

E-Testing Versus Paper Testing in EFL in Higher Education: A Comparative Analysis of Student Performance with Reference to Anticipated Stress Level

Marija Stanković

the Faculty of Philosophy, Niš

Nikola Tatar

Singidunum University Centre, Niš

Abstract

E-assessment turns out to be extremely important for the improvement of student learning experience, especially in higher education: an increasing number of universities opt for e-tests instead of paper-and-pencil tests. Therefore, the aim of this study is to investigate the validity of e-testing by comparing the scores of a computer-administered test to the scores of a paper-and-pencil test. Besides student performance, the research also surveys students' personal opinions and measures stress level before and after the tests. It includes a sample of 60 students from Singidunum University and the Faculty of Philosophy in Niš, whose knowledge of English ranges from A1 to B2. The overall results indicate that the aspects of validity, practicality and seeing each student as a separate individual have to be taken into consideration with these two types of testing.

Key words: foreign language assessment, e-assessment, paper-and-pencil test, stress level.



1 Introduction

Rapid technological advancement and a growing amount of knowledge have paved the way for information and communication technology (ICT) in classroom, as the only appropriate way to respond to the increasing demands on knowledge acquisition and knowledge assessment. Therefore, ICT has begun to permeate education, which is no longer restricted to schools. New technologies, which have become central to people's reading, writing, calculating and thinking, create learning opportunities that challenge traditional concepts of education, schools and universities, enabling people of all ages to engage in the process of learning whenever and wherever they want (Collins & Halverson, 2009).

In order to respond to students' curiosity and the variety of their learning needs, which nowadays go beyond simple knowledge discovery, a modern classroom must be equipped with computers. In the entire process of learning, e-assessment turns out to have an extremely important role in the improvement of student learning experience, especially in higher education, which is confirmed by the increasing number of universities that opt for e-tests instead of paper-and-pencil tests (Hillier & Fluck, 2013). It is widely acknowledged that examinations serve multiple purposes: they determine not only the extent of students' knowledge, but also the extent to which educational objectives have been achieved (Shah, 2002); eventually they reveal what goes on in the classroom, scrutinizing the very process of teachers' teaching and students' learning (Rehmani, 2003). Thus, the ultimate goal of the examination process is not only to grade students, but to point to possible omissions, identify the weak links and in that way enable the improvement of the teaching process (Ketabi & Ketabi, 2014). Learning styles of new generations of students have dramatically changed and, more importantly, their working environment will be recognisably different. Teachers can no longer teach the way they have been teaching for years because they will not gain students' attention, whose habits and learning styles depend on fast search and instant feedback (Kovacs, 2015). If teachers want to be successful, they need to get students prepared for the working environment that awaits them, the one not much different from their everyday living environment (Hillier & Fluck, 2013): the grand empire of ICT in which the imperative is not only to know, but to know fast.

Whereas the introduction of e-tests went smoothly with the majority of subjects, the same cannot be said for languages. In Spain, for instance, foreign language teachers were firmly opposed to e-testing. Most of those teachers reacted positively to a series of trainings organised afterwards, but were not ready to implement them on their own (Laborda & Royo, 2009). Therefore, the aim of this paper is to investigate the validity of e-testing by comparing the scores of a computer-administered test to the scores of a paper-and-pencil test. Besides student performance, the research also surveys students' personal opinions and measures stress level before and after the tests. The entire procedure consists of two parts: doing the paper test and the e-test, and filling in the single direct-method questionnaire, which, in this case, represents the research tool used for data collection. As far as our quantitative data analysis is concerned, frequency distribution was used.

1.1 Starting assumptions

Assessment has become extremely important for the improvement of student learning experience. It provides a measure of student performance necessary for effective decision making in educational system (Dietel, Herman & Knuth, 1991). It is an important factor that reflects and affects the quality of learning and education (Tomljanovic & Polic, 2015). Teachers have been assigned a new role: to create a supportive environment for a pedagogical approach known as assessment *for* learning, in which students are supposed to be actively involved in the assessment process, the elicitation of constructive feedback and the development of self-assessment skills (Maele, Baten, Beaven, & Rajagopal, 2013),

