

Gender Difference of Confidence in Using Technology for Learning

Hon Keung Yau and Alison Lai Fong Cheng

Abstract

Past studies have found male students to have more confidence in using technology for learning than do female students. Males tend to have more positive attitudes about the use of technology for learning than do females. According to the Women's Foundation (2006), few studies examined gender relevant research in Hong Kong. It also appears that no studies have examined these gender differences in the perception of confidence in using technology for learning specifically in Hong Kong. The aim of this study was to examine gender difference regarding confidence toward using technology (e.g., AutoCAD, SPSS, Compiere, Arena, and programming language, such as C, Java, Visual Basic, etc.) for learning in higher educational institutions in Hong Kong. The study employed a survey methodology collecting 211 questionnaires from one specific university in Hong Kong. The findings confirmed that male students have more confidence in using technology for learning than do female students because gender imbalances in computing are socially constructed and not related to a learner's innate ability. It is recommended that the universities should set up training courses for female students so these students can build confidence in using technology for learning.

Key words: Confidence; Gender difference; Hong Kong higher education; technology and learning

Introduction

Motivation is an essential factor in learning, and it affects all fields of education (Kahveci, 2010). Appropriate teaching methods that motivate students result in effective learning. Hong Kong has experienced a wider range of educational opportunities for females during the past two decades (The Women's Foundation, 2006). Since 1996, Hong Kong has also experienced a trend where more female students than male students have entered Hong Kong universities (University Grant Council Hong Kong, 2010). Most educational research in Hong Kong has not been gender specific (The Women's Foundation, 2006). One study found in the literature (Kahveci, 2010), only focused on the

students' perceptions of the use of technology. However, it appears that few research studies have focused on undergraduates' gender difference in the use of educational technology, particularly higher education in Hong Kong. Thus, the purpose of this study was to determine if there are student differences of confidence between males and females in using technology for learning in Hong Kong higher educational institutions. This study used a survey methodology at one Hong Kong university to answer the following question: "Do male students have more confidence in using technology for learning than do female students?"

Literature Review

In Hong Kong, as in other parts of the modern world, students use technology for learning, including word processing, Internet surfing, educational software applications, and programming. Students gain experience with word processing, information from the Internet, and educational software during their primary and secondary school education. In Hong Kong, as in other locations, university students are required to use technology for learning in applications (using Blackboard to download teaching materials, Microsoft Office to complete reports and projects, and email to contact professors and instructors). In addition, there are many technology-related courses in university departments. Students have more opportunities to access educational technology, such as AutoCAD, SPSS, Compiere, and Arena and to take related computer courses to learn programming, such as C, Java, Visual Basic and more. Those technologies were investigated in this study.

Confidence in using technology for learning

According to education research, students are not motivated to learn if they do not have sufficient confidence in using technology for learning (Keller, 2010). Additionally, technology may cause students to fear the topic, skill, or situation because they have had negative or inadequate experience in using technology for learning previously. In contrast, learners might believe incorrectly that they already know the target information or learning task and then overlook the important details in the learning

activities (Keller, 2010). To avoid this situation, three strategies should be followed: learning requirements, success opportunities, and personal control. Learning requirements can be used as a strategy to build a positive expectation for success. Success opportunity is a method to enhance the students' beliefs in their individual and personal competence. Personal control is a tactic to let the learners know their success has been more clearly based on their efforts and abilities (Keller, 2010).

