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Jovana Jović
University of Belgrade, Serbia

Marija Stojanov
University of Belgrade, Serbia

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TRANSITIONING FROM PAPER-BASED TO WEB-BASED TESTING IN AN ESP COURSE AT HEI

Abstract

The LSP courses taken by a large number of students often impose heavy workload on teachers when it comes to the testing phase, particularly if paper-based testing is still in use. Such testing is not only time-consuming and inefficient owing to the lengthy test development, grading and reviewing processes, but also stressful for teachers due to the possible grading mistakes, miscalculation of points, illegible students' handwriting, etc. Using as an example an ESP undergraduate course at a business-oriented university, the purpose of this paper is to describe how testing in large LSP courses can be facilitated and made more efficient by shifting to web-based testing via Moodle. This descriptive study aims to outline the process of transition in terms of fulfilling the technical requirements, analysing the paper-based test to determine how best to adapt the test items and the grading system for computer delivery, which was followed by choosing question types and creating a question bank on Moodle. Although these transitioning phases are laborious and require some teacher training on how to use Moodle to create tests, once completed they significantly reduce subsequent teachers' workload. The time needed to devise test items in every exam term is reduced to just a few clicks, teachers do not partake in grading since it is done completely by the computer, the reviewing lasts for a few minutes and the problems teachers previously faced with paper-based testing (grading mistakes, miscalculations, illegible handwriting) are avoided. Therefore, it transpires that the web-based testing via Moodle has eventually made the testing process more practical and efficient from teacher's perspective, but also emphasized the importance of choosing the question types appropriately in order to achieve test authenticity.

Keywords: web-based testing, ESP, higher education, Moodle

1 Introduction

The testing of Languages for Specific Purposes (LSP) has witnessed many changes in recent years most notably due to innovations in LSP teaching and testing, fast-paced advances in computer technology and its growing use in institutions of higher education among others. These changes have brought about the need to re-examine the role of traditional paper-and-pencil tests and consider how computer capabilities could be exploited to measure the mastery of the course content. The potential of computers in language testing is enormous. Computers offer greater efficiency, accuracy and practicality in terms of test construction, response collection, score reporting and test analysis (Alderson & Banerjee, 2002, p. 224). That said, it is no surprise that computer delivery is now becoming commonplace around the globe either in the form of computer-based or web-based testing.

The shift towards computerized testing has been largely influenced by the enhanced capabilities of modern computers compared to the ones they had at the outset of their integration into language testing. The first use of computers in language testing can be traced back to the 1960s with the emergence of PLATO, a computer system that was used for storing grammar and vocabulary gap-filling or multiple-choice items, processing responses and providing simple feedback (Merczak et al., 2016, p. 46). Their capabilities were enhanced in the 1970s and 1980s to include more advanced functions of grammar and spellchecking, and reading exercises, while the first multimedia computers enabled the testing of integrated language skills through computer-assisted language testing (CALT) (Merczak et al., 2016, p. 46). The highlight of the technological revolution, however, was the integration of the Internet in language testing in the 1990s, yielding the term web-based testing (WBT), which meant that tests could now take electronic forms or be administered via virtual learning environments such as Moodle (Merczak et al., 2016, p. 46). As a result of these innovations, test takers can now take computerized TOEFL tests, computer-adaptive tests (CATs) or computer-based diagnostic tests called DIALING (Alderson & Banerjee, 2001, p. 224), while test developers can experiment with programs for the automated scoring of spoken and written responses to aid the assessment process (Douglas, 2013, p. 378), making attempts to keep up with the times.

Due to the impracticality of the paper-and-pencil tests for our context, we have decided to switch to web-based tests administered via Moodle and describe how the testing and assessment process has been made more expeditious for language teachers and test developers as a result. It is worth mentioning here that we have not developed a new test, but rather adapted our existing paper-based mid-term exam for computer delivery. Considering that its purpose in either format is to test students' linguistic knowledge mainly by asking them to insert the words/sentences in the spaces provided, we assume that it is possible to retain the same test tasks that the initial paper-based test had. In addition, we might need to add some variation in the test tasks in order to facilitate the process of test development, test administration and test evaluation. Finally, we believe that the stages we have undertaken and described here would be of use to other language teachers and test developers looking to shift to web-based testing, as well as some challenges and limitations associated with such testing that our experience has revealed.

The present paper has been divided into seven sections. After the Introductory remarks, Section 2 presents the body of literature pertaining to computer-based and web-based testing in

the context of LSP and ESP. Section 3 looks at the course description, while Section 4 outlines the problems of using paper-based tests and is followed by the description of the transition to web-based testing as the most practical solution in Section 5. Section 6 explores some practical implications for developing and administering web-based tests. Finally, concluding remarks are stated in Section 7.

2 Theoretical background

In order to place LSP testing in context, it is necessary to define the notion of LSP from a teaching perspective. Language for Specific Purposes (LSP) is defined as the teaching of specific features of language use and skills that would enable students to perform tasks and achieve communicative functions similar to the ones they will encounter in their academic or workplace target situations (Basturkmen & Elder, 2004, p. 673), such as holding medical consultations or presenting a product to clients. LSP courses are targeted at a specific homogenous group of students, usually at tertiary levels (Basturkmen & Elder, 2004, p. 673) and should be based on a detailed analysis of learners' needs and language used in target situations, which should, in turn, be translated into LSP tests (Basturkmen & Elder, 2004, p. 674; Alderson & Banerjee, 2001, p. 222; Douglas, 2001, p. 172).

ESP testing

One of the many branches of LSP testing and pertinent to this paper is the testing of English for Specific Purposes (ESP). With regard to evaluating the extent to which students have developed the ability to use English to satisfy their future academic or workplace demands, the distinction should be made between ESP testing and ESP assessment. ESP assessment involves a more comprehensive analysis of learning obtained by way of observations, surveys, interviews and portfolios over a period of time for the purpose of helping students develop the necessary skills and knowledge (Bucur & Ceagu, 2015, p. 899). Conversely, ESP tests are summative tools that require students to provide answers to questions that test their language ability and domain-specific knowledge under supervision and within a limited time-frame, evaluated against some pre-established criteria (Bucur & Ceagu, 2015, p. 899). Research encourages the use of both continuous assessment and tests to best evaluate learners' progress (Tevdovska, 2017, p. 28). Before we proceed with the types of ESP tests, it is worth mentioning that some researchers consider ESP assessment as any other type of assessment which should involve defining the purpose, conducting a needs analysis with the key language and skills, and developing tasks (Douglas, 2001, p. 368). ESP tests might be low-stakes in case they matter only to students and teachers in tracking progress, or high-stakes which influence an important decision or outcome such as entrance exams (Bucur & Ceagu, 2015, p. 899). In addition, curriculum-related ESP tests may be designed for the following purposes (Alderson et al., 1995, p. 11; Carr, 2011, p. 7):

a) Admission test is used to decide whether a student has completed the minimum requirements to be admitted to a program.
b) Placement test is used prior to an ESP course to determine the most appropriate level or course.

c) Diagnostic test is used to identify students' strong and weak points in order to provide extra help where needed.

d) Progress test is given during the course to report on students' progress.

e) Achievement test is given at the end of the course to measure what students have learned.

However, the main issue with designing LSP and ESP tests is the role of topical or subject-specific knowledge (Carr, 2011, p. 194; Basturkmen & Elder, 2004, p. 681). While it is true that LSP test tasks should, by definition, draw on knowledge, functions and skills specific to the field being assessed, it would be unfair to expect examinees to have acquired such specialist knowledge prior to gaining experience in the target domain (Basturkmen & Elder, 2004, p. 681). Consequently, such a test would fail to make an accurate prediction of the examinees' future performance in the target domain (Basturkmen & Elder, 2004, p. 681). There is also a concern that the content being tested is 'generally too broad to be fully captured in a teaching syllabus, let alone in a one-off test' (Basturkmen & Elder, 2004, p. 683), which influences the specificity of the test. Authenticity is also reported to be unachievable on any test since there needs to be 'a demonstrable correspondence between the task on a test and the corresponding target language use situation' (Basturkmen & Elder, 2004, p. 688). Davies (2008) also maintains that tests can never achieve authenticity but rather simulate it (as cited in Douglas, 2013, p. 371). Even though a needs analysis serves to provide subject-specific knowledge to be included on an LSP test and enhance its specificity and authenticity, it is extremely difficult to devise it in a way that would cater for all those challenges. One way to solve this challenge is by positioning ESP tests on a 'continuum of specificity' varying from less authentic and specific on one end of the spectrum, to more authentic and specific on the other (Douglas, 2013, p. 371). Another way to enhance authenticity in ESP tests is through options offered by computer-assisted language testing (Suvorov & Hegelheimer, 2014, p. 4; Marczak et al. 2016, p. 49).

