

# **Computer-Related Stress and Learning Styles among Elementary School Teachers**

**Sister Matthew Marie Cummings**

**Collin T. Ballance**

**Aquinas College**

## **Abstract**

Ninety-four elementary school teachers from southern Parochial schools were surveyed using a learning style inventory to categorize learning style as visual, auditory or kinesthetic and Hudiburg's updated Computer Technology Hassles Scale. Participation in the study was voluntary and was solicited through school principals. Groups of teachers organized by learning style were formed. Multivariate comparison of these groups based upon five stress variables suggested that computer stress, particularly that related to Computer System Performance Concerns, was associated with the learning style of the teacher's who were visual learners.

## **Introduction**

Technology integration in the classroom is dependent upon the classroom teacher. There are factors, including personal, behavioral and environmental factors, which influence the use of technology by teachers (Dusick, 1998). As more and more virtual schools come into existence (Archambault & Crippen, 2009), so does the need for teachers who are competent and comfortable using and teaching with technology. Is there a relationship between the learning styles of teachers and the level of computer stress that they experience? If a relationship can be identified between learning styles and computer stress then the manner in which teachers learn can be targeted in such a way that computer stress can be minimized.

There are several different theories concerning learning styles. For this study, the Visual, Auditory, and Kinesthetic (VAK) model of learning styles was used. This approach to learning styles includes three basic categorizations: visual, auditory, and kinesthetic. The visual learner's predominate approach to learning is by watching, observing or creating a visual representation. The auditory learner's dominate approach is from listening or speaking. The kinesthetic learner's dominate approach is through the use of the sense of touch and movement (Heaton-Shrestha & Gipps, & Edirisingham, & Linsey, 2007).

Computer anxiety has been defined as emotional fear, apprehension and phobia felt by individuals towards interactions with computers or towards the thought of using

computers (Wang, 2007). Computer anxiety is a barrier to computer use (Christensen, 2002). A study of elementary teachers indicated that computer anxiety prevents teachers from using technology (Clark, 2000).

Identifying the barriers to technology integration in education is an important step in being able to address these barriers. A recent study noted the barriers to technology integration as being availability and access to computers, availability of curriculum materials, teachers beliefs, demographic characteristics of teachers, teachers' technological and content knowledge, and technical, administrative, and peer support (Lowther, Inan, Daniel Strahl, & Ross, 2008). No mention of learning styles or computer stress was made. Perhaps the manner in which one learns can be a barrier to technology integration and thus the need for this study is to see if there is a relationship between learning styles and the amount of stress that is experienced in using a computer.

## **Method**

*Sample* - The sample for this study was composed of ninety-four elementary school teachers from southern Parochial schools. The teachers who participated in this study did so voluntarily. All of the teachers had participated in some type of professional development related to technology integration during the course of the semester in which they responded to the survey.

*Measures* - The subjects responded to two instruments: The Computer Technology Hassles Scale and the VAK Learning Styles Self Assessment Questionnaire (Chislett & Chapman, 2005; Hudiburg, 1989, 1992). The Computer Technology Hassles Scale is an index of computer-related stress. Hudiburg (2005) has released a revised and expanded version of this scale which has been updated to incorporate stressors related to recent technologies including the Internet. This revised scale is a 71 item list of potentially irritating instances associated with computers and computer use (e.g. "computer hardware failure", "lack of computer expertise", and "busy website"). Each item requires a response to severity, with potential responses "not at all" (recorded value=0), "somewhat severe" (value=1), "moderately severe" (value=2), and "extremely severe" (value 3). This scale yields two numerical scores. The number of scale items selected beyond the option "not at all" indicates the extent to which a respondent views computer interaction as a hassle and the average value of the responses indicates the severity of the computer hassles. Factor analytic work (principal components, varimax rotation) by Hudiburg (2005) identified three factors. Subscale scores in this study are based upon the 15 highest loading items on each factor. The subscales are Computer system performance concerns, Computer skills and information concerns, and Computer Internet use concerns. Reliabilities (Cronbach's alpha) of .9542, .9413, and .9127 are reported for these factors respectively. Values in this sample were .90, .90 and .92, respectively.

The VAK Learning Styles Self-Assessment Questionnaire (Chislett & Chapman, 2005) is a 30-item survey which permits the assignment of a respondent to one of three learning styles: visual, auditory, or tactile learning style. In this survey, thirty different settings are posed and respondents select a solution which is tied to one of the three learning styles. For the thirty items, the learning style most often selected determines the learning style label assigned to that individual. It is possible for a respondent to mark responses tied to two (or three) learning styles with equal frequency and not be considered to have a single learning style.