Gender difference in using technology for learning

Much literature exists that has found that men and women have been characterized by a range of social and biological differences. The role of gender differences in using technology for learning has been extensively researched (Kahveci, 2010). In past studies authors found that using technology for learning is a dominant activity for males and that males have positive attitudes toward using technology for learning more than do females (Kadijevich, 2000; Li & Kirkup, 2007). Moreover, when equal access is provided to all students, females are less likely to use computers than males because females perceive that using technology for learning is predominately a male activity (Hwang, Suk, Fisher, & Vrongistinos, 2009; Kirkup, 1995). Gender stereotypes affect students easily because of societal influences. For example, although females excelled in male-dominant subjects like technology, they were still dismissive about their achievement and feigned clumsiness to retain a feminine image (Hwang et al., 2009; Joiner et al., 2011). Similarly, Comber and Colley (1997) reported that girls perceived themselves being the same as boys to be a part of a computer culture, but males still dominate stubbornly in computing. In addition, Dhindsa and Shahrizal-Emran (2011) found that female students had a strong belief in the equality of both sexes in using technology activities. Thus, the above findings show that there is gender difference in using technology for learning.

Females are less likely to be attracted to computer courses than are males, because computer courses are a traditionally dominant activity for males, and thus females lose interest in using technology for learning (Li & Kirkup, 2007). Even though females may be interested in using technology for learning, most female students have less confidence when compared to males (Comber & Colley, 1997). Another study found more females than males indicated that

computers are useful, but females found it less enjoyable to learn to use computers than did males (Kaino, 2008). A number of other studies found that females are less confident in using technology and more anxious to use it for learning (Dhindsa & Shahrizal-Emran, 2011; Kirkpatrick & Cuban, 1998). Additionally, women had more difficulty in searching the Internet than did men (GVU Center at Georgia Tech, 1998). Interestingly, Li and Kirkup (2007) compared Chinese and Western students on gender differences in the use of technology for learning; they reported that both Chinese and British male students had more confidence than did female students about their computer skills, and they agreed that using a computer is a male-dominant activity. Thus, this case applies both to Western and Asian cultures.

Based on the above evidence, this study made the following hypotheses:

H0: There is no difference among male and female students' confidence in using technology for learning in Hong Kong higher education.

H1: Male students in this study will have greater confidence in using technology for learning than will female students in Hong Kong higher education.

Methodology

This study employed a survey technique using a questionnaire administered to students in a convenience sample.

Questionnaire

In this study, a questionnaire survey was conducted to collect student data needed to determine if there are indeed confidence gender differences in using technology for learning (where technology was defined as the use of computer applications, such as AutoCAD, SPSS, Compiere, and Arena and exposure to programming languages, such as C, Java, Visual Basic, etc.). For the purpose of this study the confidence variable was measured by using a modified Fennema-Sherman Attitude Scale (Kahveci, 2010) specifically modified for a questionnaire used to investigate if there were gender difference of student confidence in using technology for learning. This variable consisted of five questions (Table 1) that were rated according to a 5-point Likert-type scale, ranging from 1 "strongly agree" to 5 "strongly disagree."

Table 1. Items of the Study Questionnaire

Question	Items	Factor loading
1.	I am sure I can do advanced work in technology.	0.712
2.	I am sure I can use technology.	0.516
3.	I think I could handle more difficult technology problems.	0.711
4.	I can get good grades in the courses related to technology.	0.726
5.	I have a lot of confidence when it comes to the use of technology.	0.774

Pilot study

To assure having a useable instrument, the authors conducted a pilot study to determine if the chosen questions worked as intended and were effective for collecting useful information based on best practices (Lowe, 2006). In the pilot study, a convenience sample of 12 students completed questionnaires to determine if items needed wording or other changes to reduce potential nonresponse rates as suggested by Oppenheim (1992). Subjects were asked to complete the questionnaire without any explanation to determine whether they understood the questions in the instrument. In addition, each subject supplied individual feedback. We found some questions too similar and some too difficult for the subjects to understand. A revised questionnaire removed duplicate items and rephrased others, making the questions easier to understand. The revised instrument was further pilot tested by 10 additional subjects. With the additional pilot study, we found students understood the questionnaire content, and they did not object to its length.