thus taking control of their own learning (Whitelock, 2009). Therefore, today's generations, which use powerful tools to support learning and solve problems in class, should not be denied access to these tools when their knowledge is assessed (Ridgway, McCusker & Pead, 2004). One of the broadest definitions of e-assessment is the use of computers for any assessment of student activities (Tomljanovic & Polic, 2015). As research has confirmed, the advantages of e-assessment over paper-assessment are abundant: it is faster both to complete and to grade, with no difference in scores (Bodman & Robinson, 2004; Koppel & Hollister, 2003) or with a positive impact on the scores (Clariana & Wallace, 2002); it is cost-effective (Ridgway, McCusker & Pead, 2004); it is a valid, practical, reliable and secure alternative to a paper-and-pencil test (Tomljanovic & Polic, 2015); students have positive attitude towards e-assessment due to the ease of use, friendly interface and feeling of control, as well as instant feedback (Karadeniz, 2009; Ridgway, McCusker & Pead, 2004).

It is not strange that students have welcomed ICT at schools: it perfectly suits their learning styles and living habits. However, the same cannot be said for their teachers, at least some of them and, especially, those who teach languages (Kovacs, 2015). Even if they agreed that the introduction of ICT could really improve the learning process, and thus the teaching process itself, and eventually accepted to enrich their classes, they have not yet come to terms with using ICT in the process of assessment. Some of the reasons usually listed for this reluctance are: languages are not like other subjects (Lo Bianco & Aliani, 2013), not all four skills could possibly be tested via e-tests (Laborda & Royo, 2009), e-tests could never be as valid and reliable as paper-and-pencil tests, and, therefore, the results obtained would not show the real state of affairs when it comes to students' knowledge or point out their weaknesses and strengths.

The questions which inspired this paper are:

- Is e-assessment as valid and reliable as traditional paper-based assessment?
- Do students feel (more) comfortable doing assessments on computers?
- Are there any practical reasons why traditional assessment should give way to e-assessment?

So, the three factors the authors were interested in were:

- reliability – should the marks obtained through e-testing be considered as valid as the ones obtained through paper-testing?
- affectiveness – how do students feel during e-assessment and paper-and-pencil assessment?
- practicality – in what sense are e-tests better than paper-and-pencil tests?

In order to investigate the validity of e-testing, it was necessary to compare the scores of a computer-administered test to the scores of a paper-and-pencil test; then, for the effectiveness, it is students' personal opinions and stress level before and after the tests that count; finally, the practicality factor was determined by an informal talk to teachers, on the one hand and, consulting the existing literature, on the other hand.

The starting assumptions were: if new generations are brought up on technology which, as their natural environment, becomes central to their learning, and if they expect to get an instant feedback, then e-testing should prove valid and less stressful.

2 Method

This part of the paper focuses on the participants and the procedure. The whole procedure can be divided into two parts. The first part, or the experiment, included doing the paper test and the e-test, while the second part included completing the single direct-method questionnaire, which was our



research instrument used for data collection. The questionnaire was distributed by the examiner once the examinees have finished the tests. Our quantitative data analysis included frequency distribution, which is, in this case, represented as the percentage of agreement with the given statement.

2.1 Participants

The research included a sample of 60 students from Singidunum University, Centre Niš, and the Faculty of Philosophy in Niš with the following characteristics: the students were all about 19 years old, their knowledge of English ranged from A1 to B2, they attended the same English language course with the same grammar and vocabulary units, and they took the same tests for the research. To mention the differences, the students study at two different universities (private and state, respectively) and at two different faculties, and the tests were done at different stages of the course (one mid-term and the other at the end of the semester).

2.2 Procedure

In order to answer the first two questions ‘*Is e-assessment as valid and reliable as traditional paper-based assessment?*’ and ‘*Do students feel (more) comfortable doing assessments on computers?*’ the research needed to be conducted. In the first part of the research, the students were asked to complete an e-test and afterwards a paper-and-pencil test. After that, they had to complete a questionnaire related to their stress level before, during and after the tests (Deramo, 2009).

