
RESEARCH ARTICLE

Saudi Undergraduate Students' Preferences toward Tests and Test Anxiety Differences in Blended Learning

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ABSTRACT

In blended learning, which has become very common due to the prevailing conditions, tests play a pivotal role, as the percentage of reliance on online tests has increased more than on paper tests. This study aims to measure the percentage of test anxiety in online and paper-based tests. It also seeks to determine the students' most desire for online paper-based tests in terms of test anxiety. 138 students participated in this study, and a questionnaire was used to measure the level of test anxiety and students' preferences for the two test types in relation to test anxiety. The results showed that students experience more test anxiety in paper-based tests than on online tests. Students also showed a significant tendency toward using online tests for testing in relation to test anxiety. They prefer online tests more than paper tests to cope with test anxiety.

KEYWORDS

EFL learners, blended learning, test anxiety

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1. Introduction

Feeling some sort of anxiety in tests situations is considered a natural and common condition among students. However, test anxiety at high levels can negatively influence positive students' performance and put them in uncomfortable situations that directly affect their education process. According to Rana and Mahmood (2010), test anxiety is an evident factor responsible for students' low performance and underachievement. Test anxiety investigations mainly focused on face-to-face education, especially in a particular and unique context such as Saudi Arabia. Online education has proceeded to develop primarily in higher education (Hernández & Gantes, 2009; Allen & Seaman, 2017).

Online learning has become one of the most critical subjects in education in the last decade and during the previous two years, with the situation of the Corona Pandemic. The demand for online learning shifted from optional to compulsory at the country's level, and Saudi Arabia was not exceptional. It can be defined as learning programs utilizing innovative developments and technology, including computers and the internet (Conrad, 2002; Carliner, 2004; Benson, 2002). According to Banas and Emory (1998), online learning started in 1800 for the purpose of delivering education virtually to students in rural areas.

And since the focus was entirely on test anxiety related to face-to-face education, it became necessary to investigate the other side, which is an online education, especially in a specific and exceptional environment such as the Kingdom of Saudi Arabia. The present study investigated Saudi undergraduate students' preferences for paper-based or online tests in terms of test anxiety—moreover, Saudi undergraduate students' differences in the level of test anxiety between face-to-face and online education.

1.2 Research Questions

Two research questions guided this study to achieve its goals.

RQ1: Are there any differences in the level of test anxiety in blended learning among undergraduate students in Saudi Arabia?

RQ2: Do Saudi undergraduate students prefer paper-based or online tests in terms of test anxiety?

1.3 Research Hypotheses

H1. Students experience more test anxiety in paper-based tests than in online tests.

H2. Students prefer online tests in relation to test anxiety.

1.4 Significance of the Study

The issue of test anxiety has been a significant concern among educators because it influences students' performance. Test outcomes have significant critical contributions to every learner's academic association and job circumstances. The study's findings suggest the need to decrease the level of test anxiety among those who suffer more and aid students in enhancing the processes of thinking that assist them with a sense of management and control over their assessment processes and other actions in their lives.

Being familiar with the type of assessment in relation to test anxiety preferred by high students can guide decision-makers and curriculum designers to shed more light on their plans due to the outcomes of this study. The conclusions of this study can furnish students with a clear vision of test anxiety with face-to-face and online learning and give more assistance to cope with. From the teacher's side, the study can complete the picture for them and provide them with the ability to make the right decisions and the proper strategies when dealing with face-to-face or online learning and tests.

2. Literature Review

Test anxiety is a common condition that occurs throughout the three stages of testing (before, during, and after) as a type of psychological response to these three stages. Various symptoms accompany this event, such as fear of failure, stress, emotionality, lack of confidence, worry etc. (Roos, Goetz, Voracek, Krannich, Bieg, Jarrell & Pekrun, 2021). In higher education, in particular, there is accelerated growth and exceptional demand for distance education, especially in the last century, and due to the recent epidemiological conditions, the importance of the subject has expanded. Consequently, learning and testing through virtual platforms are shifted to become a significant part of our academic life; in other words, electronic assessment has become as crucial as traditional face-to-face learning and examination (Karthika, Vijayakumar, Rawal & Wang, 2019).