Parent study

After the pilot study, questionnaires were distributed to a larger number of students studying business, engineering, social science, and other disciplines at the selected university. The sample for this study included year 1 through year 3 students attending a local Hong Kong university that included students who were experienced with the educational technology in their university courses or in high school. Therefore, we determined that this sample was valid for collecting information about student motivation in using technology for learning. In total, 211 of the 350 questionnaires distributed were returned, resulting in a 60.29% response rate. All returned questionnaires were useful because the data was relevant and the questionnaires were fully completed.

Validity and reliability analysis

Prior to conducting bivariate and t-test analysis, the data set was examined to ensure it

was amenable for these techniques. We examined responses to each question minimize invalid responses and missing values. Then we employed Cronbach's alpha to test the reliability of the variable. The Cronbach's alpha value of confidence was 0.886. Normally, the alpha value should be greater than 0.7 for well-established measures (Peterson, 1994; Valeberg et al., 2009). We consider the results to be consistent and reliable because the alpha value in this survey was greater than 0.7.

Factor loading is the means of interpreting the role each variable plays in defining each factor. Factor loadings are the correlation of each variable and the factor. Loadings indicate the degree of correspondence between the variable and the factor, with higher loadings making the variable representative of the factor (Valeberg et al., 2009). Table 1 also shows that five items of confidence ranged from 0.516 to 0.726. They were all retained because only factor loadings on the attributes greater than 0.3 were suitable for interpretation (Valeberg et al., 2009).

Results**Demographic data**

As stated previously, 211 questionnaires were returned. Table 1 shows the demographic data of respondents. Of these, male students completed 51.7% and female students completed 48.3%; 35.1% of respondents were under age 21, and 58.3% of respondents ranged between 21 and 25 years of age, 4.7% of respondents ranged between 26 and 30 years of age, and 1.9% of respondents ranged between 31 and 35 years of age. Over 28% of respondents were year 1 students, 35.5% were year 2 students, and 36% were year 3 students. In addition, 85.8% were full-time students, 13.3% were part-time students, and 0.9% were exchange students.

Mean, standard deviation and t-test

The means and standard deviation were calculated to analyze the data. Table 2 shows that the mean value for female students was 3.0569, which was higher than that of male students

Table 2. Statistics of the Personal Data of Respondents

Personal Details	No. of respondents	Percentage of respondents (%)
Gender		
Male	109	51.7
Female	102	48.3
Age		
< 21	74	35.1
21-25	123	58.3
26-30	10	4.7
31-35	4	1.9
Year of Study		
Year 1	60	28.4
Year 2	75	35.5
Year 3	76	36.0
Mode of study		
Full time	181	85.8
Part time	28	13.3
Exchange	2	0.9

(mean = 2.6495). The findings show that male students have more confidence in using technology for learning than do female students. The *t*-test was then used to test the significant difference between the two genders' confidence in using technology for learning. The findings showed that there is significant difference between the perception of males and females ($t = -3.563, p < 0.001$) and that males have more confidence in using technology for learning. This finding was also supported by Kahveci (2010), Kirkpatrick and Cuban (1998), Li and Kirkup (2007), Shashaani and Khalili (2001), and Kaino (2008). Therefore, the hypothesis H0 was rejected in support of H1.

example, some parents may believe using technology to be a male activity and consequently they may give biased feedback to their children on career choices or may misrepresent the importance that this subject should have in high school; such attitudes would make little progress in removing the observed gender bias in student confidence in learning with technology.

The finding in this research showed that both male and female students in the study university liked to learn to use technology. This particular university provides learners proper and sufficient educational technology on campus, including computers, laptops, and software.

