EduAkcja. Magazyn edukacji elektronicznej
nr 1 (7)/2014, str. 37–42

Marking large amounts of student assignments

Artur Opaliński
Gdańsk University of Technology
artur.opalinski@pg.gda.pl

Abstract: Technologies offer plenty of possibilities to prepare individual remote online tasks for students. This gives a lot of space to search for ways to overcome the challenges, one of them being grading a high volume of student-generated content. The paper surveys the author's experience with various forms of student e-activities and various forms of grading.

Keywords: e-learning, assignment marking, tools and methods

1. Introduction

One of the numerous aspects e-learning introduces to education is the ease of communication. Supporting the teachers with getting closer to students or distributing thecourse material seems an obvious advantage. But the means of communication inherent in electronic distance education also make it possible for students to generate a lot of content. This causes imbalance if traditional teaching methods are employed, which assume that the teacher is responsible for both correcting and marking all student-generated content as well as giving feedback on the content and on the student progress.

Two issues are clearly contradicting here: on the one hand, learning by doing and activating students percieved as the most efficient methods of learning (DuFour, DuFour, Eaker, & Many, 2010; Struyven, 2005), and on the other hand the amount of student-generated content which may be easily overwhelming for a single teacher, or even for a team of instructors trying to work in a traditional manner. Taking Moodle (https://moodle.org) as an example e-learning tool, there are many activities which encourage students' independent work:

- Assignemnts,
- Chats,
- Choices,
- Forums,
- Glossaries,
- Lessons,
- Quizzes,
- Wikis
- and Workshops.

Most of these activities (except Forum) can be additionally configured to require a timely response or action, by setting deadlines. This creates an almost ideal tool for teaching:

- students get stimulated often, on a regular basis;
- it is easy to force step-by-step learning, to prevent students from overlooking part of the material and failure when getting too early to more complex assignments;
- the instructions to each activity can be easily provided, quickly extended and re-distributed if reported unclear or incomplete by students;
- the amount of content can be clearly defined, enforced, and reported – by defining e.g. the

number of posts or number of uploaded files for a given activity;
- the deadlines are automatically enforced.

All the above advantages are achievable with relatively low teacher involvement, as they are controlled by the tool after configuring Moodle. The most laborious part on the teacher's side to this point is to find the most efficient tasks and to divide the training content into different teaching forms – which is done once, and then hopefully only slightly corrected and improved in the following semesters.

The author employs in his blended course the following Moodle activities:
- Assignments in the form of file upload,
- Forums,
- Wikis,
- Quizzes with closed questions,
- Choices, just for organizational purposes,

with a timeframe to respond by students set to one week, to align the virtual part of the course with the in-class work pace. All online remote activities have clearly and separately assigned scores, which must be collected by students in adequate amount to reach the final passing grade. Therefore students are highly motivated to participate in every activity.

To discourage dishonesty when doing activities on Moodle, various organizational solutions are used, e.g.:
- remote activities account for at most 50% of the passing score (at most 30% of the total score; usually not more than 20%);
- files uploaded in assignments are checked against plagiarism, together with publishing an honor code and advocating punishment for breaking it;
- grades of some remote activities are only considered after relating them to the grades acquired in-class, under the teacher supervision. An example is multiplying the score from the remote activities with the score gained from the in-class activity;
- on many courses, the crucial part of the score is based on final (or mid-term and final) assessment test done in-class under the teacher supervision. Students are encouraged to treat the former remote online activities as a mean to prepare for these conclusive assessments.

2. The problem

Remote online activities always bring at least three challenges, which are interwoven:
- motivating students to engage,
- ensuring students' independent work,
- grading a large amount of content.

The extensive use of various activities, but especially the frequent weekly schedule and the sheer number of students participating in the author's courses, which is in the range of 150 – 430 students per course, make it very challenging to process the student-generated content, even – or especially – on a weekly basis. Therefore, the previously mentioned e-course planning phase must include ideas and methods for processing the student-generated content.

Fortunately there are many options to it, but selecting the right one depends on the goals to be achieved with a given activity. The student independent homework is expected (Cooper, Robinson, & Patall, 2006; Marzano, Pickering, & Pollock, 2001) to bring one or more from the following:
- learning new material,
- repeating already known material,
- applying the knowledge already possessed,
- verifying the right understanding of material,
- getting feedback on progress,
- grading to cumulatively assess student readiness to get a passing final grade.

