USING ONLINE CONTESTS FOR INSTRUCTIONAL PURPOSES: A PILOT WITH UNDERGRADUATE INFORMATION TECHNOLOGY STUDENTS*

Abdullah Çevik[1] & Yavuz Akbulut[2]

[1,2] Lecturer, Department of Computer Education and Instructional Technology, Anadolu University

E-mail: abdullahc@anadolu.edu.tr, yavuzakbulut@anadolu.edu.tr

ABSTRACT

The current study aims to contribute to classroom instruction of undergraduate education faculty students through development of an online contest, and evaluation of test items based on participants' responses. The study was first presented at the 7th International Educational Technology Conference in the Turkish Republic of Northern Cyprus. It is a pilot study which covers four units of a single course offered in the Department of Computer Education and Instructional Technologies at Anadolu University. Students are provided with the opportunity to practice their skills on-line whenever and wherever they want. The research process involved four successive and interdependent steps, namely design, development, application and evaluation. An on-line testing program which has both a learner and instructor version was prepared. Questions were gathered from different sources along with the ones prepared by researchers. Item facility, item discrimination and distractor efficiency indices of questions were calculated by the program after it was piloted with 32 undergraduate students. Features of the program and implications for instruction were provided as well.

Keywords: Online contest, assessment, item analysis, higher education

1. INTRODUCTION

Assessment is an important factor in the success of university education (Phillips & Lowe, 2003). Despite widespread use of computers in teaching and learning endeavors, their use for assessment purposes seem to be limited. Computer adapted testing has been used with hesitation maybe because of its novelty or its limited feedback ability on authentic instructional tasks. In recent years, availability of course management software like Blackboard and WebCT made Internet increasingly attractive for assessment purposes. Computer based assessment not only facilitates routine tasks like grading multiple-choice tests, but also can empower students' learning experiences (Brown, Race & Bull, 1999). Using computers in assessment has several benefits as suggested by Brown et al. (1999), Cann and Pawley (1999), Danson (1999), and Harvey and Mogey (1999). These benefits can be listed as follows:

- Large number of papers is marked quickly which reduces the load on teachers.
- Immediate feedback is given.
- Responses are coded without coding errors.
- Responses are directly transferred to statistical software packages, which facilitates further item analyses.
- Responses of participants can easily be monitored and classified.
- Assessment can be stored and reused.

- Assessment items can be randomly selected to provide different test sheets for each student.

On the other hand, as suggested by Pain and Le Heron (2003) creating a question database for computer adaptive assessment is time consuming. Test delivery may differ by the type of browser. The infrastructure might be insufficient to administer on-line assessment as observed in a recent study (Harwood, 2005). Thus, on-line tests

should be prepared with caution so that it is applicable in as a large variety of computer settings as possible.

A distinction between formative and summative assessment is usually made while examining the purpose of the assessment (Biggs, 1999). Formative assessment provides feedback to students to help their learning while summative assessment is generally used to grade students at the end of a course. Bransford, Brown and Cocking (1999) review studies on developmental and cognitive psychology and maintain that formative assessment is particularly important since it improves the quality of thinking and understanding, provides regular feedback, and creates opportunities for revision. The current paper provides an online formative assessment tool where self-assessment is realized by participating students.

Harvey and Mogey (1999) summarize the problems related to computer adapted testing and suggest that practitioners should not be too ambitious while realizing a computer-based assessment process. Rather, they should start with small but manageable project. Thus, the study starts with small segments of an information technology course offered at a computer education and instructional technologies department in Turkey, and builds on the results to develop the project further. As suggested by Dowsing (1999), there should be harmony between the technological nature of the subject matter and some of learning and assessment practices. Students of BTÖ 101 - Information Technology in Education I course are supposed to be proficient at using technology. Thus, they constitute an appropriate sample for online computer adaptive assessment practices.

