CHAPTER 16. USING AN ONLINE QUIZ AS A FORMATIVE TOOL IN LATIN MEDICAL TERMINOLOGY COURSES

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Introduction

This paper reflects on the benefits, outcomes, and effectiveness of integrating online mini-quizzes as a formative tool in classes of Basic Medical Terminology taught to first year students of the English-language programme of general medicine at Masaryk University, Brno. It is a compulsory course where successful completion is a precondition to attend certain second year mandatory preclinical courses. As such, it is designed to be a first introduction into Latin anatomical nomenclature; the basic clinical and pharmacological terminology heavily rooted in Greek and Latin, as well as to the general framework of medical professional language. There are roughly fifteen students in each seminar group with fourteen sessions per semester, each taking one hundred minutes.

In the five years that I have taught this course, motivating students to engage in pre-class preparation and to take responsibility for their own academic progress has proven to be a great challenge. I have felt increasingly that I want to eliminate the two following scenarios: 1) students underestimate the importance of continuous pre-session preparations and fail the course despite resitting the exam once or twice which, consequently, prolongs their studies; 2) students pass the course only with great difficulties or spend excessive amounts of time on it during the exam period, while neglecting other foundational first year courses.

Currently, students are required to reach at least seventy per cent on the written final exam to pass the first part of the course in the autumn term. So far, student progress has only been measured by two progress tests in the sixth and ninth weeks of the semester, both of which give students a five per cent bonus in the final exam if they score above seventy per cent. Despite this reward component, the progress tests have not proven effective either in motivating students' pre-class preparation or enhancing successful completion of the final exam. As such, it was necessary to integrate a formative learning component into the classes.

The innovation and its conceptual background

Astin (1999: 519) argues that educational effectiveness is directly linked to raising student involvement while DeSouza and Fleming (2003) call attention to the importance of students' problem-solving skills, critical thinking, and attentiveness in class within this process. Specifically,

DeSouza and Fleming (2003) show that students taking computer-assisted quizzes performed significantly better in all their assessments than those taking traditional printed tests. Therefore, I selected an in-class innovation relying on an online quiz tool; Socrative (2018), to help improve my students' learning. Socrative is a platform that provides both students and teachers with immediate feedback and in its 'teacher paced' mode students may only move on to the next question after everyone submitted their answers to the current one. I used this software option because it allows for combining quizzes with formative assessment.

Shavelson's (2006: 6) concept of 'formal embedded-in-the curriculum formative assessment' calls for assessment that takes place regularly during classes to address problematic areas and clarify the goals of each unit of instruction. These kinds of assessments serve to create 'teachable moments' (Shavelson et al. 2008: 301) at critical junctures of the curriculum. Therefore, quizzes were used regularly in the autumn term: there were seven online mini-quizzes implemented over the 14 weeks – i.e. one in every second week – in all of my nine seminar groups. Furthermore, after each quiz question, I asked follow-up questions from students which aroused a discussion. It has also made students carefully consider and justify their choices before responding to quiz questions rather than clicking on an answer randomly.

As instructors we tend not to give students enough time and opportunity to facilitate intellectual exchange (Black et al. 2004; Row 1974). Therefore, quizzes were administered without a time limit, which proved beneficial in increasing waiting time after each quiz question, and thus, allowing a pause for thought and discussion. This was especially helpful to slow-thinkers and those students who would likely perform unsatisfactorily in the final exam. The only potential drawback of this approach was that the exercise could be very time-consuming. Quizzes did take up roughly a quarter of each session, which seemed a lot initially, but they soon became an integral part of the teaching and learning process, rather than a mere tool for the testing of knowledge. Students worked on the quizzes in pairs rather than individually because stimulating peer-to-peer communication was crucial for these intellectual exchanges. By explaining concepts to their peers and, generally helping each other, students could verbalize the thought process behind their choices and debate their different ideas.

