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CREATING ADVANCED QUIZZES USING MOODLE

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Abstract

Taking on the role of adviser, the teacher must now assess the student's learning process, not merely to sanction their results but to help the students achieve his best results through a constant supervision of his work. In this way, even though there may be final exams, these won't be the only means of assessment. Sometimes the great amount of work that constant supervision implies may prove to be cumbersome. For this reason it is useful to employ questionnaires using Moodle. In short, if our purpose is to use Moodle to assess the student's competence acquired through an exam, calculated question types are very useful to generate questions in this virtual domain. Therefore each student will have different questions and we will avoid situations in which the students share the answers since they will have to know the procedure to arrive at the solution.

Keywords: Moodle, questionnaires, calculated question type.

1 INTRODUCTION

With the signing of the Bologna declaration, new educational model attempts to link theory and practice, it seeks to promote the effort and cooperative learning, it wants to facilitate learning through libraries, virtual campus and it aims to assess learning through continuous assessment systems [1]. Taking on the role of adviser, the teacher must now assess the student's learning process, not merely to sanction their results but to help the students achieve his best results through a constant supervision of his work. In this way, even though there may be final exams, these won't be the only means of assessment. Thus, Education focus on new procedures to facilitate the constant supervision of the student's learning, such us objective tests (true/false, multiple-choice...), short-answer tests, extended-answer test, oral tests...anyway, there is a greater variety of tools.

Finally, in this paper we focus our attention on the objective tests from all these procedures. An objective test is a psychological test that measures an individual's characteristics independent the examiner's own beliefs, usually by the administration of a bank of questions marked and compared against exacting scoring mechanisms that are completely standardized, much in the same way that examinations are administered [2][3].

Moodle (acronym for Module Object- Oriented Dynamic Learning Environment) is a highly flexible Learning Management System, LMS that allows you to create online learning communities. Some of the main features of LMS are to manage users, resources, enrollments, quizzes and quiz questions, syndication, external newsfeeds can be displayed in a course and forums, blogs, among others [4].

Sometimes the great amount of work that constant supervision implies may prove to be cumbersome. For this reason it is useful to employ questionnaires using Moodle [5]. It provides various types of questions: calculated, description, essay, matching, embedded answers, multiple choice, short answer, numerical, random short answer matching, true/false. In this paper, we will focus our attention on calculated questions. With this kind of questions we can generate multiple versions of a question with different numerical values. Therefore each student will have different questions and we will avoid situations in which the students share the answers since they will have to know the procedure to arrive at the solution.

With this method, we intend that students evaluate their own learning. For example, in our classes, quizzes are used as mini tests at the end of every topic. These questions are marked automatically, so that immediate feedback on the level of acquired knowledge is obtained. In this way, students can use quizzes for self-assessment.

2 CALCULATED QUESTION TYPES

Calculated questions offer a way to create individual numerical questions by the use of wildcards, which are substituted with random values when the quiz is taken.

The main aim of the calculated questions is to generate multiple versions of a question with different numerical values. To this end, we need define, at least, one wildcard in one of the answers.

In short, if our purpose is to use Moodle to assess the skills acquired by the students through a test, calculated questions are very useful for generating questionnaires in this virtual platform. Therefore each student will have different questions and we will avoid situations in which the students share the answers since they will have to know the procedure to arrive at the solution.

2.1 Wildcards

Wildcards are a set of data in Moodle. When Moodle delivers a calculated question to the students, the wildcards used in the wording of the question are replaced with randomly selected values. However, these values are not completely random, they are randomly selected from a predefined dataset of possible values. In this way, we have control over the possible chosen values in order to make sure the answers of the question are truthful.

3 CALCULATED QUESTION CONFIGURATION

We can find three types of calculated questions in the questionnaires offered by Moodle: calculated questions, calculated multiple-choice questions and simple calculated question, where the latter is a simpler version of the above.

To create or modify a calculated question, or calculated multiple-choice question, there are three pages to work through, which we will detail below.

3.1 Editing a calculated question

We know that the questions are stored, collected in categories, in a *Bank of questions*. To create a question, once we have entered to the *Bank questions* submenu of the *Administration* block, we select the question category, we click on the *Create new question* button, and we choose the type of question with which we want to work [6]. Let us first calculated multiple-choice questions. In Fig. 1 we show the screen to edit the question¹, where only the fields marked with an asterisk are required.

¹ The figures of the paper are in Spanish because we work in the Spanish version of Moodle in our course.

