



Exploring the Relationship between Teaching Staff' Age and Their Attitude towards Information and Communications Technologies (ICT)

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Current research seeks to understand the relationship between teaching staff' age and their attitude toward ICT. Survey methodology is facilitated through the use of the questionnaires. The survey domain is a random sampling of teaching staff in Egyptian HEI. The population for this study was 500 full-time Faculty staff, and only 412 returned and completed questionnaires are considered as the study sample. The results showed that there is a moderate and positive relationship between the age of participants and their attitude towards ICT; thus, when considering attitude towards ICT by teaching staff members in Egyptians HEI, age is a significant factor. The result of this research has significant implications to HEI when they plan, develop, and adopt ICT. HEI has to consider that teaching staff' attitude towards ICT is related to their age.

Key Words: Information and Communications Technologies (ICT), Higher Education Institutions (HEI), Teaching Staff, Age, Attitude

INTRODUCTION

The definition of information and communication technologies (ICT) was set by several authors such as Meadowcroft (2006) and Mejiuni and Obilade (2006), they has defined ICT as the electronic and non-electronic technologies and infrastructure systems used to create, store, manipulate, retrieve, and communicate or disseminate information. According to Haghighi and Eskandari (2012), the use of ICT has fundamentally changed education industry and how knowledge is being transmitted from teaching staff to students. ICT has the power to change the daily practices of teaching staff.

This same view was shared earlier by Hardin and Ellington (2005), who believed that higher education institutions (HEI) cannot deliver high quality education without the use of ICT in their daily practices. In the same context, Ouzts and Palombo (2004) in their study concluded that ICT has the power and the abilities to enhance and develop teaching and learning, as ICT gives teaching staff a wealth of knowledge and a wide number of options to facilitate the process of learning; thus enabling students to gain

more control over their learning process and enhance their abilities to be lifelong learners.

This view is shared also by Look (2005), who found that the performance of the students in rich technological environments experienced highly positive effects in all subject areas consistently. Moreover, this opinion is shared with United Nations Development Program (2002), as they declared that ICT is an important factor in determining the shape of the new society that has a rapid and continues changes.

ICT already changed the way of communications and doing daily tasks in a large number of fields such as education, as ICT significantly changed the way of teaching and learning and the roles played by both teaching staff and students. Moreover, ICT has become an important part of most organizations and businesses these days (Zhang and Aikman, 2007). Also, Dawes (2001) believes that ICT has the power to support teaching and learning, and provide new enhanced approaches for doing the required tasks in ways that have not been possible before.

While the literature has a number of research studies supporting higher education faculty perception of adopting technology in general (Albright, 1996; Jacobsen, 1997; Johnson et al., 1999; Straub, 2009; & Sugar et al., 2004) very limited research existed to highlight on the nature of the relationship between teaching staff age and their attitude towards ICT in Egypt; thus more research is warranted in this regard in order to highlight the effect of age on teaching staff attitude towards ICT.

The research believes that the key to successful integration of ICT into education is teaching staff; thus investigating factors directly related to their attitude towards ICT is significantly important. The aim of this investigation and analysis is to add to the limited literature regarding the direct relationship between HEI teaching staff age and their attitude towards ICT.

Related Research

In a study by Jennings and Onwuegbuzie (2001), they declared that younger teaching staff was found to have more positive attitudes towards the use of ICT. Also in the same context, Oscarson (1976) discovered that age is in a positive relationship with the attitude towards technologies, where older teaching staff were more adoption prone than younger teaching staff.

Educational institutions still have a long way to go before being able to take full advantage of the opportunities provided by ICT, as research studies showed that in many cases the use of ICT is not that much as many teachers are still not fully ICT literate and do not use it in their teaching and learning activities (Ya'acob et. al., 2005; So and Paula, 2006). This conclusion is inline with Barak (2006), who reveals that while teaching staff make use of ICT, they are cautious about integrating advanced ICT. The study further revealed that while teaching staff aware of the advantages of using ICT in their teaching and learning, they do not think that ICT is preferable for class-based instruction for promoting cooperation and reflection in learning.

