International Journal of Evaluation and Research in Education (IJERE)
Vol.6, No.2, June 2017, pp. 157~163
ISSN: 2252-8822

Format of Options in Multiple Choice Test Vis-a-Vis Test Performance

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Article Info

Article history:

Received Mar 16, 2017
Revised May 25, 2017
Accepted May 31, 2017

Keyword:

Testing
Test Format
Multiple-Choice Test
Evaluation
Student Performance

ABSTRACT

Testing or evaluation in an educational context is primarily used to measure or evaluate and authenticate the academic readiness, learning advancement, acquisition of skills, or instructional needs of learners. This study tried to determine whether the varied combinations of arrangements of options and letter cases in a Multiple-Choice Test (MCT) affect the test performance of the homogenous BEED students. A test was designed and administered to test the performance across test items employing different arrangements of options (Cascading Eye Movement, Inverted N Eye Movement, Z Eye Movement, and One-line Horizontal Eye Movement) and across case of letter options (upper and lower case), that is, a total of eight (8) treatments. The statistical analyses revealed that there is an insignificant difference in the mean performance of students in relation to letter cases and arrangement of letter choices in a multiple choice test. Thus, the test performance of students in a multiple choice type of test does not depend on either letter cases or arrangement of letter choices.

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1. INTRODUCTION

Test taking is a salient part in the teaching-learning process, through which teachers will become certain as to the learning and progress that students make in the class. Teachers, when making or constructing test items, take into consideration principles and guidelines set and accepted as standard; however, with the education's inclination of becoming more student-centered, an issue that calls attention nowadays is that whether or not in the formulation of test items teachers place importance and consideration on students' preferences and likes, among others, and not just what they (teachers) opt and think as best.

An aspect in the learner-centered education is the recognition of learning style preferences which has been widely accepted in the teaching-learning environment. However, [1] noted that the phase of assessing a learner's knowledge is rarely included in the process of accommodating their preferences. This is very crucial because ""if any aspect of a test is unfamiliar to candidates, they are likely to perform less well than they would do otherwise (on subsequently taking a parallel version, for example)" [2].

Along with the same line of argument, [3] reported that although innovations in instruction that respond to different learners' styles and preferences like variety of instructional techniques and materials are implemented, the issue on assessment has not received the same amount of attention. It was further argued

that if teachers can agree that students have different methods for learning, does it not stand to reason that they have different methods of reproducing this knowledge as well?

Reference [4] reviewed existent literatures and reported that students' learning style preferences seem to be correlated with their class performance when teaching styles match with students' learning style; but they recognize the dearth of literature that concerns learning preference and performance with respect to type of examination used. Consequently, they ventured on finding out learners' performance in a Multiple Choice Test if it is significantly influenced by their learning style preferences.

Reference [5] ventured on a study that identified students' preference on arrangements and letter case of options in a multiple-choice test. The study revealed that students preferred the Cascading arrangement options, while their least preferred arrangement of options was the One-line horizontal arrangement. Moreover, their preference was based on the reason that the cascading option is easy to the eye and does not contribute to confusion and which means lesser effort on the test takers' part. This reported reason conforms to what references [6]-[13] asserted that people want their choice to be easy. This study's findings led the researchers to argue that in constructing a Multiple Choice Test, one has to consider using the Cascading arrangement of options.

The consideration concerning options in the MCT, specifically the arrangement of options is within the domain of eye movement or the eye-mind link in visual cognition. Reference [14] introduced the "gaze-contingent moving window paradigm" which asserts that text presented during any given fixation is directly manipulated by changing the display as a function of eye position; thus, text within the window region (area of text visible to reader) is displayed normally, and those outside the window is mutilated in some way. This further pointed out that readers can only process information contained in a certain visual field (window) in a single fixation. Figure 1 illustrates moving window paradigm.

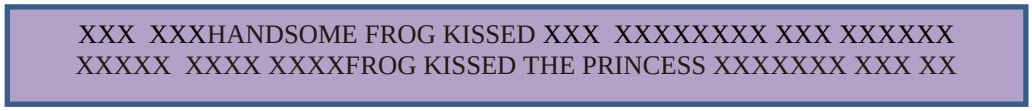

Figure 1. Moving Window Paradigm

The moving window paradigm is aptly employed in the structuring of the MCT options, where each option is considered a window or a visual field in which test takers process information in a single fixation. Considering the takers' eye movement determined through moving window in going through the sequence of options determined through letter sequences *a*, *b*, *c*, or *d*, it is noteworthy to bridge connection between and among eye movement and test takers' preference of options in the MCT, and to delve into finding out whether or not eye movement poses an effect to information processing as affected by arrangement of the sequence of options.

