

Technically speaking: Creating adaptive online learning materials with the QuizPort module for Moodle

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Column

Introduction

As a way to cater for an increasingly diverse range of abilities and demographic backgrounds in tertiary education, while at the same time promoting efficiency and transparency in classroom administration, online learning management systems (**LMS**), such as Moodle, hold great potential for the teacher willing to incorporate a degree of technology into his or her teaching practice. One exciting possibility that these systems offer is to allow students to interact with multimedia materials which are not only engaging but also ubiquitously available via the Internet. However, the very fact that an **LMS** can be accessed anytime from anywhere via the web often means that the **LMS** as a whole, and the content creation tools of the **LMS** in particular, are based on static web-pages which can be slow and cumbersome for editing tasks. It is often far easier for teachers to create content outside of the **LMS**, using content authoring software with which they are familiar such as Hot Potatoes, and then import that content into the **LMS**.

The recently completed QuizPort module for Moodle allows such externally created content to be administered via Moodle, and furthermore allows teachers to define different paths through the materials depending on students' navigation choices and responses to challenges within the content. The learning path is decided in part automatically according to the student's responses, and in part manually by offering

the student navigation choices about what to do next. In this way, the materials adapt to the learner's ability and preferences. This paper gives detailed examples of how to use the QuizPort module to create these kinds of adaptive learning materials for Moodle.

Background

Moodle is an open-source **LMS** that allows teachers to create and administer courses wholly or partially via a local area network (**LAN**) or the internet. The popularity of Moodle stems not only from its active online forums, where Moodle developers and users interact with and support one another, but also from the flexible structure of the software which allows its functionality to be extended using plugins. One such plugin that initially developed outside of Moodle but was later incorporated into the standard Moodle download was the HotPot module. This module allows interactive activities authored on the teacher's own **PC** using software called Hot Potatoes to be administered via Moodle.

There are five kinds of Hot Potatoes activity: cloze activities, crossword activities, matching activities, jumbled sentence activities and conventional quiz activities which contain a series of questions to which the students select from a number of possible answers or enter a short word or phrase into a text box. The HotPot module was pioneered by Thomas Robb in 2004 and then revamped in 2005 by Gordon Bateson who continues to maintain the module today.

The HotPot module has evolved to become a reliable and popular part of Moodle, but discussions on the Moodle help forums for the HotPot module have highlighted several key areas where educators feel the software could be improved. These are:

1. administer a set of quizzes as a single learning unit
2. insert multimedia such as images, sounds and videos into quizzes without the need to input **HTML** code directly
3. lock some quizzes until certain conditions, such as scores on previous quizzes, have been met
4. branch through the materials so that the score a student gets on a particular quiz will determine which quiz they are shown next
5. change settings, for example the navigation style or the maximum grade, on several quizzes at once
6. be compatible with the most recent versions of Moodle, which improve the layout, security, accessibility and maintainability of the software.

To address these shortcomings a new Moodle module has been developed as the successor to the HotPot module. The new module does everything that the HotPot module does but also addresses the issues listed above. For the purposes of this paper the most notable features of the new module are that it allows the teacher to treat a collection of quizzes as a single learning unit and then add pre-conditions to control access to the quizzes, and post-conditions to specify what happens after a student finishes each quiz. The combination of pre- and post-conditions provides a simple yet powerful mechanism to create adaptive learning materials, which offer students challenges suitable for their level and preferred learning style.

The following section will describe how to make such a unit of adaptive learning materials using Hot Potatoes (version 6) to create the quizzes and the QuizPort module running on Moodle (version 1.9) to administer the quizzes to students. The unit will contain several

matching exercises which familiarize students with vocabulary items used in a listening text called “Jupiter.”

1. Create a container folder

To simplify file management, it is a good idea to create a folder on the teachers **PC** to hold all of the quizzes and media files for a single unit. Let us call this folder “Jupiter-Vocabulary.”

2. Prepare the vocabulary

Before making the matching activities using the JMatch component of the Hot Potatoes software, you need to decide on which English vocabulary items you wish to use and then create sound files and translations for those items. You may be fortunate enough to work with willing and able native speakers of your students’ mother tongue who can help with the translation. Alternatively there are many online resources for translating. For example, I often need to translate from English to Japanese and two of the most useful sites I have come across are Space **ALC** (<http://www.alc.co.jp>) for single words, and **POP Jisyo** (<http://www.popjisyo.com>) for longer phrases and sentences. I usually try to locate translations online and then ask native Japanese speakers for confirmation of items about which I am not sure.

3. Create the sound files

To create the sound files you will need audio recording software and a microphone that connects to your computer. Your operating system may come with its own recording software, and there are many open-source and commercial programs you could use for this purpose, such as the trial version of Easy **MP3** Recorder for Windows, but one reliable and freely available sound editing application that runs on all major operating systems is Audacity (download: <http://audacity.sourceforge.net/download>). Audacity also requires the **LAME MP3** encoder (<http://lame.sourceforge.net/links.php>).

The **LAME MP3** encoder is a separate piece of software from Audacity, but Audacity needs it to export audio clips as **MP3** files. Details about how to download and install the **LAME MP3** encoder are available on the Audacity help pages (“How do I download and install the **LAME MP3** encoder?” <http://audacity.sourceforge.net/help/faq?s=install&item=lame-mp3>).

