The Effects of Immediate Forewarning of Test Difficulty on Test Performance in Applied Educational Context

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Abstract

Researchers have always been concerned with factors that predict students' test performance. The current study closely examined the effect of immediate forewarning of test difficulty on test performance. Previous research was conducted in a controlled setting detached from actual classroom context. It was hypothesised that low trait anxiety would be associated with better test performance, when given immediate forewarning of test difficulty, than high trait anxiety. Thirty-eight undergraduates were randomly assigned to three conditions: group A was given the warning that the test would be difficult; group B was told that the test would be easy; and group C was not given any warning at all. The students filled in STAI questionnaires and then completed a written test. The results were inconsistent with previous studies and revealed that neither trait nor state anxiety influenced performance. Correlations of both trait and state anxieties with test scores were very weak. Implications for theory, research, and practice are discussed.

Keywords: Test performance, anticipated test difficulty, test anxiety, immediate forewarning, applied educational context

Introduction

Much has been written about the factors that can influence the performance of a student in a test. In'nami (2006)[1] notes, "The test-taker characteristics and test task characteristics have effects on each other, and as a consequence, test performance results from these interactions" (pp. 318). Considerable research has been carried out to explore these characteristics and among these, anticipated test difficulty has long been theoretically specified as a crucial factor. Anticipated test difficulty is widely acknowledged as a student-formulated construct and has been found to have significant effect on test performance.[2] It is commonly conceptualised as the perception held by students regarding the difficulty level of an upcoming test.Explaining the way anticipated test difficulty was primarily manipulated in experimental settings, Thiede (1996)[3] points out that students were first exposed to either a more difficult or a less difficult test before being ultimately given a final test. It was assumed that being given a test of a particular level of difficulty would lead these students to anticipate a final test of similar difficulty level.

[1] In'nami, Y. (2006). The effects of test anxiety on listening test performance. *System*, 34, 317–340.

[2] Marso, R. N. (1969). The influence of test difficulty upon study efforts and achievement. *American Educational Research Journal*, 6 (4), 621–632.
Sax, G., Eilenberg, E. G., & Klockars, A. J. (1972). Achievement as a function of test item complexity and difficulty. *The Journal of Experimental Education*, 40, 90–93.
Sax, G., & Reade, M. (1964). Achievement as a function of test difficulty level. *American Educational Research Journal*, 1 (1), 22–25.

[3] Thiede, K. W. (1996). The relative importance of anticipated test format and anticipated test difficulty on performance. *The Quarterly Journal of Experimental Psychology*, 49A (4), 901–918.

The variant scores of tests were then compared to determine the effect of anticipated test difficulty on test performance. The findings of these experiments reflected that test performance was better for students who had anticipated a more difficult test as compared to those who had anticipated a less difficult one.[4] The researchers cited three main reasons for this: (1) a heightened motivation to study[5], (2) greater time spent on task[6], and (3) longer study time[7]. It must be noted that these earlier studies were typically conducted in a setting where students had sufficient time to study for the upcoming test, which they anticipated to be difficult. However, at times students learn about the difficulty of a test just moments prior to the test. For example, they may get to know it through other batch-mates or the teacher may drop the hint when distributing the test paper. In this instance, students have no time to study for the test, rendering all the above-mentioned theoretical explanations inapplicable. Researchers believe that in this case, anxiety will be triggered.[8] Hence the term 'immediate forewarning' in the present study scenario refers to the warning that is given just moments before administering the test. The present research is designed to investigate the extent to which immediate forewarning of test difficulty affects test performance.

Role of Test Anxiety in Influencing Test Performance

When students are warned about the difficulty of a test, test anxiety is aroused [8] above. Since test anxiety is one of the underlying constructs in the present study, it is imperative to understand it further. Test anxiety is an extensively-researched area in educational psychology and has been the subject of much scholarly debate.[9] One well-accepted definition of test anxiety is "the reactions of students in a variety of testing and assessment contexts" (pp. 209).[10] The occurrence of test anxiety is influenced by both trait dispositions and situational factors.[11] Previously, research proposed that test anxiety inhibits test performance.[12] According to this straightforward, linear model, more anxiety necessarily translated into poorer performance. However, in their comprehensive study on test anxiety, Sarason, Mandler, & Craighill (1952)[13] posited that moderate levels of anxiety (conceptualised as the sum of state and trait anxiety) would generate better test performance as compared to higher levels of anxiety. Here, it is necessary to define and differentiate state and trait anxiety:

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[4] Sax, G., Eilenberg, E. G., & Klockars, A. J. (1972). Achievement as a function of test item complexity and difficulty. *The Journal of Experimental Education*, 40, 90–93.
Sax, G., & Reade, M. (1964). Achievement as a function of test difficulty level. *American Educational Research Journal*, 1 (1), 22–25.

