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ICIS 2002 Proceedings

International Conference on Information Systems (ICIS)

December 2002

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# BRIDGING THE DIGITAL DIVIDE:  THE EFFECTS OF HOME COMPUTER OWNERSHIP AND SCHOOL IT ENVIRONMENT ON SELF-DIRECTED LEARNING

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## Abstract

*The digital divide has attracted enormous attention from both the popular press and information systems researchers. A survey study was conducted to determine the impact of the digital divide on students' self-directed learning in an information technology-based learning environment through their computer self-efficacy, and to assess the role of the school IT environment in bridging this digital divide. Partial least square analyses, with data from more than 5,000 middle school students, show many significant effects. Computer self-efficacy has an effect on self-directed learning. Home PC (personal computer) ownership has a significant effect on computer self-efficacy. The school IT environment affects the computer self-efficacy of students with or without a home PC in different ways. In general, a better perceived school IT environment has more impact on students without a home PC, and thus is important in reducing the impact of the digital divide. The findings provide strong evidence of the digital divide affecting computer self-efficacy and learning behavior, and support investments in improving school IT environments.*

**Keywords:** Digital divide, PC ownership, computer self-efficacy, school IT environment, self-directed learning behavior, survey, PLS

## 1   INTRODUCTION

Globalization and advances in information technologies (IT) have hastened the emergence of the knowledge-based economy. Knowledge is now an important factor of production and a key strategic economic resource, fundamentally changing the form and structure of economic growth. Indeed, innovations and applications of knowledge are fueling tremendous economic growth and individuals with more knowledge have better job opportunities, mobility, and remuneration (Chew 2001). In this knowledge era, individuals, corporations, and nations alike must continuously explore and accumulate knowledge to remain competitive.

In light of this, an active learning society is emerging worldwide. Access to IT could profoundly influence one's life quality and impact a nation's economic development. Countries with good IT infrastructure are better positioned to compete in the world market, and individuals with IT knowledge have higher paying jobs (Mineta et al. 2000).

Unfortunately, access to IT is not ubiquitous at the country nor at the individual levels, resulting in a problem known as the digital divide (Kiiski and Pohjola 2002). The National Telecommunications and Information Administration reported that within

America, there are discrepancies in PC access along the lines of income, race, education, household type, age, region, and gender. Evidence shows that individuals without PC access face a great disadvantage at improving their socioeconomic status (SES) because they are denied the opportunity of acquiring knowledge via the Internet (Bishop et al. 1999).

PC access helps to bridge the digital divide. Governments worldwide seek to diminish this digital divide by investing in PC and Internet access for libraries, communities, and schools (Mineta et al. 2000). This paper addresses the impact of the digital divide on learning behavior in an IT-based learning environment through an empirical study of students in Singapore. Drawing on social cognitive theory (Bandura 1997), it explores the effect of home PC ownership on students' learning behavior through their computer self-efficacy (CSE). CSE, defined as the perception of one's ability to use computers in the accomplishment of a task (Compeau and Higgins 1995), has been suggested as a significant determinant of learning behavior (Mann et al. 1999), and is worthy of investigation because IT is increasingly being used in teaching and CSE can influence one's attainment more than do actual possessed skills (Pajares 1997). Furthermore, we investigate the role of the school in bridging this digital divide by ascertaining direct and moderating effects of the school IT environment.

Our findings have several important implications. First, providing evidence of the digital divide impact on learning behavior helps focus societal attention on students who are deprived of PC access at home. Second, determining the impact of the school IT environment on CSE enables schools and governments to better assess and justify their IT investment for education.

## 2 THEORETICAL FOUNDATION

Social cognitive theory espouses self-efficacy beliefs as the core of all thoughts that affect human functioning (Bandura 1977). It posits that unless people believe that their actions can produce the outcomes they desire, they have very little incentive to act or to persevere in adverse situations. Bandura (1997) suggests that people's level of motivation, affective states, and actions are based more on what they believe (self-efficacy beliefs) than on what is objectively true. Self-efficacy beliefs affect actions and accomplishments through influencing the choices made, the persistency and amount of effort expended on an activity, and the thoughts and emotional reactions associated with performing the activity. Social cognitive theory is very much supported by empirical evidence, which indicates that one's accomplishment and behavior is better predicted by how capable one believes oneself to be than one's actual capability.

