An investigation of computer anxiety by gender and grade

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Abstract

Many tests have been constructed to assess computer anxiety. This has lead to the construct being conceptualised in some cases as a multidimensional, with a confusing array of dimensions, and also, implicitly, as unidimensional. The present study has used the computer-anxiety index (CAIN), a scale previously developed by Simonson, Maurer, Montag-Torardi, and Whitaker [Simonson, M. R., Maurer, M., Montag-Torardi, A., & Whitaker, M. (1987). Development of a standardised test of computer literacy and a computer anxiety index. *Journal of Educational Computing Research 3*(2), 231–247] to test its unidimensionality with the view to arrive at a scale that provides a unidimensional measure, hence avoiding the conceptual confusion of multi-dimensionality. Rasch analysis [Rasch, G. (1980). *Probabilistic models for some intelligence and attainment tests*. Chicago: The University of Chicago Press (expanded edition, original work published 1960).], a technique that has been adopted in international educational measurement studies such as the Third International Mathematics and Science Study (TIMSS) and the Program for International Assessment (PISA), was used to analyse the responses from 910 grade 7, 9 and 11 male and female students The response patterns obtained conformed to the strict requirements the Rasch model and confirmed the assumption that all 26 items of the Computer-Opinion Survey measured a single underlying trait. This result differed somewhat from that of a previous investigation by King and Bond [King, J., & Bond, T. (1996). A Rasch analysis of a measure of computer anxiety. *Journal of Educational Computing Research 14*(1), 49–65.] where for the lowest age group alone, six of the items were rejected. An investigation of the grade facet indicated that grades 7 and 9 were measurably different in computer anxiety from grade 11, and that grades 7 and 9 were the same within error. Investigation of the gender facet revealed a small measurable difference in computer anxiety between males and females, with males being more anxious than females. There was a significant interaction between gender and grade with a

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reversal of anxiety interaction occurring at about the grade 9 level. © 2002 Elsevier Science Ltd. All rights reserved.

1. Introduction

Computers are fast becoming an essential tool in the areas of work, school and leisure. Computer use is a part of the school curriculum that aims to increase students' computer literacy and provide students with the skills to enhance learning, and to access information. Due to the increasing importance of attaining at least a rudimentary level of computer literacy in today's technological society, it is desirable to minimise students' computer anxiety levels (Bowers & Bowers, 1996; Brosnan, 1998; Goss, 1996; Hemby, 1998; Presno, 1998) as high computer anxiety is considered to reduce a person's effectiveness when utilising a computer (Rozell & Gardner, 1999; Shelley, 1998). This is increasingly important as sources of information are now universally available via computers on the Internet. Not only students, but people re-training in the workforce need to develop computer skills unencumbered by the emotional constraints that can accompany the attainment of those skills. Delveccio (1995) reported on a study by Deakin University that found one in 10 young people suffer from computer anxiety even though over 50% had computers at the time of the survey. Other reports suggest that feelings of anxiety toward computers and computer use is common, affecting 30–40% of the population (Tseng, Tiplady, Macleod, & Wright, 1996).

Anxiety can generate a range of emotional responses and two different methods can be used to identify these responses. The first involves detecting actual physiological changes in the subject. The second method requires the subject to complete self-report tests, a procedure more practical than the former in educational environments. These tests generally use a Likert scale format and record persons' perceived feelings, attitudes and reactions as opposed to how their bodies are actually responding.

Psychologists have classified general anxiety into two areas. One domain is trait anxiety, and the other is state anxiety (Biggs & Moore, 1993). Trait anxiety can be described as "a general readiness to react with anxiety in many situations" (Biggs & Moore, 1993, p. 243). State anxiety refers to "anxiety actually experienced in a particular situation" (Biggs et al., 1993, p. 243). Examples of state anxiety would be maths and test anxiety (Hunsley, 1987). Computer anxiety as state anxiety can generally be defined as "the fear or apprehension felt by individuals when they use computers, or when they consider the possibility of computer utilisation" (Simonson, Maurer, Montag-Toradi, & Whitaker, 1987, p. 238).

In the literature, computer anxiety is sometimes subsumed under the more general definition of computer attitude (Simonson et al., 1987), a practice that does little to assist in its measurement. It is recognised by at least some researchers that computer