Table 3: Summary Table of Gender Statistics in Gender Difference in Confidence

Gender	N	Mean	Std. Deviation
Male	109	2.6495	.83095
Female	102	3.0569	.82887

Discussion

Based on the finding of this study, male students were more confident in using technology for learning than were female students in higher education in Hong Kong. Similar findings were reported by other researchers. For example, research conducted by Shashaani and Khalili (2001) revealed that even female students agreed there is gender inequality in the use of technology, and they had little confidence in using technology for learning as compared to male students. Literature suggests the reasons for such gender imbalances in computing are socially constructed and are not related to innate ability (Joiner et al., 2011). Teachers, parents, and peer groups influence student attitudes toward computing (Shashaani & Khalili, 2001). For

In addition, students use such technology daily, thus building their confidence in the use of technology for learning. For example, teachers upload course materials to blackboard and students download materials through blackboard. Most students would check their email every day. Practically all students use applications such as Microsoft Office to accomplish projects and assignments. Most students search for information on the Internet when completing term papers and projects. Extensive research has found that the use of the Internet motivates student learning and provides students with effective learning environments (Langin, Ackerman, & Lewark, 2004; O'Bannon & Puckett, 2010), online courses (Kim, Liu, &

Bonk, 2005), blackboards (Lang, 2008), discussion boards (Clyde & Delohery, 2004; Lang, 2008), email (Clyde & Delohery, 2004), library databases (Clyde & Delohery, 2004), Microsoft Word, Excel, PowerPoint (Lawrence, 2003), and laptops (Changchit, Cutshall, & Elwood, 2008). Therefore, both male and female students can be positioned to have a positive attitude toward the use of technology for learning and to become more motivated to use technology for learning under the e-learning environment.

Conclusion

The findings in this study show that male students have more confidence in using technology for learning than do female students in higher education in Hong Kong. This study can contribute to reducing gender difference regarding student confidence toward using technology for learning in Hong Kong higher education by ensuring that all students have access to and are encouraged to use technology in learning. Based on this study's findings, we can understand more about both male and female students' perception of confidence in using technology (e.g., AutoCAD, SPSS, Compiere, and Arena and some programming language, such as C, Java, Visual Basic, etc.) for learning. These findings should also encourage university educators in Hong Kong to integrate technological components into their courses to enhance student confidence in using technology for learning. In addition, it is recommended that the universities

should set up training courses for female students. The female students can build their confidence in using technology for learning through such training courses.

Suggestions for Additional Research

Because this study was limited to a small sample at a single Hong Kong university using a single survey instrument for data collection, additional studies should be conducted employing mixed methods of data collection. Additional qualitative techniques, such as interviews and focus groups, could be used to explore other reasons why female students have less confidence in using technology for learning than do male students in Hong Kong higher education. In order to improve the generalization, we should focus on all of Hong Kong's universities. Further ideas for reversing this difference should be explored for future generations of Hong Kong students so that they can be freed of the observed bias.

Dr. Hon Keung Yau is in the Department of Systems Engineering and Engineering Management at the City University of Hong Kong.

Dr. Alison Lai Fong Cheng is an independent researcher in Hong Kong.

References

- Arch, E. C., & Cummins, D. E. (1989). Structured and unstructured exposure to computers: Sex differences in attitude and use among college students. *Sex Roles, 20*, 245 - 254.
- Changchit, C., Cutshall, R., & Elwood, S. (2008) Perceptions of laptop initiatives: Examining determinant factors of university students for successful implementation. In Lawrence Tomei (Ed.), *Adapting information and communication technologies for effective education* (pp. 88-99). Hershey, PA: Information Science Reference.
- Clyde, W., & Delohery, A. (2004) *Guide to classroom technology for mainstream faculty*. New Haven, CT: Yale University Press.
- Comber, C., & Colley, A. (1997). The effects of age, gender and computer experience upon computer attitudes. *Educational Research, 39*(2), 123-133.
- Dhindsa, H. S., & Shahrizal-Emran (2011). Using interactive whiteboard technology-rich constructivist learning environment to minimize gender differences in chemistry achievement. *International Journal of Environmental & Science Education, 6*(4), 393-414.
- GVU Center at Georgia Tech. (1998). GVU's 10th WWW user survey. Retrieved from http://www.cc.gatech.edu/gvu/user_surveys/survey-1998-10/.