With the importance of online learning more than before, it has become necessary to investigate the surrounding circumstances related to test anxiety around the education process these days. The online testing system comes with various conditions and procedures that may completely differ from the paper-tests conditions—for example, instructions, procedures, computer competence, management etc. There are many advantages to computerized assessment, such as immediate test scores, viewing grades and mistakes right away, administering the time more efficiently and many more (Baig, Al-Zahrani, Al-Jubran, Chaudhry & Qadri, 2018). All of these reasons can create a different atmosphere between face-to-face education and online education in terms of students' feelings and the level of anxiety that may occur during the exam period.

Test anxiety is an essential topic in students' academic life and has been under investigation for a long time since the first usage of the concept of anxiety back in 1914. Test anxiety is described as a form of anxiety that arises in testing situations (Sarason & Mandler, 1952). Anxiety, in general, is related to feeling unpleasant, insecure, and uncomfortable concerning the future and panicking about the consequences of what is coming (Mennin, 2004). It is considered typical in the academic world that test anxiety is a human problem that can negatively impact learners. High anxiety levels can initiate poor performance (Deffenbacher, 1986). Moreover, in his study, Wine (1971) uncovered a firm relationship between students' anxiety and poor performance in examinations.

The use of technology, which students in exams generally prefer, can facilitate the educational process and also promote the conduct of exams, which is a source of anxiety for many students when involved in paper exams (Ataiefar & Sadighi, 2017). Face-to-face confrontation with the test paper and the attendant pre- and post-exam consequences, in addition to the special circumstances of each test, such as preparations and instructions, which are directly on the students, and are usually a cause for concern (Minghe & Yuan, 2013; Young, 1990; Riasati, 2012). Accordingly, online testing, which avoids face to face confrontation with the test paper with a less stressful environment for interaction with the test (Rezai & Zafari, 2010; Grant et al., 2014)

A study conducted by Stowell and Bennett (2010) investigated how students' exam performance and test anxiety are affected by online testing. The researchers observed that learners who commonly experience test anxiety at high levels in face-to-face education had decreased the percentage of test anxiety levels when taking online exams. At the same time, the opposite was true for those low in classroom anxiety. Another study by Cassady and Gridley (2005) examined the influences of online formative and summative assessment materials on undergraduate learners' testing behaviours like study habits, beliefs and performance, study habits. The study revealed that students attending tests online reported lower levels of perceived test threat. Another study conducted by Powers (2001) provided a test of the relationship between online computerized versions of tests against paper-

based tests. The data was collected from undergraduate samples, and the findings supported a slight difference in the effect of test anxiety on both testing styles.

Although many studies agreed that online tests for students are less severe in terms of test anxiety, it is a suitable environment for those who suffer from negative test anxiety since it reduces the anxiety that accompanies tests. However, some studies contradict this idea and found that online tests lead to undesirable consequences in terms of test anxiety. For instance, Woldeab & Brothen (2019) studied 631 high students in the United States in relation to online examinations and their challenges. The study, which was meant to assess the influence of online exams on student test anxiety, found that test anxiety appears significantly in students when they take online tests, where the level of test anxiety among students is raised due to the different and unusual circumstances in online tests.

Test anxiety can create a major impact on students' performance. It may cause serious problems for learners, which eventually leads to lower students achievements. Rana and Mahmood (2010) dissected the relationship between Test Anxiety total scale scores and academic achievement scores for 414 students in varied science subjects. The participants were male and female postgraduate students and were selected randomly. Test Anxiety Inventory (TAI) by (Spielberger 1980) was used to collect the data. The outcomes confirmed a strong negative impact on students' performance scores due to high levels of test anxiety.