To perform an activity well, self-efficacy beliefs should first be developed. Social cognitive theory suggests that the mechanisms through which self-efficacy beliefs can be constructed include enactive mastery experience, vicarious experience, and social persuasion (Bandura 1977). Performance accomplishments, achieved through enactive and guided mastery experiences, create and strengthen efficacy beliefs. Self-efficacy beliefs are also strengthened through vicarious learning: seeing people similar to oneself succeed increases one's beliefs in one's own capabilities. Vicarious learning also transmits knowledge, skills, and strategies to observers to effectively manage environmental demands. Social persuasion strengthens self-efficacy beliefs through exhortations. Bandura (1997) argues that "to the extent persuasive boosts in perceived efficacy lead people to try hard enough to succeed, self-affirming beliefs promote development of skills and a sense of personal efficacy" (p. 101).

The familial and the school environments are important sources of self-efficacy development, especially for students (Bandura 1997). Social cognitive theory contends that parental responsiveness increases children's cognitive competence, and children's enhanced capabilities elicit greater responsiveness in a two-way influence. Similarly, the school environment in the form of resources, the teaching program, class structure, and culture also affect the development of students' self-efficacy. The entire interactive social system of the school can provide a positive environment that promotes academic attainment or a demoralizing, custodial environment that conveys a sense of academic futility. Given that students' beliefs in their capabilities to master academic activities can affect their aspirations, their level of academic interest, and their ultimate academic performance, the school environment exerts an influential role on learning behavior and outcomes.

## 3 RESEARCH MODEL AND HYPOTHESES

With improved multimedia capabilities and ready access to information resources on the Internet, IT-based learning is playing an increasingly important role in the educational development of students. IT-based instruction improves not only the delivery of lessons but it also inspires self-directed learning, which is a major aim of education in this increasingly complex and knowledge-intensive era (Straka 2000). Drawing on social cognitive theory, we develop a research model to address the effects of the digital divide on learning behavior. In this research model (see Figure 1), the digital divide is manifested in whether or not

students have access to a home PC. Students' CSE is posited to play a crucial mediating role in understanding the effects of the digital divide on self-directed learning. In accordance with social cognitive theory, we include the school as a key institution that shapes CSE with a view to foster greater self-directed learning in an IT-based learning environment. Students with higher CSE are likely to practice greater self-directed learning in an IT-based learning environment because they are likely to have better control of the IT environment. Because school is an important agency for cultivating efficacy beliefs, we posit that it can moderate the effects of the digital divide (home PC ownership) on students' CSE.
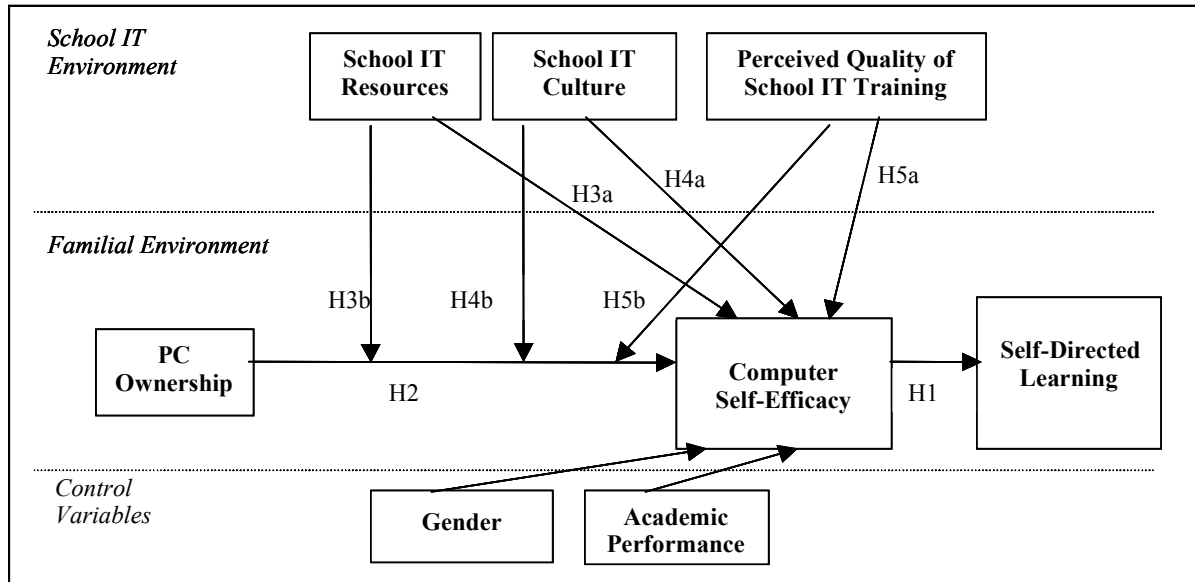


