# THE CREATION OF "QUESTIONS BANK"
# AND INTRODUCTION OF 2.0. EXAMINATION SESSION

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In the Institute of American Studies and Polish Diaspora Jagiellonian University, with the support of the Distance Learning Centre at the Jagiellonian University was introduced an innovative method of examination based on empowering the students.

During the 2014 session, the students were invited to create test questions. Accepted by the lecturer questions were used on the exam. Extensive "Questions Bank" may be used in subsequent examinations 2.0.

The authors of the paper present practical advice on how to prepare and carry out such an examination. They share *know how* of practical suggestions from pedagogical to technical aspect of moving from teaching to learning while using the idea of Questions Bank. They discuss the impact on the motivation and creativity of students, the principles of achievement and assessment, methods of verifying the content of the questions and technical measures to make questions and hindering cheating.

The use of innovative methods of preparing and conducting the exam based on the Questions Bank had a positive impact on the mobilization and involvement of students, which resulted in a very good performance evaluation questionnaires of the lecturer.

Keywords: e-learning, exam, assessment, teaching, motivation, mobilization

## 1. From teaching to learning

The idea of "Questions Bank" locates itself in the broader framework of changing education from teaching to learning. The Questions Bank project is an outcome of the second *Education Quality Week* at the Jagiellonian University (UJ) held on December 2-6, 2013. The event is organized annually by the Section Analysis Quality of Education, UJ (Sekcja Analiz Jakości Kształcenia, UJ). The five days-long event is addressed to all members of the Jagiellonian University community. Its aim is to increase awareness of measures taken to improve the quality of education. It is a forum for the exchange of good practices. [1]

In 2013 the second day of the event was dedicated to workshops for academic teachers. One of the workshops focuses on *how to create tests well, including tests on the University platform Pegasus*. This was the place where the authors of this article met for the very first time: Andrzej Filip (from *the Distance Learning Centre UJ – Centrum Zdalnego Nauczania UJ*) was one of the workshop speakers, while Piotr Drag was a participant on the side of academic teachers.

The aim of the workshop was quite different from the final product "Questions Bank". This was the description of the workshop:

"The written knowledge test is a method of examining students, which is of particular use in the conduct of distance education. The workshop will enable participants to gain knowledge about the principles of building test forms. In addition to the teaching of the theory, participants will also have the chance to see how to prepare for a test on the university e-learning platform Pegasus" [2].

The innovation of the "Questions Bank" project is to invite students to the process of creating test questions.


## 2. When is a student learning the most?

It seems that the answer to this question is rather obvious. The students learn the most before the events that will test their knowledge. There is a certain rule: more important examination students face then their learning preparation efforts tend to be more intense. According to this rule - students learn the most - right before the final exam. The aim of the exam is to test the knowledge of students by a professor. The preparation for an exam is based on the student testing his knowledge that he was able to gain while taking a course. In this way the test is not only a method of assessment intended to measure a test-taker's knowledge, but could also be taken as an effective way to learn. In order for this to happen a teacher needs to empower his students or rather develop in them the ability of critical thinking and asking the right questions.

The 2013/14 academic year was the very first year of teaching in the new academic environment for dr. Piotr Drag. In the beginning of the year he was

offered a position, that of an academic teacher at the Institute of American Studies and Polish Diaspora in the Faculty of International and Political Studies at the Jagiellonian University. Dr. Drag has international academic credentials. As an Oxbridge he was exposed to learning the tutorial method from the best sources. Besides the European and American Universities were he taught he also had a chance to study at the Hebrew University in Jerusalem. There he was stunned by the sheer intensity with which the students grappled with texts and were not afraid to raise questions. Sometimes he would hear in the classroom the encouraging comment of teachers in Yiddish "du fregst a gutte kashe" (you raise a good objection). Dr. Drag tried to introduce the same attitude among his students. In 2013/14 dr. Drag taught classes entitled: *Migration* (lectures + exercise – 60 hour long course) for stationary and not-stationary students and *The ethnic issues in Polish History* just for stationary students (lectures + exercise – 60 hour long course). All of his students participated in the process of creating the Questions Bank. In order to encourage his students to learn by asking questions, dr. Drag used the story of a Nobel prize winner in physics from 1944 - Isidor Isaac Rabi.