Computer-based language testing

Computer-assisted language testing (CALT) refers to the use of computers in the collection and automatic evaluation of examinees' responses in L2 (Suvorov & Hegelheimer, 2014, p. 1). Language tests administered via computers are of great use to language testers in that they are able to not only replicate the recommended criteria for devising paper-based tests, but offer more efficient and 'more expeditious test delivery, test evaluation and score reporting' (Suvorov & Hegelheimer, 2014, p. 2). CALT offers the option of accessing item banks immediately, providing accurate and immediate feedback to students, without having to decipher instances of illegible handwriting (McNamara, 2000, pp. 118-119). Within the notion of CALT, Suvorov and Hegelheimer (2014) have developed a framework for the description of computer-assisted language tests comprising nine attributes and their corresponding categories (p. 2). According to directionality, tests may be linear if test takers answer the same number of questions in the same order, going back to previous ones if needed, adaptive or semi-adaptive tests that adjust the difficulty of each test item so that it corresponds to test takers' language ability without the option of going back to previous questions (Suvorov & Hegelheimer, 2014, p. 3). Next, Suvorov and Hegelheimer (2014) distinguish between computer-based and

Web-based delivery format (p. 2). Whereas computer-based tests (CBTs) are administered offline by using CDs or software applications previously installed, Web-based tests (WBTs) are meant to be taken online (Suvorov & Hegelheimer, 2014, p. 3). In addition, they (2014) have classified tests according to media density (single medium and multimedia), target skill (single language skill and integrated skills), scoring mechanism (human-based, exact answer matching and analysis-based scoring), stakes (low stakes, medium stakes and high stakes), purpose (curriculum-related tests such as placement, progress and achievement and non-curriculum-related such as proficiency tests), response type (selected response and constructed response) and task type (selective such as multiple choice, productive such as short answer, and interactive such as drag and drop) (p. 2). While the framework has been developed specifically for describing computer-assisted tests, the categories of stakes, purpose, response type and task type may also be used for describing paper-based tests whereas the interactive task type is exclusive to computer-based tests (Suvorov & Hegelheimer, 2014, p. 2). Some examples of computerized tests include TOEFL, BULATS Online Tests, Basic English Skills Test (BEST), COMPASS ESL Placement Test, Versant English Test and Pearson Test of English (Suvorov & Hegelheimer, 2014, pp. 7-9).

Web-based testing

Among all attributes of Suvorov and Hegelheimer's framework (2014), more attention should be devoted to the notion of WBT for the purposes of the present paper. WBTs are considered the successors of CBTs written in HTML (Roever, 2001, p. 84). In order to administer a WBT, testers use the central server on their computer to allow access to the HTML test data to testees, who then use a web browser to display the HTML data on their client computers, answer questions and send the responses back to the central server or the tester (Roever, 2001, p. 85). Upon that, they are provided with the feedback written in JavaScript (Roever, 2001, p. 85). WBT tests may be high-tech which require the use of advanced software and specialists to maintain it, while low-tech tests do not require any programming skills or code writing (Roever, 2001, p. 85). Although WBTs cannot genuinely simulate target situations, just like any others, they offer a wide array of testing options including multiple choice, cloze items and reading comprehension (Roever, 2001, p. 86). Finally, some concerns related to WBT are testees' familiarity with computers and the testing environment, their typing speed and delivery failures (Roever, 2001, p. 87). Regardless of these potential challenges, WBTs are highly recommended in language testing, especially in lower-stakes or supervised medium-stakes exams (Roever, 2001, p. 91).

Moodle

There are many instruments for creating and delivering Web-based language tests such as Google Forms, Microsoft Forms, Canvass, Kahoot! and Socrative, but one of the most commonly used by higher education institutions and central to this paper is Moodle. Moodle is an open-source course management system (CMS) or virtual learning environment (VLE) 'designed for teaching and learning purposes in a variety of educational settings' (Suvorov & Hegelheimer, 2014, p. 9). It has seen many upgrades since the introduction of Moodle 1.0 in 2002, while the newest version 4.2 was released in April 2023 (Moodle Releases). Myrick (2010) has devoted an entire book entitled *Moodle 1.9 Testing and Assessment* to the topic of developing

and evaluating tests that describes the features we employ in testing, so the remaining of this paragraph draws knowledge from it. According to him (2010), Moodle is conducive to testing both receptive and productive skills as teachers can develop tests easily within the course by choosing among a wide array of advanced options (p. 6). To begin with, they can set the timing and duration of the test, determine the number of attempts, set the display, grading system, review and feedback options, and a password or a specified IP address so as to maximize test security (Myrick, 2010, pp. 8-10). In addition, they can store test items in the Question bank in a multitude of open-ended and cloze formats including multiple-choice, true/false, matching, drag and drop, embedded answers (cloze), short answer, selecting missing words and others, so they could be readily used when developing a test (Myrick, 2010).

Another distinctive feature of Moodle is the possibility of multimedia integration, which is reported to enhance the authenticity of LSP tests (Suvorov & Hegelheimer, 2014, p. 4; Marczak et al. 2016, p. 49). For example, teachers may include authentic videos in a listening test that require students to analyze it beyond the linguistic input it contains. The test that we have chosen to adapt for computer delivery, however, does not contain any multimedia. Modifying it in a way that does would have necessitated the luxury of time to familiarize ourselves with multimedia integration that we did not have at the time. Moreover, it would have been highly impractical to administer a computer-based speaking test for 500 students all speaking at once or increase the number of exam shifts, which is bound to cause additional anxiety and stress. Our reasoning was that the basic Moodle features would suffice for the first attempt at adapting the test for computer delivery and we would have the chance to explore more advanced options once we have mastered the basic ones, which we did with the subsequent ESP courses. For example, in one of the most recent computerized ESP tests, the students are presented with a picture of a graph and its description that contains some blanks that students have to fill in by choosing the most accurate vocabulary.[1]

Nevertheless, Moodle makes test development and administration more practical and efficient, especially with large groups. Some of the benefits for language teachers and test developers are that they can create quizzes easily by drawing items directly from the Question bank, regrade them easily in case of mistakes, export results in the form of Excel files and analyze them (Myrick, 2010), without having to grade every single paper and enter grades manually. At the same time, students get immediate feedback and test results (Myrick, 2010).

3 ESP course outline

The course at issue is English for Specific Purposes 1 (ESP 1). It is a mandatory undergraduate course, taught to the first-year students of two study programs – Management and Organization and Information Systems and Technologies – at a business-oriented university. The course focuses on the revision of the elementary grammar (tenses, conditionals, reported speech, articles, prepositions, etc.), basic business terminology (starting up a company, organizational structures, management styles, the Internet, job hunting, etc.), as well as on the principles of business correspondence (elements, types and structures of formal letters and emails, formal vs. informal style, etc.). With its syllabus, it serves as an introduction to the English for Specific Purposes 2 (ESP 2) course offered to the second-year students of both

1 An example of this task is provided in the Appendix.

study programs and aimed at presenting them with more advanced terminology and language structures pertinent to their fields of study.

Since the ESP 1 course is two-semester, the students are tested twice – the first time in January in the form of a *mid-term exam*, and the second time in June, when they take the *final exam*. The mid-term exam tests mostly the grammar and part of the terminology that is included in the first section of the course book *Organize Your English* (Jakić, Anđelković & Novaković, 2016). The final exam tests the second section of this book and centers around the terminology from this section and business correspondence. The total number of points in the course is 100. As shown in Table 1, the distribution of points is as follows: in the mid-term exam students must win 21/40 points to pass, whereas in the final exam they can win up to 50 points without any limitations to pass. The remaining 10 points are awarded to students for class work. In order to successfully complete the course, students have to win at least 51 points as a sum of their scores in the mid-term and final exams. The points for class work are added after this condition is met.

Table 1
Distribution of points in ESP 1

	mid-term exam	final exam	class work
number of points	40	50	10
lower limit to pass	21	no	no

Even though this grading system is effective, the underlying testing process used to cause difficulties to the course teachers.

4 Describing the problem

To begin with, the fundamental issue was the size of the course, since around 900 students took ESP 1 each year. The ESP 2 also numbered around 900 students and had the same testing schedule (the mid-term exam in January and the final exam in June). Considering that about 500 students would usually take the January as well as the June test in each course, the ESP teachers were faced with a substantial number of tests to evaluate in a rather short period in almost every exam term.

However, even before the evaluation overload, the ESP teachers found the test development and administration challenging and time-consuming, given such a large number of students. Therefore, in order to explain why the entire testing process appeared inefficient at the time, we will divide it into three stages – test development, test administration and test evaluation – relying on the work of Alderson, Clapham and Wall (1995) and McNamara (2000).