**Figure 1. Research Model**

## 3.1 Computer Self-Efficacy and Self-Directed Learning

Recent studies (e.g., Webster and Martocchio 1992) have found that one's CSE plays an influential role in shaping one's computer usage behavior in learning situations. Students who have higher CSE are more receptive to using IT in various learning situations (Katz and Offir 1988). Generally, they tend to gravitate toward self-directed learning when using IT because they are more confident in their ability to utilize IT to accomplish required learning tasks, and are unaffected by occasional IT failures. In contrast, students with low CSE feel less comfortable performing tasks with IT, are easily discouraged by negative experiences, and may even resist using IT (Oliver and Shapiro 1993). A few empirical studies have confirmed the positive relationship between CSE and learning behavior (e.g., Mann et al. 1999). Hence, we hypothesize:

> *H1: CSE will be positively related to self-directed learning.*

## 3.2 Personal Computer Ownership

There is a sizeable difference in home PC ownership across and within countries. For example, the levels in the United States and Turkey differ by 31 percent (OECD 2001). Within the United States, only half of the households owned a PC in 2000, with clear income and racial differences (Mineta et al. 2000). In Singapore, 60 percent of public and 80 percent of private housing families have a PC (Dawson 2001). Home PC ownership confers several advantages, as IT access has become an integral part of learning. Frequent home PC usage allows students to acquire mastery experience leading to higher CSE. Sibling or parental use of the home PC could provide a vicarious learning experience for higher CSE. Finally, social persuasion from family members could have a positive impact on CSE. Indeed, some empirical studies have supported these effects. Students owning computers have higher self-perceived computing skills (Selwyn 1998). Students are more likely to explore additional usage of computers in schools based on their experiences at home, and to select courses that involve specialized applications (Fishman 1999). Thus, we hypothesize:

> *H2: Home PC ownership is positively related to CSE.*

## 3.3 School IT Environment

Schools play a significant role in providing more equal opportunities for students. School IT environment plays a significant role in determining the effectiveness of its IT-based learning environment and the IT proficiency of its students (e.g., Mann et al. 1999). Our thorough review of empirical educational literature identified three important school characteristics that could potentially affect students' CSE. They are the school's IT resources (e.g., Barry and Wise 1996), IT culture (e.g., Olson and Eaton 1996), and the perceived quality of school IT training (e.g., Krissoff and Konrad 1998).

### 3.3.1    School IT Resources

School IT resources, measured as the ratio of PC-to-student in IT-based classrooms, is important. Similar to the role of a home PC, the amount of IT resources available in schools plays a particularly critical role in enhancing students' CSE. Yuen (1988) cited availability of computer hardware as a key determinant of educational technology implementation success. Students without a home PC are more likely to tap IT resources from public institutions such as schools to enhance their learning (Mineta et al. 2000). Indeed, the ratio of student-to-PC in schools determines the amount of access a PC-deprived student has to enhance his CSE. In contrast, higher SES students can fall back on their home PC and Internet access. Hence, we hypothesize:

> *H3a:      School IT resources is positively related to CSE.*

> *H3b:      School IT resources are more important for students without home PC ownership than for students with home PC ownership in enhancing their CSE.*