[5] Foos, P. W. (1992). Test performance as a function of expected form and difficulty. *The Journal of Experimental Education*, 60, 205–211.

[6] Eisenberger, R. (1992). Learned industriousness. *Psychological Review*, 99 (2), 248–267.

[7] Kellas, G., & Butterfield, E.C. (1971). Effect of response requirement and type of material on acquisition and retention performance in short-term memory. *Journal of Experimental Psychology*, 88, 50–56.
Waugh, N. C. (1967). Presentation time and free recall. *Journal of Experimental Psychology*, 73, 39–44.

[8] Weber, C. J., & Bizer, G. Y. (2006). The effects of immediate forewarning of test difficulty on test performance. *The Journal of General Psychology*, 133 (3), 277–285.

[9] 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.

[10] Putwain, D. (2007). Researching academic stress and anxiety in students: some methodological considerations. *British Educational Research Journal*, 33 (2), 207–219.

[11] Fairclough, S. H., Tattersall, A. J., & Houston, K. (2006). Anxiety and performance in the British driving test. *Transportation Research Part F*, 9, 43–52.

[12] Lusk, S. L. (1981). Test anxiety, level and accuracy of predicted performance. *Psychological Reports*, 49, 527–532.
Sarason, I. G. (1984). Stress, anxiety, and cognitive interference: Reactions to tests. *Journal of Personality and Social Psychology*, 46, 929–938.
Tobias, S., & Everson, H. T. (1997). Studying the relationship between affective and metacognitive variables. *Anxiety, Stress, and Coping*, 10, 59–81.

[13] Sarason, S. B., Mandler, G., & Craighill, P. G. (1952). The effect of differential instructions on anxiety and learning. *Journal of Abnormal and Social Psychology*, 47, 561–565.

> "State anxiety has been defined as a transitory feeling of tension and apprehension; it may fluctuate over time and can vary in intensity. In contrast, trait anxiety denotes relatively stable individual differences in anxiety proneness and refers to a general tendency to respond with anxiety to perceived threats in the environment." (Vigneau & Cormier, 2008, pp. 280)[14]

This alternate proposition advocated by Sarason, Mandler, & Craighill (1952)[13] hints at a curvilinear model of test anxiety and test performance. This implies that the relationship between test anxiety and performance is more complex than traditionally thought. There are various factors that moderate the relationship between the two. For example, performance during the lessons versus tests[15], massed vs. distributed practice of test taking[16], and item difficulty.[17] This finding can be understood in terms of Eysenck and Calvo's (1992)[18] processing efficiency theory. According to this theory, anxiety may either enhance or hamper task performance. They believe that restrictions in working memory capacity are responsible for the decrements in the cognitive performance of highly test-anxious individuals. This is because in test situations, these individuals encounter task-irrelevant thoughts, such as worries and fear of adverse outcomes, which partially occupy working memory capacity. In easy tasks, the remaining memory capacity may suffice to fulfil task requirements. In complex tasks, however, it may not. Consequently, high-anxious individuals will demonstrate performance decrements primarily in complex tasks.

Subsequently, well-documented evidence emerged, based primarily on correlational work, endorsing this contention of a curvilinear relationship between anxiety and performance.[19] For example, Rocklin & Thompson (1985)[20] ascertained that on a fairly complex examination, students reporting lower test anxiety tended to illustrate better scores than their high-test anxiety counterparts. Alternatively, when given a relatively easy test, students with modest levels of test anxiety achieved higher scores than those maintaining either low or high levels of anxiety. Since these researches challenge the hitherto simple beliefs regarding anxiety, this theoretical perspective requires further investigation.

Immediate Forewarning of Test Difficulty as a Moderator

Although research into the effects of anticipated test difficulty on test performance is abundant, relatively few investigations have directly focused on immediate forewarning of test difficulty. A series of research on test performance employ the methodology where the warnings of test difficulty are given well before the exam so that students have adequate time to prepare.[4] Unfortunately, the construct of forewarning students only minutes before the exam continues to be an understudied area. Recently, Weber & Bizer (2006)[8] investigated the effects of immediate forewarning of test difficulty on test performance in a laboratory setting, where students' performance did not have any implications on their grades. The participants included sixty-two Eastern Illinois University psychology students, who were subjected to Graduate Record Examination (GRE). Although, the importance of this exam was seemingly stressed upon students, it was obvious that their performance had no bearing on their future academic life.