Test development and administration

Considering the number of students who would usually take the January and the June test in each course, it was mandatory to develop tests with many different items, but with the same

structure, to enable test reliability (Douglas, 2000, p. 249) and potentially eliminate the possibility for students to copy and memorize each other's answers. Since there was not enough space on the university premises for 500 students to take the test simultaneously, they were divided in two exam shifts. For this reason, the ESP teachers would construct four different groups of questions, two per each exam shift. Even though devising more test items required much more work for teachers, it was paramount to provide as best testing environment as possible (Bachman and Palmer, 1996, p. 245) and enable test security (Bachman and Palmer, 1996, p. 177). Another important step in providing this environment was to provide enough classrooms and exam supervisors. Even with the benefit of two shifts, such a large number of students required 3 lecture classrooms, 11 regular classrooms and 15 supervisors for test administration. Additionally, since the majority of supervisors were not language teachers, the ESP teachers had to go around every classroom to check if there were any questions about the test and make sure that everything ran smoothly. This resulted in a highly inefficient use of resources, amplified by the excessive use of paper, since both mid-term and final exam were *paper-based*.

Test evaluation

Taking the paper test format into account, the test contained numerous *fill-in-the-blank* questions. As much as this type of question contributes to the test authenticity by delegating students the responsibility to come up with their own answers rather than providing them with ones[2] (McNamara, 2000, p. 30), it has many downsides. Firstly, there may be more than one correct answer to each question that teachers might not have predicted when writing the key to the test. This implies that the teachers need increased focus and more time to read each answer carefully when evaluating in order not to make a mistake and mark an answer as incorrect. Moreover, sometimes students' writing tends to be illegible, which makes the evaluation even more difficult. On top of that, calculation mistakes can occur when adding up the points. Unfortunately, this is not the end of the problem. Once the evaluation had finally finished and the students received the results, they were allowed to review their tests. With almost 500 evaluated tests, this process could be rather lengthy. Not only did students want to check where they had made mistakes, but they also perceived the reviewing process as an opportunity to plead for the passing grade. All this turned even the last stage of the testing process into a highly demanding one.

Lastly, at the time when the workload was this heavy, there were only *two* teachers in charge of all aspects of both ESP undergraduate courses, one additional ESP course taught to some 90 senior students in the spring semester, and one graduate English for Human Resources course taken by about 20 students in the spring semester as well.

Seeing all this, it was imperative that the ESP teachers act immediately to find a workable solution to their problems. Although the problems existed in both ESP courses, the authors will describe only how these problems were solved in ESP 1, since they participated in the process.

2 Which is the case with, for example, the multiple choice (MC) questions.

5 Towards a solution

Presented with various challenges regarding the testing process (from test development to its administration and evaluation), the teachers in the two ESP courses started exploring the ways of making it more efficient in all three of its stages, thus reducing the workload. Some authors (McNamara, 2000; Douglas, 2000) mention efficiency as one of the advantages of using computer technology in language testing. Since the higher education institution (HEI) at which the ESP teachers work is well-equipped in terms of computer technology, the teachers knew they had a good starting point. Furthermore, the HEI introduced the *Moodle* platform as an officially approved method of testing students several years before the ESP teachers' problems arose. Some of the co-workers, who teach nonlinguistic subjects, had already incorporated *Moodle* into their testing practices. Having conducted interviews with them and gained all the necessary information about the transitioning process from traditional testing to testing on *Moodle*, the ESP teachers decided to follow in their footsteps, relying on *Moodle's* praised ease of use, automatic test grading and immediate feedback (Myrick, 2010) which would potentially help teachers achieve greater efficiency.

Transitioning from paper-based to web-based assessment

The transitioning process can be divided into the following five stages:

1. Considering technical aspects,
2. Analyzing the paper-based test,
3. Choosing question types and adapting the grading system,
4. Creating the question bank and
5. Administering the web-based test.

Considering technical aspects

Before changing the type of testing in a particular course at our HEI, it is necessary to get the permission from the Vice Dean of Education. Once the permission was granted, the ESP teachers had to learn about *Moodle* features and how to use them. One of the colleagues who had already undergone the transitioning process was so kind as to introduce the teachers to all important aspects of testing on *Moodle* – quiz features (including grading), creating a quiz, choosing question types, and creating a question bank (Myrick, 2010). Relying on his instructions and the relevant literature, the teachers were ready to start using *Moodle* to create their own quizzes.

However, there was another technical aspect to be considered before they started creating the quizzes. This aspect involved receiving the technical support for the creation of protected accounts on *Moodle* for both teachers and students. The teachers had to get from the Student Affairs the list of all students enrolled in ESP 1 course, together with their student ID numbers and email addresses, and send it to the IT Support Specialists at the university to create the accounts. This aspect also took a considerable amount of time considering the

number of enrolled students. On the other hand, creating the accounts for teachers was a rather quick process as there were now only three of them (another teacher was employed right before the beginning of the transitioning).

Analyzing paper-based test

Turning to the theory, the paper-based test in question could be described as a curriculum-designed, achievement test with medium stakes, since it affects the students' progress in the course. It uses constructed response and mostly productive task types. As indicated above, it is a mid-term test in which students can win up to 40 points. They have one hour to complete the test and need to score at least 21 points to pass. The test[3] comprises 8 test tasks divided into two broad categories: vocabulary and grammar. These two categories can further be divided into 8 subcategories, three for vocabulary and five for grammar, or one subcategory for each test task, as presented in Table 2. Next to each task type is the assigned number of points for that task.

Table 2
Paper-based test tasks and their points

	Task	*Type*	*Number of points*
vocabulary	1. definition matching	short-answer	5
	2. reading comprehension	T/F	10
	3. word formation	short-answer	5
grammar	4. tenses (active and passive)	gap-filling	5
	5. reported speech	short-answer	5
	6. conditionals	short-answer	5
	7. infinitive / -ing	short-answer	2.5
	8. articles	gap-filling	2.5

All in all, the test contains only one task in which students can choose the answer (T/F in reading comprehension) and seven tasks in which they have to come up with the correct answer (therefore constructed response and productive task types). Although the short-answer and gap-filling task types imply that students need to take more responsibility for their answers, which in turn lowers their chances to guess the correct answer (McNamara, 2000, p. 30), all the downsides of evaluating such task types, mentioned in the Test evaluation subchapter, still remain. If teachers unintentionally created an ambiguous test item, there may be more than one correct answer which, together with the illegible student writing, increases the evaluation time. This creates room for evaluation mistakes, which in turn prolongs the reviewing process once the evaluation is finished.

3 Some sample tasks from the mid-term paper-based test are provided in the Appendix.

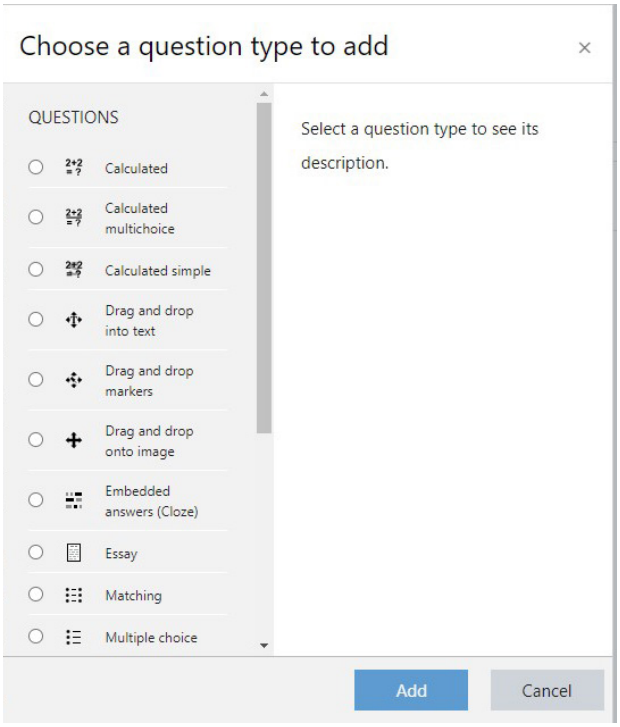
Choosing question types and adapting the grading system

When the ESP teachers decided to switch to web-based testing, they wanted to achieve the following objectives:

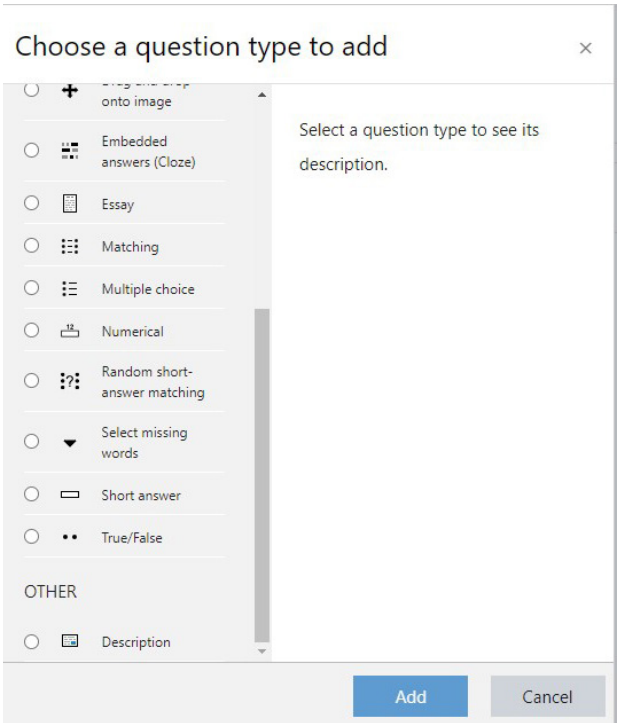
1. to keep the same testing tasks divided into two broad categories – vocabulary and grammar;
2. to keep the same number of points as in the paper-based test – 40;
3. to use a variety of task types that are graded exclusively by the computer.