3. Methodology

In order to answer the research questions, this study employed a descriptive questionnaire and correlational design. Students at the University of Tabuk study in all disciplines using the blended learning method, which means they have both types of testing (paper-based and online testing). The quantitative method in the present study was designed to answer the questions about the level of test anxiety among undergraduate students at Tabuk university for the two testing approaches. Moreover, investigating the Saudi undergraduate students' preferences toward tests and test anxiety differences in blended learning.

Two sets of questionnaires were employed. The first one is the test anxiety questionnaire by Nist and Diehl (1990), which was assigned to decide if a student encounters a mild or severe state of test anxiety. This questionnaire was presented to the participants in order to answer research question one. Are there any differences in the level of test anxiety in blended learning among undergraduate students in Saudi Arabia? After reading each statement and reflecting upon past testing experiences, students completed the questionnaire. Each statement revealed students' reaction to the level of test anxiety in paper-based and online tests by choosing from one to five. The numbers represent the following answers Never, Rarely, Sometimes, Often Always. The overall result indicated students' level of test anxiety.

The second questionnaire was designed by the researcher based on the literature review of the following studies: Yanifari & Rihardini (2021), Alibak, Talebi & Neshat-Doost (2019) and Duraku (2017). The questionnaire was designed to collect responses from the participants and answer the second research question. Do Saudi undergraduate students prefer paper-based or online tests in terms of test anxiety? The statements in the questionnaire are based on a statement of students' preferences for both types of paper-based and online tests where the students answered the questionnaire items that reflect whether they prefer the paper-based test in terms of test anxiety or the same for the online tests. The answers ranged from 1 to 3 as the following: Disagree, Neutral, and Agree. The Overall responses determined whether students would like more paper-based or online tests in terms of test anxiety and showed whether students preferred either type of test when dealing with test anxiety.

The respondents in this study were 138 female undergraduate students from the University of Tabuk, Saudi Arabia. They were full-time students in their first semester from different disciplines. The respondents were enrolled in the courses offered by the University of Tabuk. The respondents were randomly selected during normal class hours. This study included two questionnaires to be answered online through google forms by the students. The two questionnaires were answered simultaneously by sharing the URL link with them. Participants were asked to write their first email with no names before they started answering the questions. The questionnaire was unlimited with time. However, students were able to answer the questions in the questionnaire for approximately 25 to 30 minutes. All elements of the questionnaire were translated into Arabic so that students could fully understand the elements of the questionnaire, including the instructions and the complete protocol.

Data were analyzed to answer the research questions using SPSS statistical analysis package 26 as the following: descriptive statistics, The non-parametric test, Wilcoxon rank test, frequencies and percentages, arithmetic mean and standard deviation to compare the average response of the sample subjects between the two test methods (online - paper) and to compare the average response of the sample subjects on the levels of test anxiety in the two test methods (online – paper-based).

3.1 Reliability test

Cronbach's alpha method was used to calculate the stability using (SPSS) program, where the alpha coefficient expresses the degree of internal consistency of the scale "Internal Consistency." The value of the alpha coefficient is acceptable if it is greater than 0.60, as it is known. The result of our questionnaire is as shown in the table:

Reliability Statistics	
Cronbach's Alpha	N of Items
.807	40

We note that the value of Cronbach's alpha coefficient is equal to 0.807, and this is evidence of the reliability and validity of the questionnaire.

4. Results and Discussion

This section illustrates the statistical analysis of the collected data from the two instruments that used in this study. The participated students in the current study reacted differently to both questionnaires that were used to obtain data.

The first research question was, are there any differences in the level of test anxiety in blended learning among undergraduate students in Saudi Arabia? To answer this question, the researcher employed the test anxiety questionnaire by Nist and Diehl (1990) to decide if students encounter a mild or severe state of test anxiety on paper-tests and online tests. All participated (138) students responded to the same questionnaire to describe how do they feel toward the paper-based and online examinations. In other words, the questionnaire showed the level of test anxiety when they engage in paper-based tests and in online tests.

