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Evaluation of Test Anxiety Levels among Preparatory Year Students of PSMCHS During Computer-Based Versus Paper-and-Pen Examination

Waheed Ahmad Baig*, Eidan Musa Al-Zahrani, Khalid M Al-Jubran, Tariq Chaudhry and Anjum Anwar Qadri

Prince Sultan Military College of Health Sciences, Dhahran, Saudi Arabia

**Corresponding e-mail: waheedahmadbaig@yahoo.com*

ABSTRACT

Background: *Computer-based examination (CBE) has become increasingly popular as a testing modality in under- and postgraduate health sciences education. Since 2013, Prince Sultan military college of health sciences (PSMCHS) has utilized CBE to conduct the preparatory year examination in first year assessments with multiple choice questions, column matching, and the modified essay question paper.* ***Aims:*** *To evaluate the test anxiety levels among students during computer-based and traditional paper-and-pen examination.* ***Settings and Design:*** *The descriptive survey based study was conducted in PSMCHS.* ***Methods and Material:*** *A sample of 199 male and female students of the preparatory year of allied health sciences was selected by random sampling technique. Test anxiety was quantified by using Westside anxiety scale.* ***Statistical analysis:*** *Descriptive statistics were used to analyze data. Mean anxiety scores were compared by unpaired t-test.* ***Results:*** *Of 199 students, 109 (54.8%) and 89 (45.2%) were males and females. A statistically significant decrease in mean anxiety score on WTA scales was observed in students administered with computer-based examination when compared with pen-and-paper based examination (2.48 vs. 3.90; P<0.05). The mean level of anxiety in paper and pen examination among male and female students was 3.77 and 4.04, respectively. There was more mean examination anxiety in females as compared to male students.* ***Conclusions:*** *There is a strong relationship between test anxiety and paper-and-pen exam. It is suggested that to reduce the students test anxiety to improve the technological awareness and utilization of computer-based examination at the preparatory level for both the teachers and the students.*

Keywords: Computer-based examination, Test anxiety, Education, Online assessment

INTRODUCTION

Anxiety is an unpleasant feeling characterized by fear or feeling apprehensive. It is evident when the person is worried and has some concern over an issue. It is one of the human emotions and is a feeling which all of us undergo at some point in our lives. It definitely affects our behavior e.g. makes one nervous [1].

Anxiety is a reaction to tension which is experienced by the individual. This reaction can be emotional or physical. Those students who are frequently experiencing these reactions can badly affect their memory and recall. The misinterpretation of information perceived can adversely affect performance. Anxiety can be broadly classified into State anxiety and Trait anxiety. The former is related to the reaction of an individual to any event and the latter being permanently incorporated into the personality of a person [2]. The students possessing trait anxiety are less motivated during their studies in class. The anxiety related to the exam or simply related to as test anxiety modifies the behavior of students. The academic performance which is very important to all stakeholders including students, their parents, and the institution, is adversely affected [3].

Test anxiety which is an unpleasant feeling of nervousness experienced by students just before, during and after tests and is definitely an important consideration to keep in mind while evaluating a student [4]. Test anxiety can not only mask the actual abilities of a student but also undermine it. This can adversely affect the outcome of a student's performance in exams thus making the educational surroundings unfriendly [5]. Test anxiety can infuse negativism like decreased self-esteem and confidence thus making the students emotionally unstable. This causes the students to keep on trying to postpone the exams rather than focusing on preparation. Those students with less test anxiety are under less stress emotionally and physically than with higher anxiety [6]. Test anxiety has proven to decrease the

student's academic performance and hinder their learning [7] and has also proved it to be a significant factor for the failure of students to achieve their academic goals. Test anxiety can have adverse effects on people of all age groups especially when it involves them to be tested for academic [8].

Considering the high prevalence of test anxiety for students with and without disabilities, educators need to explore methods that may help reduce students' anxiety. One option is to administer computerized assessments. Computer-based examinations (CBE) are exams given on a computer, but take the same form as a paper and pencil examination. The advantages of CBEs are even greater for students with disabilities as there are a number of adaptive devices for the computer that improve accessibility. One feature is the magnifier which offers several different magnification options including full screen magnification allowing magnification of the entire desktop, as well as a lens option that magnifies a rectangular area on the screen to magnify only what the viewer needs to magnify for learners with visual impairments. In addition to its potential for decreasing test anxiety, there are many advantages to computer-based examination. When a computerized assessment is given, the test can be scored immediately, and the student can see his/her grade right away. Additionally, computerized exams take much less time to administer. CBEs can be given one-on-one or to a whole classroom of students. There are also other advantages of having a CBE over traditional paper and pencil examination [9]. It has the edge of providing an assessment of various aspects of knowledge which one cannot assess in other forms of examination. It can moreover have a detailed analysis of students' cognition for a particular subject and can also relate it to other factors [10].

