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Online vs Paper Examination in University EFL courses

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Abstract. Universities have long been struggling with academic dishonesty in both online and pen-and-paper examinations. Different authors have suggested various deterrents to decrease cheating during exams. The aim of this study is to investigate how the online environment affects academic dishonesty during online exams and to compare students' behaviour during written and paper exams. The hypotheses tested is that there is a significant difference between mean values of the results achieved on pen-and-paper tests and online tests. The research adopted a cross-sectional study design. The Wilcoxon Signed Ranks Test confirmed the hypothesis as it showed that the scores on the online exam (mean rank = 35.9) were statistically higher than the ones on the pen-and-paper test (mean rank = 28.3), Z= -3.311, p=0.001 with a small effect size r = 0.29. This could be due to the test format and insufficient proctoring technology. Online cheating could be minimized by giving priority to formative assessment, by raising students' awareness of the negative consequences of academic dishonesty, and implementing more sophisticated technologies to track students' behavior during online exams. Additionally, multiple-choice questions should be replaced by open-ended questions. Finally, a speaking section could be added to online tests, which is to be passed successfully in order for students to receive a passing grade for the EFL course.

Key words: *online examination, pen-and-paper tests, test design, academic dishonesty.*

Introduction

The World Health Organization declared a COVID-19 pandemic on 11th March 2020[1] (Cucinotta & Vanelli, 2020). Consequently, upon the Government's proposal the Ministry of Education and Science of the Republic of North Macedonia passed a decree with force of law for the application of the Law on Higher Education during a state of emergency on 23rd March 20201. According to the decree the educational process continued online and testing was to be conducted online as well. Macedonian universities were left with no choice but to act promptly. Within two weeks after the interruption of the educational process, the International Balkan University (IBU) in Skopje adopted the 'synchronous online mode of teaching, applying real-time video conferencing and interactive teaching, using the Zoom platform' (Kujundzicka, 2021). IBU had previously developed its own online university management system, called the Hello online system, which was first implemented in 2018. All exams were conducted online. 80% of the university staff used the Exam.net service; the remaining 20% used Google forms, oral examinations or projects to assess students' knowledge (Kujundziska, 2021).

Prior to the pandemic the problem of academic dishonesty in online courses has long been an issue of concern (Peterson, 2019; Kolowich, 2016, McCabe et al., 2012, King et al., 2009, Lanier, 2006). Some authors claim that cheating is more prevalent in online than in live courses (Young, 2012, Miller & Young-Jones, 2012). We may therefore assume that 'online scores are likely inflated by cheating' (Dendir & Maxwell, 2020). Several studies have shown that students believe that cheating is much easier in online tests (King et al., 2009; Lanier, 2006). However, two other studies yielded opposite results (Grijalva et al. 2006; Stuber-McEwen et al., 2009). Namely, it was found that there was either no significant difference between cheating on online and paper-based tests, or students cheated less in online exams. There is 'prevailing disparity between the amount of actual cheating and the perception of academic dishonesty' (Watson & Sottile 2010). The reasons why students decide to cheat are numerous and depend on gender, personal needs, age and cultural rules (Miller & Young-Jones, 2012, Yu Niiya et al., 2008, Humbarger & DeVaney, 2005, Kohlberg, 1971).Since the start of the pandemic universities have been struggling with finding effective ways

[1]https://mon.gov.mk/stored/document/Uredba-so-zakonska-sila-za-primena-na-Zakonot-za-visokoto-obrazovanie-za-vreme-na-vonredna-sostojba-24-03-2020_1.pdf