The results acquired from the questionnaire were ratified and reported the same in many other studies and investigations, which stated that students in test situations experienced certain levels of test anxiety (Williams & Andrade, 2008; Rezazadeh & Tavakoli, 2009). However, the results obtained for the questionnaire in the present study reported a greater level of test anxiety among undergraduate students in paper-based tests than the test anxiety level in online tests.

The table below shows a clear difference in the level of test anxiety between online tests and paper tests. Students responded to the test anxiety questionnaire in paper-based tests that they experience a high level of test anxiety in paper-based test situations. On the contrary, the results of the students' response to the questionnaire on the level of test anxiety in the paper tests showed that the level of test anxiety was low and less severe than what it was in the paper tests.

Descriptive Statistics					
	N	Mean	Std. Deviation	Minimum	Maximum
paper2	138	3.4870	1.15701	1.00	5.00
onlin2	138	2.1377	1.07705	1.00	5.00

The table showed that participants responded to the questionnaire paper-based test anxiety by showing a high level of test anxiety with (1.157 Std. and 3.487. mean). On the other hand, the same participants responded to the same questionnaire for online test anxiety and showed a low level of text anxiety with 1.077 Std and 2,137 mean.

Percentage of students' answers to the five-point likert scale (paper-based tests)

third section	Response				
	Never	Rarely	Sometimes	Often	Always
Percent	13.04%	12.83%	22.46%	15.72%	35.94%

The table above shows that students responded to the level of tests anxiety questionnaire for paper-based tests as the following: 13.04% of students experienced test anxiety as (never), 12.83% of students experienced test anxiety as (rarely), 22.46% of students

experienced test anxiety as (sometimes), 15.72% of students experienced test anxiety as (often) and 35.94% experienced test anxiety as an (always). Obviously, the largest number of students showed a high level of test anxiety for paper-based tests.

Percentage of students' answers to the five-point Likert scale (online tests)

fourth section	Response				
	Never	Rarely	Sometimes	Often	Always
Percent	43.70%	22.97%	18.19%	7.10%	8.04%

The table above shows that students responded to the level of tests anxiety questionnaire for online tests as the following: 43.70% of students experienced test anxiety as (never), 22.97% of students experienced test anxiety as (rarely), 18.19% of students experienced test anxiety as (sometimes), 7.10% of students experienced test anxiety as (often) and 8.04% experienced test anxiety as an (always). Obviously, the largest number of students showed a low level of test anxiety for online tests.

Wilcoxon rank test

		N	Mean Rank	Sum of Ranks
onlin2 – paper2	Negative Ranks	108a	71.05	7673.50
	Positive Ranks	23b	42.28	972.50
	Ties	7c		
	Total	138		

The non-parametric test (Wilcoxon rank test) was applied for two related samples. The value of test statistics is 7.699 with a small p-value = 0.00, which means there is sufficient evidence that the two approaches are different in the level of test anxiety. The table above showed that 108 students showed a higher level of test anxiety for paper-based tests than for online tests. Twenty-three students showed the online test to have more test anxiety than paper-based tests. Only seven students showed no difference between the two learning approaches. There is a clear relationship between the type of teaching in blended learning and the level of test anxiety, and the paper-based test appears, causing a larger volume of test anxiety than the online tests.

Looking at the results issued by the study, we find that graduate students at the University of Tabuk find that they are less prone to test anxiety when their tests are done using the computer and online. These results were consistent with several studies conducted in different educational environments and levels. For example, a study conducted by Stowell and Bennett (2010) indicated that online tests contribute to decreasing the percentage of test anxiety, with the opposite for face-to-face education. Similarly, the outcomes from the present study were comparable to a study by Cassidy and Gridley (2005). They pointed out that online tests have a different environment from paper tests, as they contain features that help reduce test anxiety. Moreover, online tests represent less threat to students than paper-based tests.

To answer the RQ2, Do Saudi undergraduate students prefer paper-based or online tests in terms of test anxiety? A questionnaire designed by the researcher was used to collect the data. The question was meant to test whether students prefer to deal with paper-based tests or online tests in terms of their test anxiety problems. In other words, do students see that paper-based exams cause less test anxiety, so they prefer them, or do they think online exams cause less test anxiety, and therefore they prefer them?