The first step in doing so was to check the available task types on *Moodle* and see how they could be used to achieve the objectives. The version of *Moodle* used then was 3.5 and it offered 16 task types, called *question types* (https://docs.moodle.org/39/en/Question_types), as shown in Pictures 1 and 2.

Picture 1
Question types available on *Moodle*, pt. 1



Picture 2
Question types on *Moodle*, pt. 2



Among the offered types, the teachers decided to use the following ones, bearing in mind particularly the third objective that could help them achieve greater efficiency:

a) Drag and drop into text,
b) Matching,
c) Multiple choice (MC),
d) Select missing words and
e) Short answer.

Moreover, the chosen question types (specifically types *b, c, d* and *e*) were considered strongly to quite useful as well as easy to use by EFL teachers in the study by Syahid (2018).

Apart from the short-answer question type that dominated the paper-based test, there were now four additional types, all graded by the computer. Therefore, the objective number three was achieved. As far as the objectives one and two are concerned, the teachers arranged the test tasks and the number of points as shown in Table 3. It is clear from the Table that reading comprehension is now worth 5 points in the web-based test instead of 10 points originally assigned in the paper-based test, conditionals are worth 2.5 points instead of 5, and two completely new items have been introduced, easily confused words and prepositions worth 5 and 2.5 points, respectively. These changes are given in red in Table 3.

Table 3
Web-based test tasks and their points[4]

	Task	*Type*	*Number of points*
vocabulary	1. definition matching	matching	5
	2. reading comprehension	drag and drop into text	5
	3. easily confused words	select missing words	5
	4. word formation	short-answer	5
grammar	5. tenses (active and passive)	short-answer	5
	6. reported speech	select missing words	5
	7. conditionals	multiple choice	2.5
	8. infinitive / -ing	short-answer	2.5
	9. articles	select missing words	2.5
	10. prepositions	short answer	2.5

The test tasks remained divided into two broad categories – vocabulary and grammar, but with the addition of two more test tasks, one per each category. The task *easily confused words* joined the vocabulary category because the teaching materials contained numerous such words (e.g., economic and economical, price and prize, effect and affect, staff and stuff, personal and personnel, lend and borrow, etc.) that had not previously been tested in any task. Therefore, the number of points for the reading comprehension task was reduced from 10 to 5, while 5 points were assigned to the newly introduced task. Another reduction of points was applied to the conditionals task due to the change in question type. The short-answer type from the paper-based test became multiple choice type. Since Alderson, Clapham and Wall (1995) believe that students can easily come up with the strategies that can help them guess the correct answer in MC questions, it was decided to reduce the number of points for this task from 5 to 2.5. Finally, the remaining 2.5 points were assigned to the new task – *prepositions* – added to the category *grammar*. The reason for adding this task was the

4 An example of each of these tasks from one of our first web-based tests is given in the Appendix.

same as for the previous one – the prepositions had not been tested before even though they were taught during the semester.

In conclusion, although in both versions of the test the tasks are divided into two broad categories – vocabulary and grammar – the web-based test contains 10 tasks as opposed to 8 tasks in the paper-based test, which is one additional task per category. While the paper-based version contains 7/8 questions of short-answer/gap-filling type, in the web-based one 4/10 question types are short-answer, whereas the others belong to the remaining four types chosen by the ESP teachers from the available question types on *Moodle*. As a result of the change in question types and the addition of two tasks, the distribution of points in the web-based version is slightly different from the one in the paper-based test. In view of these characteristics, the *Moodle* test could be described also as curriculum-designed, achievement, medium-stakes test, but with the additional features of a web-based test – it is single-medium, linear, low-tech, uses exact answer matching as the scoring mechanism, the combination of selected and constructed response, as well as all three task types - selective, productive and interactive (Suvorov & Hegelheimer, 2014).

Creating the question bank

Before the first web-based test could be created, the final step in the transition remained – to create a question bank. This implied devising the questions, or test items, for each of the 10 tasks to be included in the test and sorting them into different categories according to the task type. As the major resource for test item development, the teachers used their own course book. Additional resources include Raymond Murphy's *English Grammar in Use* (2004), *Business Grammar and Practice* by Michael Duckworth (Oxford, 2006), *English for ICT Studies in Higher Education Studies* (Garnet, 2011), *English for Management Studies in Higher Education Studies* (Garnet, 2009), *Professional English in Use ICT* (Cambridge University Press, 2007), *Professional English in Use Management* (Cambridge University Press, 2011), etc.

The process of creating the question bank was rather time-consuming since it comprised careful writing of every question so as to be perfectly understandable, without ambiguities and with only one correct answer. Where more than one answer was correct, the teachers included them in the answer section of each question to prevent confusion among students and unnecessary regrading. Clear instructions were provided in the text of every question in the question bank, so that students could easily understand what their task is. Once the questions were ready, the teachers added them to the categories in the question bank on *Moodle*, following the instructions given by Myrick (2010) and their more experienced colleague who had already included *Moodle* into his testing practice. As the last, but definitely not the least step, the teachers double-checked all the questions in the question bank to see if they are clear and precise enough to be presented to students.

Administering the web-based test

Four stages preceded the administration of the web-based test. In these stages the ESP teachers considered the technical aspects of testing on *Moodle*, analyzed the paper-based test in terms of task types, question types and the points assigned for each task, chose the

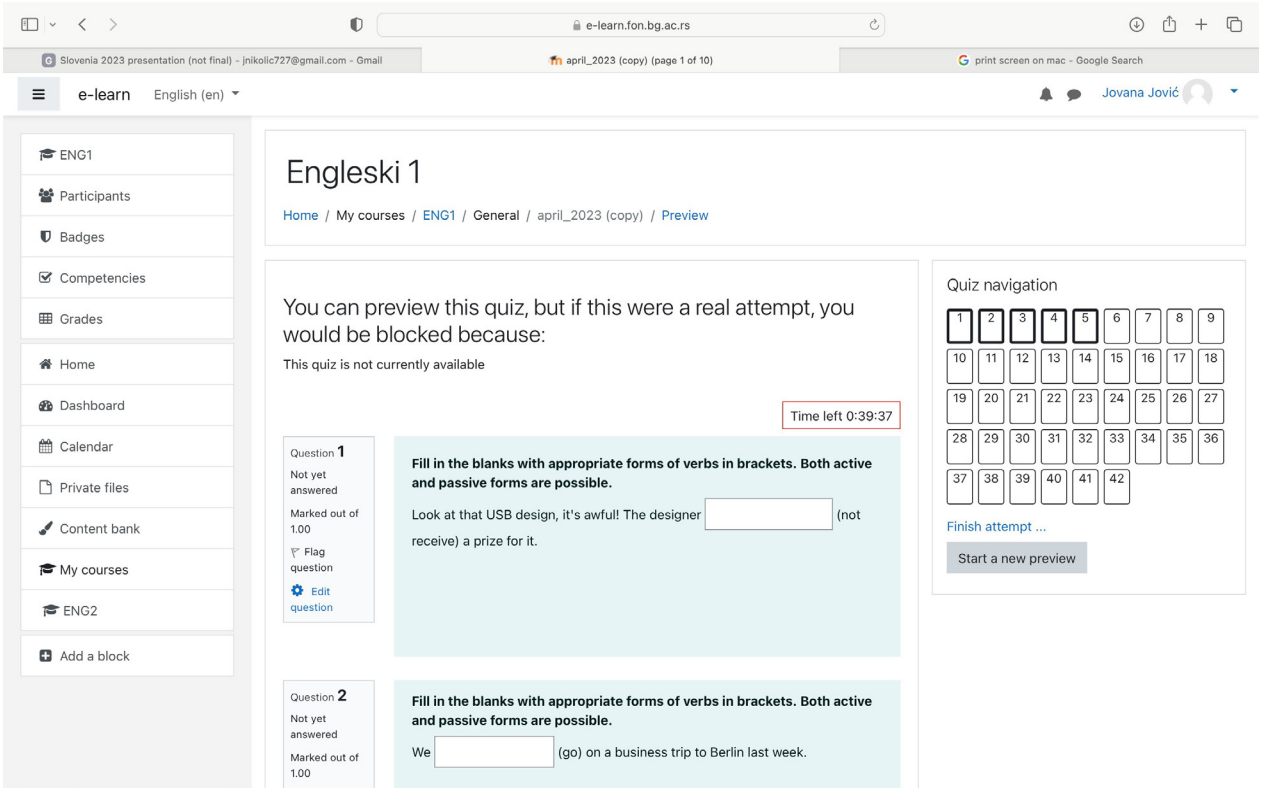
question types available on *Moodle* and adapted the grading system accordingly, and created the question bank with questions organized in various categories according to the task type. Now the web-based test, or quiz as called on *Moodle*, was only a few clicks away. It was necessary to name the quiz, set the timing (when the quiz opens, closes and what the time limit for completing the quiz is) and grading (set grade to pass at 21 points and allow only one attempt per student), check review options, add a password as an extra restriction and, finally, add the questions to the quiz and set the number of points for each question. Having taken all these steps, the test was ready to be administered to students.