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[14] Vigneau, F., & Cormier, S. (2008). The factor structure of the state-trait anxiety inventory: An Alternative View. *Journal of Personality Assessment*, 90 (3), 280–285.

[15] Kivimaki, M. (1995). Test anxiety, below-capacity performance, and poor test performance: Intrasubject approach with violin students. *Personality and lndividual Differences*, 18, 47–55.

[16] Zimmer, J. W., & Hocevar, D. J. (1994). Effects of massed versus distributed practice of test taking on achievement and test anxiety. *Psychological Reports*, 74, 915–919.

[17] Kim, S. H., & Rocklin, T. (1994). The temporal patterns of worry and emotionality and their differential effects on test performance. *Anxiety, Stress and Coping: An International Journal*, 7, 117–130.

[18] Eysenck, M.W., & Calvo, M.G. (1992). Anxiety and performance: The processing efficiency theory. *Cognition & Emotion*, 6, 409–434.

[19] Sapp, M. (1993). *Test anxiety: Applied research, assessment, and treatment intervention*. Lanham, MD: University Press of America.

[20] Rocklin, T., & Thompson, J. M. (1985). Interactive effects of test anxiety, test difficulty, and feedback. *Journal of Educational Psychology*, 77, 368–372.

The findings revealed that students with low trait anxiety performed better when told that the test would be difficult than when told that the test would be easy. On the other hand, students with high trait anxiety were susceptible to adverse performance when warned that the test would be difficult than they did when told the test would be easy. Hence Weber & Bizer (2006)[8] also found substantial empirical support for a curvilinear relationship between test anxiety and test performance.[21]

The Present Study

Given the critical importance assigned to testing in educational institutions and society, the relationship between test anxiety and test performance merits to be probed further. The primary aim of the current experiment is to extend the Weber & Bizer (2006)[8] study and examine the association between immediate forewarning of test difficulty and test performance. Hence the current research seeks to advance understanding of test performance and will hold implications for educationists in deciding whether or not to give a warning of test difficulty just before giving the test paper. Since some examiners give such warnings, the research will empirically investigate the effects of doing so. Moreover, the research will also shed light on the psychological mechanisms that underpin students' performance in a test. Here, the term 'applied educational context' needs to be clarified. The term entails an actual classroom setting, where students' performance in the test will have consequences on their final grade in the course. It is not clear how this context might influence students' performance. It is conceivable that this key alteration in test conditions may potentially escalate the anxiety experienced by students and therefore, influence the results. Therefore, the present study was designed in order to establish these linkages.

Hypothesis

In accordance with theoretical and empirical works reviewed, the following hypotheses were advanced:

H1: Students with low trait anxiety would perform better when given a warning of test difficulty just before the test.

H2: Students with high trait anxiety would not perform as well when given a warning of test difficulty just before the test.

Methodology

Participants

Thirty-eight first-year BBA students, studying in a private business school in Karachi, were selected as participants. The participants comprised of 14 male and 24 female students. The students were all enrolled in a course titled Speech Communication, which basically stressed on oral communication in various contexts, especially business.

Procedure

Upon entering the class, the students were briefed about the requirements of the study. They gave their written informed consent to take part. They were then given vague information regarding the purpose of the study, so as to prevent participant bias. They were told that they will be participating in a study that investigates students' test achievements and that they would have to fill in some questionnaires after which they will be given a test. The students were then asked to complete the 20-item trait-anxiety questionnaire (measuring level of dispositional anxiety) from the State-Trait Anxiety Inventory (STAI)[22] to evaluate their levels of trait anxiety. It is a self-report instrument with items like 'I feel nervous and restless' and options ranging from 'almost never' to 'almost always'.

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[21] Alpert, R., & Haber, R. N. (1960). Anxiety in academic achievement situations. *Journal of Abnormal and Social Psychology*, 61, 207–215.
Ball, S. (1995). Anxiety and test performance. In C. D. Spielberger & P. R. Vagg (Eds.), *Test Anxiety: Theory, assessment, and treatment* (pp. 107–113). Washington, DC: Taylor & Francis.

[22] Spielberger, C. D. (1983). *Manual for the State-Trait Anxiety Inventory Form* V. Palo Alto, CA: Consulting Psychologists Press.

The students were then randomly sent into three different classrooms. In this way the students were allocated to three distinct condition groups A, B and C, based on the kind of warning they received about the difficulty of the test. Group A (n =12) was warned that the test will be particularly difficult; group B (n =13) was told that the test will be particularly easy; and group C (n = 13) was not recipient to any warning at all and hence acted like a control group. This was done to induce different degrees of state anxiety among students. All the warnings were given orally.