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to minimize cheating during online exams. Different authors have suggested using various deterrents to decrease academic dishonesty. Lee et al. (2020) suggest using before-during-after strategies. The before strategy is to encourage academic honesty among students and make them agree to it by signing and submitting a signed Test Ethics Pledge prior to taking the online tests (Benson 2020, Lee et al. 2020). Their during strategy involves the use of technology, such as a tablet PC with a face-tracking function (UBT, NS Devil Co., Ltd, Seoul, Korea), a videoconferencing application and a computer-based test with a random question sequencing function. The after strategy referred to providing students with a list of 'cheating behaviors' and informing them about the punitive consequences of being caught cheating. After analyzing the results of 86 students who took an online exam in dental medicine, it was concluded that the face tracking technology, Zoom monitoring, and random question sequencing were perceived as effective ways to control cheating by 32%, 95%, and 67% of students, respectively. (Lee et al. 2020). Furthermore, there are various high-tech methods such as keyboard dynamics, handwriting analysis, fingerprint analysis, tracking of IP addresses, voice recognition software, and even iris scans or facial recognition (Peterson, 2019, Wolverton, 2016). Using cutting-edge technology may seem effective but universities are unlikely to use it as it is complicated and expensive.

Pre-Covid 19 surveys on cheating in online exams generally indicate that there is little to no difference between face-to-face and online examinations (Bilen and Matros 2020). Watson and Sottile (2010) conducted a survey with 635 university students and asked them whether or not they had previously cheated on an examination. Results showed that 32.1% of the students admitted having cheated in face-to-face courses, and 32.7% of students from online courses admitted doing the same during their online exams. Based on the findings the authors concluded that online courses do not involve more cheating than face-to-face courses. However, the main drawback in their research methodology is the lack of objectivity when asking students to admit to cheating rather than using a quantitative tool to detect cheating.

The aim of this study is to examine the impact of the online environment on cheating possibilities during online tests. The research hypothesis is that cheating is more common when taking an online exam in comparison to pen-and-paper tests, resulting in increased mean values of the test results of students taking online exams. The format and type of browser used for online tests play a crucial role in the extent to which it is feasible for students to cheat.

Testing procedures for paper-based and online exams at the International Balkan University

Before the outbreak of the pandemic in 2020, all exams were conducted at the university premises, including both paper-based and oral exams. As Dyer et al. (2020) claim proctoring shows students that universities take assessments as well as academic integrity seriously. Therefore, written exams were always invigilated by several members of the academic staff, which makes it impossible to compare results from unproctored to those of proctored exams. Invigilation itself does not render cheating unfeasible. When pen-and-paper exams were substituted by online exams the same procedure was followed regarding exam invigilation. Students with no cameras were not allowed to take the exam.Taking into consideration students' and the university's current economic status as a result of the pandemic, low-cost technology was used. The technical requirements included a PC or a laptop, a camera, a microphone and a stable internet connection. All IBU students had their student profiles in the Hello online system. Each student had their own IBU Gmail account and a password, which they used to enter the Hello system. The students could do online exams by following the links created in the Zoom platform, which had previously been integrated into the Hello online system, according to a previously announced exam schedule. The link to the tests was shared in the zoom chat. All exams could only be accessed through the students' emails, opened by the IBU IT department. Private accounts could not be used instead. Cheating possibilities were reduced by a) invigilating students and b) by restricting access to tests. The time allotted for the online tests was 70 minutes, which was the same amount of time that was previously given for the paper-based test.

The study included 105 first-year students who took the compulsory course English language 2, from the Faculty of Law, Faculty of Economics and Administrative Sciences and the Faculty of Education - ELT department. The same students attended classroom lectures in English language 1 in

their first semester of the academic year of 2019-2020. They took a pen-and-paper test at the end of the first semester. In the second semester they had already had four lectures in English language 2 before the pandemic outbreak. Classes continued online and the final exam was held online as well. The same course instructor held the lectures in the first and the second semester. Regarding online assessment tools, teachers were allowed to choose a digital platform that would best suit their needs. The exam.net platform for digital exams was recommended by the university management. However, the three teachers who had the course English language 2 decided not to use this platform as it did not (at that particular moment) offer the option to have students' answers automatically checked. 60% of the tests contained multiple-choice questions, and it was highly practical for teachers with such large groups to choose another type of a digital tool, one that had this feature. The fact that it was a large group of students was a decisive factor in choosing Google forms to create the tests for the English course.