## 3. 'Izzy, Did You Ask a Good Question Today?'

The story of Isidor Isaac Rabi was a perfect story illustrating not only the method implemented in the creation of the Questions Bank but it was also a very good example for issues taught during the class on *Migration* and *The ethnic issues in Polish History.* Our champion of asking questions, the title Izzy was a child from an immigrant Jewish family who left Galicia (Rymanowa near Krosno) when he was one year old and eventually settled down in Brooklyn, New York. The American Dream of Isidor Rabi came true in his academic career. In addition to his Nobel award, his work contributed to the invention of nuclear magnetic resonance spectroscopy, radar, the nuclear bomb, the laser and the atomic clock. Once he was asked, "Why did you become a scientist rather than a doctor, a lawyer or a businessman, like the other immigrant kids in your neighborhood?" His father had been a tailor and a grocery store owner in Brooklyn [3]. Isidor Isaac Rabi responded that this happened because of his Yiddishe Momme. "My mother made me a scientist without ever intending it. Every other Jewish mother in Brooklyn would ask her child after school: 'So? Did you learn anything today?' But not my mother. She always asked me a different question. **'Izzy,'** she would say, **'did you ask a good question today?'** That difference – asking good questions – made me become a scientist!'" [4].

Although Sheindel Rabi, dr. Rabi's mother had not received the benefits of education beyond perhaps grammar school, her question testified that those who ask good questions are those who will not only survive, but who will prevail.

Therefore, her question has served as an inspiration and as a credo for the students who participated in creating Questions Bank [5].

The secret code to incorporate one's questions to the Questions Bank was the good mastery of the material, since only good mastery and an interest in a particular subject enables one to ask the right questions.


## 4. Technical and organizational overview

Theoretically the 'question bank' assignment could be done as a 'pen and paper' exercise where students submit all the questions on paper and the teacher selects them and incorporates them into a test paper. But it would be impractical since it would take at least the same amount of time as using modern IT tools (and most likely disproportionally more) and would also prevent one from creating randomized tests (with different questions set for each student).

The best way to do so smoothly was to use the Moodle virtual learning environment. Moodle is a well-known platform for course material delivery, but it is sometimes forgotten that Moodle was created with a social-constructivism approach in mind [6]. Using this approach, students can participate in the content creation process. This is possible thanks to the *Locally assigned roles* function. This function allows one to give each student a *Teacher* role for a selected activity module.

For the purposes of the 'question bank' assignment, a separated quiz activity module was created for every student, and thus each student was made a teacher in this quiz module (more will be covered in *Technical details* part of this article). This gave students the possibility of creating new questions and editing quiz properties, but they were restricted to their own quiz module – other students' modules were hidden from them.

During the assignment each student had to create 10 questions which were obligatory and up to 20 extra questions for bonus points. They had 4 weeks to create their own question set.

In order to make the question creation process smooth, there was a short (circa one-hour) training showing students how to create questions. This was done to help students with less advanced computer skills, but in the future we will create a dedicated on-line training material for the 'question bank' assignment.

During the question creation process students were obliged to provide references for every question they made. References in the form of bibliographical information and a photo of each particular page were inserted in the *General feedback* field for each question (*General feedback* is information displayed when a question is answered, but it can be hidden at the teacher's discretion). Thanks to the photo-bibliography, the teacher was quickly able to verify the value of each

question. After 4 weeks students were deprived of the *Teacher* role for their quiz, which meant that they could not change anything. Then a teacher checked all the questions and chose appropriate questions for a subsequent test. Only good, essential questions with proper references were selected.

All questions selected by the teacher were put to a categorized question bank. Roughly half of the questions were shown to the students in an unmarked, free-access quiz module, giving them the possibility to partially prepare for the final test.

## 5. Technical details

### 5.1. The Question bank's creation process

All 'question bank' assignment activities were done on Moodle platform. For each student a separate quiz module was created. In order to make the process of quiz modules creation smooth, one quiz was created and it was cloned using *Duplicate* function. The quiz module used default setup except:
- *Layout > New page* was set to *Never, all question on one page* – this made preview and correction easier.
- *Question behaviour >* was set to *Adaptive mode (no penalties)* – this allowed one to check particular questions without submitting the whole quiz.