Figure 1.- Screen to edit a calculated multiple-choice question.

- Name (Nombre de la pregunta). We give a descriptive name to the question.
- Question text (Enunciado de la pregunta). This corresponds to the wording of the question we want the students to answer. It must include all the information they need to calculate an answer. Therefore it must contain at least one wildcard, inside curly braces. For example, "If a tree is {h} m tall, its height expressed in feet is ...".
- Default question grade (Puntuación por defecto). The maximum number of marks for this question.
- General feedback (Retroalimentación general). This is text that appears to the students after he has answered the question
- One or more answer (Una o varias respuestas). It determines the number of right answers in the question
- Shuffle answers (Barajar respuestas). If the box is activated, the order of the answers varies randomly in each trial, provided that "Shuffle within questions" in editing the questionnaire is also enabled.

Then we enter the possible answer to the question. They are marked with the heading Choice 1, Choice 2, Choice 3, etc (see Fig. 2). All of them have the same structure.

Figure 2.- Editing the answer of a calculated multiple-choice question.

- **Choice** (Elección). We add here the formula of the answer, as a rule as we would on a calculator. As it is shown in the example of Fig. 2, the answer must begin with the = sign and it has been inside curly braces. Furthermore, calculated questions can use more than simple arithmetic operators[7].
- **Grade** (Calificación). In this box we choose the grade that the students will get if they give this answer. This should be a percentage of the total marks available. Thus, if the question has only one correct answer then we can assign 100% for that answer. Besides, we can apply penalties in the wrong answers. In the multiple-choice questions is always advisable to apply penalties
- **Correct answer shows, Format** (Mostrar y Formato). They determine the precision of the answer. We use these settings to select the number of decimal places or significant figures we want to use.
- **Feedback** (Retroalimentación). The students will see this text if they enter this answer.

For calculated questions, the edit form is similar to that we just discussed, with some small differences that we will detail below:

- **Tolerance** (Tolerancia). As for numerical questions it is possible to allow a margin within which all responses are accepted as correct. The "Tolerance" field is used for this. However, there are three different types of tolerances. These are Relative, Nominal and Geometric.
- **Units** (Tratamiento de las unidades). We can also specify units for the answer.

Finally we can click "Next page" to save what we've done and move on. If we are editing an existing question, we can click "Next page (new question)" to create a completely new question based on an existing one.

3.2 Dataset properties

Each wildcard that we specify in the answer formula must have an associated set of possible values, this is, its dataset. In Fig. 3 we show the second page to edit a calculated question in Moodle.

Figure 3.- Screen to edit the wildcard properties.

Each of the wildcards is listed on this page along with a choice of dataset: private (only used by this question) or shared (shared with other calculated questions in the same category). To continue, simply choose your preferred dataset for each wildcard, then click "Next Page".

3.3 Choosing the dataset

Finally, we only need to generate the set of possible values that each wildcard involved in the question can take. For this end, there are two ways of creating values: we can type the data manually, or we can have Moodle generate them for us (see Fig. 4).

Editar el conjunto de datos de los comodines

Comodines compartidos: No hay comodines compartidos en esta categoría

Actualizar los parámetros del grupo de datos

Item para agregar

Comodín (s):

Rango de valores: Mínimo: - Máximo:

Decimales:

Distribución:

Parámetros de tolerancia en las respuestas

Actualizar los parámetros de tolerancia en las respuestas

(=)h(73.281) (+)1.219.581()
3.8972

(=)h(3.281) (+)1.219.581()
0.36676219174699

(=)h(73281) (+)1.212291()
2697.2

(=)h(2.54) (+)1.212.54()
3.548

(=)h(11.0254) (+)1.210.0254()
0.02049

Ver más...

Agregar

Siguiente Item a agregar

reutilice el valor anterior si está disponible

forzar la regeneración de solo los comodines no compartidos

forzar la regeneración de todos los comodines

Nuevo elemento a añadir ahora

Agregar Item: Agregar Item: nueva(s) serie(s) de valores para el comodín

Debe añadir al menos un conjunto de datos para poder guardar esta pregunta.

Mostrar: serie(s) de valores para el comodín

Figure 4.- Screen to edit the dataset to the wildcards.

