JUST HOW MUCH PRACTICE MAKES PERFECT? USING AN ONLINE TEST AS A REVISION TOOL FOR STUDENTS

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Abstract

A common revision strategy for undergraduate students involves attempting practice questions taken from past examination papers or provided by tutors. This paper discusses the use of an online practice test as a means of preparing undergraduate business students to sit a formal examination.

In this exploratory study 835 undergraduates were allowed unlimited attempts at an online practice test provided as a means of preparing for a formal examination. Details of each student's attempts at the practice test were recorded automatically and then compared with exam performance.

An initial analysis of results suggests that the use of online practice tests offers a number of benefits to educators and students. As well as providing a relatively quick and effective way for tutors to provide students with targeted study advice, such tests can reduce the amount of time needed to revise and can increase examination performance significantly. The discussion also considers the optimum number of practice attempts and the extent of potential increases in student performance.

1 INTRODUCTION

While the use of mock or practice assessments for revision purposes is widely considered beneficial [1], surprisingly little seems to be known about the extent to which practice tests can improve examination performance. In addition, little is known about how much practice is needed to gain such improvements.

Computer-based tests (CBTs) are also considered to be of value to institutions, educators and students. Terzis & Economides [2], for instance, describe advantages such as test security, cost and time reduction, speed of results and automatic record keeping for item analysis and distance learning. However, despite widespread use of CBTs in all areas of education, little is known about how they act to improve learning.

This paper supports the view that testing can contribute to student learning and that multiple-choice tests can be of particular value to students. Holmes [3], for example, also shares this view and states:

In recent years there has been a great expansion of research on how test-taking can actually enhance student learning — a phenomenon known as the testing effect. Most research on the testing effect has been based on multiple-choice tests. This research illustrates that the potential utility of multiple—choice tests goes well beyond their efficiency.

Of particular interest for this study is the notion of the testing effect described by Holmes. Carpenter [4] states that “Many studies have shown that retrieving information during a test facilitates later memory for that information”. Wissman, Rawson and Pyc [5] go further, suggesting that the testing effect can also improve the learner's ability to assimilate new material.

This study was exploratory in nature, intended to investigate and quantify the benefits of online practice tests for students. The intention was to make use of data that was collected routinely in order to determine if a larger and more thorough investigation was warranted. This working paper presents some of the provisional findings of the research.

The research involved 835 first-year business undergraduates studying a variety of programmes. All first-year undergraduates within Aston Business School take an introductory ICT module which is assessed by an examination.

2 METHODOLOGY

An examination paper containing 100 multiple choice questions was prepared. At the same time, a computer-based test was created as a revision aid for students. The test contained questions covering
the same concepts and topics that would appear in the examination. Thus, if the examination contained three questions covering a given topic, the CBT would also feature three questions on the same topic. In order to ensure consistency, all of the questions used in both the exam and the CBT were drawn from the same source.

The revision test was created using software that enabled it to be delivered in a range of formats suitable for a variety of popular operating systems and web browsers. This meant that the test could be used on many different devices, including desktop computers, laptops, smartphones and tablets. By producing the test in SCORM format, it could also be connected to the institution’s virtual learning environment (VLE), making it easier to track how students were using it.

At the start of the module, students were informed that a practice CBT would be made available during the last week of teaching. All students would have an opportunity to use the CBT during a seminar session. This would allow staff to ensure that every student could access the software and use it correctly. Students also received guidance on test-taking strategies, especially on how to use the CBT as a revision aid, using it to pinpoint problem areas that could then be dealt with in various ways, such as by seeking help from tutors or by completing further reading. Authors such as Biçak [6] suggest that preparing students in this way can improve their examination performance and can reduce anxiety.

Students were allowed unlimited attempts at the test. There were no time limits and students could return to questions if they wanted to change their answers. The software also allowed students to end a test and pick up from where they left off later on. Being delivered in an online format, the test could be used from any location with Internet access.

At the end of each attempt a report was available giving the student’s score and a list of the questions they had answered incorrectly. The result of every attempt was recorded automatically by the institution’s VLE. As a backup, the CBT also sent an e-mail containing the same information to a specified address.