Adams (2002), in one of the studies that showed age concerns, he studied full and part-time faculty members teaching at a HEI, and he indicated the following summary results:

- The 18-24 age range display recognizably higher level of computer integration
- Females display a greater integration average than do males.
- The overall trend shows those in their middle years of teaching tenure, 10 to 19 years of experience, as having the least demonstration of integration of technology into teaching practices.
- Respondents with less than 10 years of experience or those with 20 years or more of teaching experience demonstrate a greater degree of technology integration.
- The data indicate that approximately 25% of the respondent faculty population is not actively participating in the innovation.

Adams concluded that HEI teaching staff members' development regardless of their age is essential in order for them to learn about new technologies or innovations to diffuse them into teaching. He concluded that younger female teachers with less teaching experience more readily integrate technology into teaching practices.

In the same context, Kumar et al (2008) declared that it is important to investigate the factors that affect teaching staff use of ICT. In their research, they discovered that attitude, motivation, gender, age, and computer training have important effects of the actual use of ICT by teaching staff. This result is supported by a more recent research of Sang et al (2009) as they concluded that attitude, gender and age have significant effects on the use of ICT by teaching staff.

Grenier-Winther (1999) believed that HEI teaching staff members are supposed to balance all their duties using their time and energy as they are expected to be lecturers, researchers, and active staff members in the HEI. He declared that integrating ICT into teaching and learning activities consumes big amount of time, but by the time this integration of ICT into their daily activities will requires less time as a matter of the effect of the increase of their experience in this regard. The challenge increases when trying to convince digital immigrant faculty – who are not familiar with the technology during their early life stages (Prensky's 2001 argument) - to incorporate ICT into their traditionally face-to-face courses, which might certainly pose a problem and a potential barrier to this integration.

Research results conducted in some developed nations revealed narrow gaps across age groups in their attitude towards ICT. For example Luchetta (2000) found that elder teaching staff members are exhibiting better attitude towards ICT than in the former year's staff members, but this narrow gap across age groups in attitude towards ICT is not a global trend.

The result of Luchetta (2000) was also supported by a study examined the Norway's situation in this regard as Hernes et al., (2000) concluded that the teaching staff who showed a good command of the use of the Internet are negatively correlated with age. About 77% of the teaching staff who are 25 years or younger stated that they have a good command of the use of Internet, compared to 25% of the teachers who are 56

years or older, also around 63% of the teaching staff who are 25 years or younger versus only 32% of the teachers who are 56 years or older have a positive attitude towards the use of the Internet in their own teaching. This is also consistent with the findings of Liang and Chao (2002) as they obtained that Taiwan younger teachers were more literate towards using the Internet. Another study for Lam (2000) on Canadian teachers, he showed that age affects the use of ICT in the classroom.

A different approach entirely was that of William et al., (2000) as they studied the relationship between age and attitude towards ICT of teaching staff across primary and secondary schools in Scotland. Secondary teachers showed significant positive attitudinal difference towards ICT as a matter of age. Primary teachers on the other hand showed negative attitude towards the use of ICT.

In a similar context, Teo (2008) studied Singapore pre-service teachers; he discovered no significant difference between age and attitude towards ICT.

From the previous illustrations, it seems that the literatures yields mixed results regarding the relationship between age and attitude towards ICT. Therefore, there is a need for investigating this relationship in Egypt in order to highlight the effect of age on teaching staff' attitude towards ICT.

METHOD

Current research seeks to understand the relationship between teaching staff' age and their attitude toward ICT. Survey methodology was employed in this research. Oscarson (1976) developed a questionnaire with several sub-scales in order to measure adoption proneness, which was used in this research in order to aid in understanding this relationship. Each item in the questionnaire has an accompanying 6-point likert-type scale ranging from no (never) to yes (always). Oscarson (1976) questionnaire was used in this study after major modifications due to the conduct of a pilot study and instrument testing done by Elsaadani (2011) in order to ensure that the questions used reflect the intended meaning of the researcher and to ensure that this meaning will be understood by anyone reading these questions. So, the instrument is therefore valid.

A follow-up pilot study was conducted in 2011 before the start of the spring semester with a sample of teaching staff. This pilot study sample comprised 25 Faculty staff, with a return rate of 80%. The responses from this pilot sample did not request any further modifications to the instrument. Analysis of quantitative data is processed with the aid of SPSS 19.0 (SPSS is a computer program used for survey authoring and deployment, data mining, text analytics, and statistical analysis) to produce research findings.