- **Adding values manually.** In this block *Param* (Item para agregar), we enter the value we wish for each of the wildcards. Then we scroll down to the Add section (Agregar) and we click the *Add* button, selecting a single value for the wildcard. Finally, we repeat the above steps as many times as the number of values we want to give wildcards.
- **Adding values automatically.** In the block *Param*, we choose the range of values where we want to be the wildcard, the number of decimal places for the value and the way in which Moodle will choose the values between the limits ('uniform' means any value between the limits is equally likely to be generated; 'log-uniform' means that values towards the lower limit are more likely). Next, in block *Add* section, we indicate *Force regeneration*, we choose the number of sets of random values we wish to add to the list and we click the *Add* button.

4 CONFIGURATION QUESTIONNAIRES

Once we have created a question bank, we will create a questionnaire and add the questions we want. In the following, we will describe how to configure a questionnaire

4.1 Adding and editing questionnaires

Within the course where we want to generate the questionnaire, we activate the drop down menu *Add an activity or resource* and we select *Questionnaire*. In Fig. 5 we show the configuration screen of the quiz.

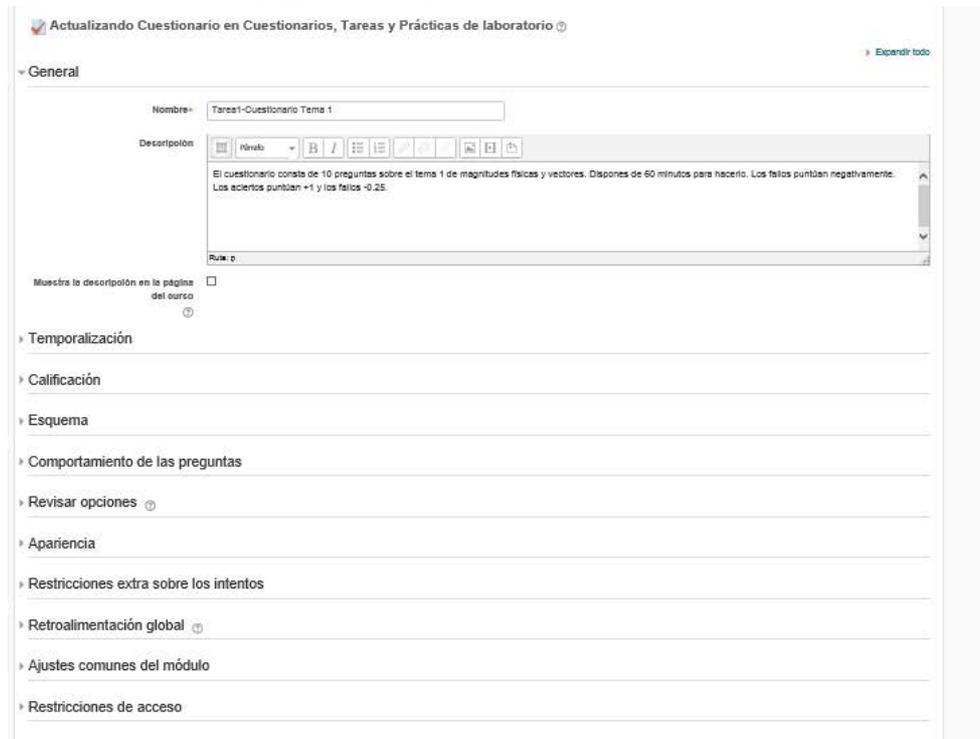


Figure 5.- Configuration screen of a questionnaire.

- Name (Nombre). We give a descriptive name to the quiz.
- Description (Descripción). We write every suggestion that we consider appropriate to answer the questions.
- Time (Temporalización). We set the date window for users can complete the questionnaire.
- Grade (Calificación). When multiple attempts are allowed, there are different ways you can use the grades to calculate the student's final grade for the quiz:
 - Highest grade, the final grade is the highest (best) grade in any attempt
 - Average grade, the final grade is the average (simple mean) grade of all attempts
 - First grade, the final grade is the grade earned on the first attempt (other attempts are ignored)
 - Last grade, the final grade is the grade earned on the most recent attempt only
- Layout (Esquema). In this block we select the question order. If '*Shuffled randomly*' is selected, then the order of questions in the quiz will be randomly shuffled each time a student starts a new attempt at the quiz. The intention is to make it a little harder for students to copy from each other. Also, we limit the number of question per page.
- Question behaviour (Comportamiento de las preguntas). We have seen that the order of questions can be randomly shuffled. We can also made the same with the answer choices within each question.
- Review options (Revisar opciones). This section controls what information students will be shown when they review their past attempts at the quiz, and during the attempt in adaptive mode. It is a matrix with check boxes, Fig. 6. For each of the items, we can determine the timeframe when students will see them: *During the attempt*, *Immediately after the attempt*, *Later*, *while the quiz is still open*, *After the quiz is closed*.