- Hwang, Y., Suk., Fisher, W., & Vrongistinos, K. (2009). Calibrating a measure of gender differences in motivation for learning technology. *Journal of Instructional Psychology*, 36(3), 259-272.
- Joiner, R., Iacovides, J., Owen, M., Gavin, C., Clibbery, S., Darling, J., & Drew, B. (2011). Digital games, gender and learning in engineering: Do females benefit as much as males? *Journal of Science Educational Technology*, 20, 178-185.
- Kadijevich, D. (2000). Gender differences in computer attitude among ninth-grade students. *Journal of Educational Computing Research*, 22(2), 145-154.
- Kahveci, M. (2010). Student's perceptions to use technology for learning: Measurement integrity of the Modified Fennema-Sherman Attitudes Scales. *The Turkish Online Journal of Educational Technology* 9(1), 185-201.
- Kaino, L. M. (2008). Usefulness and enjoyment of using computers in learning. *A gender dimension. Gender & Behaviour*, 6(2), 1841 – 1857.
- Keller, J. M. (2010). *Motivational design for learning and performance*. New York: Springer
- Kiesler, S., Sproull, L., & Eccles, J. S. (1985). Pool halls, chips and war games: Women in the culture of computing. *Psychology of Women Quarterly*, 9(4), 451-463.
- Kirkpatrick, H., & Cuban, L. (1998). Should we be worried? What the research says about gender differences in access, use, attitudes, and achievement with computers. *Educational Technology*, 38(4), 56-61.
- Kirkup, G. (1995). Gender issues and learning technologies. *British Journal of Educational Technology*, 26(3), 218-219.
- Kim, K. J., Liu, S., & Bonk. C. J. (2005). Online MBA students' perceptions of online learning: Benefits, challenges and suggestions. *Internet and Higher Education*, 8(4), 334-335.
- Lang, J. M. (2008). *On course: A week-by-week guide to your first semester of college teaching*. Cambridge, MA: Harvard University Press.
- Langin, D. W., Ackerman, P. A., & Lewark. S. (2004). Internet-based learning in higher forestry education. *Unasylva*, 216(55), 39-44.
- Lawrence, A. T. (2003) *Challenges of teaching with technology across the curriculum: Issues and solutions*. Hershey, PA: Idea Group Publishing.
- Li, N., & Kirkup, G. (2007). Gender and cultural differences in internet use: A study of China and the UK. *Computers & Education*, 48(2), 301.
- Lowe, M. (2006). *Beginning research: A guide for foundation degree students*. New York: Routledge.
- O'Bannon, B. W., & Puckett, K. (2010). *Preparing to use technology: A practical guide to curriculum integration*. Pearson.
- Oppenheim, A. N. (1992) *Questionnaire design, interviewing and attitude measurement*. London: Pinter Publishers.
- Peterson, R. A. (1994). A meta-analysis of Cronbach's coefficient alpha. *Journal of Consumer Research*, 21, 381 – 391.
- Shashaani, L., & Khalili, A. (2001). Gender and computers: Similarities and differences in Iranian college students' attitudes toward computers. *Computers & Education*, 37(3), 363-375.
- Valeberg, B. T., Hanestad, B., R., Klepstad, P., Miaskowski, C., Moum, T., & Rustoen, T. (2009). Cancer patients' barriers to pain management and psychometric properties of the Norwegian version of the Barriers Questionnaire II. *Scandinavian Journal of Caring Sciences*, 23, 518-528.
- The Women's Foundation (2006). *The status of women and girls in Hong Kong 2006*. Hong Kong: The Women's Foundation and The Fund for Women in Asia, Inc.
- University Grant Council Hong Kong. (2010). *The statistical information of undergraduate student enrolment by gender*. Retrieved from <http://cdcf.ugc.edu.hk/cdcf/searchStatisticReport.do;jsessionid=3CF720E18A9C5CBA7A9F748208B238DF>

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