### 3.3.2  School IT Culture

IT culture is defined as the importance and influence of IT usage in the environment (Akker et al. 1992). A strong IT culture will espouse the use of IT to solve problems. Students' CSE can be enhanced when exposed to successful IT applications, and when they are constantly encouraged and exhorted by teachers to apply IT in their learning (Oliver and Shapiro 1993). Schools with a strong IT culture could inculcate students' positive attitudes toward using IT. Their leaders and teachers would be more proactive and committed to the use of technological innovations in classrooms, which in turn is likely to influence students' CSE (e.g., Galvis 1993). Students without a home PC could improve their CSE more at schools with a strong IT culture, because they are less likely to obtain adequate IT exposure at home. In contrast, CSE of students with home PC ownership are constantly improved with frequent interactions with IT applications, and with encouragement from their family members. Overall, their CSE should be less dependent on IT values espoused by schools. Hence, we hypothesize:

> *H4a:      School IT culture is positively related to CSE.*

> *H4b:      School IT culture is more important for students without home PC ownership than for students with home PC ownership in enhancing their CSE.*

### 3.3.3    Perceived Quality of School IT Training

Perceived quality of school IT training reflects the students' perceptions of how useful, relevant, and adequate the training is (Krissoff and Konrad 1998). Few studies have examined the role of school IT training in fostering students' CSE and learning. IT training represents a guided mastery treatment that could significantly alter students' perceptions of their capability. It tends to internalize these skills for students, helps them to accomplish the activity successfully, and hence leads to higher CSE. Students without a home PC are generally from lower SES, and cannot afford private IT training. School IT training is critical for their CSE since it is their major avenue to acquire IT skills. In contrast, school IT training is likely to be less important to students with a home PC. CSE for these students may be developed through frequent interactions with their home computers and through private IT training to make up for any inadequacy in school IT training because they are financially better off. Hence, we hypothesize:

*H5a:*    *The perceived quality of school IT training is positively related to CSE.*

*H5b:*    *The perceived quality of school IT training is more important for students without home PC ownership than for students with home PC ownership in enhancing their CSE.*

# 4 RESEARCH METHOD

## 4.1 Instrument Development

Scale development for the constructs were developed based on procedures advocated by Churchill (1979) and Moore and Benbasat (1991). The educational technology and information systems (IS) literatures were reviewed thoroughly to identify validated standard scales, and to generate questions that cover the domain of constructs for which no standard scales exist. Except CSE, measures for self-directed learning, IT resources, IT culture, and perceived quality of IT training were developed. Excluding single-item constructs, all items in the questionnaire were anchored on labeled seven-point scale. Appendix B presents the final questions. Some points should be noted. First, as social cognitive studies on academic performance (e.g., Zimmerman 1995) have suggested, the value of education should not be narrowly limited to academic results alone. Therefore, unlike previous studies that used academic outcome as a dependent variable (e.g., Christmann et al. 1997), we used self-directed learning behavior as a dependent variable because efficacy beliefs (as in Koppi et al. 1997) affect learning behavior through self-regulation of motivation, setting of higher personal goals, and control of affective feelings. Second, perceived quality of school IT training, rather than objective training hours or number of courses, was used because the length/amount of training is not a measure of quality. Two control variables, gender and past academic performance, were included because they could potentially affect CSE. Third, the interaction variables were operationalized by the products of the underlying variables. The indicators of the interaction variables were obtained by multiplying the standardized indicators of their individual components (Chin et al. 1996).

Discussions with three information systems faculty members and 20 students from different schools were conducted to ascertain adequate content validity, leading to minor amendments. A process of conceptual validation involving sorting the questions into categories and labeling constructs was subsequently performed. Conceptual validity was assessed based on the percentage of questions correctly placed in the intended constructs, which range from 95 to 100 percent. The revised questionnaire was subjected to pilot testing, involving 100 students. The respondents were selected randomly, but a balanced sample size of students representing different SES background was enforced. Cronbach's alpha computations and factor analyses (Kerlinger 1986) confirmed the stability and validity of these constructs. On average, subjects took 20 minutes to complete the questionnaire.