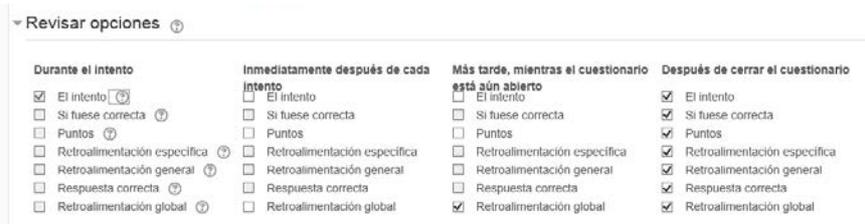


Figure 6.- Options to control information visible to users.

- Appearance (Apariencia). We select the way in which the grades, number of digits in the grade, user's profile picture will be displayed.
- Extra restrictions on attempts (Restricciones extra sobre los intentos). In this block we can define password, network address, delay between attempts...
- Overall feedback (Retroalimentación global). Overall feedback is shown to the students after they have completed an attempt at the quiz. The text that is shown can depend on the grade the students got.

Finally we click on the *save change* button

4.2 Adding questions to questionnaires

Once we have configured the quiz, now we must add questions. For this, we click on the questionnaire created, where we will see the screen shown in Fig. 7. In the left column we see the list of questions of the quiz (which is empty if we just started). In the right column, we have the questions organized by category in the question bank.

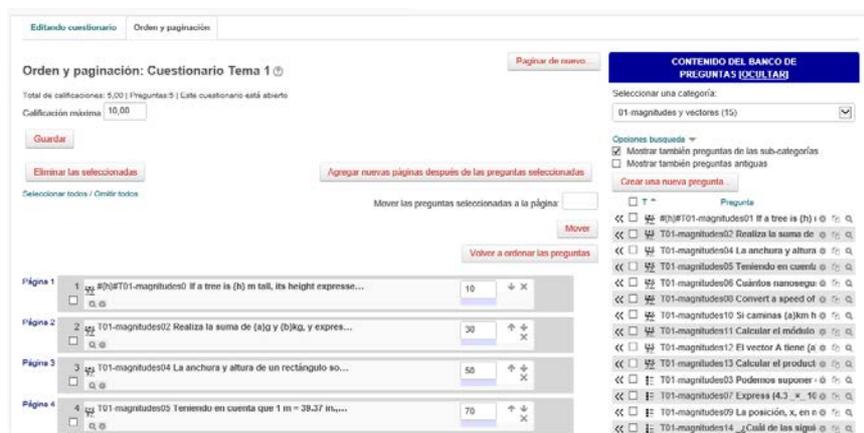


Figure 7.- Adding questions to the quiz.

Once you have accessed the quiz editing screen as above, you can add questions from a number of locations:

- Click the *"Add question"* button to begin a new question
- Click *"Show"* to reveal the contents of the question bank and then choose a pre-made question or click *"Create new question"*
- Click *"Add a random question"* to add a random question, providing there are questions in the question bank already. This might be useful if you have students in a class taking a quiz at the same time, because they are unlikely to get the same questions at the same time. The same question will never appear twice in a quiz.

Finally, Moodle also allows Import and Export questions so that we can exchange questions of our question bank among teachers or between different courses

4.3 Administration of questionnaires

Once we have created a questionnaire, the quiz module has additional settings which may be changed by an administrator. From this module we can perform different operations such as editing settings, editing quiz. Also, we can preview the whole quiz by clicking the *Preview* link. A teacher may also access quiz results by clicking on the quiz name in the Navigation block. This opens up other links, enabling them to view by grade, by correct response, by statistics and by manually graded responses.

5 CONCLUSIONS

In an educational process, the skill acquired by the students can be evaluated by different methods, one being the so-called objective test. Sometimes the great amount of work that constant supervision implies may prove to be cumbersome, especially if we have a high number of students. For this reason it is useful to employ questionnaires using Moodle. Through the quiz module, we can create a list of questions that students must answer them to get a grade. We can take continuous monitoring of student's learning without manually proofread the tests.

Of all the possibilities that Moodle offers us in the quiz module, calculated questions are very interesting for our purpose. Therefore, in this chapter we have learned to edit and create these kinds of questions, stored in a bank of questions and insert them into a questionnaire.

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