However, since students might experience increasing anxiety due to the contact with new technology (McNamara, 2000, p. 118), it was imperative to familiarize them with the technical aspects of taking the test prior to the test. The students had to be reminded to check their username and password, as any problem with their credentials would jeopardize their chance to take the exam and thus result in the test failure. Moreover, they needed to be aware of the time limit, how to submit the test once they finish, how to use the navigation bar (all presented in Picture 3), how to review their answers and, above all, how to do some tasks (such as drag and drop into text) as they might be facing these for the first time. Therefore, the teachers arranged a pilot test in the last week before the test to prepare students for what they would face in the real test. Naturally, all the instructions were repeated once the students were seated to finally take the test.

Comparing test development, administration and evaluation stages of paper-based and web-based test, it is evident that greater efficiency has been achieved in all three stages of web-based testing, which resulted in a substantial reduction of teacher workload. Not only is there no need for paper or for extra time to devise four different groups of questions, but the stage of manual evaluation is completely eliminated, since the computer automatically creates and grades different tests for all students. Instead of teachers spending too much time to create new questions each time, prepare the key and print everything out, the computer now needs about 5-10 minutes for the entire process. Furthermore, there is no longer a need for additional exam supervisors and the administration of the test requires only three computer classrooms. As for the exam shifts, their number in the computer test administration increased due to the teachers' demand to have at least one ESP teacher present in the classroom at all times during the test. Consequently, the number of shifts has risen from two to 5-6 depending on the number of students. At the end of each shift, the students can immediately review their tests by simply clicking on the blue *review* link. The correct answer to every question is shown in the yellow field below a student's answer, and the number of points won on the left side of the question. The total number of points a student scored can be seen at the top of the first test page. The students are allowed as much time as they need to review their tests in silence and ask any questions related to the test. They are reminded that no subsequent reviewing is allowed. After everyone has finished reviewing, the students are asked to log out and leave the classroom. Therefore, the reviewing time has been reduced from several hours to several minutes, and the pleading for the passing grade diminished because the students trusted the computer grading and point calculation, which is, once again, evidence of improved efficiency. Yet another evidence can be seen in the regrading process. During the testing and reviewing processes in each shift, the teachers write down any remarks by students regarding the technical malfunctions, incorrect answers or more than one correct answer, mistakes in the text of the question, etc. to check them upon test completion and regrade the tests if necessary. If it

occurs that the teachers have forgotten to include a correct answer in the key, or provided a wrong answer as correct, it is enough to correct the mistake in the edit section and then press the *regrade all* button. After a few minutes every test is regraded and in the ones that contained a mistake, the total number of points is crossed out and replaced with the correct number. In the paper-based test, if such mistakes had occurred, the teachers had to go through tests one by one and correct the mistakes by themselves as well as to recalculate the total number of points. After regrading, the teachers can easily download the results in the form of an *Excel* document and manipulate the data in the most suitable way for their record keeping.

Picture 3
A preview of the upper part of the first page of the web-based test



The final aspect of test administration stage to be considered is cheating. While taking the paper-based test, students knew that every other student had the same set of questions, which led them to develop different strategies for copying answers. For example, they would use a moment of supervisor's inattention to swap the tests, so that the student next to them would have the same set of questions, which would allow more room for cheating. Even though this strategy is unviable in a web-based test, that does not imply that the students lacked creativity in devising some new cheating options. There was an instant of a student, absent from the test, who was sent the password for the test by some other student taking the test in the classroom. The teachers immediately discovered cheating because they always compare the number of students present in the classroom with the number of students recorded by *Moodle* to be taking the test. After the IT support Specialists checked the IP address from which the student had accessed the test, they noted that it did not match any of the IP addresses of the computers in the classroom. Although the student denied everything, the

evidence of cheating was obvious, and she was properly disciplined. This experience has taught the teachers a new lesson on *Moodle* characteristics. When creating a new quiz, it is possible to set the specific network addresses from which the students can access the test in the *extra restrictions on attempts* section. By making use of this characteristic, the previously mentioned cheating strategy has become impracticable.

6 Implications

Even though there is considerable merit in using computer technology in language testing, many LSP teachers and test developers are reluctant to embrace it for a number of reasons. The first one is of technical nature and relates to the availability, quality and cost of computer equipment, as well as Internet access provided in testing facilities (Brown, 2016, p. 146; Douglas & Hegelheimer, 2007, p. 127; McNamara, 2000, p. 118); the need for devising a large number of test items which is time-consuming and involves a risk to test security (Suvorov & Hegelheimer, 2014, p. 14; Brown, 2016, p. 148; Chapelle & Douglas, 2006, as cited in Douglas & Hegelheimer, 2007, p. 123) and the need for teacher training and instruction in developing computerized tests (Brown, 2016, p. 148; Merczak et al., 2016, p. 50). However, modern computer equipment and Internet access are available in many universities and testing facilities nowadays, as well as computer labs, a trend caused by the overall increase in computer literacy (McNamara, 2000, p. 118). While it is time-consuming to devise large item banks, research suggests that this is an advantage rather than a disadvantage, given that large item banks allow for an infinite number of item combinations, which only adds to the test security and minimizes the risk that test takers will memorize test items (McNamara, 2000, p. 80). The second deterrent refers to the fact that most web-based tests rely heavily on multiple-choice tasks, which is a huge disadvantage (Brown, 2016, p. 148; Douglas, 2000, p. 276; Chalhoub-Deville, 1999, as cited in Alderson & Banerjee, 2002, p. 225) since such testing 'threatens to inhibit test developers from seeing new and more valid ways of assessing language proficiency and language testing' (Alderson, 1996, p. 249 as cited in Douglas, 2000, p. 260). However, the authenticity issue can be resolved by incorporating multimedia into language tests (Suvorov & Hegelheimer, 2014, p. 4) or the use of *fill-in-the-blanks* questions (McNamara 2000, p. 30). As Douglas maintains (2000), 'the future of test delivery seems headed in the direction of web-based formats' (p. 276) and teachers should be encouraged to move beyond the traditional testing methods (Chalhoub-Deville, 2001, p. 97).

Our process of shifting to web-based testing has confirmed that test development, administration and evaluation are indeed more practical and efficient than in the case of paper-based testing, both in theory and practice, which aligns with the theory presented (Suvorov & Hegelheimer, 2014), even when all the challenges associated with it are taken into account. The outcome of the transition is that the new testing procedure requires test developers and language teachers to invest considerably less time to design a quiz, organize a significantly lower number of test administrators and exam shifts, take just a few minutes to export the grades, and spend none grading the papers. In informal conversations with the students after the test, we learned that they were more at ease as they had been provided with the test results and feedback, without having to wait in suspense for days, which is one of the benefits of web-based testing for students. However, we cannot claim that the students find the new testing procedure to be equally practical as we do since the present paper does not

examine the students' testing preferences or experiences with web-based testing. This would require additional research data which is currently unobtainable.

However, web-based testing via Moodle is not without limitations. Even though we made sure to minimize the number of multiple-choice questions and gave priority to fill-in-the-blanks answers so as to make the test more authentic (McNamara, 2000), it seems that we have still failed to achieve authenticity. Fill-in-the-blanks questions only tested the students' ability to insert the correct forms of vocabulary or grammar in the space provided, not their ability to apply the grammar and vocabulary in question to solve tasks they will encounter in their future work as they are supposed to (Basturkmen & Elder, 2004). Due to the linguistic nature of the test items, the test leans towards the less authentic and less specific ESP test on the continuum of specificity (Douglas, 2013) and the question still remains whether Moodle can simulate real-world tasks and enhance authenticity and specificity, if so, to what extent. In order to obtain these insights, a test would have to be altered in a way that involves more practical and specific tasks that move beyond the simple insertion of vocabulary and grammar forms, preferably using multimedia, so it is the question of the ESP test design, not so much of the platform itself. In this way, we could also examine whether multimedia indeed enhances authenticity (Suvorov & Hegelheimer, 2014), which was impossible to investigate now as no multimedia was used. Be that as it may, the purpose of the paper is to describe the transition process and not to report on the ability of Moodle to enhance authenticity, so a different type of research would have to be conducted to that end. Finally, while Moodle can automatically grade selected response questions, constructed responses need to be graded manually one by one. The test in question did not contain any constructed responses, but our subsequent tests involved writing an email and it was incumbent upon us to grade them manually, which is another limitation of Moodle that teachers should be aware of when designing tests.