The positive impact of the engagement of a productive formative tool in a test-dominated context has plausibly been argued by Black and Wiliam (1998), who claim that these tools, if concentrating on specific problems and providing an understanding of what is wrong and how to put it right, are very beneficial especially to low achievers. Hence, while the quizzes were administered anonymously to secure a non-threatening atmosphere in the classroom, I had immediate access to each student's answers on all quiz questions as well as to a summary of all responses to each question. These enabled me not only to assess each student's progress but also to identify and assist those students who were likely to struggle in the final exam.

In line with Shavelson's (2006: 4 f.) notion of the 'planned-for-interaction formative assessment',

I designed quiz questions in advance so as to 'maximize the acquisition of information needed to close the gap between students' current learning and the desired state. Thus, firstly, each quiz question or the pictures displayed alongside these introduced an interesting medical fact or illustrated the practical use of the terminology taught in the course. Second, students received instant feedback after each quiz question in the form of an explanation I created, which appeared automatically in Socrative when they answered incorrectly. Third, the open discussion following each question provided students with an expedient way of revealing their learning gaps before it was too late (i.e. after failing the final exam), opportunities to re-examine knowledge continuously, and better understand what is expected of them in the final exam.

The other equally significant motivation in integrating the innovation into my classroom practice was to increase students' awareness of the learning process and enhance their active participation in it. In order to further motivate students in this regard and to induce friendly competitiveness among them, I included a reward component: if students' average score in the online quizzes exceeded seventy, eighty or ninety per cent, they were granted an extra five, ten or fifteen per cent in the final exam, respectively.

All in all, my intention with the innovation was to combine the summative form of the online mini quizzes with a formative approach. Thus, the online quizzes served both as consolidation material to fix the knowledge of small units of instruction covered in the previous sessions, as well as a revision tool for the purely summative final exam. My expectation has been that, as their awareness of the learning process increases, 1) my students will become more responsible learners and 2) will perform better on the final exam.

Data and methods

The innovation's effectiveness was evaluated through both qualitative and quantitative methods. First, I collected qualitative data through an anonymous online student survey. This survey is a tool developed by the Language Centre, under whose auspices the course is taught and it is conducted always in class to ensure a sufficient response rate and to avoid the pitfalls of the general online survey administered throughout the whole university, which is traditionally completed only by a fraction of the students. The survey also has the benefit that it can be adjusted to suit the needs of particular courses so that I could add three open-ended questions that target students' opinions regarding the impact of the innovation: 1) How did the Socrative quizzes help your learning?; 2) What should be changed/added/done to make the quizzes better?; 3) Do you have any suggestions on other tools that you regard more efficient in motivating your pre-class preparation and gradual learning? If yes, please specify these.

Regarding the quantitative analysis, I used descriptive statistics to evaluate the innovation's actual effectiveness in enhancing student success in the final exam, and thus, passing the course. First, I compared the students' results in all types of summative assessments, i.e. both progress

tests and final exam, in the autumn terms 2017 (without the innovation) and 2018 (with the innovation) to find out what the innovation's impact has been on overall student success. Second, I compared the ratios of students passing the final exam at the first, second, and third attempts, as passing the final exam at an earlier attempt may also indicate student success. Lastly, I analysed the impact of the reward component on the overall results.