## 4.2 The Survey

Principals of 98 eligible middle schools (i.e., those who have integrated IT into their curriculum) were contacted for our survey. A total of 26 schools with a combined total of 6,000 students agreed to participate. There was no response bias by school ranking. Students were about 13-years-old and in their seventh year of formal schooling in Singapore's education system. Questionnaires were hand-delivered to each school, and collected later. A total of 5,829 questionnaires were collected, yielding a response rate of 97.1 percent.

# 5 DATA ANALYSES

Partial least squares (PLS), a second-generation causal modeling statistical technique developed by Wold (1982), was used for data analyses. PLS simultaneously assesses the measurement model and the structural model (Fornell 1982). Additionally, it seeks to maximize the explanation of variance and prediction in the theoretical model and does not demand multivariate normal distributions (Fornell and Bookstein 1982).

To address our research hypotheses, we developed two structural models: the PCO model and the IE model. The PCO model assesses the impact of home PC ownership on learning behavior through CSE because its effects would be hidden when interaction variables are introduced (see Figure 2). The IE model assesses the impact of the school environment on learning behavior through CSE and the moderating effects of the school environment on the effects of home PC ownership on CSE (see Figure 3). This approach allows us to assess the role of the school environment in bridging the digital divide.
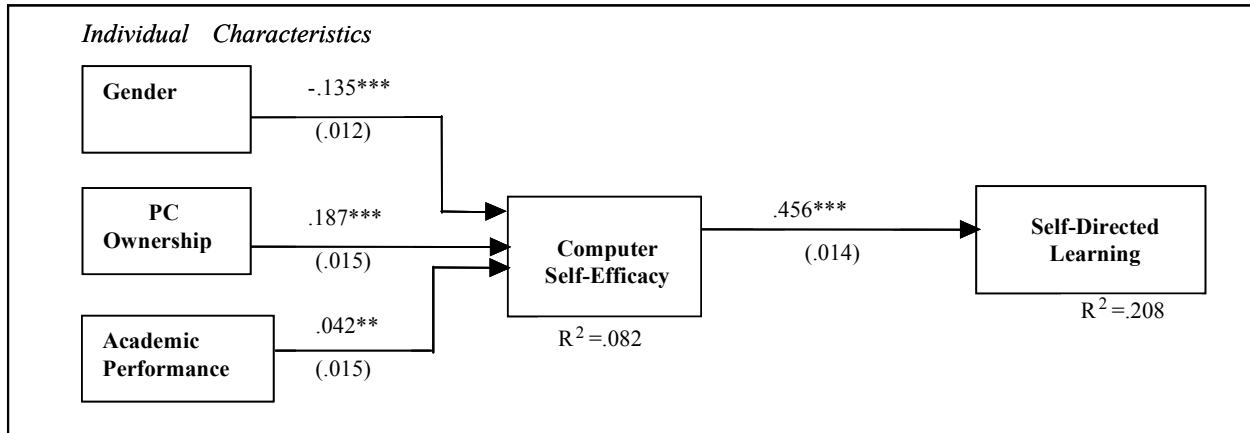
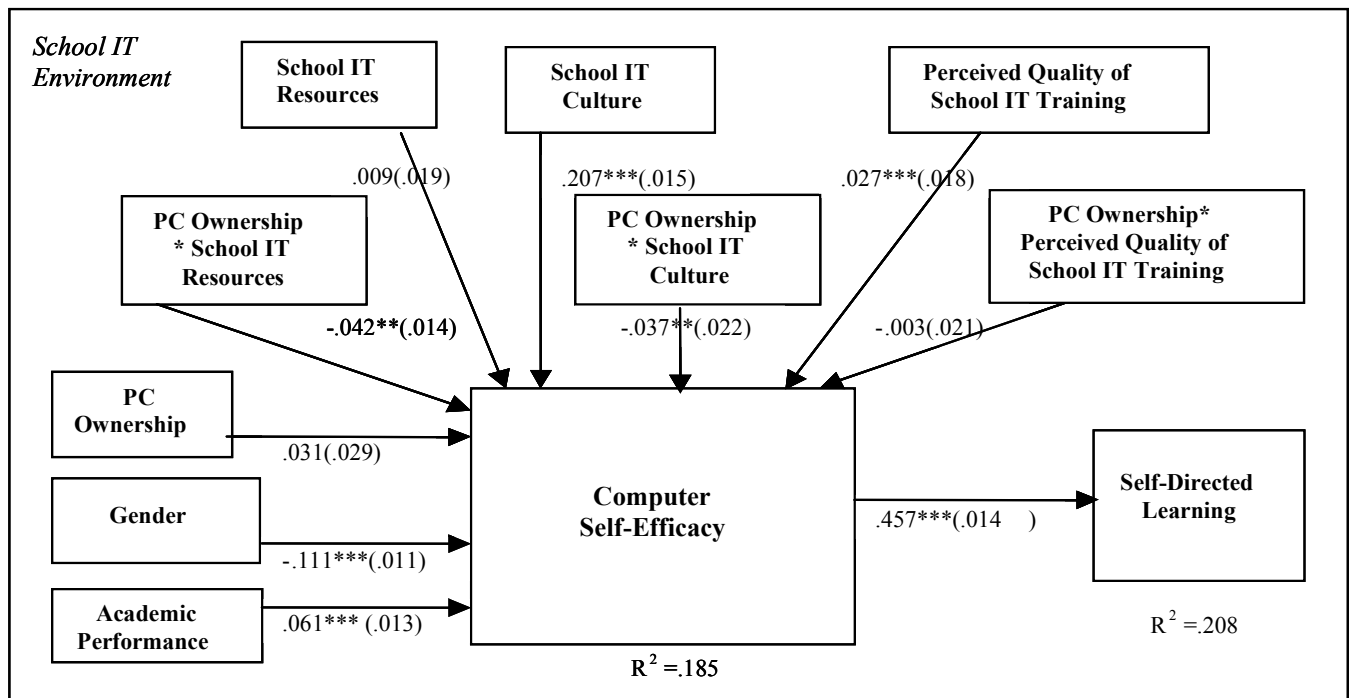**Figure 2. Path Coefficients (Standard Errors) of PC Ownership Model**