Nonetheless, our practice has shed new light on some other aspects of developing and administering web-based tests that teachers and LSP practitioners might find helpful. First of all, teachers are strongly encouraged to check whether each selected question type serves the intended purpose and best tests what it is supposed to test. For example, we might get a more accurate evaluation of students' mastery of verb tenses if we choose a constructed response rather than a selected response question. Secondly, it is advisable to write instructions in the text of every question in the question bank even if the questions belong to the same category since students are easily confused by what they are supposed to do. Moreover, we recommend leaving enough time to review all the questions in the question bank before setting the test as well as piloting it to safeguard against any potential mistakes and if so, correct them in advance. If students spot a mistake during the test, instances of ambiguous questions, more than one possible answer or a failure of the system to recognize the correct answer, teachers are encouraged to note down any such instances, check and re-grade the test if necessary. There is another *Moodle* characteristic worth considering which the authors did not exploit at the time due to the heavy workload. When adding new questions to the question bank, it is possible to provide feedback for each question. The feedback is visible to students when reviewing their tests and can contain some explanation about the correct answer or the question itself, some link for future study or anything that teachers believe students would find useful. The purposefulness of this characteristic could be examined in research with students repeating the test. The students could be divided into two groups – one presented with the feedback and the other that is not. In the next exam term, the students who failed the test could be given the same

questions as in the previous test in order to compare their results and draw some conclusions about the usefulness of *question feedback* characteristic.

Finally, teachers should familiarize students with the testing environment and give them clear and concise technical instructions before taking the exam so as to minimize anxiety levels. These considerations would make the testing process run more smoothly.

7 Conclusion

This article has examined the problem of using paper-and-pencil tests in an undergraduate ESP course at a business-oriented university and described the transition to web-based testing as the most practical solution, at least from the teachers' perspective. It has been made manifest in the course of our work that developing, administering and evaluating a total of 500 paper-based mid-term exams is no longer an option, considering the number of classrooms and exam supervisors required, the number of different tests to be made, the issues of illegible handwriting, the amount of time necessary to mark every single paper and the enormous room for mistakes during test evaluation and score reporting. In order to solve these issues, we have decided to adapt the paper-based test for computer delivery by using Moodle, aware of the fact that web-based tests would help us overcome the pitfalls of the paper-based tests and expedite test development, administration, evaluation and electronic documentation of test results (Suvorov & Hegelheimer, 2014: McNamara, 2000). Once we decided on the platform, we fulfilled the technical requirements, analyzed the paper-based test, chose the question types on Moodle carefully to match those on the paper test and developed the question bank, which has resulted in a new testing system that employs web-based tests. Upon test administration and close inspection of the web-based test, our practice has confirmed that it is indeed more practical and efficient for both ESP teachers and test developers. This paper also provides sample questions that other ESP teachers could refer to when designing their own test. In addition, the paper offers some practical considerations when designing web-based tests. For example, test developers should invest enough time to familiarize students with the new testing system and procedure, minimize the number of multiple-choice questions in favor of constructed responses, write test instructions for each question and review each one in order to avoid mistakes, and be attentive to students' questions and comments about the test in case re-grading might be necessary. Even though Moodle has facilitated the testing process, its limitations have also emerged, one of them being that authenticity is not guaranteed even if using fill-in-the-blank questions, which is the concern of other researchers (Roever, 2004; Suvorov & Hegelheimer, 2014). The authors have not examined the students' perspective on the transition and the benefits they have gained from it, only teachers'. Therefore, this research offers new avenues for future research. For instance, students could be asked to express their preferences and attitudes to web-based tests compared to paper-based tests, or teachers could compare students' performance in the web-based test against the paper-based test to see if there is a correlation between delivery mode and performance. Teachers could also divide students into two groups: one that is given written feedback for every question in the test in the reviewing process and one that is not, with the purpose of examining whether students repeating the test from the group that is provided with feedback perform better in the next exam period. These findings would provide a more comprehensive insight into the effectiveness of web-based tests.

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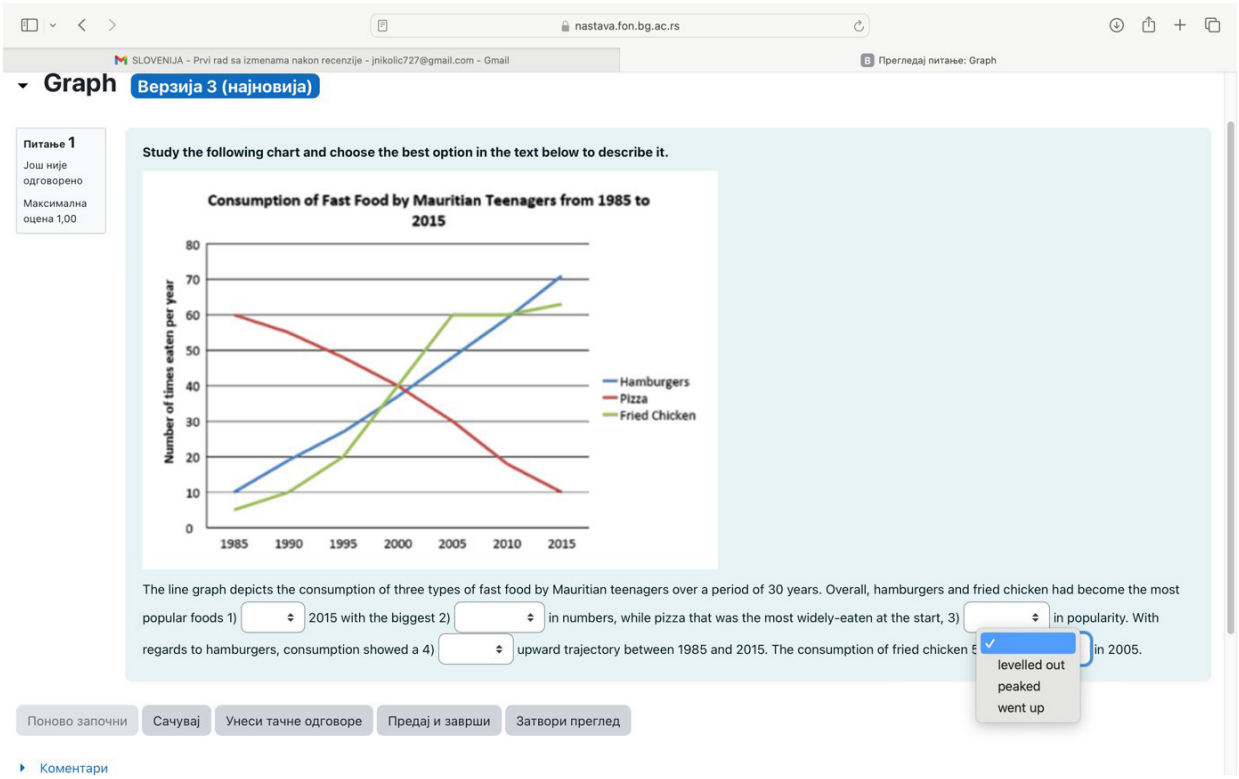
Appendix

I – Sample task with multimedia



II – Paper-based test question types

Picture 1
T/F

II Decide if the following statements are true (T) or false (F) according to the text. (10 points)

The simplest form of business in the individual partnership or sole trader: for example, a shop or a taxi owned by a single person. If several individuals wish to go into business together, they can form a partnership: partners generally contribute equal capital, have equal authority in management, and share profits or losses. In many countries, lawyers, doctors and accountants are not allowed to form companies, but only partnerships with unlimited liability for debts – which should make them act responsibly. Like sole traders, in the case of bankruptcy, partners can lose all. Consequently, the majority of businesses are limited companies, in which investors are only liable for the amount of capital they have invested. If a limited company goes bankrupt, its assets are sold to pay the debts; if the assets do not cover the debts, they remain unpaid (i.e. creditors do not get their money back). In Britain, most smaller enterprises are private limited companies which cannot offer shares to the public: their owners can only raise capital from friends or from banks and other venture capital institutions. A successful, growing business can apply to the Stock Exchange to become a public limited company; if accepted, it can offer its shares for sale on the open stock market. Founders of companies have to write a Memorandum of Association, which states the company's name, purpose and the place where the company does its business (an office, a shop, a workshop, a factory, a warehouse, etc.).