The aim of the present study was to evaluate test anxiety levels among allied health sciences students of preparatory year during computer based and traditional paper-and-pen examination.

MATERIALS AND METHODS

Study Design

This study was descriptive research design conducted at Prince Sultan Military College of Health Sciences (PSMCHS) in the Eastern region of Saudi Arabia among allied health sciences students of preparatory year. The ethical approval was obtained from the institutional research board (IRB) before the commencement of the study. A total of 199 students from preparatory year (110 male, 89 female) participated in the study. The data collection was done during periods of 4 months. The purpose and nature of the study were explained and informed. Moreover, written consent was taken from the volunteers.

Research Tools Used

For data collection, a previously validated questionnaire; Westside Test Anxiety Scale (WTS) was used to measure the test anxiety of student. Driscoll reported that this is a reliable and valid measure of test anxiety [11]. It is a short questionnaire with ten questions for fast screening of anxiety level of students.

The students were asked to circle a rating between 1-5. A rating of 1 indicates "not at all/never true, I didn't feel this way during the tests at all"; a rating of 2 indicates "a little but true, I felt this way once or twice during the tests"; a rating of 3 indicates "sometimes true, I felt this way three or four times during the tests"; a rating of 4 indicates "highly/usually true, this happened during most of the test, there were only a few seconds during the tests when I did not feel this way"; and finally, a rating of 5 indicates "always true, this happened during the whole test".

Question number 1, 4, 5, 6, and 8 were designed to measure difficulty in cognitive processing and memory loss. Questions 2, 3, and 9 were designed to measure worry. Questions 7 and 10 were designed to measure physiological symptoms of anxiety. Interpretations of mean anxiety scores are mentioned in Table 1.

Table 1 Westside anxiety scale score interpretation

Mean anxiety scores	Anxiety level
1.0 – 1.9	Low test anxiety
2.0 – 2.5	Normal or average test anxiety
2.5 – 2.9	Slightly higher test anxiety
3.0 – 3.4	Moderately high test anxiety
3.5 – 3.9	High-level test anxiety
4.0 – 5.0	Extremely high-level test anxiety

Data Collection

The students in the subject of human biology were randomly selected in two groups. The group - 1 students were administered the survey questionnaire comprising of WTS anxiety scale after computer based examination whereas group - 2 student were administered WTS scale after paper and pen examination.

Statistical Analysis

For the data analysis, descriptive statistics including frequency, percentage, mean and standard deviation. Student's t-test was used to compare mean anxiety scores.

RESULTS

One-hundred and ninety-nine WTA scale questionnaires were distributed among preparatory year students, out of which 110 (55.3 %) were for CBE and 89 (44.7%) for the paper and pen examination (Table 2). Out of the total 199 students, 109 (54.8 %) and 89 (45.2 %) were males and females respectively (Table 3).

Table 2 Examination type

Test	n	%
Computer-based	110	55.3
Pen and paper	89	44.7
Total	199	100

Table 3 Gender wise distribution

Gender	N	%
Male	109	54.8
Female	90	45.2
Total	199	100

Table 4 displays the mean overall score of 2.52 ± 0.93 for the students who gave computer-based examination, whereas who gave paper and pen examination, mean overall score is 3.91 ± 0.56 as assessed by WTA scale. The result of our study indicates that there was a significant increase in mean anxiety status in paper and pen examination as compared to CBE.

Table 4 Mean anxiety status by WTA scale

Examination Type	n	Mean ± S. D	p-value
Group 1 (Computer based)	110	2.487 ± 0.801	P <0.001*
Group 2 (Pen and paper)	89	3.912 ± 0.568	
*P value less than 0.05 defined as significant			

A significant difference ($p<0.05$) between the anxiety level of computer examination and pen and paper examination was observed by applying independent sample t-test. So, we conclude that there is the difference between anxiety levels of both examinations among students.