*Procedure* – The ninety-four volunteer participants responded to both the Computer Technology Hassles Scale and the VAK Learning Styles Self Assessment Questionnaire. A group of 14 respondents were labeled auditory learners, identified by marking more responses indicating an auditory learning style to the questionnaire items than any other type of response. Similarly, groups of visual learners ( $n = 56$ ) and tactile learners ( $n = 18$ ) were identified. Only respondents who were clearly identified as having a single dominant learning style were used in this study. Six respondents who marked the same number of items indicating two or more learning style indicators were not cast into groups and were not used in the analyses.

*Analyses* – Multivariate analysis of variance was used to compare the vectors of the five dependent measures (the number of hassles, average intensity of the selected hassles, and the three subscale scores from the Computer Technology Hassles Scale) taken as a group for the three groups of learning styles (auditory, visual, and tactile). A significant multivariate F-ratio (Finn & Bock, 2002) was calculated for the three learning style groups ( $F_{10, 162} = 3.5018, p < .05$ ) which indicates that the sets of dependent measures likely differ for the three groups: auditory learners, visual learners, and tactile learners. Tables 1 and 2 display the means and standard deviations of the five dependent measures taken from the Computer Technology Hassles Scale data. Pearson correlations appear in Table 3. These results suggest that, with regard to the learning style, respondents to the Computer Technology Hassles Scale score differently on measures of computer stress.

Univariate ANOVA's comparing the three groups (auditory, visual, and tactile) on each of the five dependent variables (the number of hassles, average intensity of the selected hassles, and the three subscale scores from the Computer Technology Hassles Scale) separately, revealed a statistically significant difference on only the CTHS subscale 1: Computer System Performance ( $F_{2, 85} = 5.30, p < .01$ ). Further analysis of the differences among the three groups on this CTHS factor using the Scheffe method of multiple comparisons (Glass & Stanley, 1970) revealed that only the average difference between the visual learning style group and the auditory learning style group was statistically significant at  $p < .05$ . This result is unlike results reported earlier by Ballance (2008) when the learning style groups were not different. This distinction may be due to

differences between the groups studied. The present study examined responses from a very homogeneous group of elementary teachers from southern Parochial schools, while the earlier work considered current college level students from diverse backgrounds with different college majors.

*Results* – A small statistically significant difference was detected among the visual, the auditory, and the tactile learners tied to the CTHS subscale measuring concerns about computer performance. This difference did not appear in a similar study conducted earlier by Ballance (2008). It is possible that measurement using these scales should be conducted on homogenous groups to increase the likelihood of detecting differences that may be hidden when subjects have widely differing backgrounds and experiences. Earlier work by Hudiburg (1990), Ballance and Rogers (1991), and Ballance and Ballance (1992; 1993; 1996) affirmed the position that computer-related stress is not a by-product of increased interaction with computers. This study, like recent work by Ballance (2008), suggests that computer stress is not tied to the preferred learning style of the subject and that visual learners, auditory learners, and tactile learners appear to manifest computer-related stress in similar ways. Finding that learning style groups differ, in this study, on one of the subscales of the Computer Technology Hassles Scale, when the groups were composed of students that are more highly similar than those studied in the past suggests that more research in the use of learning style groups to explain behaviors associated with the use of technology may be useful in explaining the variability among the measures indicative of computer related stress.

Table 1  
*Means and Standard Deviations of Number and Intensity of the Hassles Selected*

Learning Style	No. Hassles		Intensity	
	M	SD	M	SD
Auditory	31.1	19.7	1.2	0.4
Tactile	38.2	17.1	1.5	0.5
Visual	35.6	22.8	1.5	0.4

Table 2  
Means and Standard Deviations of Three Subscale Scores

Learning Styles	Computer System Performance		Skills/Information Concerns		Internet Concerns	
	M	SD	M	SD	M	SD
Auditory	14.5	5.8	4.6	4.2	4.8	4.6
Tactile	16.7	5.3	6.6	4.0	6.5	4.3
Visual	19.7	5.9	6.4	5.5	6.0	5.3

Table 3  
Pearson Correlations among the Study Variables

Concerns	Number	Intensity	System Per.	Skills Concerns	Internet
Number Hassles	1.00000				
Ave Hassle Intensity	0.56407	1.00000			
System Performance	0.84880	0.67262	1.00000		
Skills Concerns	0.90600	0.66166	0.80961	1.00000	
Internet Concerns	0.89848	0.68275	0.82381	0.90744	1.00000