Results

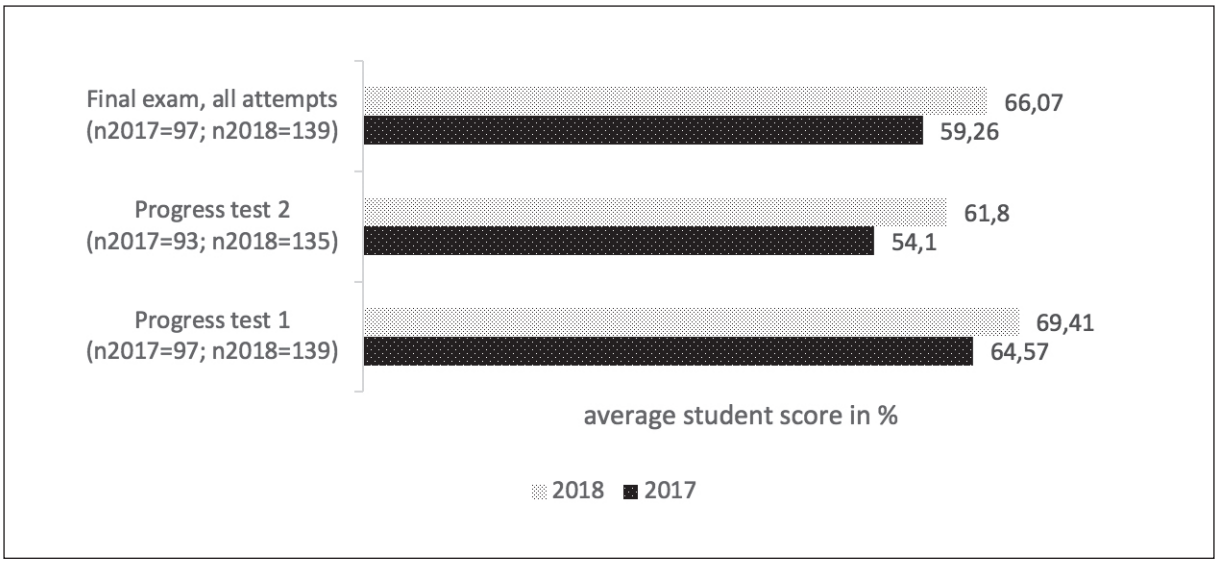
The first expectation regarding students becoming more responsible learners was primarily measured via qualitative analysis of the student feedback that was collected anonymously online. The survey was completed by 130 out of 139 students (93.5 per cent). The results show that roughly eighty-five per cent of students found the online in-class quizzes beneficial to their learning. In other words, they regarded the innovation to be a formative experience. Most frequently, students appreciated the instant feedback generated by the platform ('[online in-class quizzes are] a good practice to test what we've learnt. They are quick and we get the answer/feedback very quickly, so they are good for us to understand what we further need to revise'), the pair work component ('...working with a partner allowed me to discuss answers and questions which would help me better understand [the study material]'), and the facts that the discussions following the quiz questions encouraged critical thinking ('They helped me practice the things I learned in class and think critically about the concepts') and filled in the learning gaps ('It helped me to identify my weaknesses') in an entertaining and refreshing form ('[online in-class quizzes] make you interact more and actually think about the answers more than the rather more dull [traditional] exercises').

The only student reservations concerned the difficulty of the quizzes, i.e. some deemed these to be too challenging, and this was compounded by the fact that the system does not take into account spelling mistakes in open questions when generating the result. There was almost no feedback on the reward component, which suggests that students did not consider this to be a significant factor and valued the quizzes for such intrinsic reasons as personal accomplishment when competing with peers: 'it created a motivation to study for each one of the lessons, not only for the reduction of the credit test pass mark, but also just for the satisfaction of personal accomplishment. There was a competitive element to it too, which I enjoyed a lot'. Given that the extrinsic motivation of gaining extra points offered at the progress tests had already proven ineffective in encouraging continuous preparation, this is not entirely surprising. All in all, the qualitative analysis of student feedback has clearly shown that students were aware of the purpose of the online quizzes and appreciated various aspects of its positive impact on their learning.

When it comes to my expectation about student success in the final exam, the comparison of the rates of average student scores and ratios of students passing the course during the autumn terms of 2017 and 2018 provide evidence for the positive impact of the innovation as well. Stu-