1. The majority of businesses today are partnerships. T/F
2. Partners in a partnership usually have the same profits and debts. T/F
3. When a sole trader goes bankrupt, he or she can lose everything. T/F
4. In most companies, an investor's liability is limited by the amount of money he/she has invested. T/F
5. Private limited companies in Britain can sell their shares publicly. T/F

Picture 2
Short-answer

VI Paraphrase the following sentences so that both sentences have the same meaning. (5 points)

1. We arrived late so we didn't register before the exam.

If _____on time, _____.

2. We don't fly business class. It costs too much.

_____ if _____less.

3. I won't have enough time to prepare the presentation so it won't go very well.

If I _____more time, _____better.

4. We spent too much money on leaflets so we didn't buy new posters.

If _____less money _____.

5. Look at their website. Their address is to be found there.

If_____, you_____.

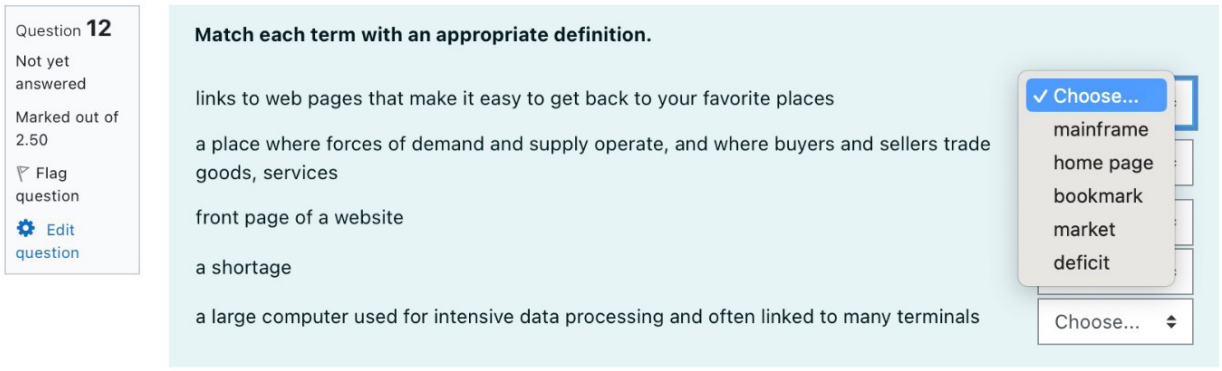
Picture 3
Gap-filling

VIII Chose the appropriate article – *a, an, the* or no article (x). (2.5 points)

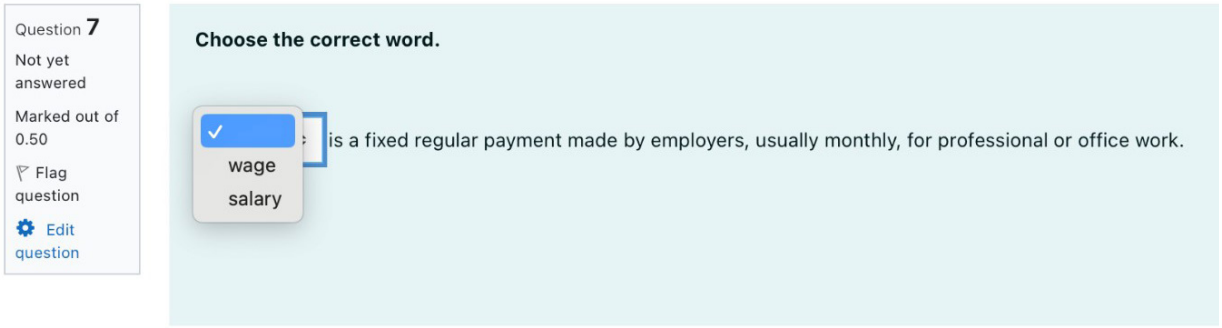
_____ Internet is a global system of interconnected computer networks that use the standard *Internet protocol suite*, a set of communications protocols, to serve more than 2.1 billion users worldwide — nearly a third of _____ Earth's population. It has reshaped and redefined most traditional communications media including telephone, music, film, and television. Its origins reach back to research of _____ 1960s, commissioned by the United States government in _____ collaboration with private commercial interests to build computer networks. The commercialization of this international network resulted in its popularization and incorporation into virtually every aspect of _____ modern human life.

III – Web-based test question types

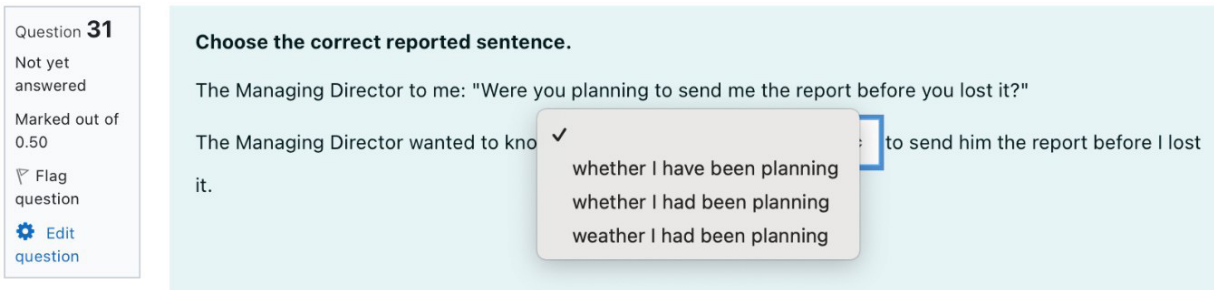
Picture 4
Matching



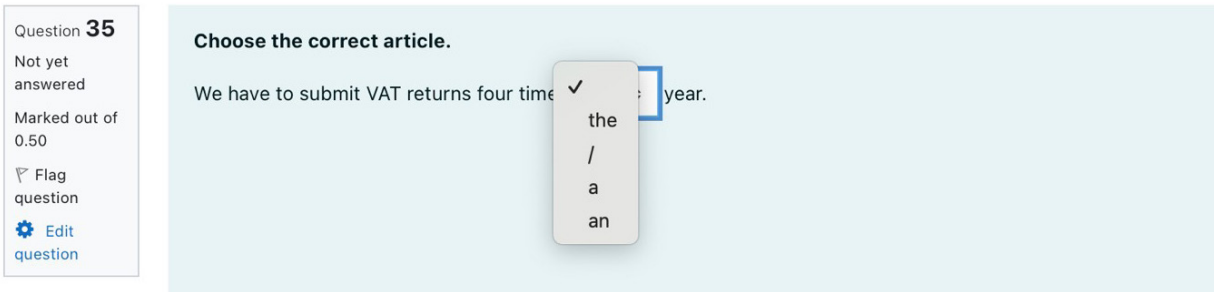
Picture 5a
Select missing words (easily confused words)