MCT options are commonly arranged as follows which [5] labelled as: Cascading Eye Movement, Z Eye Movement, Inverted N Eye Movement, and One-line Horizontal Eye Movement.

Figure 2. Cascading Eye Movement

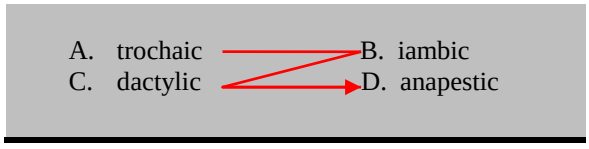

Figure 3. Z Eye Movement

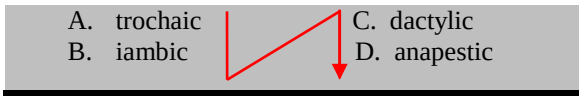

Figure 4. Inverted N Eye Movement

Figure 5. One-line Horizontal Eye Movement

Tracing the eye-movement in the Cascading arrangement, it is seen to be presenting one window in every line; thus, requiring a single fixation in every line, and eye movement is directed downwards to the other options arranged vertically in the successive next three lines. In the Z option, there are two windows in every line and eyes are to execute a return sweep going to the next options in the other two windows contained in the next line. The Inverted N option is arranged by situating two windows in each line, but eye movement is directed from the first window in the first line to the first window in the next line and is then directed to move up to the second window in the first line then moves down to the second window in the second line. The One-line horizontal movement is arranged with four windows contained in one line, in which eye movement is directed from the first window to the second, third, and fourth windows.

The test structure, whether as based on teachers' option or based on students' preferences, has to be looked into in the context of students' test performance, because after all, what matters most in testing is students' performance as manifested through test scores. This study attempted to find out information that affirms or negates the assumption that when structure of format of options in the test items are based on test-takers' preference, the better or the higher will be the test performance or scores. This ventured on finding out information on students' test performance across test items employing different arrangement of options (Cascading Eye Movement, Inverted N Eye Movement, Z Eye Movement, and One-line Horizontal Eye Movement) and across case of letter options (upper and lower case).

2. RESEARCH METHOD

This research employed descriptive-comparative design. This design was used to describe the performance of the students as well as compare their performance across different formats on arrangement and letter cases. Forty-four (44) percent, comprising of 176 students, of the total population of the second year Bachelor of Elementary Education (BEED) students of Leyte Normal University were randomly selected to participate in this study. To minimize the possible confounding effect of gender on the test performance, all females were taken as respondents. The respondents were divided into eight (8) groups, and all groups took the same test but were assigned to different arrangements of options (Cascading Eye Movement, Inverted N Eye Movement, Z Eye Movement, and One-line Horizontal Eye Movement) and across case of letter options (upper and lower case). An average of twenty-two (22) students took each test type.

The test consisted of 60 items lifted from published Licensure Examination Test (LET) Reviewers. It covered the following subject areas: English, Filipino, Science, Social Science, and Information Communication Technology. All set of tests had similar test items; the tests differed in the arrangement of choices and across case of letter options (upper and lower case). The arrangements of choices suggested by [5] were used:

Arrangement 1: Cascading Eye Movement – lower case

a. I prefer letter Q
b. I prefer letter Q
c. I prefer letter Q
d. I prefer letter Q

Arrangement 2: Cascading Eye Movement – upper case

A. I prefer letter Q
B. I prefer letter Q
C. I prefer letter Q
D. I prefer letter Q

Arrangement 3: Z Eye Movement – lower case

a. I prefer letter Q	b. I prefer letter Q
c. I prefer letter Q	d. I prefer letter Q

Arrangement 4: Z Eye Movement – upper case

A. I prefer letter Q	B. I prefer letter Q
C. I prefer letter Q	D. I prefer letter Q

Arrangement 5: Inverted N Eye Movement – lower case

a. I prefer letter Q	c. I prefer letter Q
b. I prefer letter Q	d. I prefer letter Q

Arrangement 6: Inverted N Eye Movement – upper case

A. I prefer letter Q	C. I prefer letter Q
B. I prefer letter Q	D. I prefer letter Q

Arrangement 7: One-line Horizontal Eye Movement – lower case

a. I prefer letter Q b. I prefer letter Q c. I prefer letter Q d. I prefer letter Q

Arrangement 8: One-line Horizontal Eye Movement – upper case

A. I prefer letter Q B. I prefer letter Q C. I prefer letter Q D. I prefer letter Q

The test scores were tabulated according to subject areas per test type. These were analyzed using Stata. The students' test scores in each subject area were compared according to the arrangements of choices and across case of letter options (upper and lower case) using factorial analysis of variance (ANOVA).

