

Innovative Learning: Students in the Process of Exam Quizzes Building

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Abstract

“Exam Quizzes Building” is an innovative method of learning and examination based on empowering students to create questions, putting them in a role of a teacher and role of the researcher. During “Quizzes Building” exercise, students created questions and teacher’s role was to select good questions for later use. Creating good questions required good mastery of the material. Also it provided motivation boost by creating content which was used later by other students.

The authors will describe practical aspects of educational pilot study with “Exam Quizzes Building”, including tips on how to create “Exam Quizzes Building” using Moodle platform and pedagogical, organizational and technical SWOT-like analysis of this method.

The scale of this method at pilot study was four groups, 300 students, over three thousand questions. Procedure: Students create questions using Moodle quiz with local teacher role. Students create questions along with bibliographical information. Questions are shown to students for public debate and selection.

Keywords: Exam Quizzes Building, Flipped Assessment, learning by asking the right questions, practical conclusions from the implementation, collaborative learning, critical thinking

1. Introduction

Creating quiz question by students is a method that brings benefits to both students and teachers.

Students engaged in such an activity usually need to work more and, according to multiple theories discussed later, they can learn better than through reading alone. Also, by creating content for community, they are usually more motivated than writing essays which in most cases goes into a trash can after grading.

For teachers, the main advantage is the size of question bank, available for future use. This method can lead to creation of hundreds of questions per year (depending on class size and students’ activity), which can be used during tests (both self-assessment and graded) and exams.

Although this kind of assignment is nothing new, since it can be done using pen and paper, modern IT tools like Moodle make the question creation process and question delivery much smoother and less time-consuming.

2. Theory behind student-generated quiz questions

The subject of quiz questions generated by students is studied since 1970s. There are multiple theories claiming that the process of generating questions might have positive impact on students' results.

The active text process theory claims [1] that creating quiz questions enhances students' reading comprehension by constructing relations between the text and prior knowledge, because the process of generating questions forces students to think about relations among different aspects of the text. Early study by Andre and Anderson [2] investigated effects of rereading versus student-generated questions and showed some positive impact on students' performance of the latter.

The review and elaboration theory points out that creating questions may increase student's motivation for reviewing [3] and also requires more intensive review than in case of rereading, because students need to identify important information when they want to create a good question [4].

Another approach is proposed by metacognition theory. According to Flavell [5] metacognition is "one's knowledge concerning one's own cognitive processes or anything related to them". Creating questions by students may help students to "monitor their understanding and encourages students to get to know what they know and what they don't know" [6].

Generating questions by students was also studied from socio-cognitive perspective. The process of question generation, including discussion about questions, encourages students to collaboratively build knowledge and obtain deeper understanding [7,8].

According to some research, student-generated questions promote higher-order thinking [9]. Students during question creation need to generate explanations to justify their questions, which requires students to use higher-order thinking abilities [3].

3. Description of the process

Student generated quiz questions assignments were launched multiple times by several different teachers, but generally as described below, with changes to schedules and detailed grading rules.

3.1 Preparation

When the project started in late 2013 with student generated quiz questions assignment, we were using built-in Moodle platform functions. Now, there is a dedicated plugin available, which will be described later, but before it was introduced, all of our assignments were done 'manually' by the teacher.

The teacher had to prepare workspace for his students. He created, for each student, a separate Moodle quiz module with locally assigned teacher role for that student. The quiz was hidden, so the other students were not able to access it – the access was restricted for student with local teacher role and a teacher.

The problem was in teacher's workload, because most groups consisted of over 100 students, which meant creating (or rather duplicating) one quiz for each person and then assigning local role for each student. Now, with new plugin, teacher's workload is significantly reduced.

3.2 Teacher's instructions

Students were instructed to create 10 questions as obligatory part of an assignment and they could create 10 more questions for bonus points.

Teachers usually briefly instructed students how to use Moodle quiz module and students had no technical difficulties during the question creation process.