The advantages of using online tests through Google forms are manifold, for both students and teachers: cross-platform compatibility, i.e. the test can be done on any smart device; basic computer literacy skills are sufficient as the interface is easy to use; a variety of questions can be used in the tests as the tool allows users to customize the task flow (Djenno2015; Manson 2012). Namely, teachers can use standard questions such as true-false, multiple choice, or fill-in short answers, but they can also add questions with an interactive format (checkboxes or drag-and-drop). Tests with many questions can be organized in sections, which allows teachers to shuffle the order of questions, as well as the order of the offered answers (Ivanova et al. 2018). This feature decreases cheating possibilities since all students have the same questions but in an order which is different for each student. An additional feature is to use the locked mode, which prevents students from navigating to other browsers or taking screenshots. This feature is only available for education users of a certain domain. In the case of IBU students they all have their Gmail accounts opened by the University under the @ibu.edu.mk domain. However, students often have problems with these emails (forget their password; use other people's computer devices and cannot sign in into their IBU Gmail; lack basic computer skills) so teachers hae no choice but to remove this type of restriction, thus providing students with more space for cheating.

The option to add collaborators and share results with other teachers makes this tool extremely teacher-friendly. Regarding feedback, students can receive immediate feedback by seeing not only the points they have scored, but also their mistakes and the correct answers. Giving feedback on a writing task, as well as having the text checked for plagiarism, render this tool very affective for writing assessment. One major drawback of Google forms is its dependence on a stable internet connection. Students who lose their internet connection while doing the test have to start doing it from the beginning once their internet connected has been restored. This may cause students to panic, particularly in cases when the allotted test time has expired, and the teacher has locked the test, so it no longer accepts students' responses. This is not the case when using the exam.net platform, which automatically saves the data you have entered prior to losing the internet connection. In cases of such technical difficulties, the students were advised to inform the teacher as soon as they could, so as to be given another opportunity to retake the test.

Research methodology

A quasi-experimental design of a cross-sectional study was used to compare the test results of the same 105 students who took the pen-and-paper and the online exam. The SPSS v.20 software package was used to analyze the data. The Wilcoxon non-parametric test was used to compare the mean values of the test credits from the pen-and-paper test. The $p<0,005$ was taken as statistically significant. The students whose tests were analyzed came from several Balkan countries (North Macedonia, Montenegro, Serbia, Kosovo, Albania, Bosnia and Herzegovina, Bulgaria, and Turkey). There were 44 female and 61 male students, aged between 18 and 22.

In order to replicate the testing conditions from the first semester the format of the online test was the same as the one of the pen-and-paper test. It was a summative test at B2 level, which is given as a final exam. A minimum of 50 points (20 credits) is necessary for passing the exam. The final grade is based on the sum of the mid-term exam credits, final exam credits and activity credits.

As table 1 shows both tests consisted of four sections (Grammar, Vocabulary,

Reading, and Writing). There was no listening section in the pen-and-paper test because of inadequate technical conditions in the large classrooms where the exams had previously been held. The test did not include a speaking section because class activity during face-to-face classes was taken into consideration when giving students activity points, and also because of the large number of students. It would be very time consuming to conduct a speaking exam with over 100 students. In every exam session there were at least 20 more repeaters or double repeaters who would take the test. The teachers who held the lectures did not have any assistants. Therefore, for practical reasons the English test did not have a speaking component. Please note that the data were taken from the Hello online system, where test points are automatically converted into credits. The maximum points on the test is 100, which equals to 40 credits. The final grade is calculated in the following way: 40 credits from the mid-term exam, 40 credits from the final exam, 20 credits from class participation and homework assignments or projects.

section	**Grammar**	**Vocabulary**	**Reading**	**Writing**
number of items	30	30	1 text, 10 questions	1
types of questions	multiple choice, checkboxes	multiple choice, checkboxes,	Multiple choice, fill-in short answers	short essay (150-200 words)
test points	30	30	20	20
credits in the Hello online system	12	12	8	8

Table 1: Test format of the paper-and-pen test and the Google forms online test

The descriptive statistics presented in Table 2 indicates there were 40 students who were outliers. They were excluded from further analysis for two reasons:

a) 10 of them had between 38 and 40 credits on the pen-and-paper test, which is the maximum number of credits they could score. T hese were highly proficient students, B2 or even C1, and we could assume that they would achieve similar high results on the online test; and

b) the other 30 students were A2 level or low B1 level, who were inactive, did not attend classes and never submitted their homework. They all scored significantly higher on the online final exam, which may lead to the conclusion that they had cheated.