3. RESULTS AND ANALYSIS

3.1. Performance of Students According to Letter Cases and Arrangements of Letter Choices

Table 1 shows the mean performance of the respondents across the eight (8) different combinations of letter cases and arrangements of letter choices in a multiple-choice test. Furthermore, the table apparently exhibits the ranking of the arrangements of options for upper and lower cases. As revealed, the One-line Horizontal arrangement of choices ranks first with a mean of 34.77. The second in rank is the Inverted N arrangement with a mean of 32.41 while the Z arrangement ranks third with a mean of 31.52 and lastly, the Cascading arrangement ranks fourth with a mean of 30.19.

Additionally, for the upper case, the inverted N arrangement ranks first with a mean of 34.02. The Z arrangement is second in rank with a mean of 33.63 while the Cascading arrangement ranks third with a mean of 33.61 and the One-line horizontal arrangement ranks last with a mean of 32.23.

Table 1. Mean Performance of Students According to Letter Cases and Arrangements of Letter Choices in a Multiple Choice Test

Font	Arrangement	Performance
Lower	Horizontal	34.77
	Inverted N	32.41
	Z	31.52
	Cascading	30.19
Upper	Inverted N	34.02
	Z	33.63
	Cascading	33.61
	Horizontal	32.23

However, with this ranking, it is ostensibly noticeable that there is certainly a negligible difference in the mean performance of students according to letter cases and arrangements of letter choices in a multiple-choice test. Thus, the arrangements of choices across case of letter options in the multiple-choice items had very limited effect on the respondents' test performance. This finding tells that the marketing principles as shared by [9] propagated by [12] on the Fixation Bias, and by [13] on Central Gaze Cascade Effect could not be applied in examining learners' choice for their option of answers in test taking. Furthermore, [5] recommendation of setting arrangement of option for answers of test in a cascading manner is somehow negated, as result showed that there is a very negligible effect of the arrangement to test scores. Table 2 strongly justifies further this claim.

3.2. Relationship of Arrangements of Options and Letter Cases to Test Performance

Table 2 shows the analysis of variance of the performance of students. Using the factorial ANOVA, the table reveals the mean performance of students between the two letter cases (lower or upper case), or among the four different arrangements (Horizontal, Cascading, Inverted N, or Z). It is apparent in the table that the interaction effect between arrangements of options and the letter cases to the students' test performance is not significant (p=0.1535). Likewise, the main effects of Arrangement (p=0.6549) and Letter Case (p=0.2354) are not significant. These results indicate that taken singly or in combination, Arrangements of Letter Choices and Letter Case (upper case or lower case) do not affect the performance of the students in the multiple-choice type test.

Table 2. Analysis of Variance of the Performance of Students

Source of Variation	Sum of Squares	df	MS	F	Prob>F
Arrangement	58.475576	3	19.49186	0.54	0.6549
Letter Case	51.129272	1	51.12927	1.42	0.2354
Interaction	192.37326	3	64.12442	1.78	0.1535
Error	5295.0157	147	36.02052		
Total	5607.6365	154	36.41322		

These findings are consistent with the findings of reference [15] and [16] and their colleagues who studied a list of words printed in fonts of varying sizes and judged how likely respondents would remember them on some later tests. The researchers were most confident that respondents would remember the words in large print, rating font size (ease of processing) as more likely to sustain memory even than repeated practice. However, the findings of their study revealed that on real tests, font size had made no difference and practice paid off. Another similar related study conducted by [5] revealed that the font size of a test has no significant effect on a student's overall performance on the test.

4. CONCLUSION

The varied combinations of letter cases and arrangements of letter choices in a multiple-choice test do not significantly affect the test performance of all the respondents. Meaning, the respondent's over-all score (test performance) has no significant association between and among eye movements and test takers' preference of options in a multiple choice test.

Issues about validity of the multiple choice test as a means of measuring the over-all proficiency and knowledge of the students and whether the questions are predominantly measuring the performance rather than the ability to deal successfully with multiple choice test items should cautiously be considered in constructing tests, especially in National Board examinations.

It is recommended that a similar study be conducted using students of other degree programs in other state universities and colleges. It is only then that satisfactory and conclusive generalizations can be arrived at. Further, the multiple-choice test items have to be carefully examined for their reliability and validity.

ACKNOWLEDGEMENTS

We would like to thank Dr. Ariel B. Lunzaga and all second year BEED respondents of Leyte Normal University.

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