Sometimes different types of activities can equally well serve to reach some of the goals listed above, while sometimes a specific goal can be tightly connected and achievable with only a specific activity, so the teacher is not entirely free when selecting the right activities to his or her educational goals.

3. Quiz questions

The simple and most natural solution to grading massive amounts of student work is to prepare tests (termed Quizzes in Moodle) which only contain questions that can be automatically graded. The limitation of questions is not very grave, as basically only two types of questions require manual grading – the Essay-type question and sometimes also the Short Answer-type question. This still leaves a lot of closed question types to employ, to fit them to the content:

- Calculated, and Calculated Multichoice,
- Embedded Answers,
- Matching,
- Multiple Choice,
- and True/False.

From the author's observations, test questions do not get enough attention in academic, technical education in Poland. Test questions are abundantly used e.g. in medical education in Poland (Konsylium24.pl, n.d.). The questions for medical training got already standardized (Maguire, Skakun, & Harley, 1992). In contrast, teachers of technical matters often stress the fact that the tasks to be solved by future engineers are too complex in nature to verify the necessary knowledge and skills in test questions.

This does not sound convincing, as medicine doctors – and probably many other professions which use test questions extensively in trainings – are also confronted with solving complex problems, and finding solutions by following a long reasoning path. For medical problem solving and medical diagnostic decision making, existing references define the following intellectual or cognitive capabilities: medical expertise, analytical thinking (Elstein, Shulman, & Sprafka, 1990), identifying and solving diagnostic problems and reviews errors and pitfalls in diagnostic reasoning, or reasoning under uncertainty (Elstein, 2002) – which are all complex.

It is typical that students of technical departments are faced with solving complete problems – like computing the mathematical result by recalling and appropriately using equations and other formulas, or by writing a computer program to solve a given problem. From the author's informal talks, teachers of technical matters contend with the fact that the above tasks are either too complex to be embedded in a test question, or that these tasks would loose their value when requiring students to just give the final answer in a single test question, without exhaustively documenting their complete way to the final solution.

Inspired by Lister et al. (2004), McCracken at al. (2001) and Whalley et al. (2006) the author decided to divide the task of writing a computer program by a student, which is a complex and all-encompassing engineering task, into smaller pieces, where skills and knowledge can be more easily assigned and tested by closed questions. These smaller pieces, which are very similar in many complex engineering tasks are as follows (McCracken et al., 2001):

- Abstract the problem from its description.
- Generate sub-problems.
- Transform sub-problems into sub-solutions.
- Re-compose the sub-solutions into a working program.
- Evaluate and iterate.

By looking closer at these smaller pieces and collaborating with the authors of *An Australasian study of reading and comprehension skills in novice programmers, using the Bloom and SOLO taxonomies* (Whalley et al., 2006), the author created an extensive (200+) set of closed test questions

to be used for assessing selected aspects of programming skills and knowledge.

Nevertheless tests (Quizzes) are just one activity possible for Moodle students. Quizzes may be directly associated by students with grading, and therefore students may take the attitude to only pass, and not to relax and learn. Other activities may give additional possibilities to get the students more involved and to transfer additional knowledge or to exercise skills, and also offer other possibilities for grading.

4. Dishonesty, involvement and grading

The students' work – both individual one and other – has many potential goals; grading being just one aspect, and perhaps just one of many that are possible.

4.1. Quizzes

It is hard to require both independent learning and student assessment from remote online quizzes, as the correct responses are very specific. Students without supervisions will pass the already-known solutions to each other, the more often the more difficult the quiz questions are. The author did not succeed in making remotely available quizzes with questions requiring thinking and trial and error, as such quizzes resulted in dishonesty, which was easy to spot from the time used by most students, and was signaled by some students as well.

Another venue tried by the author for remote online quizzes is to only use questions for which there are ready and obvious answers in the accompanying, already provided material. Such questions only require students to get acquainted with these specific pieces of information contained in the training material. This may be obviously very useful for education, but grades from this activity may not be well-correlated with the gain in knowledge. This also discourages dishonesty, as there is no point in using anyone's help. To the author's surprise – quite many freshmen students neglect such simple activities, up to approximately 50% of their population as semester approaches its end, which differentiates their individual position within group very well.