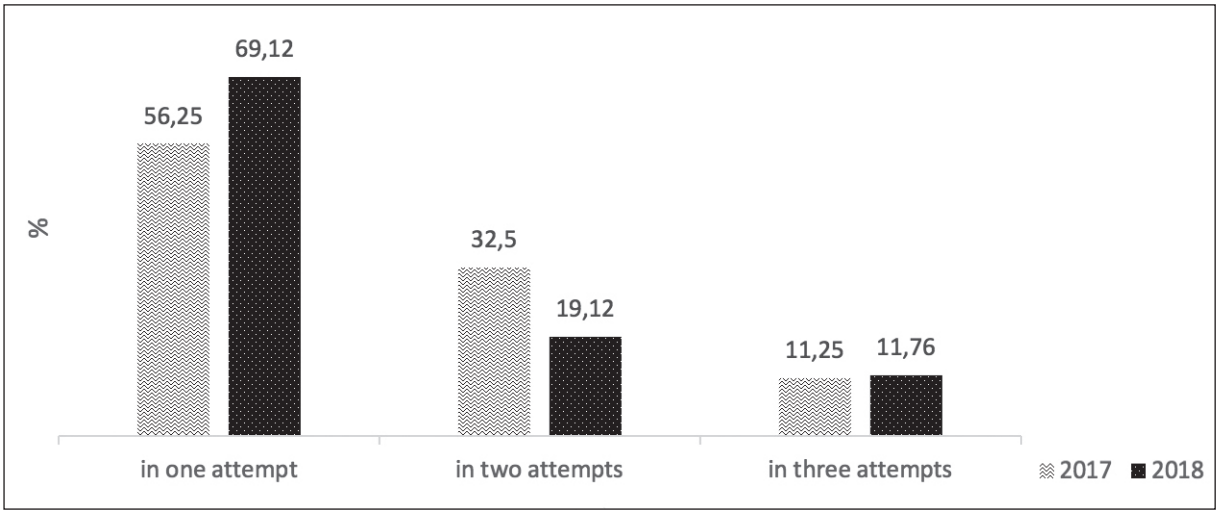
dent performance on the three major summative assessments – the two progress tests and the final exam – notably improved from 2017, when no formative tool was included, to 2018 when the innovation was integrated into the teaching and learning processes (figure 1). On average, students scored 6.45 per cent higher on these assignments in 2018 than in 2017. Although the dip in performance from the first to the second progress test remained, it was less pronounced in 2018 (10.47 per cent in 2017 and 7.61 per cent in 2018). Therefore, it seems that the integration of the online formative tool in the classroom helped spread the study load over the whole semester more evenly, which had a positive impact on student scores in all summative assessments.

Figure 1. Students' average scores in percentages for all types of summative assessments in 2017 and 2018 (the extra points are not taken into account)



A comparison of the percentage of students passing the course in 2017 and 2018 has shown that there is a sizeable increase in the number of students successfully passing the course due to performance on the final exam and, to a small degree, extra points earned during the semester. Over fifteen per cent more students passed the course in 2018 (97.84 per cent) compared to the previous year (82.42 per cent). When looking at the three attempts allowed for the final exam in both, there is an approximate thirteen per cent increase in the number of students passing the course at their first attempt in 2018 as compared to 2017. There is also a very similar drop in the number of students passing at the second attempt in 2018, which suggests that the innovation did not only have a great impact among those who otherwise would fail the course but also among those who before only passed at the second attempt. On the other hand, there is almost no difference between the two years in the ratios of students passing at the third attempt. Thus, this is a potential group of students that future iteration of the innovation could pay more attention to.

Figure 2. Percentages of students passing the course at one, two, and three attempts in 2017 (n=80) and 2018 (n=136), extra points are included



Lastly, the reward component, i.e. the extra points given for the final exam based on students' average scores in the online quizzes. I find this equally important to evaluate since it suggests whether students pass due to being motivated to prepare better for each class, or only because of the extra points given for the activity. Figure 3 shows how successful students were in the online quizzes, as a result of which they obtained extra points. The ratios of students who earned and did not earn extra points were almost identical (48.92 and 51.08 per cent, respectively), whereas only a very small portion of students (less than one per cent) were granted as many as fifteen points in the final exam.