3.3 Question creation

When the assignment has started, each student received his own Moodle quiz module with locally assigned teacher role. The quiz was invisible to other students and students were instructed not to use common quiz question data base of the Moodle course, because in that case they would see (and could edit) each other questions, so they put questions into quiz category (Moodle allows for separate category for each quiz module, which isn't shared across the course).

Students had access to variety of Moodle question types, including multiple choice and multiple answer, matching, fill-in missing words, show on picture, ordering, etc. It made quizzes more engaging and it also helped to unleash students' creativity.

Students were obliged to provide proper references for each question, including photo of the book page on which the question was based. This made checking far easier for the teacher, because he could check the question even without having that book at hand.

References were placed in the 'general feedback' text field in Moodle question. This field displays when students submits his answer (and can be hidden during the exam). This allowed students who are taking non-exam quiz to check the source of the question and get information about some book that they have missed.

Usually the question creation period lasted for several weeks. After it has ended, students were deprived of locally assigned teacher roles. They couldn't create question anymore and lost access to common quiz question database.

3.4 Peer assessment of created questions

In the next phase teacher took all the questions created by students and put them into public quiz module. All the questions were made available for review and students could discuss them on the forum.

Thanks to the references, students who omitted some books or other materials, could identify what they have missed. The knowledge of sources and questions significantly reduces stress, because students were not surprised by some less common topics.

3.5 Question selection process

Basing on the students' feedback from the peer assessment phase and his own judgement, teacher eliminated wrong questions or questions of low quality. All the accepted questions were divided

between thematic categories for future use and stored in Moodle course question database (which can be easily copied to other courses).

3.6 Computer based exams

When it came to the exams, we have been using free examination tool called *Safe Exam Browser*. Combined with Moodle quiz function it makes any cheating attempt virtually impossible. There are multiple SEB and Moodle tools to limit cheating, which can be used in any combination:

- Students cannot access the internet.
- Student cannot close the browser. If they turn the computer off, they can continue after the restart from the place they have finish.
- Access to the exam can be restricted to selected computers (by individual IP addresses or IP range).
- When exam has started, students cannot go back to Moodle materials – they have to complete the quiz.
- Students cannot go back to previous questions.
- Questions are randomized by drawing pre-set number of questions from thematic categories.
- Question order is randomised.
- Answers and distractors are randomised.

The result is that every student receives slightly different questions (but on the same subjects), in mixed order, with mixed distractors and without the ability to go back. With proper teacher's supervision, cheating is close to impossible.

With automatic grading students know their score just after finishing the exam. There is no need for manual grading and this alone can save a lot of teacher's time.

3.7 Possible technical improvements

When we have started with student-generated quiz questions, there were no specific tool to support the process. We were using built-in Moodle quiz module in conjunction with locally assigned teacher's role. The problem with that method was that it took a lot of time on part of the teacher.

But now we have *StudentQuiz* plugin for Moodle, which was developed by University of Applied Sciences Rapperswil, Switzerland. This new plugin makes the whole process much easier, especially by reducing teacher's workload. Instead of creating new quiz with locally assigned role for each student and then close quizzes for students when the question creation period ends, with this plugin teacher can create one student quiz in which all the students can publish, test and evaluate their questions. We strongly advise to move to the new plugin.

4. Data and feedback

Student-generated question bank was done by teachers of several faculties, e.g. Faculty of International and Political Studies, Faculty of History and Jagiellonian Language Centre.

One instance of course with student-generated quiz questions from the Faculty of International and Political Studies was closely monitored. We have collected data and feedback about the whole process, results and students' opinions. There were 100 students in this group.

4.1 Difficulty level

There is common apprehension that showing the questions to the students before final exam may cause the exam to be too easy.

The average final exam score among all the course subgroups was 62.90%. The maximum score was 84,17% and minimal score was 28,0%.

One subgroup of 42 students in our course had to do the exam quiz with 55 points maximum. Figure 1 shows how the grades were spread.