The students then completed the 20-item state-anxiety inventory (measuring momentary levels of anxiety) from the STAI. The students were then administered a written test, timed for 10 minutes, comprising of 10 multiple choice questions. The test had items like 'Which statement most accurately describes the relationship between spoken language and written language?' with four options namely: A) Spoken language changes very little when converted to written language; B) Mastering spoken language before written language ensures that individuals will communicate more effectively in writing; C) The complexity of ideas in written language generally contrasts with the straightforward presentation of ideas in spoken language; and D) New words are generally used in written language before they become part of the spoken language.This objective test prevented examiner bias in scores and contributed 5% to the overall mark. Test performance was operationalised via scores of the test.

Data Analysis

ANOVA tests were carried out between anxiety levels and number of correctly answered questions under each condition groups. The relative impact of anticipated test difficulty on performance was evaluated by comparing the mean proportion of correct responses on the quiz for students who had anticipated particularly easy, difficult or not anticipated at all.

Results

Recall that the hypotheses proposed that 1: A warning of test difficulty just before the test would facilitate the performance of students with low trait anxiety and 2: Students with high trait anxiety would not perform as well when given a warning of test difficulty just before the test. However, the data presented here do not appear to support this view. There were no significant differences for trait anxiety (F = 0.740 and p = 0.746). Similarly, there were no significant difference for state anxiety (F = 1.023 and p = 0.505, see Table 1). Hence both the hypotheses were rejected.

Table 1: Relationship between State Anxiety and Test Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.483	25	.299	1.023	.505
Within Groups	3.510	12	.293		
Total	10.993	37			

Evidently, correlation between trait and state anxiety was positive but not so significant (r = 0.59). The correlation between state anxiety and test scores was - 0.13, which is not significant but the correlation between trait anxiety and test scores was positive but very weak (r = 0.02). This hints at a curvilinear relationship between trait anxiety and test scores.

Discussion

The primary objective of this study was to extend Weber & Bizer (2006)[8] work and examine whether anxiety levels influenced students' performance when given warnings that the test would be difficult or easy. The results were not as expected. State and trait anxieties were not the influencing factors in students' performance. It means that regardless of the kind of warning received, students' performance did not vary significantly. These findings may be explained by the very weak associations of state and trait anxiety with test performance. This finding is in accordance with previous researches that have found no correlation between anxiety and performance.[23] It can be concluded that the earlier findings could not be generalised to an actual classroom setting.

[23] Eady, S. (1999). An Investigation of Possible Correlation of General Anxiety with Performance in Eleven-plus Scores in Year 6 Primary School Pupils. *Educational Psychology*, 19 (3), 347–359.

Firstly, a number of contextual factors may have been involved here including regular study time, motivational levels, test-taking and study/learning skills. Other factors such as the effect of experiences an individual has had on a day-to-day basis may make that individual more or less anxious on a particular day than another. Further research is needed to identify these other factors that influence the performance.

Secondly, it must be noted that in this study, trait and state anxiety levels were assessed as opposed to test anxiety. It is possible that different pattern of results in this sample may have emerged had test anxiety been measured.

Thirdly, it is probable that the small sample size did not allow for an accurate picture to emerge. Fourthly, it is possible that the students did not take the warnings very seriously. The weak correlation between trait and state anxieties could be an indication of this. Hence the manipulation may be ineffective.

Nonetheless, the present investigation contributes to our understanding of the mechanisms producing anxiety resulting from warning of difficulty. In summary, psychologists involved in the design and delivery of anxiety intervention and treatment are encouraged to think carefully about different manifestations and "types" of test anxiety [24] and avoid assumptions that targeting anxiety itself will necessarily influence performance.

Conclusion

Research has shown that a variety of variables can play a role in the grade a student receives on a particular examination. Rocklin (1997)[25] contends: "Test scores are always a result of the interaction between attributes of the examinee and attributes of the test" (pp. 84). The study aimed to establish whether immediate forewarning of test difficulty is a salient factor to effect test performance in an actual classroom setting. It is relevant to study this since teachers frequently give such warnings to their students without realising the repercussions of doing so. Since testing is an integral part of education system [26], it is important to control for environmental variables or experiences that may negatively impact the reliability and validity of test scores. The results did not support the proposed hypothesis with no significant effect of trait or state anxiety on performance being apparent in the groups studied. In summary, the study failed to find any correlation between low trait anxiety students performing better when given a warning of test difficulty just before the test as compared to high trait anxiety.

Limitations and Directions for Future Research

Considering small sample size (38 participants), the results may not be very convincing. Therefore, the sample may not be representative of possible 'real' effects of immediate forewarning of test difficulty on test performance in applied educational context.