When quiz modules were duplicated, they were renamed using the students' name and surname, and for each quiz the *Locally assigned roles* function was used to give each student *Teacher* role and permissions.

Finally, all quiz modules were hidden. This made them visible only for the teacher and student with the *Teacher* role assigned for this particular quiz. Students could not see other quizzes.

Students had access to multiple question types offered by Moodle platform (both built-in and offered by plug-ins). The most popular question types were:
- multiple choice,
- multiple answer,
- true/false,
- drag and drop matching [7],
- drag and drop into text [8],
- hotspot – show particular thing on the image (both *Drag and drop onto image* [9] and *Drag and drop markers* [10] questions were used).

References in the form of bibliographical information and the photo of each page were inserted in the *General feedback* field for each question. This is a quite essential part of the method. It allows the teacher to quickly verify if the information regarding a particular question is appropriate, and to make a reference

to the books' list from the syllabus of the particular subject. Due to the wide-spread use of photo cameras nowadays in numerous electronic devices, such as: phones/smartphones/tablets, etc., this step is very easy for students and it makes the teacher's work much faster. In fact, the evaluation process regarding question value based on its bibliographical reference and photo, could be done without the opening of the particular book.

After the question creation period, all students were deprived of the locally assigned *Teacher* role which meant that they could neither see their quiz, nor edit questions anymore.

During the question selection process, the teacher selected good questions and moved them to a categorized question bank, assigning each question to particular categories. Moodle platform mechanics allow one to create flexible, multi-level categories for organizing the question bank.

Half of the questions were shown to students which allowed them to learn and get used to particular question types. They could even copy the questions, but considering the scale of the project (over 1200 questions), memorizing half of the question bank is not the optimal strategy for learning – it would be easier just to learn the course material rather than trying to memorize everything, especially when students knew that half of the questions are hidden.

Questions were shown in a large, *Adaptive mode* quiz module (*Adaptive mode* means that students can answer various questions) with *General feedback* displayed (which showed students the source so they knew which material they should use for learning).

## 5.2. Exam – goodbye cheating

According to Polish legal regulations all final exams should be conducted in a controlled environment which means that distance-learning exams are out of the question. Exams should be conducted at the university under teacher supervision. But using modern IT tools allows for a much stricter environment, where cheating is almost impossible. This is ensured by the following tools:

- Safe exam Browser (SEB) [11] – this is a special, free, dedicated internet browser which is meant for conducting on-line exams. SEB was installed on every computer. SEB prevents students from:
  - using the internet (except entering Moodle platform – starting URL is defined in setup file),
  - launching any software,
  - connecting USB devices and using DVDs,
  - closing SEB – it could only be closed by a secret key combination known only to the teacher,
  - using course materials – after a small Moodle layout customization all navigation can be hidden in SEB mode, meaning that after

starting the quiz, students are unable to view course material or even go to their profile (they could hide a Google link or other materials there). They can only finish the quiz.

Safe Exam Browser requires changing the Moodle platform setup – under *Site Administration > Development > Experimental* setting *Enable Safe Exam Browser integration* should be turned on.

- Proper exam quiz module setup:
  o *Extra restrictions on attempts > Browser security* set to *Require the use of Safe Exam Browser* meaning that only SEB users could attempt the quiz.
  o *Extra restrictions on attempts > Require network address* with the address of the exam room network (or with the addresses of particular machines) – if someone would like to receive help from someone outside the room (even using SEB), they would not be able to start the quiz, unless physically present in this particular room.
  o *Extra restrictions on attempts > Require password* for extra security (students were given the password when they started the quiz attempt).
  o *Layout > Navigation method* set to *Sequential* and *Layout >New Page* set to *Every 10 questions* which meant that students saw 10 questions at a time, and after marking responses and going further, they were unable to come back. This made using notes or asking others for help much more difficult.
  o *Timing > Time limit* was set to *60 minutes* for 140 questions which required quite fast responses (but it was perfectly enough for those who were prepared for the exam).
  o *Review options* were set to display *Marks* only to prevent students from sharing detailed responses with the next group. They were shown full feedback after exams were finished.
- Quiz randomization mechanics:
  o Questions were randomly selected from categories providing every student with different questions (but the same amount of questions from each subject).
  o In exam quiz module setup *Question behaviour > Shuffle within question* was set to *Yes*, providing the mixing of responses for each questions. This made watching the neighbour's display for answers much more tricky, because at a distance people tend to watch position, not a particular text, and since positions are mixed, using someone else's responses could lead to mistakes.

