

Science & Research

CREATION AND USAGE OF CUSTOM GRADE SCALES IN BIOCHEMISTRY WEB BASED COURSE

Emilia Stoimenova, Simona Stoikova, A. Jordanova

Sofia University "St. Kliment Ohridski" Faculty of medicine, 1407 Sofia, 1 Kozyak Str. Bulgaria

Abstract: Blended learning was applied in biochemistry course in the master program at Faculty of Medicine, Sofia University. As a learning management system was used Moodle at the page www.elearn.uni-sofia.bg. Custom categories and grade items were created and used, to trace students' work and development through one school year education in biochemistry course. In this paper presents results from creation of different scales for assessment of the answers of the different tasks as clinical cases, protocols, term's definitions, results of a colloquium.

Keywords: Moodle, custom scales in Moodle, assessment, blended learning in biochemistry

The new technologies are getting more and more spread. Nearly all young people have in their bags, handbag or pockets a tablet or a smart phone with internet connection. Internet change our lives, and the education follows this trend. Variety of learning management systems (LMS), paid and free, that can be used in different courses and stages of education can be found on the internet. Examples for LMS are Moodle, Haiku, desire2learn, Blackboard, Canvas, etc. It is comfortable, because the teacher and the students are not restricted in time and space for teaching and study. The course in which a part of the education is traditional (with lectures, seminars and laboratory practical) and part of it is web – based is called blended course.

One of the courses in the master program Medicine at Sofia University "St. Kliment Ohridski" is biochemistry, a course which is traditionally taught by using lectures, seminars and laboratory practical exercises. Usually students have to memorize metabolic pathways with lots of formulas and enzymes. We introduce solving theoretical clinical cases, appropriate to the level of the students in order to improve their solving skills (Wilson, Goodall, & Ambrosini, 2006). One common educational approach which promotes student centered active learning in order to improve critical thinking and problem solving skills is the study of the clinical case (Popil, 2010; Shanley, 2007). These clinical cases are complimentary to the traditional lectures, practical and seminars, which helps students to explain biochemical processes and what is their influence on the organism. According to McRae (2012), clinical case studies are a valuable addition to the traditional methods of lecture, textbook reading and laboratory for teaching biochemistry, because solving clinical cases helps students see the relevance between biochemistry to clinical practice and motivates them to study (Irby, 1994). Using clinical cases in education of medical students is also preferred in comparison to other forms of instruction (Sriniva-san, Wilkes, & Stevenson, 2007).

Another helpful proposition is to let students choose a term and to explain it in order to create a glossary. On each laboratory practical students make an article – like protocol with theoretical part, materials and methods, results and discussion. In order to trace development of the students and to trace how they succeed with their learning tasks, a LMS could be used. The platform Moodle was used, which is settled on the page for e-learning of SU "St. Kl. Ohridski" - www.elearn.uni-sofia.bg.

As an assistant, I work with groups with at about 10 students. There are four hours every week for laboratory practical exercises, a seminar on biochemistry topics and a discussion of clinical cases. We start with laboratory practical exercises, because it is hard to predict the rate at which different groups work, and this is the part of the class, that we cannot leave as homework. Some assistants used to discuss clinical cases with the group, but usually there is not enough time for everything that is in the schedule. And often not all students are ready at the same time, therefore the assistant discuss answers and while some of them actively participate in the discussion and others are just listening and then repeat or rewrite the answers after the discussion. In order to made this discussion time independent I transferred it in web based course. For evaluation of the answers and marking individual students' progress in the discussion for clinical cases I decided to add a new category in grade book – "Clinical cases" and grade items for each case. In Moodle, there are ready scales that can be used for evaluation of different tasks, categories or grade items, like "2 to 6" (8 point), "excellent to very poor" (5 point), "good to poor" (3 point), etc.

For evaluation of the clinical cases there was no suitable scale. In order to trace resolving given clinical cases, it is easier to use Moodle platform. The discussions were carried out in "questions and

Science & Research

answers” forum, which do not allow students to see previous comments, before they post an answer, and have 30 minutes time, in which they can still edit their answers. Then I read the diagnoses and other answers of the questions and discuss them with each student individually, thing, that I cannot do at attendant lessons, as there is not time left for such discussion.

To trace students' discussions and to give them possibility to check which their own progress and reached grade on the colloquiums I create new categories and grade items in the grade book. My categories are Colloquiums, Protocols, Clinical cases, Glossary Nevertheless the available scales cannot be applied to this discussion, because we talked about the case until it is solved and all the questions are answered. That is why new scales had to be created. I created one new scale in order to assess our discussion. New scale was done on the menu Administration>course administration>Grades>Scales>Add a new scale. It is important that the list have to be ordered ranging from negative (which is 0%) to positive (100%), separated by commas. It is 4 point scale – “Not answered”, “Revision needed”, “Nice work + questions” and “Well done”, but it suits perfectly to my goals. “Revision need” is required for proposed wrong diagnose, like beta thalssemia instead of sickle cell anemia. “Nice work + questions” I put when the diagnosis is correct, but the answers of one or more of the other questions are not at full length, as I expect and I ask additional questions, that have to be answered. “Well done” is for full and completed answer. There is an example of a clinical case and posted answer:

A 12-year-old girl was brought to her physician by her mother. She explained that for two or three months the child has malaise, tiredness, and lethargy. Mother was not worried because she thought her condition was due to spring fatigue and many commitments at school until the child began to complain of bone pain and difficulty breathing. Also, the girl said her nose and gums often bled, her teeth started to shake and on her skin appeared red spots.