**Figure 3. Path Coefficients (Standard Errors) of Interaction Effect Model**

***significant at .001 level          **significant at .01 level

## 5.1 Testing the Measurement Model

Evaluating the measurement model involves examining the convergent and discriminant validity of the research instrument. Convergent validity is the degree to which different attempts to measure the same construct agree (Cook and Campbell 1979). In PLS, three tests are used to determine the convergent validity of measured constructs in a single instrument: the reliability of each item in a scale (the squared loading), the composite reliability of each scale, and the average variance extracted by each construct. Besides these tests, Cronbach's alphas were used in assessing the convergent validity of constructs. Appendix B presents an assessment of the IE measurement model. All individual item reliabilities exceeded the recommended value of 0.5

(Fornell 1982), which implied that each item had more explanatory power than error. Composite reliabilities of constructs with multiple indicators exceeded Nunnally's (1978) criterion of 0.7 while the average variances extracted for these constructs were all above 50 percent. Cronbach's alphas were also higher than 0.7. These results indicated that the convergent validity of the constructs was more than adequate.

Discriminant validity is the degree to which measures of different constructs are distinct (Campbell and Fiske 1959). To test discriminant validity, the squared correlations between constructs (their shared variance) should be less than the average variance extracted for a construct. Appendix A reports descriptive statistics and the results of discriminant validity, which is checked by comparing the diagonal to the nondiagonal elements. All items fulfilled the requirement of discriminant validity.

## 5.2 Testing the Structural Model

Hypotheses testing was performed by examining the size, sign, and significance of path coefficients in the structural models generated by the bootstrapping technique with 200 resamples. A 1 percent significance level was used for all statistical tests.

For the PCO model, all paths were significant. CSE plays an influential role in determining learning behavior in an IT-based learning environment. PC ownership results in higher CSE. Male students and academically better students have higher CSE. From the IE model, school IT resources have no significant impact on CSE but they significantly moderate the effects of home PC ownership on CSE. Both school IT culture and perceived quality of school IT training contribute significantly to CSE. School IT culture was found to be more important for students without a home PC than for students owning a home PC in determining their CSE. Perceived quality of school IT training has no moderating effect on the home PC ownership relationship with CSE. All hypotheses except H3a and H5b were supported. CSE explains 21 percent of learning behavior while the school and the familial environment (together with the control variables) account for 19 percent of CSE variance.

