



Affective mechanisms linking Internet use to learning performance in high school students: A moderated mediation study



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ABSTRACT

Although previous studies have concluded that Internet use can help students in learning and research, a number of empirical investigations have confirmed that Internet addiction or excessive Internet use has negative effect on students. Thus, if the Internet does not always benefit students, under which conditions can Internet use have positive effects? Since students' beliefs in their academic self-efficacy and their abilities to begin, continue, and complete their studies are as important as their academic successes and performances, this study hypothesizes that academic self-efficacy acts as a mediator for Internet use and academic performance. Based on Social cognitive theory, we argue that student academic performance will be mediated by academic self-efficacy with respect to Internet use. Two kinds of Internet use, general and professional, are considered to be antecedents of academic self-efficacy. Survey data from 212 twelfth-grade vocational high school students in Taiwan indicate that general Internet use has an indirect positive effect on student academic performance, which is also mediated through academic self-efficacy. In contrast, general Internet use has no significant direct impact on students learning performance. This study also shows that Internet anxiety moderates the relationship between academic self-efficacy and learning performance. In students with low Internet anxiety, the relationship is moderated, which results in enhanced learning performance.

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1. Introduction

The Internet has become a place where many people perform basic activities everyday (Jackson, 1999; Jackson, Ervin, Gardner, & Schmitt, 2001). Data from the 2011 Individual/Household Digital Opportunity Survey (Research, Development, and Evaluation Commission [RDEC], Taiwan, 2011, 2012) in Taiwan not only show that the percentage of household computer ownership in Taiwan increased from 66.9% in 2002 to 87.9% in 2012, but they also show that Internet connectivity rose from 56.2% in 2002 to 83.7% in 2012. For households with students, the number is even greater, with computer-ownership increasing from 92.2% in 2006 to 97.5% in 2012. High computer ownership and household Internet connectivity rates have increased Internet use among students. Student Internet use includes activities related to schoolwork as well as more general activities. This situation has motivated

several studies to examine the relationship between Internet use and academic performance. Zhu, Chen, Chen, and Chern (2011) suggested that a significant relationship exists between Internet information seeking and academic performance in high school students, thereby echoing the findings of Jackson, von Eye, Biocca, et al. (2006), who found a positive relationship between Internet use and academic performance among children. Cheung and Huang (2005) demonstrated that higher Internet use among university students leads to a better perception of learning performance. Gil-Flores, Torres-Gordillo, and Perera-Rodríguez (2012) also explored the relationship between the extracurricular experiences of students on the Internet and their performance in the Program for International Student Assessment by focusing on student competence in digital reading. Therefore, the above-mentioned Internet-based activities may have several positive influences on student learning performance.

Conversely, a number of studies have reported that Internet usage (Internet addiction, or excessive use) has either a negative influence or no significant influence on student learning performance or other outcomes (Davis, 2001; Kandell, 1998; Odaci, 2011; Odaci & Kalkan, 2010; Widyanto & Griffiths, 2006; Young,

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1996). Young (1996) concluded that (1) the more interactive the Internet function is, the more addictive it becomes, and (2) although normal users report minimal negative effects of Internet use, “dependents” spend more time online (38.5 h per week) and report significant impairment in many areas of their lives, including health, occupational, social, academic, and financial areas. Problematic Internet use also has negative effects on academic success (Young, 2004). Odaci (2011) demonstrated a significant negative correlation between problematic Internet use and academic self-efficacy. Nevertheless, the relationship between problematic Internet use and academic procrastination is not statistically significant. Inconsistent research results may be caused by generational differences, the available applications, the Internet usage tasks, and the research tools used. Such results imply that not all Internet use is beneficial to individuals and that the benefits reaped depend on how different types of Internet use can cause positive effects on an individual’s perceived self-efficacy, learning performance, health or other aspects. However, the Internet is widely used in daily life, especially in educational environments. Therefore, the Internet can be an important learning and teaching tool when appropriately used. Subsequently, the focus is on what Internet use can bring to children. People have paid considerable attention to this question in the decades since the Internet emerged, and the issue remains a perpetual concern among stakeholders, especially parents and teachers.

However, stakeholders cannot monitor and manage the Internet usage conditions of children at all times; thus, the main concern is how to boost learning performance under autonomous conditions (i.e., without control from parents or teachers). Other studies have started to examine the appropriate predictors of student performance (e.g., Cheung & Huang, 2005). Fortunately, several studies concluded that academic self-efficacy could be a moderator or mediator between Internet usage and individual performance (Walumbwa, Avolio, & Zhu, 2008; Zhu et al., 2011) because self-efficacy affects academic performance by influencing a number of behavioral and psychological processes (Bandura, 1986, 1997). As a result, academic self-efficacy has played a mediating role between Internet use and student learning performance. Compared with Internet use for a specific purpose related to a particular course, using the Internet for general purposes, such as browsing web pages, chatting with friends and shopping online, may not be significantly related to learning performance, although academic self-efficacy may have several indirect mediating effects on learning performance. The intervention of academic self-efficacy may mitigate the negative effect of Internet addiction, dependency, or excessive and problematic Internet use. Furthermore, the intervention may transform such effects into more positive ones.