The survey domain is a random sampling of teaching staff in Egyptian HEI. The research is aware of the dangers of selection bias of the study participants and a lottery-draw was made as a type of blind selection in order to ensure fairness in the selection among the full list of universities, faculties, and disciplines. A table with a randomly selected teaching staff members was generated from each faculty's human resources

department containing fifty of their teaching staff members to share in the study after taking the permission from each university administration.

The population for this study was 500 full-time Faculty staff. The research used the total population as the survey target participants, and 414 participants responded, but only 412 are complete and usable questionnaires, which are considered as the study sample. Selection criteria for study participants were based on teaching staff members who teach courses during the spring semester of 2011.

Test of normality of questionnaire data (PP plot), reliability test (Cronbach alpha), validity test (principal component factor analysis), descriptive analysis, one-way analysis of variance (ANOVA), Chi-square statistics, Pearson correlation, and regression analysis were used in analyzing the obtained data.

Descriptive analysis is employed in order to determine the frequencies of the variables. Both Cronbach alpha and principal component factor analysis are used with both the piloted and the final version of the instrument in order to ensure that the instrument is reliable and valid. One-way ANOVA is employed in order to determine whether several sets of scores have different means or not, and to determine the relationships among variables. Correlation is used with piloted data in order to ensure both criterion and construct validity.

Univariate analysis of variance is employed in order to see whether changes in the independent variable have significant effect on the dependent variable or not, but the degree of that change is determined using regression analysis. Cronbach alpha is used with both the piloted and the final version of the instrument in order to ensure that the instrument is reliable. Test on normality is conducted at the beginning in order to determine whether random variables are normally distributed or not, since this enhances the application of statistical tests applicable to normal distribution variables. The probability level for all tests of statistical significance for the study will be set at $p < 0.05$.

RESULTS

This research focuses only on the relationship between age and attitude towards ICT, rest of questionnaire analysis reported elsewhere. Test on normality is conducted at the beginning, and it was determined that the used variables are normally distributed; thus it is acceptable to use the statistical tests applicable to normal distribution variables.

Participants' ages ranged from 21 to 63 years old. Findings revealed that 53% of the respondents were between 22 and 30 years old. Respondents in the 30 to 40 age categories represented 18%, while respondents in the 40 to 63 age categories represented 29%. The oldest respondent was 63 years old, while the youngest was 21 years. Participants' gender for the participating 412 member was male participants representing 64%, while female participants representing 36%.

Reliability Case Processing for 412 participants using Cronbach's Alpha for the first part of the questionnaire, which test the attitude towards ICT (including 19 item

questions) scored 0.840; Cronbach's Alpha for the second part of the questionnaire, which test the use of ICT in teaching (including 21 item questions) scored 0.828; Cronbach's Alpha for the third part of the questionnaire, which test judgment about ICT use (including 6 item questions) scored 0.783; Cronbach's Alpha for the fourth part of the questionnaire, which test the professional development of Faculty staff (including 6 item questions) scored 0.701; Cronbach's Alpha for the fifth part of the questionnaire, which test ICT support services (including 6 item questions) scored 0.783; Cronbach's Alpha for the sixth part of the questionnaire, which test the barriers to adopting and using ICT (including 29 item questions) scored 0.862. While Cronbach's Alpha reliability for the entire instrument (the complete six questionnaire parts) scored 0.771. Thus, reliability was proved for the used survey instrument and its internal consistency is acceptable.

Principal component factor analysis was used to assess convergent and divergent validity. Most loading within variable were greater than 0.80, while most loading across variables were less than 0.30, indicating good convergent and divergent/discriminative validity.

Resulting data were analyzed using test of normality of questionnaire data (PP plot), reliability test (Cronbach alpha), validity test (principal component factor analysis), descriptive analysis, one-way analysis of variance (ANOVA), Chi-square statistics, Pearson correlation, and regression analysis. Findings revealed that age is a factor when considering attitude towards ICT.

412 participants from higher education (64% male and 36% females; with mean = 35.17 years, SD = 8.895) were investigated. The mean attitude toward ICT scored 85.26 showing that respondents have positive attitudes towards ICT as shown in table 1.

