Journal of Academic Society for Quality of Life
Vol. 1(3): 6-9, 2015
Available online at http://as4qol.org/?p=908

Multiple-Choice versus Written Test Scores in Pharmacy English Learning: Correlation of Test Methods and Comprehension through Teaching

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Received: February 10, 2015, Accepted: March 12, 2015

Abstract

Purpose: We investigated the correlation between written test (WT) and multiple-choice test (MCT) scores of students learning pharmaceutical science English (PSE) for the first time before and after teaching. **Methods:** Year(Yr)-4 university students (n=93) of either gender in university A listened and answered 12 questions (total score: 12) each in written and multiple choice methods within 15 min. Questions included numerals, units, formulas, chemical compound names, code numbers, etc. Question narrated for WT and MCT demanded listening differentiation of slightly altered answers of the same context. After a 60-min lecture on SE basics, the same 15-min listening test was given to the students again. The pre- versus post-lecture WT and MCT scores were statistically compared using the Wilcoxon signed-rank test. The Spearman's rank correlation rho method was then employed to elucidate the correlation between the 2 test methods. **Results:** The post-lecture WT (2.3±1.48) and MCT (8.1±1.89) scores were significantly improved compared with the respective pre-lecture scores of 0.8±0.97 and 5.4±1.79. When the score difference of WT (1.5±1.63) was compared with that of MCT (2.7±2.40) before and after lecture, there was a significant improvement ($P<0.001$). As for the WT-MCT score difference correlation, WT ability was not analogous to MCT ability (rho=0.233): i.e. the sensitivity of MCT was higher than that of WT (disregarding factors such as spelling, etc.). **Discussion:** After teaching relevant PSE basics, students improved significantly in WT and MCT scores, suggesting that exposing students to PSE teaching facilitated affirmative PSE acquirement. Additionally, MCT showed higher sensitivity than WT.

Keywords: multiple-choice, written, relevance and assessment sensitivity of tests

1. Introduction

Assessment of individual performance in a group functions as an important 'filter' to grade the high- from low-achievers, and the capable/competent from the incapable/incompetent for future tasks and endeavors. In universities, examinations are conducted to gauge the necessary standards and levels that student have attained and acquire to proceed to the next level.

There are various different types of test for assessment of standards and achievements of contents taught: written tests (WT), multiple choice test (MCT), oral tests, and illustration-based written tests. Of all the many tests, MCT has been routinely used. MCT is a form of assessment in which respondents are asked to select the best possible answer(s) from a list of choices. MCT is most frequently used in educational tests, marketing research, and political elections. MCT can be a very effective[1] and reliable[2] assessment technique without human bias.[3] In fact, MCTs are the strongest predictors of overall student performance compared with other forms of evaluations, such as in-class participation, case examinations, written assignments, and simulation games.[4] In terms of administration efficiency, MCTs usually require less time for test-takers to answer, are easy to score and grade, provide greater coverage of material, allows for a wide range of questions, with less subject input in grading answers, less marking errors, and can easily diagnose difficulty of test-takers on certain topics/concepts. Despite the fact that problem-solving and higher-order reasoning skills are better assessed with written test (WT) that comprises written short answers and essays. MCTs are often chosen, not because of the type of knowledge being assessed, but because they are more affordable for testing a large number of students.

In the present study, the relevance of pharmacy science English (PSE) scores before and after teaching

was assessed with WT and MCT, and their results were compared. The results revealed that students improved significantly in the relevant WT and MCT scores after PSE teaching. Moreover, MCT showed higher assessment sensitivity than WT, and the correlation indicated that WT ability is not analogous to MCT ability in learning PSE basics.

2. Methods and Subjects

We investigated the correlation between written test (WT) and multiple-choice test (MCT) scores of Japanese university students learning pharmaceutical science English (PSE) for the first time in university before and after teaching.

Students were orally briefed on the purpose and test-contents, and were told that the test results would not affect their routine scheduled tests and credits of their elected subjects. Results would not be published for purposes other than a report of the tests used without revealing individual performances and names.

2.1 Subjects: Year(Yr)-4 university students (n=93), pursuing a pharmacy degree in a 6-yr course attempted to learn PSE for the first time at university A, have learned literary English before. In fact, they had previously secured scores of more 750 (total: 990) in Test of English for International Communication (TOEIC) when they attended this assessment lecture.

