males still hold more favorable attitudes toward technology use than females, but such difference would be characterized as small effect sizes. The comparison between this study and the last meta-analysis of about two decades ago suggested that there was only minimal reduction in the gender attitudinal gap in general. But when the general attitude was broken down to different dimensions of attitude, the present study showed a reduction of gender difference in the dimension of *Affect* and *Self-efficacy*, but not in the dimension of *Belief*. The limitations of the study were noted, and the implications and future research directions were discussed.

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1. Introduction

In the past few decades, the development of technology, especially technology related to computing and information, has been fast and furious, which has resulted in the deep infiltration of technology use in almost every aspect of people's daily lives, including, among other things, education and career choices. In the current society, learning and developing a good command of some basic technology skills has become a necessary part of one's ability for successful education and career, and technology competency has become very important and critical for a wide range of careers. In this age of ubiquitous usage of technology, one issue that has received considerable attention from many educational researchers and psychologists is related to the potential gender difference in technology use, and some possible psychological culprits for such gender differences (Liao, 1999; Whitley, 1997). The difference between males and females in technology use is also a topic of interest for society in general (Brown, 2016).

Over the years, there has been a stereotypical view concerning technology use and gender: relative to men and boys, women and girls might have more negative attitudes towards technology and technology use, and they would be less actively engaged in technology-related activities and behaviors, which could have contributed to the so-called "technological gender

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gap" (Canada & Brusca, 1993). However, as technology is becoming much more ubiquitous than ever, and technology is becoming an important part of life especially for young people, women's attitudes toward technology use could vary and change across time (Buccheri, Gürber, & Brühwiler, 2011). In recent years, there has been a growing interest in studying the gender groups' attitudes towards technology or computers (Ardies, Maeyer, & Gijbels, 2015; Potvin & Hasni, 2014; Teo, Milutinović, & Zhou, 2016). But the research findings from various individual studies about gender difference, or lack thereof, in the attitudes toward technology use have been inconsistent, making it difficult to draw any firm conclusion. For examples, Sáinz and López-Sáez (2010) reported more positive computer attitudes of boys than of girls, while Sáinz, Meneses, López, and Fàbregues (2016) concluded that young males did not show more positive attitudes towards technology use than girls. To address this issue of inconsistent research findings concerning possible gender difference in the attitudes toward technology use, studies of quantitative synthesis of the research literature on this issue were conducted many years ago (Liao, 1999; Whitley, 1997), suggesting that there were statistically significant gender differences in the attitudes toward technology use, with males having slightly more positive attitude toward technology use.

Over the past two decades, the society has witnessed an exponential growth in the technology development and infiltration in all aspects of the society, to the point that the society is now heavily dependent on technology to function, and technology has become an indispensable part of our daily lives. Given the rapid development and infiltration of technology in every aspect of the society over the last two decades, given the length of time after the last synthesis of research on this issue, and given the fact that many new studies have been conducted in this area since the last synthesis, it is unclear if the previous findings (e.g., Whitley, 1997) about this issue remain relevant and valid.

As discussed by some researchers (Tsai & Lin, 2004), as the technology use became more relevant and prominent in all aspects of the society and people's daily lives, concomitant changes might have occurred, and the gender differences related to technology use could have been narrowing. With such background, it is time that we revisit this issue and take a close look at the research findings after the last synthesis (Whitley, 1997) with regard to possible gender differences in the attitudes toward technology use. This study was designed for the purpose of providing an up-to-date quantitative synthesis about gender differences, or lack thereof, in the attitudes toward technology use.

1.1. Gender and attitudes toward technology use

On the issue of gender difference in attitudes toward technology use, the last two synthesis studies were done in late 1990s by Whitley (1997) and by Liao (1999), respectively. Because these two synthesis studies were so close to each other, it was expected that there should be considerable overlap in terms of the original studies included in these two meta-analytic studies. Unfortunately, a close look at these two studies revealed that one study (Liao, 1999) did not provide any meaningful information about the original studies included in the meta-analysis. In addition, this study exhibited a severe paucity of information on many other important aspects of a meta-analytic study (e.g., an extremely short and un-meaningful literature review, lack of information on why the moderator variables were used, total lack of literature review on these moderator variables, etc.). With the considerations of these serious defects, we decided that this conference meta-analysis paper needs to be excluded from our further consideration, and its findings would not be used for comparison purpose in our study. Consequently, in our study as described below, we only used the synthesis by Whitley (1997) for reference and comparison.

As shown in the synthesis by Whitley (1997), despite the inconsistencies among the individual studies, the research findings generally suggested that males showed more favorable attitudes toward technology use than females, confirming the general perception that gender differences existed with regard to technology use. Such gender difference might partially explain the gender gap in technology use and in the technology workforce. This observation and conclusion, however, may not remain valid after almost two decades, during which the society has witnessed the fast development and wide use of technology in all aspects of the society. As Tsai and Lin (2004) discussed, with the increasing ubiquity of technology and its prominence, changes related to technology use could have occurred; with more females acquiring more experiences related to technology, gender differences regarding technology use, including the attitudes toward technology use, could have been narrowing over the years.

Similar to the situation of inconsistent, and often contradictory, research findings about gender differences in attitudes towards technology use as summarized in Whitley (1997), studies in the recent two decades continue to provide mixed and inconsistent findings. On one hand, some researchers reported that males had more positive attitudes towards technology than do females (e.g., Chou, Wu, & Chen, 2011; Colley & Comber, 2003; Collis & Williams, 2001; Durnell & Haag, 2002; Durnell, Laithwaite, & Haag, 2000; Hasan, 2010; Jackson, Ervin, Gardner, & Schmitt, 2001; Kay, 2009; Kesici, Sahin, & Akturk, 2009; Ong & Lai, 2006). On the other hand, some other research studies showed evidence for supporting the opposite conclusion: males exhibited more *negative* attitudes toward technology use than their female counterparts (e.g., Chen & Tsai, 2007; Johnson, 2011; Price, 2006; Tsai & Lin, 2004). Furthermore, no gender differences in attitudes toward technology use were reported by others (e.g., Imhof, Vollmeyer, & Beierlein, 2007; North & Noyes, 2002). To understand these inconsistencies across the individual studies, it is necessary to conduct a systematic synthesis of these individual studies. Such a synthesis will not only help in shedding light on the general question of whether there remains a gender difference in the attitudes toward technology (if yes, how large such a difference is) as revealed by the studies conducted in the last two decades, but also help us to understand if some features of the individual studies may have contributed to the inconsistent findings across the individual studies.

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