The mean level of anxiety in paper and pen examination among male and female students was 3.77 ± 0.708 and 4.04 ± 0.526 respectively (Table 5). There was more mean examination anxiety in females as compared to male students.

Table 5 Mean anxiety status according to gender

Gender	Mean anxiety status	
	Computer-based examination (Mean ± S.D)	Paper and pen examination (Mean ± S.D)
Males (n = 109)	2.45 ± 0.804	3.77 ± 0.708
Females (n = 90)	2.52 ± 0.805	4.04 ± 0.526

DISCUSSION

The primary purpose of this study was to determine whether the use of concept whether or not CBE has an effect on student self-reported test anxiety. To the best of our knowledge, this is the first study examining the impact of CBE in

Saudi undergraduate's students. It is hoped that the present study has provided baseline data for future comparisons, and development and implementation of educational technology in educational institutes.

Medical students in Saudi Arabia have been reported to be under high levels of stress, anxiety, and depression than non-Saudi students [12]. Test anxiety in students could lead to depression, decreased performance during examination and result in student burnout leading to frequent failing in examinations.

The mean test anxiety score on WTA scale was 2.487 for the computer-based test and 3.912 for the paper-and-pencil test on a scale where the possible range of scores was from 1 to 5. This reflected relatively low levels of test anxiety.

The test anxiety scores associated with the two forms of the test were not significantly different. These results indicating no differences in test anxiety level between the groups were somewhat unexpected; our results are conflicting to the findings by Llabre, et al. [13] and Ward, et al. [14] which showed that college students taking a computer-based test reported higher levels of test anxiety than their counterparts taking a paper-and-pencil version of the same test. Apparently, the new and unfamiliar experience of taking a test on a computer did not raise the test anxiety level of the students. A plausible reason for this may be that many of the students taking the computer-based test were already familiar with the use of a computer; consequently, the thought of having to take a test on the computer did not arouse much test anxiety. 26.9 % of the students in the current study never or hardly used a computer.

The observed low computer anxiety may be a reflection of the students' prior exposure to computers. It is noted that more than three-fourths of the participated students (77%) had access to a home computer. Furthermore, PSMCHS has three large computer labs equipped with 200 computers, so the students had routine access to the use of computers. Computer courses are a part of the curriculum in preparatory years. Furthermore, some of the students used the computer regularly for working on their English essays and projects in other classes.

Although CBE involves monetary issue but an online examination result in decreased in anxiety which can help students and teachers to concentrate on objectives. Similar to our results, previous studies showed that online examination reduced self-reported test anxiety. Jeffrey et al. found that students of psychology who normally experience high levels of test anxiety in the classroom had reduced test anxiety when taking online exams [15]. One of the studies used the Survey of Attitudes toward Statistics-36 (SATS-28) and instrument and eight questions from the Statistical Reasoning Assessment (SRA) to compare traditional and online sections of a graduate statistics course taught. From pre- to post-semester, the researchers found significant decreases in anxiety and corresponding increases in positive attitudes by students in the online course but noted no significant change for students in the traditional course [16].

With regard to the gender of the student, the male shows moderately high levels of test anxiety whereas female shows extremely high levels of test anxiety. This observation is similar to studies done before. The female student was associated with higher levels of perceived stress and lower levels of psychologic well-being [17]. Female are shown to have increased test anxiety. The main interpretation of these gender differences is that males and females socialized to experience evaluation situations differently and to respond to anxiety in different ways. It has been suggested that males may be more likely to perceive test situations as a personal challenge rather than as a threat and exhibit behavior characteristic of highly anxious individuals (fear, worry, anger, lower self-esteem). Evaluation situations may lead to increased arousal, worry or discomfort, and thereby lower test performance. In addition, female students may feel shame, guilt, and fear that they might lose their parents' support each of which may trigger test anxiety. Female students are more strongly motivated to satisfy their parents, demands and may be greatly afraid to disappoint them. It can also be related to emotional nature of female as compared to males [18].

There are numbers of limitations of our study. This study involved a small number of student examined for only one course; a larger sample size would result in more accurate results. The present study does not evaluate academic grades according to test anxiety levels.

CONCLUSION

Test anxiety levels among students use computer-based examination was found to be less than paper and pen examination. The other accidental finding was that female students show the extremely high level of test anxiety as compared to a male student for paper and pen examination.

DECLARATIONS

Competing Interests

The authors and planners have disclosed no potential conflicts of interest, financial or otherwise.

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