2. METHODS and PROCEDURES

2.1. Participants

Thirty-two undergraduate students enrolled at the Department of Computer Education and Instructional Technologies who took Information Technology in Education I course at Anadolu University participated in the current study. They produced responses to items which were further developed through the analyses conducted by the program.

2.2. Software

Four units of BTÖ 101-Information Technology in Education-I course were included in the contents. The units were Information System and Introduction to Computers, Computer Hardware, MS-Word and MS-Excel. After a table of specifications was prepared, some questions were prepared by researchers while others were adapted from several sources used during the course such as Önder, Çakır and Göksel (2000), Rua and Öztürk (1995), Saatçi (1993).

Figure 1. Reader version: Introductory page

While preparing the software program, PHP and MYSQL were used. A reader and an author version of the program were published online. Entrance to the program was realized through providing a user name and password (Figure 1).

When students enter their usernames and passwords, they confront with the rules of the contest. On the left side a menu is provided where students can update their membership information, see their grades along with the number of their correct and incorrect answers, their place in the whole group, and the list of all members along with their grades. Figure 2 provides the screen where students are able to see the list of all members and their grades.

Figure 2. Reader version: List of the whole group

Students are allowed to enter the page as much as they want. They are allowed to exit and restart the contest any time they wish. On all pages, students have access to a link where they can start or resume the contest. Questions are randomly selected by the program from a 200-item question pool. Twenty seconds are allotted for each question during which students are supposed to select from four distractors. Whenever a student cannot get the answer right or cannot find the answer in 20 seconds, that question is randomly asked again in subsequent pages. A sample question is provided in Figure 3.

Figure 3. Reader version: A sample question from the contest

Beside the reader version, the program has an author version where instructors can add new questions or delete inappropriate questions with bad item facility, item discrimination and distractor efficiency indices. The page to enter new questions is provided in Figure 4 below:

Figure 4. Author version: The page for entering new questions

In order to examine the contribution that each item is making to the test, item analysis is realized by the program as suggested by Hughes (2003). Item facility (IF) values are calculated by the program for each item. Item facility is the proportion of students who answered a particular item correctly (Brown, 1996). Thus, if 9 students out of 10 answered an item correctly, the item facility value is 90 %, which means that the item is very easy. Items are also examined in terms of their item discrimination (ID) index values. Item discrimination is the difference between the item facility values of the high achievers (usually the top 33 %) and the low achievers (usually the bottom 33 %) in a class (Brown, 1996). If this difference is high, it means that the item can efficiently differentiate between students who know the answer from those who do not. Finally, the distractor efficiency analysis (DEI) was utilized to eliminate the distractors that were never or rarely preferred by the pilot group. Besides, tricky distractors chosen by high ability learners and ignored by low ability learners can also be eliminated by the program. These analyses are particularly applied to improve the reliability of the test, which are calculated and displayed by the program within a single screen (Figure 5).

	SORU NO	A	B	C	D	TOPLAM % DOĞRU
Toplam	1	17	5	0	0	70.83
İYİ	1	11	4	0	0	45.83
KÖTÜ	1	2	1	0	0	8.33
Toplam	2	0	1	0	18	75
İYİ	2	0	1	0	11	45.83
KÖTÜ	2	0	0	0	2	8.33
Toplam	3	1	4	13	3	54.17
İYİ	3	1	2	10	1	41.67
KÖTÜ	3	0	0	1	1	4.17
Toplam	4	0	22	0	0	91.67
İYİ	4	0	15	0	0	62.5
KÖTÜ	4	0	2	0	0	8.33

Figure 5. Author version: Analysis of questions

3. DISCUSSION

The current study suggests an online formative assessment tool prepared for the BTÖ 101 - Information Technology in Education-I course offered at the Department of Computer Education and Instructional Technologies at Anadolu University. The software has a reader and an author version. It has the ability to diagnose item quality through item difficulty, item discrimination and distractor efficiency indices. However, new qualifications will be added to the current software for further developmental stages. The software will be able to:

- categorize questions as easy, moderate and difficult, and list questions from easiest to the most difficult,
- calculate test reliability and generate reliable test booklets on specific subject matters,
- prepare question sets in accordance with the degree of difficulty desired by instructors.

