Faceted classifiers and essays in new e-test system: benefit analysis

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Abstract

Objective of the study was to analyze benefits of the faceted classifiers and essay test technologies applicable in the Moodle electronic test toolkit.

Methods and structure of the study. We piloted the electronic test system on the Moodle e-learning platform of Institute of Physical Culture and Sports of Udmurt State University. Moodle is a multifunctional educational platform with the educational and test content design toolkit. We used the faceted classifier technologies and essays to develop test questions and problems for the knowledge and skills tests in the Martial Arts and Physical Education and Sports Information Technology disciplines. The test system was developed using the topics faceting approach.

Results and conclusion. The test system distracter analysis by V.S. Avanesov showed high quality of the classifier questions. The essay questions and problems were found as effective as in a traditional verbal examination as they require the student to thoroughly analyze the question, formulate and explain the choice rather than just choose or guess. It is also important that the difficulty and timeframe of the e-test is increased insignificantly. The new faceted classifier and essay questions test technologies were found beneficial for the test procedure fairness and quality, with special benefits for the discipline-specific question banks and the electronic test procedure on the whole.

Keywords: electronic test, test questions, classifier questions, essay questions, parallel faceted questions, physical education, Moodle platform.

Background. Presently the national higher education system gives a special priority to new electronic educational resources persistently developed as complementary to the traditional education service [7]. Electronic test is increasingly popular in the theoretical knowledge and practical skills tests [1, 3, 6, 8]. Benefits of the electronic test systems generally depend on the quality of the test sets and tools. Basic logics and classifications of the test systems were developed long ago (by V.S. Avanesov, A.N. Mayorov, et al.) as reported in a few studies [2, 5, 6, etc.], although the continued research in testology expands and perfects this taxonomy; with the hierarchical classification of the test questions apparently transforming into a network structure.

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Results and discussion

Faceted classifier questions

We analyzed the whole range of electronic test questions to form a group of classifier questions. It is standard for virtually every theoretical and practical knowledge field to classify its objects, processes

and phenomena, with the classifications applicable in the TQ system designs and templates that require a choice (check one or few) or a match in response.

In this particular case, we designed the TQ set to test knowledge of the karate-do stances based on their classification (Figure 1), with every element of the classification offered as an optional answer. Note that every answer in the test is correct, free of fictional or abstract aspects, with the classification elements used as distracters.

We use distracters in the test system in the direct meaning of the word, i.e. as diverting rather than wrong options, unlike many traditional systems. The tested subject should categorize the problems (objects, processes) in response to the test question (Fig. 1) using the classification of the karate-do stances. It was difficult for the test system designers to offer a fair range of seemingly true distracters since the traditional systems offer only four options. Classification elements/distracters in the faceted classifier go far beyond four options, and this freedom allows accurately formulate a question and increase its difficulty level. It should be mentioned that a due difficulty level is critical for the TQ and problems and ranked among the key benefits of a test system [1, 2, 3, 5, 8].

Facet means herein the presentation cell that gives a few options for the textual element presentation. Facet may be also interpreted as the presentation format for a few parallel test tasks [1, 3, 4, 5]. Given on Figure 1 hereunder is the faceted classifier that makes it possible to form an array of parallel faceted questions for every karate-do stance. The facets are used to build a topics faceting category in the TQ bank; and the test algorithm randomly selects some question from the latter– that means that every time the question is different.

Essay-requiring tests and problems

Essay questions may be defined as the open-end questions that require detailed explanatory answers – much as the traditional verbal examinations. The A.N. Mayorov's testology [5] implies the following two versions of answers: (1) full answer formulated by the subject; or (2) finisher answer, i.e. finalizing one of a few unfinished options. A.N. Mayorov distinguishes practical problems as a separate test option and emphasizes their benefits for a test system on the one hand and the high difficulties for their practical application on the other hand.

The Moodle platform offers an essay template with great technological benefits for the efforts to formulate any range of the open-end theoretical knowledge and practical skills test questions. The essay questions template offers a window for the response essay formulated by the student independently in any form. The teacher would score the answer within 0 to 1 range, and the Moddle would immediately fix the test score in the automatic test database.

The essay questions should be standardized as follows: (1) They should not be too long and intricate; (2) They should be clear, unambiguous and limited by the study material; (3) The teacher should emphasize in the lectures and practices the key points and key-

Please check the right name of the karate-do stance

Check one of the following options:
- ○ Муцуби дати
- ○ Некоаси дати
- ○ Хейко дати
- ○ Коса дати
- ○ Хатидза дати
- ○ Фудо дати
- ○ Киба дати
- ○ Уро дзенкуцу дати
- ○ Хейсоку дати
- ○ Дзенкуцу дати
- ○ Кокуцу дати