Secondly, the study relies on self-report measures of anxiety. Some students may hesitate in admitting their actual anxiety feelings. It is therefore imperative that any conclusions based on the measurement of this variable in this way be critically examined.

Thirdly, the research does not directly address how immediate warning of difficulty precisely affects performance. There is considerable scope for future research to investigate how the warnings may be influencing the anxiety-performance relationship.

Fourthly, the kind of test being given to students may also be a critical factor. For example In'nami (2006)[1] found that test anxiety did not influence students' performance in a listening skills test. Furthermore, the task type set for the test may also influence the result. In the present study a written test was given. This variable must be followed up in subsequent studies.

Fifthly, foreign language anxiety is also a crucial area.[1] It could be that the case of second language learners is different. More research needs to be done to explore this further.

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[24] Zeidner, M. (1998). *Test anxiety: The state of the art*. New York: Plenum Press.

[25] Rocklin, T. (1997). Self-adapted testing: Improving performance by modifying tests instead of examinees, *Anxiety, Stress & Coping*, 10 (1), 83–104.

[26] Miksch, K. L. (2003). Legal issues in developmental education: the impact of high-stakes testing. *Research and Teaching in Developmental Education*, 19 (2), 53–58.

Appendix A

STAI

Your responses will be treated completely **confidentially**, and results will only be referred to in statistical form or anonymously.

Please read the following statements about how people feel **in general**. Circle the number that best describes how you generally feel. There are no right or wrong answers.

1. I feel pleasant

Almost never 1 2 3 4 Almost always

2. I feel nervous and restless

Almost never 1 2 3 4 Almost always

3. I feel satisfied with myself

Almost never 1 2 3 4 Almost always

4. I wish I could be as happy as others seem to be

Almost never 1 2 3 4 Almost always

5. I feel rested

Almost never 1 2 3 4 Almost always

6. I am 'calm, cool and collected'

Almost never 1 2 3 4 Almost always

7. I feel that difficulties are piling up so that I cannot overcome them

Almost never 1 2 3 4 Almost always

8. I worry too much over something that doesn't really matter

Almost never 1 2 3 4 Almost always

9. I am happy

Almost never 1 2 3 4 Almost always

10. I have disturbing thoughts

Almost never 1 2 3 4 Almost always

11. I lack self-confidence

Almost never 1 2 3 4 Almost always

12. I feel secure

Almost never 1 2 3 4 Almost always

13. I make decisions easily

Almost never 1 2 3 4 Almost always

14. I feel inadequate

Almost never 1 2 3 4 Almost always

15. I am content

Almost never 1 2 3 4 Almost always

16. Unimportant thoughts run through my mind and bother me

Almost never 1 2 3 4 Almost always

17. I take disappointments to heart and I can't put them out of my mind

Almost never 1 2 3 4 Almost always

18. I get in a state of tension or turmoil when I think about my recent concerns and interests

Almost never 1 2 3 4 Almost always

19. I feel like a failure

Almost never	1	2	3	4	Almost always

20. I am a steady person

Almost never	1	2	3	4	Almost always

Please read the following statements about how people feel **at the moment**. Circle the number that best describes how you generally feel. There are no right or wrong answers.

1. I feel calm

Not at all	1	2	3	4	Very much so

2. I feel secure

Not at all	1	2	3	4	Very much so

3. I am tense

Not at all	1	2	3	4	Very much so

4. I feel strained

Not at all	1	2	3	4	Very much so

5. I feel at ease

Not at all	1	2	3	4	Very much so

6. I feel upset

Not at all	1	2	3	4	Very much so

7. I am presently worrying over possible misfortunes

Not at all	1	2	3	4	Very much so

8. I feel satisfied

Not at all	1	2	3	4	Very much so

9. I feel frightened

Not at all	1	2	3	4	Very much so

10. I feel comfortable

Not at all	1	2	3	4	Very much so

11. I feel self-confident

Not at all	1	2	3	4	Very much so

12. I feel nervous

Not at all	1	2	3	4	Very much so

13. I am jittery

Not at all	1	2	3	4	Very much so

14. I feel indecisive

Not at all	1	2	3	4	Very much so

15. I am relaxed

Not at all	1	2	3	4	Very much so

16. I feel content

Not at all	1	2	3	4	Very much so

17. I am worried

Not at all	1	2	3	4	Very much so

18. I feel confused

Not at all	1	2	3	4	Very much so

19. I feel steady

Not at all	1	2	3	4	Very much so

20. I feel pleasant

Not at all	1	2	3	4	Very much so