Table 1: Descriptive statistics

	N	Mean	Std. Dev	Min	Max	Percentiles		
						25th	50th (Median)	75th
Attitude towards ICT	412	85.26	11.466	67	114	77.00	81.00	91.00
Age	412	35.16	8.898	21	63	25.00	35.50	43.00

Analysis done using One-way Analysis of Variance showed a significant difference between age and the attitude towards ICT ($F(31, 380) = 6.302, P = 0.000$) as shown in table 2. Greater differences in data produce a larger Chi-square value (see table 3), and the larger the Chi-square value, the greater the probability that there is a real significant difference; this asserts the previous result.

Table 2: Analysis of variance between age and attitude towards ICT

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18346.355	31	591.818	6.302	.000
Within Groups	35686.856	380	93.913		
Total	54033.211	411			

Table 2 (cont.): Analysis of variance between age and attitude towards ICT

Source	Type II Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	18565.784 ^a	32	580.181	6.200	.000
Intercept	2994917.789	1	2994917.789	32003.275	.000
Age	18565.784	32	580.181	6.200	.000
Error	35467.427	379	93.582		
Total	3048951.000	412			
Corrected Total	54033.211	411			

a. R Squared = .344 (Adjusted R Squared = .288)

Table 3: Chi-Square test statistics

	Attitude towards ICT	Age
Chi-Square	273.515 ^a	344.917 ^b
df	47	32
Asymp. Sig.	.000	.000

Pearson correlation among age and attitude towards ICT is positive and significant ($r = + 0.150$, $p = 0.001$) as shown in table 4, which support the concluded achieved result that there is a relationship between age and attitude towards ICT. Regression factor ($R = 0.150$) is moderate and positive. The determinant factor (R Square = 0.023), which is the percentage of change in the attitude towards ICT that is explained by age (see table 5).

Table 4: Pearson correlation matrix among age & attitude towards ICT

	Attitude towards ICT	Age
Attitude towards ICT	Pearson Correlation	1
	Sig. (2-tailed)	.001
	N	412
Age	Pearson Correlation	.150**
	Sig. (2-tailed)	.001
	N	412

** . Correlation is significant at the 0.01 level (2-tailed).

Table 5: Regression analysis between age & attitude towards ICT

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.150 ^a	.023	.020	11.350

DISCUSSION

The literature revealed that the use of ICT has fundamentally changed education industry and how knowledge is being transmitted from teaching staff to students, as ICT has the power to change the daily practices of teaching staff; thus, enhancing and developing teaching and learning. Moreover, it was found that the performance of the students in rich technological environments experienced highly positive effects in all subject areas consistently.

While the literature has a number of research studies supporting higher education faculty perception of adopting technology in general, limited research existed to

highlight the nature of the relationship between teaching staff' age and their attitude towards ICT in Egypt. The research believes that the key to successful integration of ICT into education is teaching staff; thus investigating factors directly related to their attitude towards ICT is significantly important. This is supported by the reported researches in the literatures, which yields mixed results regarding the relationship between age and attitude towards ICT.

Oscarson (1976) developed a questionnaire with several sub-scales in order to measure adoption proneness, which was used in this research in order to aid in understanding this relationship. The survey domain is a random sampling of teaching staff in Egyptian HEI. The population for this study was 500 full-time Faculty staff. The research used the total population as the survey target participants, and 414 participants responded, but only 412 are complete and usable questionnaires, and are considered as the study sample. Selection criteria for study participants were based on teaching staff members who teach courses during the spring semester of 2011.

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It was determined that the used variables are normally distributed; thus it is acceptable to use the statistical tests applicable to normal distribution variables. Reliability Case Processing for 412 participants using Cronbach's Alpha for the entire instrument (the complete six questionnaire parts) scored 0.771. Thus, reliability was proved for the used survey instrument and its internal consistency is acceptable.

Principal component factor analysis was used to assess convergent and discriminant validity. Most loading within variable were greater than 0.80, while most loading across variables were less than 0.30, indicating good convergent and discriminant validity. 412 participants from higher education were investigated. The mean attitude toward ICT scored 85.26 showing that respondents have positive attitudes towards ICT. One-way

Analysis of Variance showed a significant difference between age and the attitude towards ICT. Greater differences in data produce a larger Chi-square value, and the larger the Chi-square value, the greater the probability that there really is a significant difference, which asserts the previous result.

