HIGH STAKE EXAMS WITH BYOD AT THE UNIVERSITY OF PORTO: BYPASSING CONSTRAINTS

H. Ribeiro, M. Amaral

University of Porto (PORTUGAL)

Abstract

University of Porto (U.PORTO) is a traditional higher education institution with more than 30 000 students enrolled. Nine years ago, the first high stake exam using computer was conducted with quite success through Moodle's quiz activity. Since 2009 the technical conditions and infrastructure were improved in such a way that we've faced logistic challenges due to the increasing number of exams taking place. This year of 2018 more than 15 000 quiz submissions were made on the first semester. Actually, these constraints – an indirect indicator of our success – were a result of mainly two factors: on one hand a university policy decision to shorten the assessment calendar and on the other hand a low ratio of computers per student in some faculties. Therefore, facing the uncertainty of a considerable investment on computers but also watching the rising number of students owning a laptop, the Educational Technologies unit decided to explore the path of BYOD (Bring Your Own Device) concerning computer-based assessment (CBA). So, in a careful and sustainable way – this is after all a moment of extreme importance for all stakeholders, especially for the students involved – four courses from two different faculties embraced this methodology. This paper will discuss the requirements and implementation of this solution along with the methodology followed. It will show the results of one BYOD exam session at the Faculty of Sport Sciences and Physical Education, which had some specificities, including two shifts and some students submitting on paper.

Keywords: assessment, quiz, byod, exams, LMS, Moodle, CBA.

1 INTRODUCTION

Since 2009 the Educational Technologies Unit (ETU) of U.Porto offers support to teachers who intend to have high-stake exams on computer. For that Learning Management System (LMS), Moodle is the used tool. Since the first CBA experience until today [1], the ETU concluded that the quiz tool offered by Moodle is more than enough having in mind the staff's needs. Teaming with other colleagues from Information Technologies (IT) departments - network, user support, system administrators - we established a procedure with technical and logistic stages in order to achieve a reliable and safe environment. To define and implement guidelines, configurations and workarounds throughout the campus was a very hard task but finally we were able to settle and guarantee quality.

Other than addressing the technical aspects of implementing and delivering exams in the computer the ETU promoted several training actions for teachers. These training sessions focused on the quality of multiple choice questions and question analysis and test quality. We invited a Professor from the Faculty of Medicine, Dr. Daniel Moura, who paired up with the ETU to build a training program around the quality of assessment and in particularly online assessment. Professor Daniel Moura later won the eLearning Excellence Award of the University of Porto in 2011.[2]

The results were quite good and together with the attractiveness of the computer's marking of closed questions a major demand on this service was observed, specially for courses with more than 100 students. Quite rapidly we found ourselves struggling because of the ratio computers/students. If some Faculties, like engineering or pharmaceutical sciences were perfectly comfortable, others have numbers around 30 computers in total.

At first we started by taking students shifts and preventing them from contacting each other. Two door rooms were perfect for this setting. However, if we have more than two shifts, teachers were advised to keep 10% of questions throughout all quiz versions. This way we could assess possible differences between shifts by analyzing answer behaviour in the anchor questions and then applying a model to adjust final grades if a significant variation of anchor results is observed.[3]

This approach is still very common, but in addition to students not being culturally prepared to have their marking equated, teachers struggle to generate new quality questions, and more importantly, to guarantee they have similar facility index.

Besides, even if we were to attest the validity and reliability [4] of those assessments, the shift approach still spends several hours for quizzes of 20 or 30 minutes each.

Our first BYOD experience was at the Faculty of Dental Medicine when a teacher informally asked students if they could bring their laptop to the assessment. Since they were also spending their time waiting for their peers to end up the quiz, students were very open to this solution.

2 METHODOLOGY

Naturally, we could only embrace BYOD for high-stake exams if we could guarantee a secure and controlled technical environment as if students were using a University's managed laptop. Meaning, on the top of the network worries, we would also have to prevent students from using their own notes or textbooks throughout the exam.