## 6  DISCUSSIONS AND CONCLUSIONS

This study provides strong empirical support for the set of variables and their relationships identified in the models. Our finding extends both educational and IS literature by demonstrating CSE applicability and importance in an academic learning environment for students. Most studies of CSE in the IS literature have focused on working adults while the educational literature linking CSE to learning is still limited.

Our study presents evidence of a digital divide among middle school students in Singapore. Consistent with popular literature (Selwyn 1998), PC ownership does enhance students' CSE, making them more confident and comfortable in working with computers.

Our findings identify the role of the school IT environment. Indeed, school IT resources and school IT culture have more impact for students of PC-deprived households. These findings support the huge investments by some governments to acquire IT resources and to foster an IT climate for schools.

Our results also present an unexpected finding. While perceived quality of school IT training appears to exert a significant effect on enhancing students' CSE, it does not play a significantly stronger role for students without a home PC. One plausible explanation is that students with PC ownership value the school training quality as highly as do students without a home PC. Although students with a home PC may constantly interact with computers at home, they might still feel inadequate about their competence without any guided mastery treatment. Further analyses of our data revealed that most students (60 percent) with PC ownership do not receive additional private IT training. Students without a home PC would especially value the guided mastery treatment provided. Hence, perceived quality of school IT training has a significant influence on all students' CSE.

Our paper contributes to understanding the impact of pervasive computing at the societal level. It demonstrates clearly the significance of CSE in this increasingly IT-driven and IT-based world. Such findings suggest strongly that IS researchers should develop an action of research to uncover the source and the underlying mechanisms of CSE, and compare them to findings about general efficacy beliefs. However, caution should be exercised when interpreting these findings because the nature of this study may reduce the generalizability of its findings to other economic and cultural environments. Hence, replication of this study in other countries would be extremely useful. Moreover, perceived quality of school IT training might be correlated with CSE because both are perceptual measures, thus non-perceptual measures, such as training hours, could be included  While the PC-to-

student ratio largely reflects the availability of school IT resources, other measures such as the availability of "lab time" outside the IT-based class periods could also be included in future studies. Additionally, it may be important to understand how PCs are being used at home in order to shed further light on their impact on CSE and learning behavior.

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# Appendix A
# Correlations Between Constructs and Square Root of Average Variance Extracted of Constructs (Bold Diagonals) in the Structured Model

| Constructs | Mean (Std.Dev) | PCO | SR | SC | PQST | PCO *SR | PCO *SC | PCO* PQST | Gender | AP | CSE | SL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PCO | 1.758 (0.428) | 1 | | | | | | | | | | |
| SR | 0.829 (0.273) | 0.3 | 1 | | | | | | | | | |
| SC | 4.550 (1.295) | -0.05 | 0.004 | **0.728** | | | | | | | | |
| PQST | 5.200 (1.367) | -0.026 | 0.004 | 0.334 | **0.865** | | | | | | | |
| PCO*SR | 0.100 (1.040) | 0.183 | 0.071 | -0.055 | -0.068 | **1.000** | | | | | | |
| PCO*SC | -0.005 (0.749) | 0.364 | 0.114 | -0.058 | -0.005 | 0.168 | **0.756** | | | | | |
| PCO* PQST | 0.341 (0.797) | 0.318 | 0.098 | -0.043 | -0.024 | 0.162 | 0.521 | **0.811** | | | | |
| Gender | 1.468 (0.499) | -0.009 | 0.004 | -0.051 | -0.068 | -0.002 | -0.030 | -0.003 | **1.000** | | | |
| AP | 205 (40.0) | -0.001 | -0.010 | 0.008 | 0.084 | -0.067 | 0.016 | -0.041 | -0.059 | **1.000** | | |
| CSE | 5.000 (1.433) | -0.005 | 0.011 | 0.306 | 0.354 | -0.076 | -0.043 | -0.036 | -0.143 | 0.094 | **0.843** | |
| SL | 5.130 (1.296) | -0.022 | -0.002 | 0.395 | 0.395 | 0.007 | -0.002 | 0.003 | -0.043 | 0.000 | 0.457 | **0.786** |