Pearson correlation among age and attitude towards ICT is positive and significant, which support the concluded achieved result that there is a relationship between age and attitude towards ICT. Regression factor is moderate and positive.

As new technologies are now replacing traditional instructional methods, these new technologies are doing much more than simply delivering regular lectures. It is found that there is a significant difference between the age of participants and their attitude towards ICT. As the Mean of males is higher than females, but this is not statistically significant indicating any difference between males and females as regard to their attitude towards ICT. Moreover, as the regression factor determined to be moderate and positive, and the determinant factor (R Square) showed the percentage of change in the attitude towards ICT that is explained by age differences, this study concluded that in considering attitude towards ICT by teaching staff members in Egyptians HEI, age is a significant factor.

CONCLUSION

New educational and instructional technologies are now replacing traditional instructional methods. These new technologies are doing much more than simply delivering regular lectures. Although, today HEI is increasingly using ICT as a means of improving teaching and learning, the current study adds to the limited literature on the nature of the relationship between teaching staff' age and their attitude towards ICT in HEI within the Egyptian context.

The main strength of the current study is that it provides up-to-date information about this relationship and communicates this information to the administration of HEI in Egypt.

The results showed that there is a significant difference between the age of participants and their attitude towards ICT indicating a relationship between both of them. Mean of males is higher than females but statistically this is not significant; indicating no difference between males and females as regard to their attitude towards ICT. Regression factor determined to be moderate and positive, and the determinant factor (R Square) showed the percentage of change in the attitude towards ICT that is explained by age differences. This study concluded that in considering attitude towards ICT by teaching staff members in Egyptians HEI, age is a significant factor.

The concluding results of the study indicating that there is a moderate and positive relationship between teaching staff age and their attitude towards ICT. This conclusion has been approved by many other previous studies (Liang and Chao, 2002; Oscarson, 1976; William et al., 2000; Jennings and Onwuegbuzie, 2001; Adams, 2002; Kumar et al., 2008; Luchetta, 2000; Hernes et al., 2000; Lam, 2000).

This result is contradicting with Teo (2008), who discovered no significant difference between teaching staff' age and their attitude towards ICT. Even though the study and findings seem much related to the present one, caution must be taken in comparing with them. This is because the mean age of the participants of Teo's study was 24.2 years, while it was 35.17 in this study.

The result of this research has significant implications to HEI when they plan, develop, and adopt ICT. Secondly, HEI has to consider that the attitude of teaching staffs towards ICT is related positively to their age.

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REFERENCES

- Adams, N. (2002). Educational computing concerns of postsecondary faculty. *Journal of Research on Technology*, 34(3), 285 – 303.
- Albright, M. (1996). *Instructional technology and higher education: Rewards, rights and responsibilities*. Keynote Address at the Southern Regional Faculty and Instructional Development Consortium. Baton Rouge, LA. (ERIC Document Reproduction Service No. ED 392 412).
- Barak, M. (2006). Instructional principles for fostering learning with ICT: teachers' perspectives as learners and instructors. *Education Information Technology*, 11, pp. 121-135.
- Dawes, L. (2001). *What stops teachers using new technology?* In M. Leask (Ed.), *Issues in Teaching using ICT* (pp. 61-79). London: Routledge.
- Elsaadani, M. (2011). *MITAM - A Modified ICT Adoption Model for Developing Countries: Case of Business Teaching in a Developing Country*. LAP Lambert Academic Publishing – Germany.
- Grenier-Winther, J. (1999). Real issues in the virtual classroom. *The French Review*, 73 (2), 252–264.
- Haghighi, S. & Eskandari, M. (2012). A study on barriers of using information technology on learning and teaching in elementary Schools, *Management Science Letters*, 2, pp. 417–424.
- Hardin, J. & Ellington, A. (2005). Using multimedia to facilitate software instruction in an introductory modelling course. *Inform Transaction on Education*, 5(2), pp. 25-32.