The e-test was performed via M-Tutor application, created for the needs of Singidunum University, where at least one part of almost all exams is done on the computer via this application. Teachers and professors create different areas within their subject (English teachers, for instance, vocabulary, phrasal verbs, comparison of adjectives, present tenses, past tenses, etc.) and enter the questions and answers that may appear in the tests. They mark one or more answers as correct. In that way, the teachers create online databases of questions. Before the mid-term or final exam, a teacher creates a test which may include one or more areas, by determining the number of questions from each area, the numerical value of each correct answer and the time students have to complete the test. The order of questions is random, as well as the order of answers within the same questions. Students have an access to M-Tutor application only at university. The students enter their student identity number to log in to their accounts and access the test. There is no possibility of going back to change the questions. At the end of the test, the students immediately see the results, whereas the teacher has a real-time insight into each student’s performance, with a possibility of reviewing each question within each test individually for each student. The possibility of cheating by logging in by someone other’s name is excluded by having the photo of the student corresponding to their identity number on the screen all time during the exam.

The e-test done in this research comprised 30 multiple choice questions, which appeared randomly on the screen one by one, each with four options, only one of them being correct. The questions tested the vocabulary and grammar areas previously covered in lectures. There was no going back once the question was answered (the *next* button appeared as soon as one of the options was checked). The overall time for answering the questions was 15 minutes. Upon answering the last question, or when the time ran out, the results were shown immediately on the screen, so that each student could see their score.

The paper-and-pencil test was also composed of 30 questions, some of which were fill-in-the-gaps questions and others complete-the-sentence questions. The students had to finish the test in 45 minutes, although most of them completed the answers ahead of time. It was possible to go back, think again and correct previous answers, however, there were no immediate results.

The questionnaire concerning the students' feelings before, during and after the tests was in Serbian and was comprised of six statements, each offering the same two options: e-test or paper-and-pencil test. The students had to circle the option they found more appropriate (Table 1).

Regarding the interviews with ten professors from one state faculty and one private faculty, they were invited to think whether they had used e-assessment in their teaching practice, their opinion about them, and whether they would exchange the standard pen and paper tests for e-tests.

3 Results

After the 60 students handed in the paper-and-pencil tests, the scores on the tests were compared to each student's score on e-test done via M-Tutor application in order to determine the validity of e-tests. The comparison showed the following results:

Out of 60 students, 16 did not pass the e-test and 22 failed the paper-and-pencil test. The average number of points scored on the e-test is 19.3, and on the paper test 18.4. Most of the scores on the e-test and paper test are quite similar with ± 2 points, i.e. correct answers, equally in favour of one or the other form of the test. However, there are some examples of a greater discrepancy in the results, where the difference in the correct answers equals or exceeds 5, in favour of either one or the other form of the test: there are 7 students who scored at least 5 points more on the paper test, and 8 students who scored at least 5 points more on the e-test. These results show that, the possibility of not passing an e-test is equal to the possibility of failing the paper test; in other words, having the answers offered on the screen, from which the correct one should be chosen, instead of thinking of and writing the correct answer as in a paper test, does not make the test easier and does not ensure not failing the test. Also, one quite usual assumption that some students may simply have luck when clicking on the correct answer without really knowing what the correct answer is could easily be counter-argued by the examples of the students who do not have so much luck or by those who are knowledgeable, but choose an incorrect answer by mistake.

As far as the stress level is concerned and the question how the students felt before, during and after the tests, that is whether they anticipated and expected to do better on the e-test or paper test, the results of the questionnaire are given in the table 1, in the number of students and the percentage:

Table 1: *The questionnaire results*

Statement	<i>the e-test</i>	<i>the paper-test</i>
1. <i>Before taking the test, I thought that I would do better...</i>	50 (83.33%)	10 (16.67%)
2. <i>Now, I think that I have done better...</i>	27 (45%)	33 (55%)
3. <i>The level of stress was higher before...</i>	45 (75%)	15 (25%)
4. <i>A greater amount of concentration was necessary for...</i>	19 (31.67%)	41 (68.33%)
5. <i>I find that ... is less valid.</i>	29 (48.33%)	31 (51.67%)
6. <i>In the future, I would prefer to sit the English exam as...</i>	32 (53.33%)	28 (46.67%)

Here, it could be noticed that the students had similar prejudice as some teachers: 83.33% of them thought that the e-test would be easier and they would do better on it. However, their opinion changed after they handed in the paper test: there was a slight advantage in favour of the paper test, i.e. 55% of the students said that they had thought they had done this form better. There was a great level of stress present during the e-test (75%), which, as the students explained, originated from having much less time (15 minutes in comparison with 45 for the paper test) and not being able to go back and forth



over the questions. We have also found some contradictory claims, namely more students concluded that a greater amount of concentration was needed for the paper test (68.33%). Regarding the validity of tests, the difference in opinion is not so prominent: 51.67% of the students consider the paper test more valid. Yet, 53.33% of the students would like to do e-tests in the future.