	N	Min	Max	Mean	Std. Deviation
pen-and-paper test	105	6.40	40.00	27.0286	7.38769
Online test	105	11.60	39.20	28.9638	6.61687
Valid N (listwise)	105				

Table 2: Descriptive statistics for the pen-and-paper and the online test (including outliers)

Comparison of test results and discussion

The aim of the study was to determine whether there was a statistically significant difference between mean values of the results achieved on pen-and-paper tests and online tests. Once the 40 outliers had been removed, there were 65 students and their paper and online tests. The test credits for the traditional paper test and the online test of the same 65 students were included in the analysis. The descriptive statistics is shown in table 3 below. There was an increase in the mean values of the credits, from M=27.6677 of the pen-and-paper tests to M=29.57223 of the online tests. The standard deviation also increased from SD = 5.16893 on the traditional test to SD = 5.93611 on the online test.

	N	Min	Max	Mean	Std. Deviation
traditional	65	8.80	38.00	27.6677	5.16893
online	65	15.60	39.20	29.5723	5.93611
Valid N (listwise)	65				

Table 3: Descriptive statistics for the pen-and-paper and the online test (excluding outliers)

Normality analysis of the results from both tests indicated the use of non-parametric statistic methods for hypothesis testing because both tests give a significance value smaller than .05 (see Table 4 below). For the pen-and-paper test in the Kolmogorov-Smirnov test p=0.046, and in the Shapiro-Wilk test p=0.004. For the online test in the Kolmogorov-Smirnov test p=0.082, and in the Shapiro-Wilk test p=0.043. The results from the Shapiro-Wilk test are taken into consideration for the online test. This means that the data does differ significantly from a normal distribution, i.e. the null hypothesis that the data is not normally distributed cannot be rejected. Therefore, a non-parametric test was used to compare and analyze the test results.

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
traditional	.111	65	.046	.942	65	.004
online	.103	65	.082	.962	65	.043

Table 4: Statistical tests of normality – Kolmogorov-Smirnov and Shapiro-Wilk for the pen-and-paper test and the online test

The Wilcoxon test was conducted to compare the mean values of the paper-based test and the online test and to determine whether the difference was statistically significant. According to the ranks shown in Table 5 below, 20 students had a lower score on the online test than on the pen-and-paper test. However, there were 45 students who scored better on the online test than on the paper-based test. There were no students who had the same score on both types of tests.

		N	Mean Rank	Sum of Ranks
online - traditional	Negative Ranks	20[a]	28.30	566.00
	Positive Ranks	45[b]	35.09	1579.00
	Ties	0[c]		
	Total	65		

a. online < traditional
b. online > traditional
c. online = traditional

Table 5: Wilcoxon Signed Ranks Test

If we examine the final Test Statistics table (Table 6) it reveals a $p < .05$. The Wilcoxon Signed Ranks Test indicated that the scores on the online test (mean rank = 35.9) were statistically higher than the ones on the pen-and-paper test (mean rank = 28.3), $Z = -3.311$, $p=0.001$ with a small effect size $r = 0.29$. We may conclude that there is an increase in students' test scores on the online test, in comparison with their scores on the pen-and-paper test, and it is statistically significant. Therefore, the main research hypothesis may be confirmed.

	online - traditional
Z	-3.311[b]
Asymp. Sig. (2-tailed)	.001

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Table 6: Test statistics for the Wilcoxon Signed Ranks Test

The increase in the mean values indicates that better results on the online test are due to cheating. Although the screen was blocked, and no screenshots could be taken students found other ways of cheating. This was made easier due to several facts:

a) The three teachers teaching the course English Language 2 used the same text in the reading section, and all the students took the exam at the same time. However, the grammar, vocabulary and writing exercises were different.

b) 60% of the questions were multiple-choice type of questions, which made sending the answers to other students fairly easy.

c) The computer or laptop camera does not show the entire environment. Students' hands are not in the visual field of the invigilators.

d) Each group of students had over 100 test takers, which increases the chances of the students sharing the answers on various social media used by those particular students. It is common knowledge that they have a strong student community and during exam sessions they communicate regularly on various Viber or WhatsApp groups.