Figure 3. Ratio of students granted extra points for Socrative in the final exam 2018

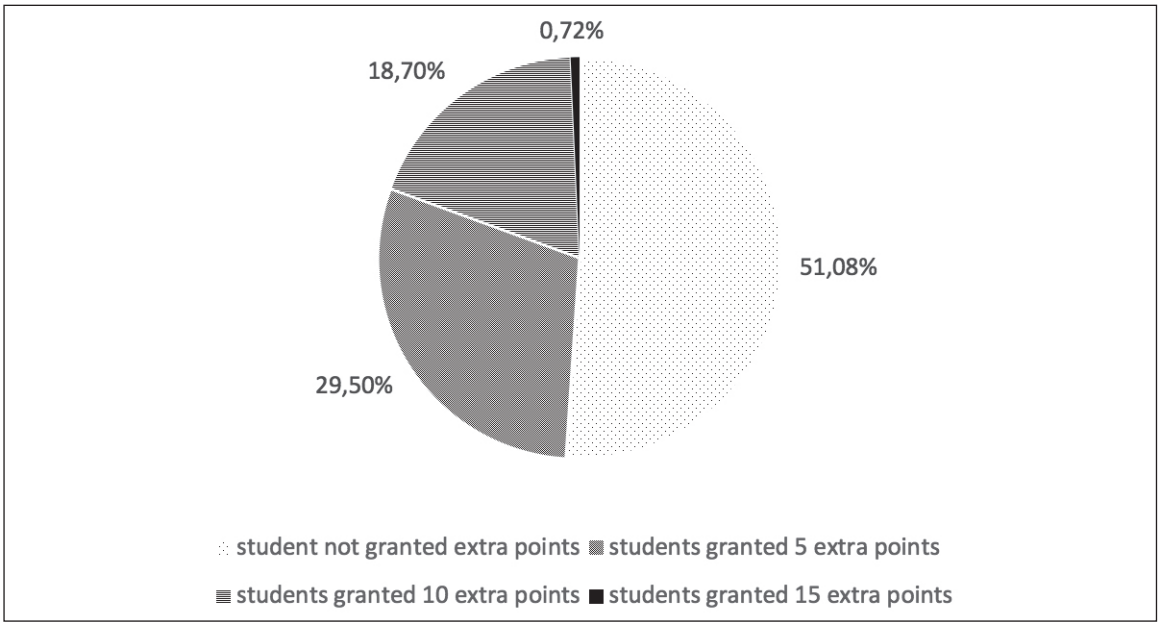
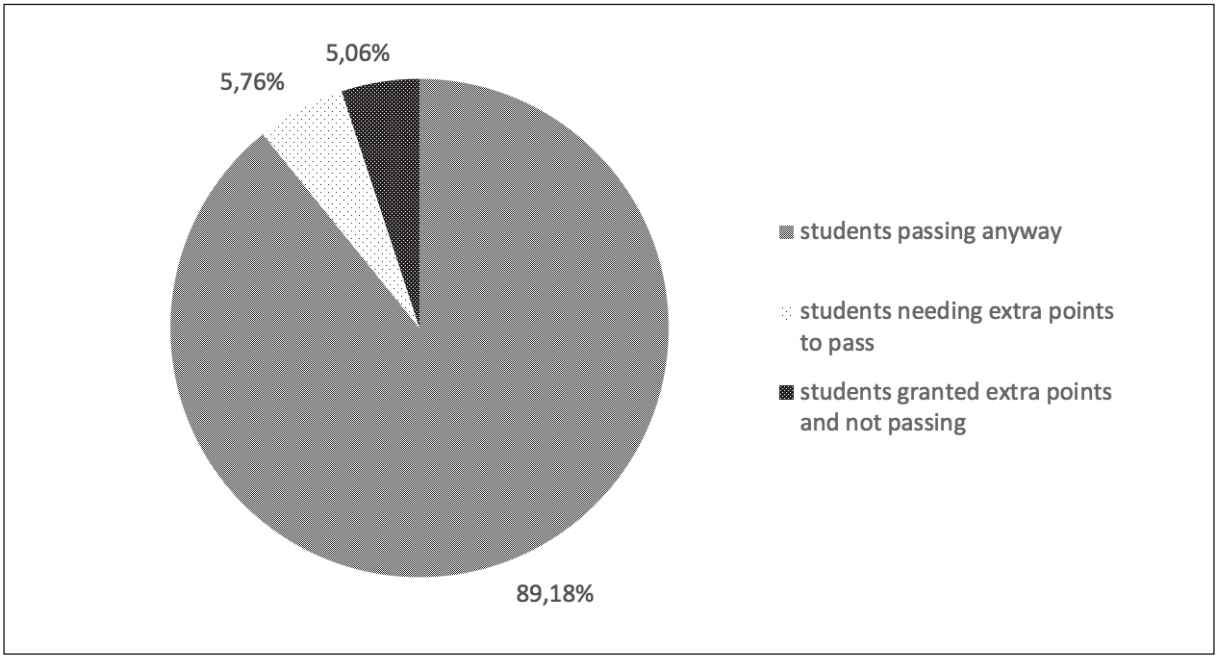