2.2 Assessment methods and tests: In the present study, they were asked to listen and answer 12 questions (total scores: 12) each in written and multiple-choice methods within 15 min before teaching/learning. Questions included numerals, units, formulas, chemical compound names, code numbers, etc. and were narrated for WT and MCT that demanded listening differentiation of slightly altered answers of the same context (see Example A) in an alternating WT-MCT manner (e.g. Q1 was first read and required students to write the answers, followed by reading of while Q2 students, where students just had to choose the right answer from the choices given). The answers were collected after the WT and MCT tests before a 60-min lecture on PSE basics was delivered. After the lecture, the same 15-min listening test was given to the students in a manner similar to that tested before lecture.

Example A:

WT: Q1. Cell line _____ was used for testing anti-tumor drug AB-12.

MCT: Q2. Cell line (1)TD122 (2)TD123 (3)DT133 (4) DT123 was used for testing anti-tumor drug AB-12.

Note: Answers for WT question (Q1): TD135 and for MCT question (Q2): TD123

2.3 Statistical analysis: The pre- versus post-lecture WT and MCT scores were statistically compared using the Wilcoxon signed-rank test, and differences where $p<0.001$ were considered significant. The Spearman's rank correlation rho method was then employed to elucidate assessment sensitivity between the 2 test methods.

3. Results

Students attempted the questions affirmatively, although they were incompetent in answering the questions after the pre-lecture test (pre-lecture scores in Fig. 1), and they felt more satisfied after the post-lecture test (post-lecture scores, Fig. 1). Answers for both tests were collected in full, showing student-driven response. Students were keen to know the test results, as they asked for the notification date, and probably they knew the lecture was more of needs-based learning.

3.1 WT scores versus MCT scores before and after lecture: Expressed in terms of a total score of 12, the mean pre-lecture WT and MCT scores were 0.8±0.97 and 5.4±1.79, respectively. However, the respective scores registered 2.3±1.48 and 8.1±1.89 after lecture delivery (Fig. 1). The post-lecture WT (2.3±1.48) and MCT (8.1±1.89) scores were significantly improved compared with the respective pre-lecture scores of 0.8±0.97 and 5.4±1.79 (Fig. 1). When the WT score differences were compared with MCT score

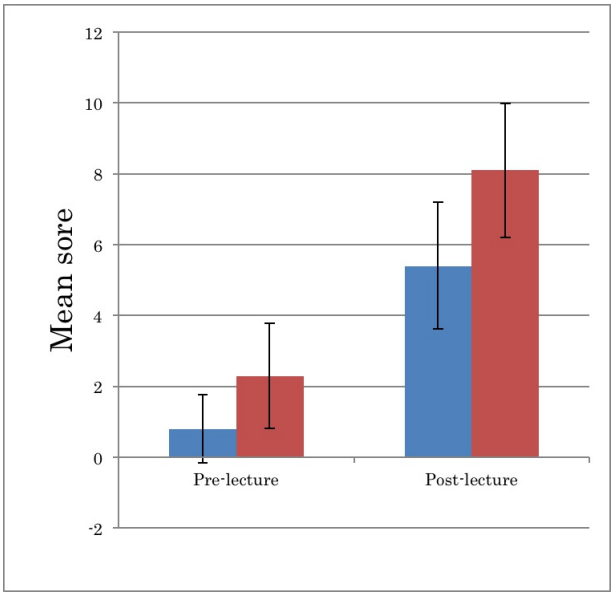

Fig. 1: Mean written test (WT) scores (blue column) versus mean multiple-choice test (MCT) scores (red column) before (left columns) and after (right columns) lecture.

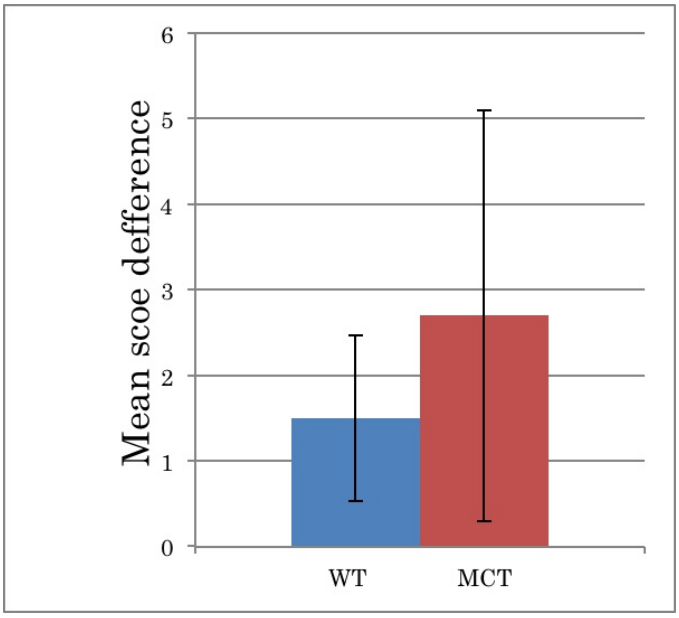

Fig. 2: The mean WT score difference between pre- and post-lecture WT scores (blue column) and that between MCT scores (red column) indicated significant difference ($p<0.001$).