After researching for solutions which could be implemented right away, we found Safe Exam Browser (SEB) [5]. One can read on their about page: *"Safe Exam Browser is a web browser-environment to carry out online exams safely. The software changes any computer into a secure workstation. It regulates access to resources like system functions, other websites and applications and prevents unauthorised resources being used during an exam"*.

Furthermore, Moodle itself has [6] specific settings on its core options plus an extra SEB add-on developed and maintained by Tim Hunt from UK Open University who's also the responsible for the quiz module on Moodle. This gave us extra security about adopting this kind of solution making it less prone to bugs or errors.

The master thesis "*Mitigation of Cheating Threats in Digital BYOD exams"* [7] from the Norwegian University of Science and Technology does state some vulnerabilities assuming one could change the program itself and the way it works since it's open source. Nonetheless, "the modifications required to cheat, are complex and time consuming". One other cheating strategy - stated on the thesis but also pointed out internally - would be to use a remote desktop solution like Teamviewer or Skype. Fortunately, SEB has revised this issue and since version 2.1 there's a standard full pack of non-authorized software prohibited to run while using SEB, meaning if a student wants to take an exam SEB will forcibly close Skype, for example.

SEB doesn't have a URL address bar, so there are no links to "google.com" hence impossible for students to get there. This functionality excuses the network team intervention on each assessment even though we collaborate with them in order to get a sense of the maximum students allowed on wifi per room.

Also, one of the SEB's main advantage is the fact that one might set different rules for each exam. If needed, a teacher might authorize MS Excel specifically, for example. This versatility is - no doubt about it - very positive, but also brings a lot of options and configurations that one can explore on SEB Config Tool.
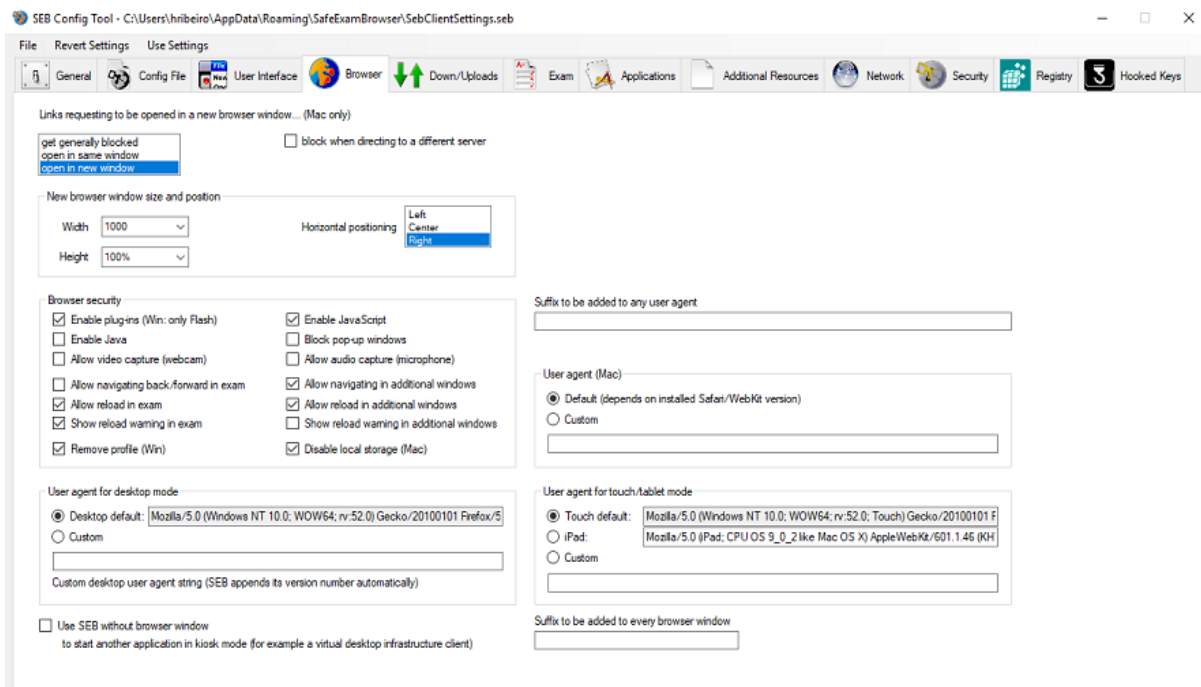
Figure 1. SEB Config Tool screen