Figure 4 illustrates the low significance of the innovation's reward component in motivating and enhancing students' preparedness for the final exam. This is especially apparent in the high percentage of students (89.19 per cent) passing the final exam without actually needing the extra points given for their average scores in the online quizzes, which can be matched by the very low percentage of students (5.06 per cent) who were granted extra points, yet failed the final exam. Thus, the extra points were irrelevant for the former group as their performance shows that they benefitted from the innovation in other ways as well, whereas the latter group could not even capitalize on the reward component and potentially remained unaffected by the innovation in other ways as well. Therefore, the reward component proved meaningful to only a small portion of the class (5.7 per cent).

Figure 4. The significance of the Socrative reward component for the successful completion of the course in 2018



Conclusion

The aim of my innovation was to raise learners' responsibility, and was designed to improve students' scores in the final exam. Implementing a formative approach, I used a series of online quizzes which provided both me and my students with regular feedback on their learning gaps. Both the qualitative analysis of data from the student survey and the quantitative evaluation of student scores in 2017 and 2018 demonstrated that online in-class quizzes approached in a formative way are useful tools to increase the student' success rate in the end-of-term summative assessment and assist them in taking greater responsibility in the learning process. The innovation had a positive effect on two aspects of the learning process. First, it motivated students to

distribute the study load throughout the whole semester, which may have raised not only students' knowledge and understanding but also their confidence when taking the summative final exam. Second, it enhanced students' learning progress by raising their awareness of the expected course outcomes and revealing learning gaps before the final exam.

In addition, the analysis of the reward component originally intended to raise students' motivation has indicated that the innovation served its purpose even without it. In the future, I would, therefore, like to either reduce or completely leave out the extra points granted. Nevertheless, the extra point component was helpful in identifying roughly eleven per cent of the class, namely those who passed due to the reward component only and who failed despite earning extra points on the online quizzes, as needing further help. To understand individual students' performance and perhaps identify students who are struggling earlier I intend to administer at least some of the quizzes for each student individually with the possibility of consulting with classmates only after submitting the answers.

It also seems that for a small group of students – those who did well enough to gain the extra points but failed the final exam anyway – the extra points themselves and the ability to consult the material when answering quiz questions may have given false confidence. Therefore, I should emphasize to these students that it is important not only to prepare continuously but also to review the material before the final exam. The dip in performance from the first to the second test could be used a warning sign. I also plan on revising exam questions so that guessing would be discouraged. Perhaps an additional quiz without the possibility to consult notes would help as well.

All in all, the results of my survey have convinced me that it is not only possible but also valuable to implement online quizzes as a formative tool even in a summative-oriented study environment. I would, therefore, recommend all lecturers of subjects that require gradual student progress, which is typical for languages courses, to integrate these in some form into their classes, be it to enhance competitiveness among students or just to refresh students' knowledge during class.

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