differences (2.7±2.40) before and after the lecture by the Wilcoxon signed-rank test, there was a significant improvement ($P<0.001$) in listening and understanding of PSE (Fig. 2).

3.2 Ability and assessment sensitivity of WT versus MCT: As for the correlation between the score differences in WT and MCT, there was a low (rho=0.233) correlation, suggesting that the WT ability was not analogous to the MCT ability: i.e. the assessment sensitivity of MCT was higher than that of WT (disregarding factors such as spelling, pronunciation, etc.).

4. Discussion

Only a limited number of Japanese institutions teach science English (SE) in pre-university years and during the first few years in university, although many universities do have a one academic year (Yr-2 or -3) for study of English for special purpose (ESP) in a 4-yr course degree curse in Japan. Therefore, it is only obvious to observe that the pre-lecture WT and MCT scores indicated their awkward and difficult position in handling PSE in this study, as students in university A were not exposed to PSE learning before the present study. However, after teaching certain PSE basics, their scores improved significantly in the relevant WT and MCT: they could do those questions that they were not able to handle well before learning, suggesting that exposing students to SE teaching/learning facilitated affirmative SE acquirement. It is therefore important to provide learning activities that are directly based on student needs: in this case PSE for pharmacy students. The results also revealed that students strived to acquire the basics taught which were perceived as useful by students, resulting in effective and valuable outcomes: i.e. significant improvement in mean scores of both WT and MCT (Fig. 1).[1]

The sensitivity of tests toward the students was different, with MCT showing higher assessment sensitivity than WT. As spelling, punctuation, other writing basics, and grammatical/expressional abilities were omitted and not assessed in the present study, MCT may appear to be more reliable.[2]

Additionally, the correlation indicates that WT ability is not analogous to MCT ability in learning PSE basics. Misspelling was prominent in the WT answers, as reflected by the vast difference between WT and MCT scores, even with questions of analogous contexts given to both tests.

Multiple-choice questions focus on the development of objective assessment items, and questions can be subjective in nature. Results are more likely to be objective as answers are graded purely on the selections without human interpretation.[3] Factors irrelevant to the assessed material (e.g. spelling, grammar, handwriting and clarity of expression/presentation) are not involved in a MCT assessment, and the test-candidate is merely graded on his or her knowledge of the topic. Essay writing and data interpretation in written words with numerals, such as PSE, are essential for English as Foreign language (EFL) learners. Although the strongest predictors of overall student performance, compared to other evaluations,[4] MCTs are not perfect; as shown in this study, where spelling ad writing activity were poor and were actually not taken into account. Therefore, even the high-achievers in MCT may not be able to write proper sentences and appropriate vocabulary and meaningful expressions of thoughts. To improve outcomes established with MCTs in evaluating performance and ability, other evaluations (e.g. in-class participation, case exams, written assignments, WT, and simulation games) are complementary in the assessment.

Taken together, assessing acquirement of PSE might be more reliable if students were given a test comprising both WT and MCT questions. Despite being sometimes contested, the choice of MCT remains popular due to its utility, reliability, and cost effectiveness.[3,4]

Competing Interests

Authors have declared that no competing interests exist.

References

1. Beckert, L., Wilkinson, T. J., & Sainsbury, R. (2003). A needs-based study and examination skills course improves students' performance. Medical Education. 37 (5), 424–428.
2. Steven M Downing (2004) Reliability: on the reproducibility of assessment data. Medical Education. 38 (9), 1006–1012.
3. DePalma, Anthony (1990). "Revisions Adopted in College Entrance Tests". New York Times. Retrieved 22 August 2012.
4. Bontis, N., Hardie, T., & Serenko, A. (2009). Techniques for assessing skills and knowledge in a business strategy classroom. International Journal of Teaching and Case Studies. 2, 162-180.