**SR**: School IT Resources   **SC**: School IT Culture   **AP**: Academic Performance
**SL**: Self-directed Learning   **PQST**: Perceived Quality of School IT Training

# Appendix B
# Measurement Model of the Interaction Effect Model

| Measures of Constructs (measured on seven-point, Likert-type scale unless otherwise stated) | | Item Loading | Cronbach's Alpha | Composite Reliability |
|---|---|---|---|---|
| **PC Ownership:** 2-*Yes;1-No* Do you have computers at home? Yes/No | | 1.000 | 1.000 | 1.000 |
| **School IT Resources:** | | 1.000 | 1.000 | 1.000 |
| PC-to-Student ratio in computer classrooms:(_) | | | | |
| **School IT Culture:** My school … | | | 0.710 | 0.818 |
| regularly organizes computer courses for me. | SC1 | 0.653 | | |
| always tells me the importance of computers in education. | SC2 | 0.749 | | |
| uses computers to handle administrative work. | SC3 | 0.730 | | |
| has been encouraging me to use the computers in school. | SC4 | 0.776 | | |
| **Perceived Quality of School IT Training:** Computer training helps me… | | | 0.898 | 0.947 |
| to be more confident in using computers. | PQST1 | 0.873 | | |
| in handling computer software in school. | PQST2 | 0.889 | | |
| make less mistakes when handling computer software. | PQST3 | 0.885 | | |
| improve my computer skills. | PQST4 | 0.866 | | |
| to be able to guide my friends in using computer software. | PQST5 | 0.863 | | |
| to solve computer software problems for my friends. | PQST6 | 0.812 | | |
| **PC Ownership * School IT Resources:** | | 1.000 | 1.000 | 1.000 |
| PC Ownership * PC-to-Student ration in computer-mediated classrooms | | | | |
| **PC Ownership * School IT Culture:** | | | 0.701 | 0.841 |
| PC Ownership * SC1 | | 0.740 | | |
| PC Ownership * SC2 | | 0.797 | | |
| PC Ownership * SC3 | | 0.672 | | |
| PC Ownership * SC4 | | 0.807 | | |
| **PC Ownership * Perceived Quality of School IT Training:** | | | 0.892 | 0.920 |
| PC Ownership * PQST1 | | 0.813 | | |
| PC Ownership * PQST2 | | 0.842 | | |
| PC Ownership * PQST3 | | 0.822 | | |
| PC Ownership * PQST4 | | 0.809 | | |
| PC Ownership * PQST5 | | 0.828 | | |
| PC Ownership * PQST6 | | 0.752 | | |
| **Gender:** 1-*Male*; 2-*Female* Please indicate your sex: Male(_) Female(_) | | 1.000 | 1.000 | 1.000 |
| **Academic Performance:** | | 1.000 | 1.000 | 1.000 |
| Your Primary School Leaving Exam aggregate is:(_) | | | | |
| **Students' Computer Self-Efficacy:** I… | | | 0.864 | 0.907 |
| am confident in working with computers. | | 0.842 | | |
| have no difficulties in following instructions in software to finish exercises. | | 0.807 | | |
| feel comfortable working with a computer. | | 0.852 | | |
| am sure I could work with computers. | | 0.869 | | |
| **Self-Directed Learning:** | | | 0.911 | 0.929 |
| I have benefited from the questions that are raised during IT-based lessons. | | 0.710 | | |
| The use of computer software has: | | | | |
| motivated me to learn more of the subject. | | 0.787 | | |
| changed my role from receiving to finding and applying the information | | 0.825 | | |
| enlarged my scope of learning beyond the textbook. | | 0.818 | | |
| helped me view the subject from a different perspective. | | 0.823 | | |
| helped me become more creative in learning the subject. | | 0.797 | | |
| helped me become more knowledgeable in the subject. | | 0.804 | | |
| helped me achieve better results in the subject. | | 0.718 | | |