The questions for this case were:

- What is the most probable cause for patient’s symptoms?
- What is the biochemical base of this disease?
- What treatment has to be prescribed?
- What would be the consequences if the disease remains untreated?

One of the answers was:

The patient is most likely suffering from scurvy, meaning a severe deficiency of vitamin C.

Vitamin C is crucial for the biochemical pathway for the synthesis and stability of collagen. So a deficiency of vitamin C would lead to a decrease in collagen.

Tablets of Vitamin C should be prescribed. And suggestion of a new diet with food rich in vitamins and necessary nutrients should be given.

The disease can lead to edema, jaundice, and heart conditions.

For this answer the student have "nice work" and my additional questions were:

"Which reactions are impaired, because of the deficiency of vitamin C? For which enzymes it is cofactor?"

After the answer "Vitamin C is required for prolyl hydroxylase and lysyl hydroxylase, involved in hydroxylation of proline and lysine of collagen chain" my grade has changed to "well done".

Other activity for students is writing protocols about laboratory practical exercises. For these tasks I created a category “Protocols” with grade items for each practice. Scale for the protocols was “Not written”, “Returned for revision”, “Signed”. Returned for revision is for example, when the readings are written, but there are not all graphs, that are needed or there is no discussion after results. When everything with the protocol is full and correct, I sign it, so the “excellent” grade in this case is “signed”.

After colloquium, I upload the grades for each student, so everyone can check his/her own grade at grade book. In Moodle on elearn.uni-sofia.bg there is a scale in Bulgarian, but we have foreign students and some of them do not know Bulgarian. There are grades with numbers, the other disadvantage is that the scale is at half number (3; 3,5; 4; 4,5 etc) and I write grades at every 0,25. Therefore I needed a new scale for colloquium grades and create another new scale (from weak 2 to excellent 6 at each 0,25 starting after average 3), which is more precise - 3,75 is different from 4,25.

For the glossary, I made another scale - "excellent", "nice work", "need major revision", "need minor revision" and "wrong" for terms definitions ,that have to be written by the students. If they have first two

grades, is OK, but for the other they have to revise their definitions. For example: Covalent Bonds and Non Covalent Interactions

Covalent bonds are the strongest bonds contributing to protein structure. This bond is formed when two atoms share an electron.

Non covalent interactions do not involve the sharing of an electron, but rather involves more dispersed variations of electromagnetic interactions between molecules or within molecule. They are critical in maintaining the 3D structure of large molecules, such as proteins and nucleic acids.

This explanation had a grade "nice work + questions", because everything is correct, but the types of the non covalent are not written. Some of the written definitions were good, and even appropriate pictures were attached, and on them I chose "well done".

To have an attestation of the semester the students have to have "well done" on all grade items at the category Clinical cases, "signed" for all protocols, and grades for all colloquiums, which give 30% of final grade at biochemistry exam.

I would like to conclude, that Moodle LMS has high potential to be customized and adapted for different courses, goals and subjects as a place for assessment and tracing students development through the course of study. Custom scales are convenient and better than ready scales in the platform, and are better for the goals of biochemistry blended learning.

References:

Irby, D. M. (1994). Three exemplary models of case-based teaching. *Journal of the American College of Cardiology*, 69, 947-953.

McRae M. P. (2012) Using Clinical Case Studies to Teach Biochemistry in a Doctoral Program: A Descriptive Paper. *Creative Education* Vol.3, No.7, 1173-1176; published Online November 2012 in SciRes (<http://www.SciRP.org/journal/ce>); <http://dx.doi.org/10.4236/ce.2012.37174>

Popil, I. (2010). Promotion of critical thinking by using case studies as teaching method. *Nurse Education Today*, 31, 204-207. doi:10.1016/j.nedt.2010.06.002

Shanley, P. F. (2007). Viewpoint: Leaving the "empty glass" of problem-based learning behind: New assumptions and a revised model for case study in preclinical medical education. *Academic Medicine*, 82, 479-485. doi:10.1097/ACM.0b013e31803eac4c

Srinivasan, M., Wilkes, M., Stevenson, F., Nguyen, T., & Slavin, S. (2007). Comparing problem-based learning with case-based learning: Effects of a major curricular shift at two institutions. *Academic Medicine*, 82, 74-82. doi:10.1097/01.ACM.0000249963.93776.aa

Wilson, A. S., Goodall, J. E., Ambrosini, G. et al. (2006). Development of an interactive learning tool for teaching rheumatology—A simulated clinical case studies program. *Rheumatology*, 45, 1158-1161. doi:10.1093/rheumatology/kei077