Despite the fact that cheating is easier when doing online tests, the effect size is small ($r = 0.29$). This means that many students did not try to cheat at all, or were not successful at it. The online test had the same format as the pen-and-paper test (see Table 1). We can assume that a test with multiple-choice questions only would additionally increase the chances of cheating and consequently lead to significantly higher scores on the online test. Nevertheless, the descriptive statistics before the Wilcoxon Signed Ranks Test revealed there were 40 outliers, 30 of which were most probably the most successful cheaters. Nearly a third of the students cheated successfully, as they all had significantly more points on the online test than on the paper-based test, and they were all A2 or low B1 level. It would be highly unlikely that a student could move from A2 to B1/C1 level 12 weeks and 24 classes, in a non-English speaking country. The high number of such outliers (30) is a clear indicator that cheating is common during online exams. On the other hand, there are 20 students who did worse on the online test. This could be due to several reasons. Firstly, such drop in performance can be due to the added stress or anxiety that students may experience when being recorded (Woldeab & Brothen, 2019; Butler-Henderson & Crawford, 2020). Secondly, technical difficulties, such as an unstable internet connection or electricity cuts, may have forced some of the students to take the test again. Namely, as it was previously

mentioned, one of the disadvantages of using Google forms is that when the internet connection is lost the test is not automatically saved, so the student has to write the answers again before successfully submitting it. This puts additional pressure on students, considering the fact that there is a time limit. Finally, the online test for the course English language 1 was the first online test the students took after the outbreak of the pandemic, in June 2020. Despite the teacher's efforts to familiarize students with the procedure through previous demo and mock tests, some students probably still lacked the necessary computer skills. Candrlic et al., (2019) claim that the effect of computer-related stress may be minimal, given the high comfort level that today's generation of students have with this type of technology. However, the teacher did receive some feedback indicating that many of the students were discomforted by the experience of taking online tests, primarily due to lack of developed computer skills. It is a common misconception that digital natives are equipped with the ability to use computer devices correctly only because they have grown up with ICT (Zogheib, 2014). In fact, according to Wang et al (2014) teenagers' use of technology outside the classroom is mainly limited to entertainment and personal interests. Several authors have indicated that there is no evidence that cheating in online environments is significantly more prevalent than in conventional assessments (Boitshwarelo et al. 2017; Online education 2020). In fact, using new technology and proctoring exams by academic staff have made it more difficult for students to cheat, and have also become a lucrative business (Krueger 2020; Ross 2020). The high rate of cheating in our survey brings us to the question of the profile of the cheaters. It seems that the students with the poorest performance on the paper-based tests were the ones that were the most motivated to cheat. Many of these students had a cheating history in the same course, while doing their mid-term exams or when sending homework that was either taken from another student or copy-pasted from the internet. Cheating may also be related to cultural values, and to how cheating is seen and treated in the educational system, starting from elementary school. Furthermore, numerous studies carried out in different settings indicate that people in general are more likely to deceive if the marginal benefit from deception is significantly large. (Gneezy, 2005; Fischbacher and Föllmi-Heusi, 2013; Gächter and Schulz, 2016; Vanberg, 2017; Bilen and Matros 2021). According to Noorbehbahani et al (2022) cheating reasons may fall into one of the following categories: teacher-related, institutional, internal, and environmental. The students who cheated included both male and female students. In fact, 14 of the 30 outliers with very high scores on the online test were females. Gender does not seem to play a role in cheating behavior (Miller & Young-Jones, 2012).