Classifier of the key karate-do stances

Figure 1. *Faceted classifier to test knowledge of the key karate-do stances in a 'check one of many' format, for tests in the Martial Arts discipline*
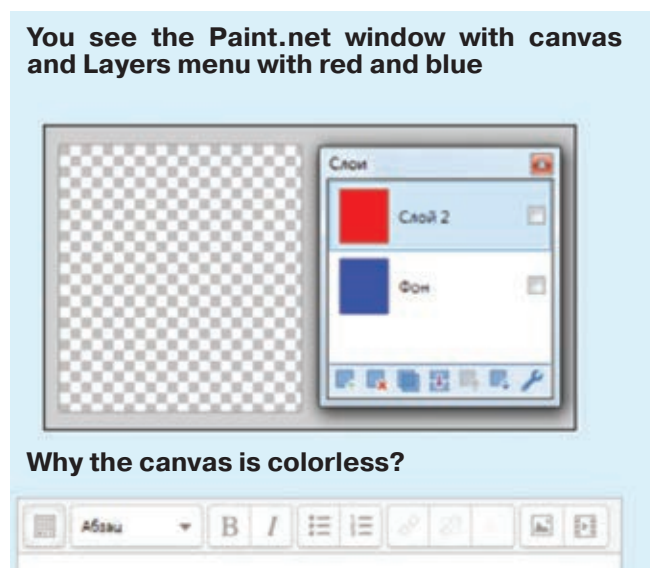
You see the Paint.net window with canvas and Layers menu with red and blue

Why the canvas is colorless?

Figure 2. *Essay-requiring problem in the PES IT discipline*

You see a karate punch

Name the (1) punch; (2) rank; (3) stance; and (4) equipment used

Answers:
1) Удар рукой - гяку дзуки; ✓
2) Верхний уровень - дзёдан; ✓
3) Стойка - "фудо дати"; ✗
4) Спортивный снаряд - макивара. ✓

Figure 3. *Structured essay question in the Martial Arts discipline, with the sub-questions and response options*

words in ever definition, statement and concept since these key notions are factored in the test scores; and (4) The test question may be clarified by a few sub-questions/ problems to help the student.

Given of Figure 2 is the example of an essay question, with the student expected to solve the problem in an explanatory format. Figure 3 gives a structured essay questions with a few sub-questions to clarify the problem on a more specific basis.

Scoring system

The Moodle toolkit offers a few test scoring scales: a dichotomous test score, as demonstrated by Fig. 1 and Fig. 2, with the right and wrong answers scored by 0 and 1 points, respectively; and a polytomic test score (Fig. 3) that varies within 0…1 range, being convertible into a 100-point or traditional 5-point scoring system.

Conclusion. The test system distracter analysis by V.S. Avanesov showed a high quality of the classifier questions. The essay questions and problems were found as effective as in a traditional verbal examination as they require the student to thoroughly analyze the question, formulate and explain the choice rather than just choose or guess. It is also important that the difficulty and timeframe of the e-test is increased insignificantly. The new faceted classifier and essay questions test technologies were found beneficial for the test procedure fairness and quality, with special benefits for the discipline-specific question banks and the electronic test procedure on the whole.

References

1. Avanesov V.S. Application of test forms in e-learning with distraction analysis. [Electronic resource] Obrazovatelnye tekhnologii. 2013. No. 3. pp. 125-135. Available at: https://cyberleninka.ru/article/n/primenenie-testovyh-form-v-e-learning-s-provedeniem-distraktornogo-analiza (date of access: 20.03.2021).

2. Avanesov V.S. Theory and methodology of pedagogical measurements. [Electronic resource] Publications in open sources and Internet. 2005. 98 p. Available at: http://www.charko.narod.ru/tekst/biblio/Avanesov_Teoriya_i_metod_ped_izmer.pdf (date of access: 20.03.2021).

3. Dmitriev O.B. E-testing: problems-focused design and application practice in physical education. Teoriya i praktika fizicheskoy kultury. 2018. No. 12. pp. 15-17.

4. Erofeev A.A., Sychev O.A. Parallel and faceted tasks in Moodle distance learning system. [Electronic resource] Otkrytoe obrazovanie. 2013. No. 3. pp. 42-46. Available at: https://cyberleninka.ru/article/n/ispolzovanie-parallelnyh-i-fasetnyh-zadaniy-v-sisteme-distantsionnogo-obucheniya-moodle (date of access: 20.03.2021).

5. Mayorov A.N. Theory and practice of test design for education system (How to choose, create and use tests for educational purposes). Moscow: Intellekt-tsentr publ., 2001. 296 p.

6. Markova O.A., Matushanskiy G.U. Analysis of forms of presentation of graphical test items. [Electronic resource] Vestnik KGEU, 2011. No. 4. pp. 111-120. Available at: https://cyberleninka.ru/article/n/analiz-form-predstavleniya-graficheskih-testovyh-zadaniy (date of access: 20.03.2021).

7. Petrov P.K. Online training courses: application experience in sport specialist training disciplines. Teoriya i praktika fiz. kultury. 2018. No. 12. pp. 12-14.

8. Polunin N.V., Levchuk I.P., Shimanskiy N.L. et al. Test control - innovative approach to students' knowledge quality rating. [Electronic resource] Vestnik RGMU. 2013. No. 1. pp. 66-69. Available at: https://vestnik.rsmu.press/archive/2013/1/15/content?lang=ru (date of access: 20.03.2021).