The online assessment environment presented in the present paper probably poses several limitations, since it was developed within a short span of time by a small design team. Therefore, it can be considered a demo for evaluative purposes. Formative evaluation of the program by students, teachers and instructional designers is necessary, so that, the instrument can serve better each time it is used. Our next step is to delve into opinions of participants who used the formative assessment tool for their course exercises. Another limitation of the current application is that the data size was not enough to conclude about the efficiency of the program. Thus, comments regarding item facility, item discrimination and distracter efficiency indices of questions along with the efficiency of the program might only be suggestive rather than definitive.

4. REFERENCES

[1]. Biggs, J. B. (1999). *Teaching for quality learning at university*. Philadelphia, PA: Society for Research into Higher Education & Open University Press

[2]. Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (1999). *How People Learn: Brain, Mind, Experience, and School*. National Academy Press. Retrieved February 25, 2007 from http://www.nap.edu/html/howpeople1

[3]. Brown, J. D. (1996). *Testing in language programs*. Upper Saddle River. NJ: Prentice Hall Regents.

[4]. Brown, S., Race, P., & Bull, J. (1999) (Eds), *Computer-assisted assessment in higher education*. London: Kogan-Page.

[5]. Cann, A.J., & Pawley, E.L. (1999). Automated online tutorials: New formats for assessment on the WWW. In Brown, S., Race, P. & Bull, J. (1999) (Eds), *Computer-assisted assessment in higher education*. London: Kogan-Page.

[6]. Danson, M. (1999). Optimal mark reading as CAA: Experiences at Loughborough University. In Brown, S., Race, P. & Bull, J. (1999) (Eds), *Computer-assisted assessment in higher education.* London: Kogan-Page.

[7]. Harvey, J., & Mogey, N. (1999). Pragmatic issues when integrating technology into the assessment of students. In Brown, S., Race, P. & Bull, J. (1999) (Eds), *Computer-assisted assessment in higher education.* London: Kogan-Page.

[8]. Harwood, I. (2005). When summative computer-aided assessments go wrong: disaster recovery after a major failure. *British Journal of Educational Technology 36* (4), 587–597.

[9]. Hughes, A. (2003). *Testing for language teachers.* Cambridge: Cambridge University Press.

[10].   Pain, D., & Le Heron, J. (2003). WebCT and Online Assessment: The best thing since SOAP? *Educational Technology & Society, 6* (2), 62-71. Retrieved February 25, 2007 from http://ifets.ieee.org/periodical/6-2/7.html (ISSN 1436-4522)

[11].   Phillips, R., & Lowe, K. (2003). Issues associated with the equivalence of traditional and online assessment. In G. Grisp, D. Thiele, I. Scholten, S. Barker, and J. Baron (Eds.), *Interact, Integrate, Impact: Proceedings of the 20th Annual Conference of the Australian Society for Compters in Learning in Tertiary Education*. Adelaide, 7-10 December 2003.

[12].   Önder, H., Çakır, H., Göksel. M.A. (2000) *Temel bilgisayar teknolojileri kullanımı*. Nobel Yayın Dağıtım: Ankara

[13].   Rua, P, & Öztürk, Ö. (1995): *PC'nin sırları: Kesmeler ve düşük seviyeli fonksiyonlar.* İstanbul: Sistem Yayıncılık.

[14].   Saatçi, Ali (1993): *Bilgisayar işletim sistemleri*. Ankara: Meteksan Yayınları.

---

[*] The first draft of this paper has been presented at the 7th International Educational Technology Conference (IETC 2007) in the Turkish Republic of Northern Cyprus, and published in the Conference Proceedings.