However, the average students, despite having the possibility to cheat, did not resort to cheating, or they did not manage to cheat successfully. Google forms tests that primarily contain multiple-choice and fill-in short answers allow students to cheat. Therefore, the number of such questions should be minimized, and more open-ended questions should be included. These types of questions are knowledge based, rather than information-based, and the answers cannot be found on the web or in a book. Answering such questions involves critical thinking and reasoning (Nguyen et al, 2020). However, one must take into consideration that this is a language test, and the only way to test grammar, vocabulary, or use of English is typically through short answers. Therefore, a speaking section should also be added to the test, thus identifying the students who have obviously cheated. Checking answers to open-ended questions and conducting speaking exams would result in increasing teachers' workload, but if the pandemic does not end soon course instructors will have to be prepared for such work, if they are to retain a satisfactory level of assessment in higher education. Language teachers should not forget the ultimate goal of testing language knowledge. Students do not study in order to be tested; they are tested so as the teacher can receive feedback on how well they have managed to achieve the learning outcomes of the course. Since it is a language that the students are learning, both the spoken and written form of the language should be tested. Additionally, more importance could be given to formative assessment. Students could be involved in individual projects, which would compensate for the reduced number of points on the online tests. The total number of test points could be divided into two sections: 40% from the test itself and 60% from the projects. Teachers could use project progress charts to give students feedback on their work, as well as a sense of progress and achievement (Baumgartner, J., 2022). Using 'more project-oriented assessments or having students submit papers or assignments in stages can

provide for an assessment of student learning that allows the use of resources', which they would otherwise be using when trying to cheat during an online exam (Peterson, 2019: 32). Formative assessment could replace the speaking section of an online, which is not practical for teachers due to its length. Over the last decade, teachers have started using mobile phones as 'formative speaking assessment tools' (Hasan et al, 2021). Students' speaking skills can be assessed both quickly and effectively if sufficient attention is given to design principles and strategies for such tools in the language classroom (Samaie et al, 2016).

Considering the fact that additional software or mobile devices are not always available to institutions or students from developing countries, a more pedagogical and cost-effective strategy should be implemented to minimize or discourage cheating (Nguyen et al. 2020). Cheating could be approached from two different perspectives: deterring students from their intention to cheat and detecting cheating during or after online exams. Policies regarding academic integrity include asking students to sign an honor code statement before the exam, constantly reminding students about the penalties of such misconduct, and most importantly creating a close community with the students (Stonecypher & Wilson, 2014; Williamson, 2018). Daily interaction would help teachers familiarize themselves with their students. In turn, communication in the target language itself could reveal the true English proficiency of the students. Concerning prevention of cheating during exams, developing countries may not always be financially prepared to purchase sophisticated software. To conclude, the format of the online test for the EFL course should include both a written and an oral exam, the allotted time should be reduced, and the final grade should depend more on formative assessment results.

Conclusion and further research

The results of the research on a total of 130 pen-and-paper tests and online tests are presented in this paper. After comparing the results of the paper-based tests to the online tests, we can conclude that the mean values of the scores from the online test were statistically higher than those from the pen-and-paper tests. This means that the main hypothesis was confirmed, i.e. using online-based language tests allows many students to cheat. This is a result of the test format and lack of sufficient proctoring technology. Online cheating could be reduced by: changing the test format, including more formative assessment (particularly of the speaking skills), raising students' awareness of the unacceptance of academic dishonesty, and implementing more sophisticated technologies to track students' behavior during online exams. The test should consist mainly of open-ended questions, and the number of multiple-choice or fill-in short answers should be minimized. In addition, the online test should have a speaking section, which is to be passed successfully in order for students to receive a passing grade for the EFL course. Furthermore, formative assessment of speaking skills could be used to replace the oral exam, which is time-consuming for teachers of large groups of students. Further research could be done to establish the causality between students'/ nations' psychological profiles and cheating. Other ways of testing could be explored, such as effective and efficient organization of oral exams for large classes in order to minimize cheating possibilities during online exams.

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