2.1 Ethics

It was felt that there were no ethical issues to address because all of the data used was routinely collected in order to improve quality. The data concerning student performance on the CBT, for instance, was used to identify problem areas where students might benefit from additional input. Similarly, data related to examination performance was also routinely collected and analysed in order to inform curriculum development at module, programme and School level. It was felt that extending the use of all of this data to look at the issues discussed within this paper was in keeping with the broad goal of improving student attainment.

It is also worth noting that the data used for this work did not contain any personally identifiable information (PII).

3 RESULTS

835 students were enrolled on the module. Of the data collected, 20 sets were spoiled, duplicated or incomplete. This was for a number of reasons, including administrative errors or students leaving the institution.

A total of 4,857 records was collected detailing student attempts at the CBT. Since students often ended attempts early many sets of data were incomplete. Once this data was removed, there were 2,045 records remaining.

After eliminating all incomplete test attempts, 206 students were left without any data regarding completed attempts at the CBT. In other words, 206 students never completed the whole of the CBT. The average mark achieved in the examination by this group was 63.21%. The highest mark was 95% and the lowest was 20%. Some 8.73% failed the examination (defined as achieving a mark of below 38%).

The number of completed attempts at the CBT ranged from 1 to 14. However, so few students made 10 or more attempts that they were grouped together for simplicity. The average mark achieved in the examination by this group was 72.49%. The highest mark was 92% and the lowest was 28%. Only 0.87% failed the examination.

Fig. 1 shows the average score achieved on computer-based test by the number of attempts. As can be seen, students generally begin to see significant increases in their scores after three or more
attempts at the CBT. After eight or more attempts, students achieve the very highest scores. Outliers appear to cause the decreases seen at six and nine attempts.

![Average CBT Score By CBT Attempts](image1)

Fig. 1: Average score achieved on computer-based test by no. of attempts

Fig 2 shows the average score achieved in the examination by the number of attempts at the computer-based test. As can be seen, students appear to perform significantly better in the examination after three attempts at the CBT. It can be argued that little additional benefit was gained by taking more than 6 – 7 attempts at the CBT.

![Average Exam Score By CBT Attempts](image2)

Fig. 2: Average score achieved on examination by no. of attempts at computer-based test

The software used to deliver the practice test also recorded how long students spent on each question. The total time taken for each attempt at the test was also recorded. Students were able to complete the practice test in as little as 45 minutes, half the time allowed for the examination. Furthermore, working at a faster pace did not appear to affect performance on the test.

4 CONCLUSIONS

Students using the practice test as a revision aide scored an average of 9.28% more in the examination that those who did not use the test. This suggests that the use of a practice test is beneficial with respect to examination performance, supporting the idea of the test effect mentioned earlier.

However, high scores in the CBT did not necessarily correspond to similar scores in the examination. CBT scores were usually higher than examination scores; in some cases, the difference amounted to 20% or more. This might be attributed to factors such as differences in the environments in which the
CBT and the examination were taken, or that students were able to refer to notes when working with the CBT. If we also consider that students tended to complete the CBT relatively quickly, we might explain the difference in scores in terms of the task-focus effect proposed by Bocij & Greasley [7] at the turn of the century:

…computer-based tests tend to be completed more quickly than conventional assessments. If performance increases and the time taken to complete the assessment decreases, then it can be argued that the assessment technique itself may be acting to enhance the ability of students to focus on questions and recall relevant information. One way in which we might describe this is by suggesting that computer-based assessment appears to improve task-focus.

With regard to the number of attempts at a practice test likely to yield most benefit, the data collected for this study suggests that a minimum of three attempts is needed. However, there appears to be little additional benefit to be gained by taking more than six – seven practice attempts.

It must be noted that any conclusions drawn are tentative since they are based on a relatively superficial analysis of the data collected. Further research involving this data set might involve a more rigorous analysis in order to substantiate the conclusions drawn here. Such an analysis might also investigate issues such as differences in scores obtained in practice tests and examinations by demographic factors, such as gender, ethnicity, home or overseas status, and so on.

REFERENCES