Spearman correlation		Value	Asymptotic Standard Errora	Approximate Tb	Approximate Significance
Ordinal by Ordinal	Spearman Correlation	-.573	.079	-8.147	<.001c
N of Valid Cases		138			

The Spearman correlation test showed that the two styles of testing, paper-based and online, are correlated with 0.57, and the p-value supports a significant correlation where it appears clearly that there is a difference between the two types of testing and that the students' responses were different in terms of preference for one type over another.

Descriptive Statistics					
	N	Mean	Std. Deviation	Minimum	Maximum
Paper based tests prefer	138	1.6732	.68001	1.00	3.00
Online tests prefer	138	2.3971	.70202	1.00	3.00

The table explicitly showed a discrepancy in the students' responses to their preferred test type, whether a paper-based or an online test. The descriptive statistics table showed that students prefer online tests with a mean of (2.397 and std 0.70) and paper-based tests with a mean of (1.673 and std 0.680). Clearly, from the table, we notice that students prefer online testing for better dealing and handling test anxiety. The findings mean that students reveal students' tendency toward online testing when dealing with test anxiety.

Wilcoxon rank test Ranks				
		N	Mean Rank	Sum of Ranks
Online tests prefer & paper-based tests prefer	Negative Ranks	32a	43.81	1402.00
	Positive Ranks	90b	67.79	6101.00
	Ties	16c		
	Total	138		

The non-parametric Wilcoxon rank test was applied for the two related data samples. The test showed a difference between the two testing styles. The table above showed that 16 students indicated no difference between the two testing styles. Moreover, 90 students indicated that they prefer online tests in relation to test anxiety. However, 32 students indicated that they prefer paper-based tests in relation to test anxiety.

Responses percentage for paper-based tests

first section	Response		
	Disagree	Neutral	Agree
Percent	55%	22.68%	22.32%

The table above shows the percentage of students' responses to each item. The table shows that 55% of students indicated (Disagree) with the questionnaire items. Also, 22.68% of students indicated (Neutral). Finally, 22.32% of students indicated (Agree). Clearly that the majority of students disagree that paper-based tests are preferable to test anxiety.

Responses percentage for online tests

first section	Response		
	Disagree	Neutral	Agree
Percent	19.49%	21.30%	59.20%

The table above shows the percentage of students' responses to each item. The table shows that 19.49% of students indicated (Disagree) with the questionnaire items. Also, 21.30% of students indicated (Neutral). Finally, 59.20% of students indicated (Agree) clearly that the majority of students agree that online tests are preferable for test anxiety.

It is clear that online education will continue to grow, and with each passing day, the need to use it in the educational process increases. Moreover, it has become clear that online education and testing was the only solution during the period of the Corona pandemic, which made it impossible to conduct paper-based and face-to-face exams, as online education was the only available option.

The results of the quantitative data in the present study support the first hypothesis that students experience more test anxiety in paper-based tests than in online tests. The present study reported an issue with paper-based and online tests that appear to have escaped the attention of researchers. The findings from the present study at Tabuk University revealed that students when involved in paper-based tests and online tests, their level of test anxiety differs. It found that they encounter a higher level of test anxiety in paper-based tests than in online tests. A severe high level of test anxiety may have a negative impact on students' academic performance (Khalid and Hasan 2009; Rana and Mahmood 2010; Hancock 2001; Ndirangu, Muola, Kithuka, and Nassiuma 2009). Providing students with online tests instead of paper tests can help reduce students' anxiety and lower the relationship between test anxiety and test performance (Powers, 2001).