Once the technical aspect was covered, it was necessary to solve the human factor/ issue, namely the communication between the Moodle operators, students and teachers. Early on, we assumed we would have to have a backup plan. On a worst case scenario, like total loss of wifi connectivity, the only alternative would be a pen and paper exam. So for each BYOD assessment the teacher is given a ready to print version of the exam and asked to print beforehand a couple of copies or at worst, to have the ability to print them out very fast if needed. The students themselves were given the initial conditions:

1. Bring a Mac or Windows laptop with proper battery for the whole duration of the assessment, bearing in mind it can take longer than initially expected;

2. To guarantee a stable connection to the university's wifi. This happens because on the spot would be impossible to solve any individual issues in a timely manner.

3. To install SEB on their Windows or Mac laptop beforehand.

Then, taking in mind the exam requirements, the support office prepares two files containing the final settings and specific random tokens using "SEB Config Tool", one for each computer platform. Then the Moodle quiz is matched with given tokens. This feature, together with Moodle's own quiz password, - that should be changed as soon as the last student starts the quiz - ensures that only allowed students access that particular exam.

It's our understanding that the University should provide an alternative for students who are unable to bring their device for any reason. Those students should take the assessment on a managed computer, for example the traditional rooms where computer-based assessment take place.

Unfortunately, the logistic of the next case made impossible to follow this guideline, but on the other hand allowed us to compare students taking the quiz on paper and on a BYOD setting.

Figure 2. Students taking a BYOD exam at Faculty of Dental Medicine

3   RESULTS

We were able to deploy a BYOD assessment exam at the Faculty of Sport Sciences and Physical Education for the first time on March 201. "Education for Health" is a 3rd year course with a total of 170 students enrolled. This course is mandatory and the Professor describes it as "being very easy" but it is also placed aside by some students who are more interested in soccer courses, for example. It would also be the first time doing CBA, however the Faculty only has a total of 30 computers available so the only viable option was BYOD. Moreover the existing computer room was inaccessible thus students who didn't have their own laptop had to take a paper and pencil exam.

Quiz had a time limit of 20 minutes, with text only MCQ starting at 9 o'clock. In the computer, students started 16 minutes after scheduled time. While this is undesirable, it is also true that happened mostly because of students missing the requirements, namely failing to install SEB or to recall their Moodle login credentials. In the end 122 students submitted their answers on Moodle and 32 on paper.

On May 2018 we had the second BYOD quiz for this course on the same conditions even though there were more students taking the exam on paper: 49 and 104 on the computer.
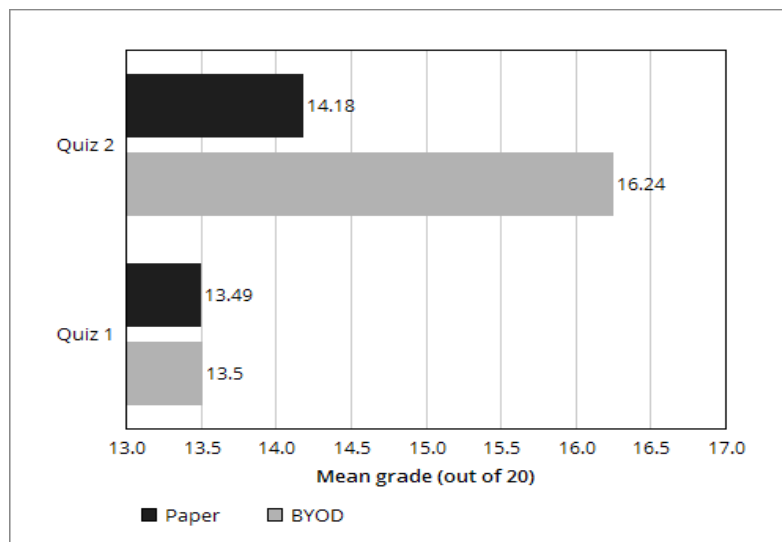
Their mean grade are stated in the following chart.