Finally, practicality as the factor which is often considered when deciding on the changes in every educational system. The information was gathered by talking to teachers and professors, and also from the sources (Sindre & Vegendla, 2015; Tomljanovic & Polic, 2015; Dermo, 2013; Hiller & Fluck, 2013; Ridgway, McCusker & Plead, 2004). Most of the teachers and professors were satisfied with the possibilities that e-assessment provides, but they were not willing yet to start using e-tests because, according to them, some students tend to do worse on computer-based tests. They claimed the main reason had more to do with the students' familiarity with technology than with their academic knowledge and skills. One of the professors believed the students would need a lot of time to adjust to computer-based testing, so some of the students with excellent foreign language knowledge might not do as well in e-tests.

The following can be deduced:

- no paper is needed for online assessments, therefore there are reduced costs to parents and schools;
- online exams are more accessible than paper-based exams, providing that higher education institutions are equipped with a sufficient number of computers, so that students divided into groups can take turns in accessing online tests;
- online assessments are less time-consuming;
- online assessments reduce grading time;
- since there is no human error, grading is more accurate with online assessments;
- online assessments offer a simple method of grade record keeping system.

4 Discussion

Successful assessment, whose ultimate goal is not merely to grade students, is a complex and ongoing cycle. It includes the collecting and analysing of data, discussion, the identification of outcomes, suggesting improvements, introducing changes, and reflection (Buzzetto-More & Alade, 2007). Student outcomes should be improved by using the obtained assessment data (Martell & Calderon, 2005).

The inspiration for the research was the fact that even though there are teachers who are greatly opposed to the idea of introducing ICT in both teaching and assessment processes, some universities are still gradually, but surely introducing ICT (Laurie, Bridglall & Arseneault, 2015). However, there are still some traditional universities which are not willing to implement, or even take into consideration any changes, even though their teaching staff approves of it enthusiastically. The opinions on this matter are quite divergent, and it seems that there has been a disregard for what students think and appreciate, based on the amount of research conducted (Dermo, 2009).

Sources most often point out the fact that we spend most of our time online whether in the workplace or at home (Hillier & Fluck, 2013; Collin & Halverson, 2009; Laurie, Bridglall & Arseneault, 2015), which means that we are always surrounded by modern technologies. This is one of the reasons for introducing e-assessment. In addition, if we are to get used to ICT in the teaching and learning processes, the introduction of e-assessments is expected to complete the whole process. Computer-based testing (CBT) will likely become the main method for administering tests in the future (Ghaderi, Mogholi & Soori, 2014).

The second most commonly cited reason in favour of ICT is related to practicality. In the 21st century, technology is central to learning in school and outside school, so there is no reason why it should not prove central to the assessment process, especially because it may facilitate testing and support authentic assessment (Bennett, 2002). ICT tools may reduce the burden on teachers while testing a range of skills, knowledge and understanding (Jamil, Tariq & Shami, 2012). E-tests are effective in terms of cost and time: they reduce the cost of test administration and distribution, reduce testing time and grading time, there is also a greater level of accuracy in grading, and it is simple to keep records of grades. Additionally, online testing is nowadays using 3D engineering models, audio and video items, industrial tools and machines, and even interaction (Sindre & Vege-ndla, 2015). Finally, one more fact in favour of this claim which at the same time relates to the first one: the century we live in has witnessed the success of online universities and virtual schools in the United States (Bennett, 2002).