Therefore a simple counting of the number of involvements in activities can be used as student score, making marking unnecessary, or at least of minor importance.

4.2. Forums

Forums are open and visible to any students, and they mimic human communication. Therefore when used to foster a student's independent work they naturally discourage dishonesty, understood as unofficial passing one's own solution to someone else during the discussion. Forums have the additional benefit namely that students can see each other's activity. This offers quite many subtle advantages; students:

- get more motivated, as they tend to follow the others and not to stay behind,
- get a better understanding what the homework is about when they see others' solutions,
- get a higher self-confidence that the task is feasible,
- get more ideas by reading others' posts,
- learn facts, when reading others' posts; but wrong posts may mislead them,
- have a natural reminder that a homework is due, in the form of the e-mail traffic; but in courses with many participants students tend to disable the e-mail communication as it is too voluminous.

The scope and difficulty of the discussion must be trimmed by the teacher in advance appropriately for technical topics. People do not tend to read elaborate posts in online discussion. Students also tend to stay inactive when there is no clear question, so the task can not be defined as loosely as 'discuss today's lecture topics'.

In massive courses the teacher has little chance to supervise, guide or correct the discussion once it starts. Therefore, the authors experience is best with semi-discussions: setting 4 open questions to be answered with a minimum of 5 sentences. Students are free to choose one of these questions

and have to post just one answer, but are instructed not to repeat the ideas from other posts. This requirement was introduced to encourage them to read the former posts. The most active and ambitious students participate first, while the weaker students follow. Ideally, that could mean that the weaker students learn more by reading more former posts by their stronger colleagues – but no measurements have been done to support such claim. The later posts sometimes seem to not bring much new ideas, even if they do not explicitly repeat the wording of the previous messages.

Marking of such Forum activities may probably get quite high efficiency by just counting the involvements of each student. The author created a separate tool (Opaliński, 2013a) to support quick grading with skimming through the posts content.

4.3. File upload assignments

Online remote assignments in the form of file upload are the most challenging ones to grade. They allow for more voluminous content and are therefore well-suited for larger work. Such larger work can be easily defined in a way, that no one single solution is possible, or even that the solutions are so numerous that they bear clear influence of their author.

On the one hand, this makes the cases of dishonesty easy to spot – when dishonesty is understood as uploading other participant's work with only slight or no modifications. On the other hand, students have a much bigger chance to fail to even try to start such larger pieces of work, as they may be intimidated, they may have difficulty to understand and tackle with the task, or there are much more pitfalls in such tasks, especially when no single solution is possible.

Grading online Assignments automatically is not possible in Moodle. There are a few other options, though:

- Moodle peer review module – which allows to assign students to groups where they comment on each other's work. The biggest advantage is that the number of graders grows with the number of participants. But using grades assigned by students to other students must be done with caution. Also, the peer comments can be of low quality, or they arising discussions require guidance by the teacher. Therefore, the effective use of this tool does not free the teacher from processing a lot of assignments.
- Moodle Online Judge module, or external Online Judges (e.g., SPOJ.com), or cTeacher (Opaliński, 2013b) – which are dedicated tools to process computer programming assignments in the form of source code to be test-run and verified against requirements. This is a very effective grading tool, but its use is limited to computer programming assignments.

5. Marking and grading

It should be remembered that doing independent homework by students may serve various goals. Students get one more opportunity to learn, they also get feedback on their accomplishments if their work is marked by the teacher. Grading is sometimes just a way to increase students' external motivation. The author did not succeed in encouraging students to do complex home assignments over prolonged periods of time without using grading. This seems to suggest that just the fun of doing interesting things and getting recognition among peers is not a sufficient internal motivation for doing many complex home assignments.

The value of grading homework is somewhat overestimated for the teacher, as it only offers a somewhat interwoven measure of student abilities, involvement, time management skills, and perhaps other factors.

Nevertheless, the positive effects of marking a homework – even without assigning a grade to it – include an opportunity for a student to learn from mistakes. Therefore any form of marking, commenting, or giving other feedback may be valuable, even without assigning scores, i.e. without explicit grading.

6. Conclusion

There is a plenty of possibilities to prepare individual remote online tasks for students. This gives a lot of space to search for ways to overcome the most significant challenges, being:

- motivating students,
- preventing dishonesty,
- grading or otherwise giving feedback.