Figure 3. Mean grades

The first experience had the same result, however in the second assessment we saw a difference of almost 2 points. Actually, on the second exam there were 5 students on paper scoring below zero and none scoring 20. On the other hand, there were 8 scoring the maximum grade on BYOD. The possible explanation for these results, based on what we've seen happen also in other courses, is the fact that students tend to relax after the first BYOD assessment. Students with lower grades wouldn't bother taking their laptop to the university and this ends up by creating a natural division between interested and non interested groups of students.

We also find it important to stress one given answer by a student - out of the two who gave feedback. The CBA was one of his favourite implementations because "it's environment friendly and allows students to know their grade on the same day".

From our experience it's almost mandatory to give students same day feedback, namely the grades, since this is a major advantage for them.

4   CONCLUSIONS

There are some options to engage on BYOD assessments like the commercial Lockdown Browser Respondus [8] or the e-Exam [9] platform supported by the Australian Government. Even though we've adopted SEB because it suits our needs and it's free, we will stay watchful for other solutions.

We are also aware of possible strategies [10] that, in theory, could allow cheating. For example one of the first strategies to be mentioned is the use of a use a virtual machine, but SEB itself has a option to allow or not such environment.

This is just a reminder of the number of options available on the SEB Config Tool. It's usage might be difficult at first, but once the team understands the main settings and which workout best for the specific case the whole process becomes more effortless. Nonetheless, it seems mandatory the presence of a member of the support team on the day of the assessment reinforcing instructions and providing additional help, whether involves SEB or Moodle itself. This staff member will be key for the quiz to take place as smoothly as possible.

Of course one of the main difficulties using BYOD is the fact that each computer is different and differently configured, making it harder to solve any major issue on the spot. Therefore, we can only enforce a backup plan, ideally extra computers or a computer managed room.

At this point, we must also stress the fact that this BYOD setting has been used only for browser usage. In every assessment activity teacher must ensure equality of treatment [11] between students and that could be in fact a major issue if we were talking of exams with extra software like SPSS or Excel as a result of different computing powered devices.

This work addresses a very short quiz, but we must stress the fact that no student lost their wifi or, much worse, the given responses, thus having to start over on paper. Even though this might be due to the short duration of the assessment, we must advise that staff members must be prepared to act quickly if something happens, and extend student's time limit or, at worse, have a backup plan like an extra computer or a paper copy.

Our experience using the BYOD setup has left us however with a couple of questions Institution will need to address shortly:

1   will the University impose the usage of a personal laptop? Probably, the best approach would be to let it be voluntary and to offer an alternative, whether managed laptops or an alternate computer room.

2   what happens to students who miss the requirements and will delay the whole process?

3   should the Institution allow students to connect to their Internet Service Providers (ISP) in case of emergency, if they are willing?

As for the last question it doesn't seem to be any issues raised since SEB can control which sites are permitted, but perhaps should be the University to offer an alternative connection, maybe by providing ISP router as a backup plan to solve.

Despite these successful experiences - which will be taken again this year on different courses - one should bear in mind the possibility of wifi total loss. In this case pen and paper would be the last resort.

Finally, these BYOD approaches to computer-based assessment also interest the University since U.Porto is implementing e-learning courses and blended-learning courses. The BYOD is explored in more depth and also with some partner universities from the north of Portugal (U.Minho and UTAD) in a national funded project - U.NorteX.PT - U.Norte Extension School.[12] These computer-based solutions are interesting to explore by the consortium since the trainees of b-learning courses can be able to bring their own devices and perform assessment activities with security.

ACKNOWLEDGEMENTS

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