The third significant factor puts students in focus. Namely, more recently, there have appeared surveys which focus on students and their experience. There is no doubt that especially summative assessment can be stressful for students. Unlike formative assessment (*aka* informal assessment), summative assessment produces a great amount of stress and makes students feel anxious (Ketabi & Ketabi, 2014). Furthermore, while waiting for the results, students drift apart from this stressful circumstance and may forget what problems or question ambiguities they had encountered, so, when they finally get the scores, these are most often without any further or only with a vague feedback. In other words, the connection between assessment and learning becomes difficult to see. The students lack the information about their weak points, which is crucial for their future performance and thus the prime function of assessment – the improvement of teaching and learning process – is lost (Kopp, 2015).

Given the lack of research on this topic from the perspective of student perception of e-assessment, a piece of research was carried out at the University of Bradford in order to make some conclusions on this matter (Dermo, 2009). The focal point of the research were practicality, reliability, validity, security, affective factors as well as learning and teaching dimensions. It was found that as much as it is important for teachers to consider e-tests valid, it is also significant that students have confidence in a test because it will certainly affect their motivation, engagement and cooperation (Domino & Domino, 2006). This research confirmed the previously mentioned notions and some new ones. Firstly, it proved validity and practicality and, secondly, security and reliability; thirdly, it pointed out the benefits for teaching and learning processes. Finally, the focus, which was of equal importance, was on the so-called affective factors. They refer to the emotions such as concentration, comfort, stress, student expectations and preferences, which students experience during e-assessments, and even though there were some anecdotal answers, the results of the survey indicate a normal range of attitudes, with slightly positive feelings towards e-assessment. Therefore, the minority of students who have opposite views should not be ignored, but, nevertheless, foreign language teachers should not be afraid to use e-assessment (Dermo, 2009).

In a way, this paper confirms almost all of the factors considered above. Despite the modest sample of students, the research confirmed that e-assessment is as valid as paper-and-pencil assessment: the students pass and fail both forms of assessment. A slightly higher number of correct answers on the e-test can be accounted for by the possibility of guessing the answer, but also by the fact of feeling more comfortable doing the test in the familiar environment. There will always be students who prefer one form over the other form of the test. If foreign language teachers are to respond to their students' needs, maybe the option of allowing students to choose which form of test they prefer should be considered.

When asked how they felt before, during and after the tests, the students gave a variety of answers. The common thread is the realisation that, in contrast to their expectations, the e-test was not at all



easier than the paper-and-pencil test. Contrary to the authors' expectations, the stress level was much higher on the e-test. Namely, the authors assumed that the students would be more comfortable and stress free in their everyday environment, i.e. doing the e-test. It turned out that the time limit of 15 minutes was the cause of stress: if the students had been given more time (and the possibility of going over the same questions again), they would not have been under such pressure. However, the time limit did not make them concentrate, it only rushed them into clicking the answers. That is why they felt more concentrated when doing the paper test. The final point of interest in this research was practicality, which was unambiguously confirmed in all aspects: cost-effectiveness, time-effectiveness, accessibility, accuracy, and storage.

5 Conclusion

As it has already been mentioned, the main aim of this paper was to investigate the validity of e-testing in foreign languages by comparing the scores of a computer-administered test to the scores of a paper-and-pencil test on a sample of 60 students, attending two different universities. Besides student performance, the research also gained insight into students' personal feelings and opinions and measured stress level before and after the tests.

Based on the results of this small-scale survey, the following can be concluded:

- validity of e-assessments should not be a stumbling block: e-assessments are as valid as traditional assessments;
- students as individuals are different: some feel comfortable and perform better on e-tests, others when doing paper-and-pencil tests;
- practicality is recognized by everyone: universities, teachers and students.

The limitations of our study are a small sample of participants and the fact that the sample was taken only from two universities. Further research should be of a larger scale, both in terms of the number of participants and the number of universities included.

On the whole, if language teachers still harbour doubts about e-assessments, maybe we should start with formative online assessment and gradually move towards summative e-assessment, remaining aware that every approach has its advantage and limitations. Of course, in order to introduce e-assessment, teachers must work in classrooms equipped with computers, where, prior to the assessment, e-learning should be encouraged. Furthermore, it will probably take some time before students themselves get used to e-tests. Until then, it would be desirable that they should be given the option to choose the form of the test they prefer. After all, we are all interested in guiding and encouraging foreign language students in order to increase their autonomy and take responsibility for their learning, which will, undoubtedly, continue even after we give them final grades.

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