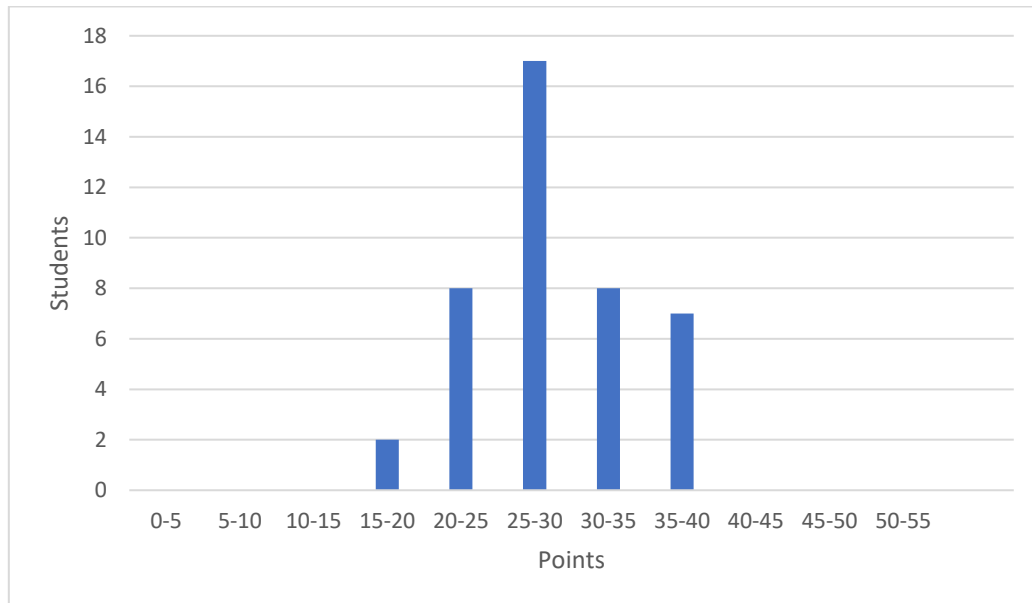


Figure 1: Spread of points (for 42 students).

Despite students were shown most of the questions before exam, there are no maximum or even near-maximum grades, proving that exam was far from being too easy.

Even if students copied all the questions from the whole database and try to memorise them, there were over 2800 questions, which make the whole effort very time consuming and basically pointless.

4.2 Activity impact on exam results

Students' activity during question creation and peer assessment had significant impact on their results. There was a correlation between actions (by action we mean any operation on Moodle platform that is recorded in logs) and final exam grade. The Pearson's correlation coefficient was 0,466 (significant at the 0,05 level). Figure 2 shows the details.