Social cognitive theory provides a solid and comprehensive theoretical framework for self-efficacy, human behavior, social interaction, and psychological well-being (Bandura, 1986, 1989, 1997). Self-efficacy is the belief of individuals in their ability to successfully perform tasks in a particular domain (Bandura, 1993). Therefore, academic self-efficacy refers to a belief specifically formed for the academic domain. The concept of reciprocal determinism addressed by Bandura (1978, 1986) suggests that (a) personal factors, in the form of cognition, affect, and biological events, (b) behavior, and (c) environmental influences create interactions resulting in triadic reciprocity. Individuals are viewed both as products and producers of their environment and social systems because personal agency is socially rooted and operates within a context of sociocultural influences. Events in which personal influences are exercised vary with what is being managed and involve the regulation of personal motivation, thought processes, affective states and actions or changing environmental conditions. Self-efficacy beliefs are sensitive to these contextual factors. They differ from other expectations and beliefs in that self-efficacy judgments

are more task- and situation-specific. Therefore, individuals use these judgments in reference to certain types of goals (Bandura, 1986, 1989; Pajares, 1996a, 1996b; Printrich & Schunk, 1995). Given the aforementioned perspectives, academic self-efficacy (the perception of self-efficacy as a personal trait in a specific academic domain) can be a crucial mediating factor in Internet use (a type of behavior in Internet environmental settings) and learning performance.

Recently, a body of research has emerged emphasizing Internet use and Internet anxiety (Brosnan & Thorpe, 2001; Chou, 2003; Joiner, Brosnan, Duffield, Gavin, & Maras, 2007; Presno, 1998; Thorpe & Brosnan, 2001). According to Joiner et al. (2007), a significant and negative relationship exists between Internet anxiety and Internet use. People who are more anxious about using the Internet utilize the Internet less although the magnitude of the effect is small. Internet anxiety may be assessed by three measures, i.e., general Internet anxiety from actual Internet use, Internet infrastructure related to hardware or software and direct or indirect Internet involvement (Marcoulides, 1989; Chou, 2003; Dyck, Gee, & Smither, 1998; Marcoulides & Wang, 1990). Our exploration into the relationship between Internet use and academic learning performance involves the important factor of Internet anxiety because a significant relationship exists between Internet use and Internet anxiety (Barbiete & Weiss, 2004; Cody, Dunn, Hoppin, & Wendt, 1999; Chou, 2003; Cooper & Weaver, 2003; Durndell & Haag, 2002; Jackson et al., 2001; Joiner et al., 2005, 2007). Why do we include Internet anxiety as a moderator in this study? A significant relationship that exists between Internet anxiety and Internet use, but Internet use anxiety may lead to different outcomes. Mild anxiety can cause mild stress and motivate a student’s learning process, while excessive anxiety may discourage students, who then lose their will to tackle conundrums.¹

In summary, this study draws on the Social cognitive theory of Bandura (1994) and the academic self-efficacy literature to develop a theoretical framework for the conceptual model that links general Internet use, professional Internet use, academic self-efficacy, Internet anxiety, and student learning performance. Based on the theory and literature, academic self-efficacy can be a crucial mediating factor in Internet use and student learning performance, and academic self-efficacy may be affected by Internet use. According to the literature (March et al., 2000; Torkzadeh, Chang, & Demirhan, 2006), anxiety can be a moderator for different constructs (e.g., pre-training and post-training self-efficacy).

¹ Compared with the study of Zhu et al. (2011), which had already tested the mediating and moderating roles of academic self-efficacy on the relationship between Internet information seeking and academic performance, our study clarifies the difference between Internet use and Internet information-seeking as follows: (1) Internet information seeking is a subset of Internet use. The nature of Internet information seeking is different from that of Internet use. Internet use is more relevant to our study than Internet information seeking because we want to explore all types of Internet use, not just information-seeking. (2) Choo et al. (1999) developed four main modes of information seeking on the web: undirected viewing, conditional viewing, informal searching and formal searching. Zhu et al. (2011) used the Choo et al. study (1999) to develop a questionnaire based on Internet information seeking scales. Clearly, the passive nature of Internet information seeking is also distinct from the active involvement seen with Internet use. For example, Internet use involves participation in web chat rooms, communicating with others via e-mail and instant messaging software, and so on. (3) From the educational perspective, the academic performance used by Zhu et al. (2011) is related to the overall learning performance of students, but students are not excellent in all school courses. For teachers in different disciplines, understanding the student learning processes in different courses will be influenced by factors, such as Internet use, academic self-efficacy, and Internet anxiety. (4) The relation between Internet information seeking and overall academic performance does not necessarily exist between Internet use and student learning performance of a particular course. (5) The role of academic self-efficacy may not be true for a specific course. This study added Internet anxiety to discuss its interactive relationship with academic self-efficacy. Therefore, our study originated from the idea of Zhu et al. (2011), but different from that of Zhu et al. (2011) in the above-mentioned five points.

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