Using test questions is the simplest technique for grading, but it still remains underestimated in technical education in Poland. It also does not provide all the possible educational benefits – independent from the field of teaching. Other options should also be considered, including, but not limited to Forums and File upload assignments, described in this paper.

Teaching of massive classes – while far from perfect from the best current practices point of view – seems to stay sound in contemporary education as one of the options. It is not to say that teaching in smaller groups should be abandoned. Just as always – new challenges require new specific methods and tools to accomplish the task.

5. Bibliography

1. Clinical problem solving and diagnostic decision making: selective review of the cognitive literature. (2006). *BMJ, 333*(7575), 944. doi: 10.1136/bmj.333.7575.944-c
2. Cooper, H., Robinson, J. C., & Patall, E. A. (2006). Does homework improve academic achievement? A synthesis of research, 1987–2003. *Review of Educational Research*, 76(1), 1–62. doi: 10.3102/00346543076001001
3. DuFour, R., DuFour, R., Eaker, R., & Many, T. (2010). *Learning by Doing: A Handbook for Professional Learning Communities at Work* (2nd Ed.). Moorabin: Victoria Hawker Bronlow.
4. Elstein, A. S. (2002). Clinical problem solving and diagnostic decision making: selective review of the cognitive literature. *BMJ, 324*(7339), 729–732. doi: 10.1136/bmj.324.7339.72
5. Elstein, A. S., Shulman, L. S., & Sprafka, S. A. (1990). Medical Problem Solving: A Ten-Year Retrospective. *Evaluation & the Health Professions*, *13*(1), 5–36. doi: 10.1177/016327879001300102
6. Konsylium24.pl. (n.d.). [A database of 20.055 test questions from LEK, D-LEK, PES and other medical exams on Medicine Doctors Portal]. Retrieved February 25, 2014, from http://konsylium24.pl/testy_edukacyjne
7. Lister, R., Adams, E. S., Fitzgerald, S., Fone, W., Hamer, W., Lindholm, M., . . . Thomas, L. (2004). *A multi-national study of reading and tracing skills in novice programmers.* Working group reports from ITiCSE on Innovation and technology in computer science education.
8. Maguire, T., Skakun, E., & Harley, C. (1992). Setting Standards for Multiple-Choice Items in Clinical Reasoning. *Evaluation & the Health Professions, 15*(4), 434–452. doi: 10.1177/016327879201500406
9. Marzano, R. J., Pickering, D. J., & Pollock, J. E. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Alexandria, VA: ASCD.
10. McCracken, M., Almstrum, V., Diaz, D., Guzdial, M., Hagan, D., Ben-David Kolikant, Y., . . . Wilusz, T. (2001). *A multi-national, multi-institutional study of assessment of programming skills of first-year CS students.* Working group reports from ITiCSE on Innovation and technology in computer science education.
11. Opaliński, A. (2013a). Improving Web user experience with caching user interface. *Studia Informatica*, 34(2B), 237–245.
12. Opaliński, A. (2013b). I*ntegrating web site services into application through user interface.* Paper presented at TEWI Conference, Lodz, Poland.
13. Struyven, K. (2005). *The effects of student-activating versus lecture based teaching/learning environments on students' perceptions, student performance and preservice teachers' teaching* (PhD dissertation). Katholieke Universiteit Leuven.
14. Whalley, J. L., Lister, R., Thompson, E., Clear, T., Robbins, P., Ajith Kumar, P. K., & Prasad, C. (2006). *An Australasian study of reading and comprehension skills in novice programmers, using the Bloom and SOLO taxonomies.* Paper presented at ACE ,06 Proceedings of the 8th Australasian Conference on Computing Education.

Ocenianie dużej liczby prac studentów

Streszczenie

Słowa kluczowe: e-learning, ocenianie prac, narzędzia i metody

Technologie oferują mnóstwo sposobów przygotowania zadań do wykonania zdalnie przez studentów. Pozwala to szukać optymalnych rozwiązań pojawiających się problemów, z których jednym jest ocenianie dużej ilości treści generowanej przez studentów. Artykuł przedstawia doświadczenia autora z różnymi e-metodami aktywizowania studentów oraz oceniania ich prac.