- Hernes, F. et al., (2000). Knowledge and competence in ICT among teachers in Norway. Retrieved 15/10/2011 from <http://www.ifip.or.at/con2000/iceut2000/iceut09-04.pdf>
- Jacobsen, M. (1997). Bridging the gap between early adopters' and mainstream faculty's use of instructional technology. [Online]. *Information Analysis*. Retrieved July 13, 2010, from http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/16/ed/23.pdf
- Jennings, S. & Onwuegbuzie, A. (2001). Computer attitudes as a function of age, gender, math attitude, and developmental status. *Journal of Educational Computing Research*, 25(4), 367-384.
- Johnson, M. et al., (1999). Technology as a change agent for the teaching process. *Theory into Practice*, 38(1), Redefining Teacher Quality, 24–30.
- Kumar, N. Et al., (2008). Predictors of technology deployment among Malaysian Teachers. *American Journal of Applied Sciences*. 5(9), pp. 1127-1134.
- Lam, Y. (2000). Technophobia or technophilia? A preliminary look at why second language teachers do or do not use technology in their classrooms. *Canadian Modern Language Review*, 56(93), 389-420.
- Liang, M. & Chao, J. (2002). Investigating into the Internet literacy of elementary and junior high school teachers in Taiwan. *World Transactions on Engineering and Technology Education*, 1(1), 129-131.
- Look, D. (2005). Discussion paper: Impact of technology on education, PUSD Excellence Committee, December 2005. Retrieved 19/11/2011 from <http://pleasanton.k12.ca.us/Superintendent/Downloads/Technology.pdf>
- Luchatta, T. (2000). Gender and computers, toolbox or toystore? Gender differences and similarities among children, youth and college students concerning computing attitudes and use. Presented at the Spring 2000 Wisconsin Association of Academic Librarians Conference, April 2000.
- Meadowcroft, B. (2006). The impact of information technology on work and society. Retrieved 24/9/2011 from www.m-w.com/cgi-bin/netdict?society
- Mejiuni, O. & Obilade, O. (2006). The dialectics of poverty, educational opportunities, and ICTs, in A. Oduaran & H.S. Bholu (Eds), *Widening access to education as social justice* (pp. 139-148). The Netherlands: Springer.
- Oscarson, D. (1976). Factors associated with vocational teacher proneness toward the adoption of innovations. Unpublished doctoral dissertation, Virginia Polytechnic Institute and State University.
- Ouzts, D. & Palombo, M. (2004). Technology in higher education: A study of perceptions of college professors. *TechTrends*, 48(5), pp. 17-22.

- Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5).
- Sang, G. Et al., (2009). Factors support or prevent teachers from integrating ICT into classroom teaching: A Chinese perspective. Proceedings of the 17th International Conference on Computers in Education. Hong Kong: Asia-Pacific Society for Computers in Education., pp. 808-815.
- So, T. & Paula, S. (2006). e-Learning readines of Hong Kong teachers. University of South Australia.
- Straub, E. (2009). Understanding technology adoption: theory and future directions for informal learning. *Review of Educational Research*, 79(2), 625-649.
- Sugar, W. et al., (2004). Examining teachers' decisions to adopt new technology. *Educational Technology and Society*, 7(4), 201-213.
- Teo, T. (2008). Assessing the computer attitudes of students: an Asian perspective. *Computers and Human Behavior*, 24(4), 1634-1642. [SSCI]
- United Nations Development Program (UNDP). (2002). Information, communication and knowledge-sharing, gender in development, learning and information pack, UNDP, New York; Retrieved 1/8/2010 <http://www.undp.org/gender/infopack.htm>.
- Williams, D. et al., (2000). Integrating ICT in professional practices an analysis of teachers' needs based on a survey of primary and secondary teachers in Scottish schools. *Journal of Information Technology in Teacher Education*, 9(2), 167-82.
- Ya'acob, A. et al., (2005). Implementation of the Malaysian Smart School: An Investigation of Teaching-Learning Practices and Teacher-Student Readiness. *Internet Journal of e-Language Learning & Teaching*, 2(2), pp. 16-25.
- Zhang, P. & Aikman, S. (2007). Attitudes in ICT Acceptance and use. In J. Jacko (Ed.), *Human-Computer Interaction, Part I* (pp. 1021-1030). Syracuse, NY: Springer-Verlag Berlin Heidelberg.