The results in the present study also came into agreement with the second hypothesis. Students prefer online tests in relation to test anxiety. The students reacted positively to the level of test anxiety in online tests. Their response to the favored testing style expressed a high tendency to continue with online tests rather than paper-based tests. It is clear that they feel more comfortable with online tests; on the contrary, they still have many hesitations concerning paper-based tests. The results were also in agreement with a study by Özden, M. Y. (2005). He stated that although the students displayed some degree of anxiety during the online test, it was clear that they had a strong inclination toward continuing with the online tests. The outcomes also came into agreement with (Al-Qdah & Ababneh 2017). The researchers compared the students' perceptions of paper-based and online tests in their study. They found that students favoured and showed more comfortability with some features of online exams, such as immediate results and feedback. It appears that the characteristics of online tests offer a more peaceful environment for students, which can lower the level of their test anxiety.

5. Conclusion

Many studies indicated that online learning and testing involves many factors like better control, fast and easy use, friendly interfaces, instantaneous feedback, and many others that students prefer to deal with and can positively impact how they feel (Ridgway, McCusker & Pead, 2004; Peterson, 2013; Eljinini, Alsamarai, Hameed, & Amawi, 2012). The findings from the present study should pave the way for further exploration of this topic in Saudi Arabia and enable us to expand our understanding of the relationship between paper-based and online tests. Indeed, additional research in this area would benefit more learners to be successful. However, possibly more noteworthy is that we have determined a need that decision-makers and college and university counselling administrators need to address in their programs and that instructors require to consider when utilizing paper-based or online tests in their classrooms.

6. Limitations

The educational system in the Kingdom of Saudi Arabia is based on gender segregation in education and teaching. Accordingly, it was difficult for the researcher to reach the male campus and obtain male samples. Consequently, the current study was limited to female samples only, as it would have been possible to obtain more diverse and comprehensive data if it had been included.

In addition, to some extent, the percentage of students who participated in the study was low due to poor communication with students during the data collection period. Many participating students were contacted through social media like WhatsApp or through their teachers in the classrooms. Consequently, the researcher was forced to be satisfied with a limited number of answers to the questionnaire and start analysing and obtaining results.

7. Recommendations

It is recommended that other studies be carried out containing diverse samples, including males and females, and covering both sexes. The gender variable is considered one of the variables that have an effective impact in research, as in most cases, differences and similarities appear that directly affect it (Hyde, 2007).

The current study is considered one of the unfamiliar studies in Saudi Arabia, which needs more research and study with more extensive features. Therefore, more studies are recommended, containing more samples, including more diverse groups and more students, and covering more areas within the Kingdom.