(all correlations significant,  $p < .01$ )

## References

- Archambault, L., & Crippen, K. (2009, Summer 2009). K--12 Distance Educators at Work: Who's Teaching Online Across the United States. *Journal of Research on Technology in Education*, 41(4), 363-391. Retrieved July 8, 2009, from Academic Search Premier database.
- Ballance, C. T., & Ballance, V. V. (1992). Psychology of computer use: XXVI. Computer related stress and in-class computer usage. *Psychological Reports*, 71, 172-174.
- Ballance, C. T., & Ballance, V. V. (1993). Psychology of computer use: XXVII. Relating self-rated computer experience to computer stress. *Psychological Reports*, 72, 680-682.
- Ballance, C. T., & Ballance, V. V. (1996). Psychology of computer use: XXXVII. Computer-related stress and amount of computer experience. *Psychological Reports*, 78, 968-970.

- Ballance, C. T., & Rogers, S. U. (1991). Psychology of computer use: XXIV. Computer related stress among technical college students. *Psychological Reports*, 69, 539-542.
- Ballance, C. (2008, June). Computer-related stress and learning style. *Psychological Reports*, 102(3), 678-682. Retrieved July 23, 2009, doi:10.2466/PRO.102.3.678-682
- Chislett, V., & Chapman, A. (2005). VAK Learning Styles Self-Assessment Questionnaire. Retrieved June 26, 2006 from <http://www.businessballs.com>.
- Christensen, R. (2002, Summer). Effects of Technology Integration Education on the Attitudes of Teachers and Students. *Journal of Research on Technology in Education*, 34(4), 411. Retrieved July 13, 2009, from Teacher Reference Center database.
- Clark, K. (2000, Winter). Urban Middle School Teachers' Use of Instructional Technology. *Journal of Research on Computing in Education*, 33(2), 178. Retrieved July 13, 2009, from Academic Search Premier database.
- Dusick, D. M. (1998). What Social Cognitive Factors Influence Faculty Members' Use of Computers for Teaching? A Literature Review. *Journal of Research on Computing in Education*, 31(2), 123.
- Finn, J., & Bock, D. (2002). MULTIVARIANCE for Windows (Windows Version 8.01) Mooresville, IN: Scientific Software International.
- Glass, G. V., & Stanley, J. C. (1970). *Statistical Methods in Education and Psychology*. Englewood Cliffs: Prentice-Hall, Inc.
- Heaton-Shrestha, C., Gipps, C., Edirisingha, P., & Linsey, T. (2007, December). Learning and e-learning in HE: the relationship between student learning style and VLE use. *Research Papers in Education*, 22(4), 443-464. Retrieved July 13, 2009, doi:10.1080/02671520701651797
- Hudiburg, R. A. (1989). Psychology of computer use: VII. Measuring technostress: Computer related stress. *Psychological Reports*, 64, 767-772.
- Hudiburg, R. A. (1990). Relating computer-associated stress to computerphobia. *Psychological Reports*, 67, 311-314.
- Hudiburg, R. A. (1992). Factor analysis of the Computer Technology Hassles Scale, *Psychological Reports*, 71, 739-744.

Hudiburg, R. A. (2005). Scale analysis of a revision of the Computer Hassles Scale, a paper presented at the 82<sup>nd</sup> Annual Meeting of the Alabama Academy of Sciences, March 31, 2005, Birmingham, Alabama.

Lowther, D., Inan, F., Daniel Strahl, J., & Ross, S. (2008, September). Does technology integration “work” when key barriers are removed?. *Educational Media International*, 45(3), 195-213. Retrieved July 21, 2009, doi:10.1080/09523980802284317

Wang, Y. (2007, November). Development and validation of a mobile computer anxiety scale. *British Journal of Educational Technology*, 38(6), 990-1009. Retrieved July 13, 2009, doi:10.1111/j.1467-8535.2006.00687.

### **Author's Note**

Sister Matthew Marie Cummings, O.P. has taught for the past 25 years; 13 at the elementary school level and 12 at the collegiate level. Sister has a doctorate and Master of Science degree in Instruction and Curriculum Leadership from the University of Memphis. Her research interests include learning styles and technology integration. Sister's current appointment is in education and technology at Aquinas College, 4210 Harding Road, Nashville, TN 37205.

Collin Ballance teaches in the Mathematics Department at Aquinas College. His research interests include technology-related stress, testing, and statistical methods. He holds a doctorate in research methodology and statistics from Memphis State University.