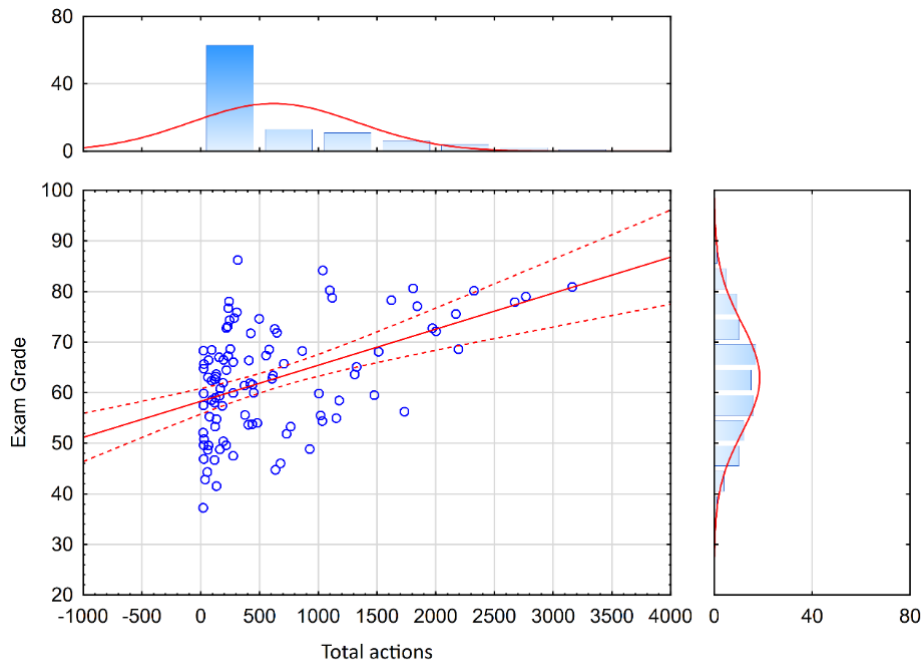


Figure 2: Correlation between exam grades and students' activity (for 100 students).

4.3 Students' feedback

After the assignment was over, students were given short anonymous survey. Their responses were as follows:

Would you like to create more quiz questions in other subjects?

- Definitely yes – 35%
- Rather yes – 45%
- Difficult to say – 20%
- Rather no – 0%
- Definitely no – 0%

Is question creation method a good method of learning?

- Yes, but is too time consuming – 20%
- Yes, it allows for deeper understanding – 80%
- No, reading books is enough – 0%
- No, it's a complete waste of time – 0%

Was creating questions difficult from technical perspective (using Moodle)?

- Easy and without problems – 60%
- Mediocre, it could be better – 40%
- Difficult and cumbersome – 0%

What form of test do you prefer – computer-based exam knowing a part of the questions or pen and paper exam but without knowing a part of the questions?

- Computer based – 65%
- Pen and paper – 10%
- Makes no difference to me – 25%

Which form of test do you prefer without knowing a part of the questions?

- Computer based – 25%
- Pen and paper – 35%
- Makes no difference to me – 40%

We have also concluded interviews with the students and they have clearly stated, that they were far more motivated by creating content that will be used by their group and others, than write essays that will probably land in the trash can after grading.

Students also stated, that this kind of assignment requires much effort, which was considered good by more ambitious students.

Some students stated, that knowing the range of course material (thanks to references in Moodle questions) significantly reduced stress, because the probability of being surprised by some questions was significantly lower.

4.4 Number of questions created

The main advantage for the teachers is the ability to obtain large question base with much less effort than creating questions themselves. They spend time for evaluating the questions and preparing the whole assignment, but with new plugin available, the time spend is limited only to question evaluation, which is significantly faster than creating questions from scratch. There is also another benefit when it comes to question diversity, because students often surprise teachers with their creativity with available multiple question types.

For one of our courses, number of students and number of questions created is shown in Table 1.

Table 1: Number of students and new questions in each course edition at the Faculty of International and Political Studies.

Edition	Students	New questions
2013/2014	108	ca. 1300
2014/2015	100	ca. 1540
2015/2016	126	ca. 240
2016/2017	101	ca. 460

The activity decreased in later years because teacher had enough questions for his purposes and because creating new, original questions were much more difficult to create given large question base.

5. Conclusion

We have launched multiple instances of student-generated questions assignment. They were used both for preparing exam questions and as an additional activity during a course.

The assignment has some slight impact on students' results, but greater impact can be seen when it comes to motivation. Students are used to write essays that are not used anymore after grading, so

the students have the notion that they write essays only to themselves. In case of creating quiz questions, they are aware that questions will be used by their group and in the future years and such notion of creating something for the community motivates many students far more than writing the essays.

Knowing the questions before the exam and the ability to review references published for each question greatly reduces stress, while keeping difficulty level quite high, because it is virtually impossible to memorize such large question base.

Students have no technical problems while creating questions using the Moodle platform and taking photos to put into references.

Teachers acquired large question data bases for future use, not only for final exam but also for self-assessment tests for each subject. Although with built-in Moodle functions it required a lot of effort (still significantly less than creating questions by themselves), but with new plugin available, the whole process is far less time-consuming.

The additional benefit of using Moodle quiz module is an ability to launch computer-based safe exam with far more limited cheating than on standard pen and paper exam.

6. References

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