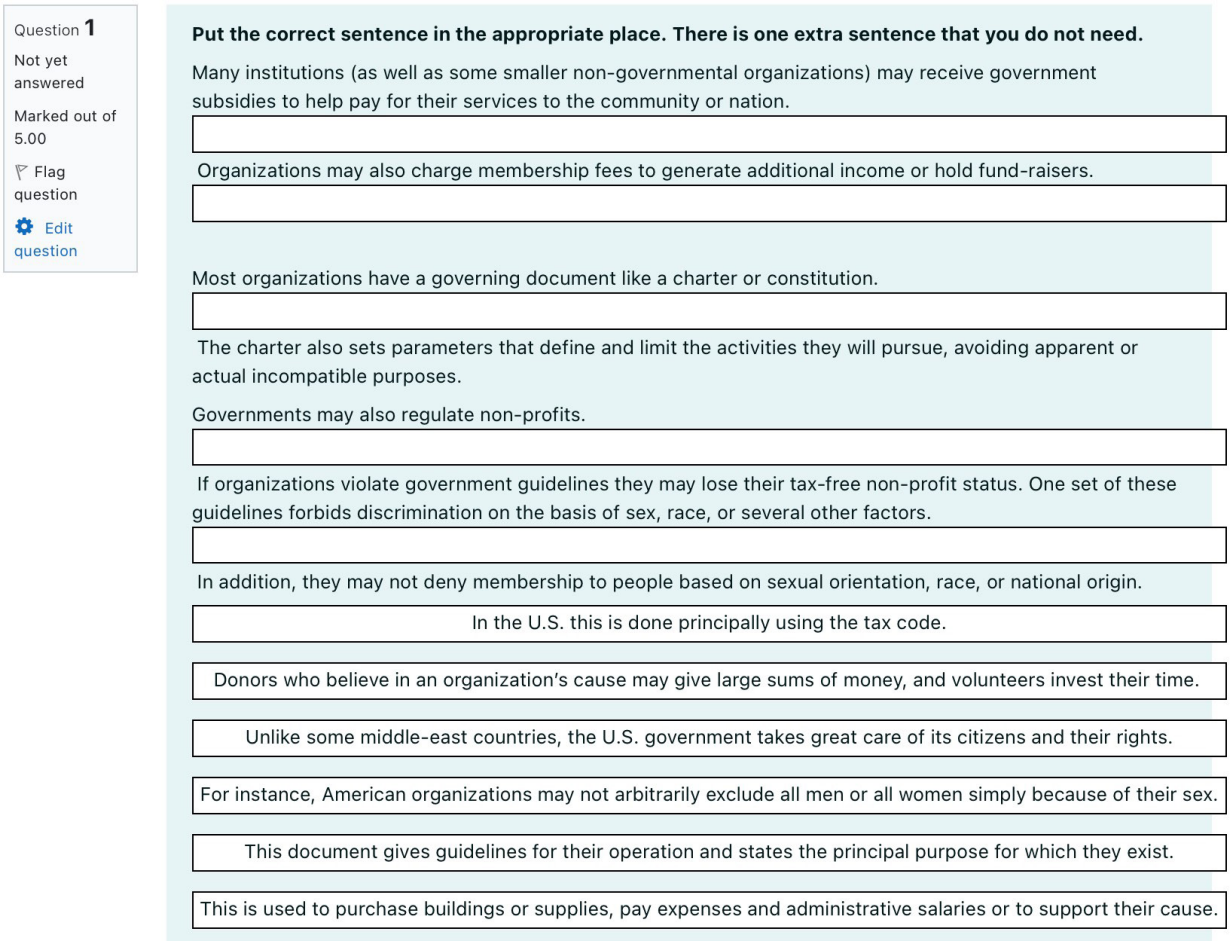
Picture 5b
Select missing words (reported speech)



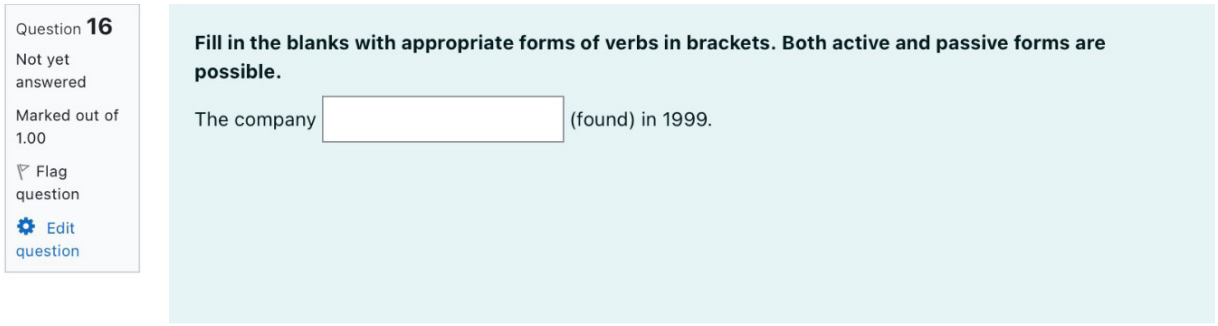
Picture 5c
Select missing words (articles)



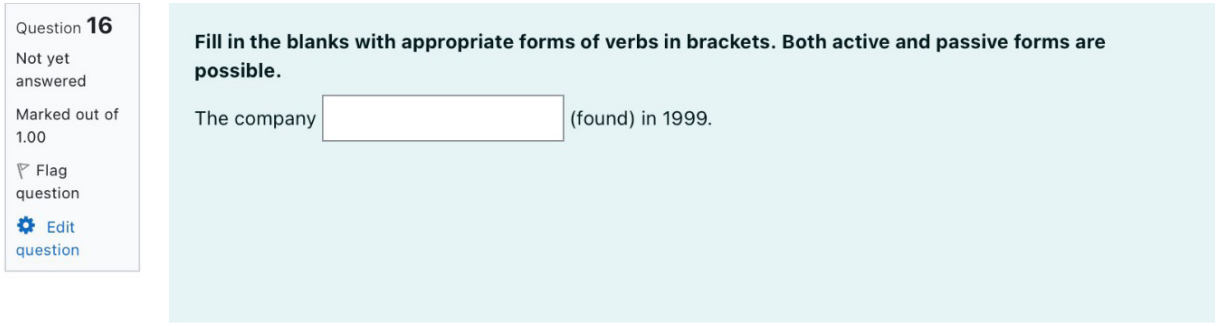
Picture 6
Drag and drop into text



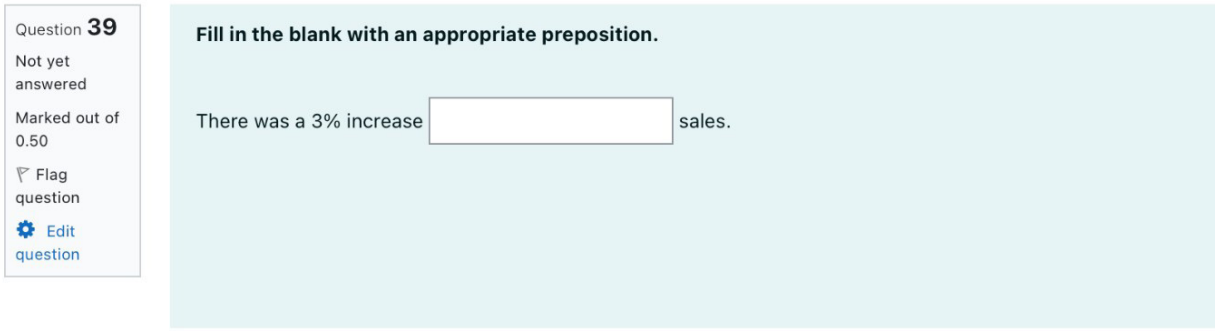
Picture 7a
Short-answer (tenses)



Picture 7b
Short-answer (infinitive / -ing)



Picture 7c
Short-answer (prepositions)



Picture 7d
Short-answer (word formation)

Question **4**
Not yet answered
Marked out of 1.00
Flag question
Edit question

Use the word in the brackets to form the appropriate word. You may need a prefix and/or a suffix.

Nowadays, personal computers are _____ and most people can't imagine their lives without them. **(REPLACE)**

Question **5**
Not yet answered
Marked out of 1.00
Flag question
Edit question

Use the word in the brackets to form the appropriate word. You may need a prefix and/or a suffix.

Some workers need constant _____ if they are to work effectively. **(SUPERVISE)**

Question **6**
Not yet answered
Marked out of 1.00
Flag question
Edit question

Use the word in the brackets to form the appropriate word. You may need a prefix and/or a suffix.

The company decided to _____ new projects. **(PRIORITY)**

Picture 8
Multiple choice (conditionals)

Question **27**
Not yet answered
Marked out of 1.00
Flag question
Edit question

Choose the sentence with the same meaning as the given sentence.

Tony would be promoted but he left his previous job.

Select one:

a. If Tony hadn't left his job, he would have been promoted.
b. If Tony doesn't leave his job, he will be promoted.
c. If Tony didn't leave his job, he would be promoted.

Izvleček

Prehod na spletno preverjanje znanja pri predmetu *angleščina kot jezik stroke* na visokošolski ustanovi

Predmet tuj jezik stroke (TJS) običajno obiskuje veliko število študentov, kar učiteljem pogosto predstavlja veliko obremenitev na vseh ravneh, zlasti pri ocenjevanju. Prav proces preverjanja znanja terja največ časa. Da bi pospešili postopek ocenjevanja, bi lahko učitelji TJS razmislili o prehodu na spletno preverjanje znanja. V prispevku opisujemo primer takega prehoda pri predmetu Angleščina kot jezik stroke na poslovno usmerjenem dodiplomskem študijskem programu, pri katerem smo uporabili spletno učno platformo Moodle. Opisati želimo celoten proces v smislu izpolnjevanja tehničnih zahtev in analize pisnega izpita, da bi ugotovili, kako najbolje prilagoditi testne elemente in sistem ocenjevanja računalniški izvedbi. Temu sledi izbira tipa vprašanj in oblikovanje banke vprašanj v orodju Moodle. Ob upoštevanju vseh dolgotrajnih faz prehoda se je izkazalo, da je postopek ocenjevanja v orodju Moodle bolj praktičen in učinkovitejši. Da bi pa spletno preverjanje znanja v orodju Moodle prineslo želene koristi, je treba skrbno pristopiti k vsaki fazi prehoda in se osrediniti predvsem na izbiro tipa vprašanj, da bi se izognili problemu verodostojnosti testov.

Ključne besede: spletno testiranje, TJS, visokošolsko izobraževanje, Moodle