Finally, teacher supervision made other forms of cheating very risky. Together with the technical means of cheating prevention, randomized questions and a time limit (without the possibility of returning to previous questions) made cheating nearly impossible.
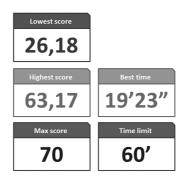
## 6. Exam – the numbers

There were 108 students who took part in the 'questions bank' assignment. After the assignment, 1283 questions were selected by the teacher for further use.

The exam consisted of 140 randomly selected questions, each marked for 0.5 points – for a total of 70 points. Other 30 points could be scored for preparing questions during the 'questions bank' assignment. Besides the 30 points for 10 obligatory questions, there was also a possibility to earn 10 extra points for bonus questions.

| Students | Questions |
|---|---|
| **108** | 1283 |

| Exam time | Questions during exam | Points per question |
|---|---|---|
| **60 minutes** | 140 | 0,5 |

| Points for exam | Points for questions |
|---|---|
| **70** | **30** |

Despite the fact that students had access to roughly half of the questions bank, the exam proved neither too easy, nor too difficult. The lowest score was 26.18 out of 70, and the highest was 63.17. All students managed to finish within the 60-minute time limit. The fastest solution took just 19 minutes and 23 seconds, and this was also one of the highest scores during the exam.

| Lowest score |
|---|
| **26,18** |

| Highest score | Best time |
|---|---|
| 63,17 | 19'23" |

| Max score | Time limit |
|---|---|
| **70** | **60'** |

There were also interesting results in the post-assignment survey. The authors thought that students would consider this method good but too time consuming. During the survey, however, only 10 out of 46 students considered it too time consuming, 34 considered it good, and only 2 preferred just reading course material to the question creation activity.

Moreover, the increasing activity during classes resulted in an increased activity during the university-wide evaluation survey – 63.51% students took part in the survey compared to the 15.4% university average. The average mark for 'classes quality' was 4.9 out of 5, compared to the university average of 4.39, and the average mark for 'teacher' was 98 out of 100, compared to the university average of 85.

## 7. Ideas for the future

Preparing a 'questions bank' by the students is just one example how students can be engaged in the creation of different types of course material. There are many different activities depending on classes type and their computer skills.

One of the simplest ideas is to write short articles on particular subjects: like an event, person, concept, etc. Such articles can be used as course materials. Students can also create simple video-essays, combining Power-Point or Prezi presentations supplemented with audio (or audio/video) comments recorded with a screencasting software (like Techsmith Camtasia or something similar).

Students can also use built-in Moodle tools to create dictionaries, wiki-style knowledge bases, or a reference base containing bibliographical positions and links to useful sites and articles.

## 8. Summary

The innovation of the Questions Bank project was based on empowering students and giving them the role of a teacher. The excellence of the students' performance stemmed from asking good questions, which is inseparably connected with a good mastery of the material. The typical pre-examination stress in the face of unknown questions that a teacher might ask during the exam was reduced, since a good part of the questions were known to students who were actually their authors. The pre-examination stress engine was directed towards the creativity of students. The motivating element of competition between students was introduced. All of these made the project very successful. Shifting from teaching to learning made the project very well received at the prestige conference *Virtual University 2014* held at the Warsaw University of Life Sciences – SGGW on 25-26.06.2014, as well as on the international level. Keen interest in the Questions Bank project

was shown by Dr. Thomas H. Bak from the University of Edinburgh, presently holding the position of Chair of the World Federation of Neurology. This shows that the Questions Bank project could be implemented by teachers and specialists of various sciences – those who know the value of asking a good question.

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