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References

- [1] Alibak, M., Talebi, H., & Neshat-Doost, H. T. (2019). Development and Validation of a Test Anxiety Inventory for Online Learning Students. *Journal of Educators Online*, 16(2), n2.
- [2] Al-Qdah, M., & Ababneh, I. (2017). Comparing online and paper exams: Performances and perceptions of Saudi students. *International Journal of Information and Education Technology*, 7(2), 106.
- [3] Allen, I. E., & Seaman, J. (2017). Digital learning compass: Distance education enrollment report 2017. Oakland, CA: Babson Survey Research Group.
- [4] Baig, W. A., Al-Zahrani, E. M., Al-Jubran, K. M., Chaudhry, T., & Qadri, A. A. (2018). Evaluation of test anxiety levels among preparatory year students of PSMCHS during computer-based versus paper-and-pen examination. *International Journal of Medical Research & Health Sciences*, 7(1), 48-52.
- [5] Benson, A. (2002). Using online learning to meet workforce demand: A case study of stakeholder influence. *Quarterly Review of Distance Education*, 3(4), 443-452.
- [6] Carliner, S. (2004). An overview of online learning (2nd ed.). Amherst, MA: Human Resource Development Press.
- [7] Cassady, J. C., & Gridley, B. E. (2005). The effects of online formative and summative assessment on test anxiety and performance. *The Journal of Technology, Learning and Assessment*, 4(1).
- [8] Conrad, D. (2002). Deep in the hearts of learners: Insights into the nature of the online community. *Journal of Distance Education*, 17(1), 1-19
- [9] Duraku, Z. H. (2017). Factors influencing test anxiety among university students. *The European Journal of Social & Behavioural Sciences*.
- [10] Eljinini, M. A. H., Alsamaraï, S., Hameed, S., & Amawi, A. (2012). The Impact of E-assessments system on the success of the implementation process. *International Journal of Modern Education and Computer Science*, 4(11), 76.
- [11] Hancock, D. R. (2001). Effects of test anxiety and evaluative threat on students' achievement and motivation. *The Journal of educational research*, 94(5), 284-290.
- [12] Hernández-Gantes, V. M. (2009). Teaching adult learners in online career and technical education. *International Journal of Web-Based Learning and Teaching Technologies (IJWLTT)*, 4(4), 32-49
- [13] Hyde, J. S. (2007). *New directions in the study of gender similarities and differences*. *Current Directions in Psychological Science*, 16(5), 259-263.
- [14] Khalid, R., & Hasan, S. S. (2009). Test anxiety in high and low achievers. *Pakistan Journal of Psychological Research*, 24(3-4).
- [15] Karthika, R., Vijayakumar, P., Rawal, B. S., & Wang, Y. (2019, May). Secure Online Examination System for e-learning. In *2019 IEEE Canadian Conference of Electrical and Computer Engineering (CCECE)* (pp. 1-4). IEEE.
- [16] Kumar, A. N. (2014, October). Test anxiety and online testing: A study. In *2014 IEEE Frontiers in Education Conference (FIE) Proceedings* (pp. 1-6). IEEE.
- [17] Mennin, D. S. (2004). Emotion regulation therapy for generalized anxiety disorder. *Clinical Psychology & Psychotherapy: An International Journal of Theory & Practice*, 11(1), 17-29.
- [18] Ndirangu, G.W., Muola, J.M., Kithuka, M.R. & Nassiuma, D.K. 2009. An investigation of the relationship between test anxiety and academic performance in secondary schools in Nyeri District, Kenya. *Global Journal of Educational Research*, 8(1&2), 1-7.
- [19] Nist, P., & Diehl, M. (1990). PHCC test anxiety questionnaire. Retrieved Aug 20, 2010.
- [20] Özden, M. Y. (2005). Students' perceptions of online assessment: A case study. *International Journal of E-Learning & Distance Education/Revue internationale du e-learning et la formation à distance*, 19(2), 77-92.

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- [21] Powers, D. E. (2001). Test anxiety and test performance: Comparing paper-based and computer-adaptive versions of the graduate record examinations (GRE©) general test. *Journal of Educational Computing Research*, 24(3), 249-273.
- [22] Peterson, D. (2013). Five steps to better tests.
- [23] Rana, R., & Mahmood, N. (2010). The relationship between test anxiety and academic achievement. *Bulletin of Education and research*, 32(2), 63-74. ISO 690
- [24] Rezazadeh, M., & Tavakoli, M. (2009). Investigating the Relationship among Test Anxiety, Gender, Academic Achievement and Years of Study: A Case of Iranian EFL University Students. *English Language Teaching*, 2(4), 68-74.
- [25] Ridgway, J., McCusker, S., & Pead, D. (2004). *Literature Review of E-Assessment*. Bristol: Futurelab.
- [26] Roos, A. L., Goetz, T., Voracek, M., Krannich, M., Bieg, M., Jarrell, A., & Pekrun, R. (2021). Test anxiety and physiological arousal: a systematic review and meta-analysis. *Educational Psychology Review*, 33(2), 579-618.
- [27] Stowell, J. R., & Bennett, D. (2010). Effects of online testing on student exam performance and test anxiety. *Journal of Educational Computing Research*, 42(2), 161-171.
- [28] Williams, K. E., & Andrade, M. R. (2008). Foreign language learning anxiety in Japanese EFL university classes: Causes, coping, and locus of control. *Electronic journal of foreign language teaching*, 5(2), 181-191.
- [29] Wine, J. (1971). Test anxiety and direction of attention. *Psychological Bulletin*, 76, 92-104.
- [30] Woldeab, D., & Brothen, T. (2019). 21st-century assessment: Online proctoring, test anxiety, and student performance.