Having installed Audacity and the **LAME MP3** encoder on your computer and started up Audacity, you can record your voice by clicking the record button and speaking into your microphone. The Audacity manual (<http://audacity.sourceforge.net/manual-1.2>) has more exact details about recording. Since **MP3** is the most widely used file format for audio clips on the web, I recommend you export the audio from Audacity as an **MP3** file so that it is accessible to as many web-based media players as possible. As you create the sound files, one for each vocabulary item, you should save them in the same folder as the JMatch files and give them meaningful names such as “neighbor.mp3” or “howdoyoudo.mp3.” Make sure that the names do not contain spaces and check that all filenames end with “.mp3”, so that no matter what operating system the file is transferred to, it will always be recognized as an **MP3** sound file.

4. Install the Hot Potatoes software

The Hot Potatoes software runs on the teacher's own computer, so the first step is to download and install the Hot Potatoes software. The installer can be downloaded for free from the University of Victoria web site (download: <http://hotpot.uvic.ca/index.htm#downloads>). The unregistered version of the software allows you to make short quizzes with a limited number of questions. However, if you register the software, which is free to do, the limit on the length of the quiz is removed. Be aware that although teachers at state-funded educational institutions do not need a license to use Hot Potatoes, if you work at a private institution, you should purchase either a personal or institutional license to ensure that the software continues to receive funding for its maintenance and development (license: <http://hotpot.uvic.ca/index.htm#downloads>). Once the software is installed and registered the teacher will be able to create quizzes using the following five applications:

- ✧ JCloze – cloze activities
- ✧ JCross – crossword activities
- ✧ JMatch – matching activities
- ✧ JMix – jumbled sentence activities
- ✧ JQuiz – quizzes containing multiple choice and fill in the blank questions

Detailed instructions and tutorials for using each of these applications are available on the web. For example, see “Tutorials and Other Resources on Hot Potatoes” <http://hotpot.uvic.ca/wintutor6/tutorial.htm>).

5. Create the multimedia JMatch quizzes

In our example we will use JMatch to make a sequence of matching activities which familiarize students with a set of vocabulary items. We will make eight matching activities which students should attempt in order of difficulty, where “Stage 1” is the easiest activity and “Stage 8” is the most difficult. Each activity will have Japanese items in the left column and draggable audio players for spoken English phrases in the right hand column. The students' task will be to match the spoken English phrases with the corresponding Japanese text within the time limit of one minute. The “Stage 1” quiz requires five items to be matched whereas in the “Stage 8” quiz eight items have to be matched.

To cut down on the work the teacher needs to do to create the quizzes we will make just one JMatch activity containing sixteen matching pairs, and then use the configuration settings to specify how many pairs should be displayed in each stage of the unit. The JMatch user interface will look something like this:

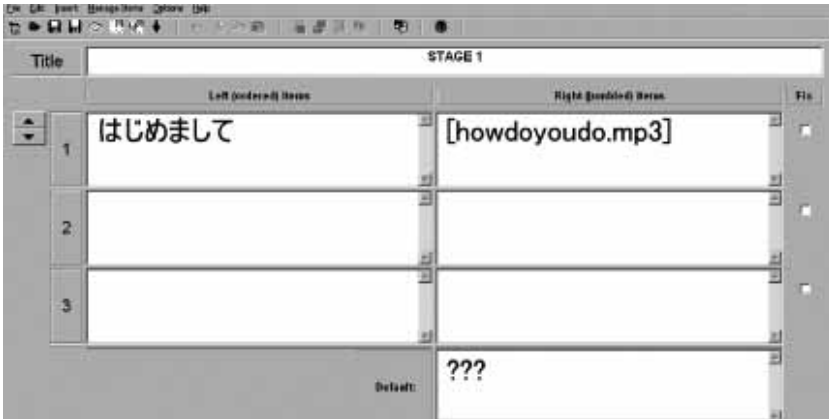


Figure 1. Creating a Hot Potatoes JMatch quiz

In the above screen shot, the first matching item of the quiz has already been input. Notice that the Japanese text goes in the left column and the name of the sound file, contained in square brackets, goes in the right column. Input all sixteen items in a similar way.

Having created the JMatch activity with sixteen items you can go ahead and save it as a JMatch file (File → Save) in the folder we created earlier. The file name should be something meaningful such as “stage1.jmt.” Notice that the file name ends with “.jmt”, so that the file is recognized as a JMatch file on whatever computer it is transferred to.

In order to limit the number of items that are actually displayed, we go to the JMatch output configuration page (Options → Configure Output), select the “Other” tab, check the box marked “Show a limited number of items each time the page loads” and enter the number 5 for the setting marked “Number of items to show on each page load.” We will also check the box marked “Shuffle order of items each time page loads” so that students will not be able to predict the order of the left hand side items. Now click the “Timer” tab and check the box marked “Set a time limit for this exercise.” Set “Minutes” to “1” and the “Seconds” to “0.” To save these settings we now click the “OK” button and then save the activity again.

6. Add the QuizPort module to Moodle

In order to administer these quizzes via Moodle as a unit of adaptive learning materials, you will need to make sure that the QuizPort module is installed and enabled on your Moodle site. If it is not installed you can download the module from the moodle.org site (<http://moodle.org/mod/data/view.php?d=13&rid=2228>) and install and enable it following the instructions in the Moodle documentation (“Installing contributed modules or plugins” http://docs.moodle.org/en/Installing_contributed_modules_or_plugins).

7. Add the quizzes to Moodle

At this point we have a folder containing the sixteen sound files and eight quizzes. We can now upload these files to a Moodle course. Having logged in to Moodle as a teacher, go to the main course page of a course for which you are a teacher. If necessary, switch on editing

by clicking the “Turn editing on” button in the top right of the course page. Now locate the section of the course where you want to add the new activity, and select “QuizPort” from the “Add an activity ...” drop down menu in that section. The “Adding a new QuizPort” page will then be displayed.

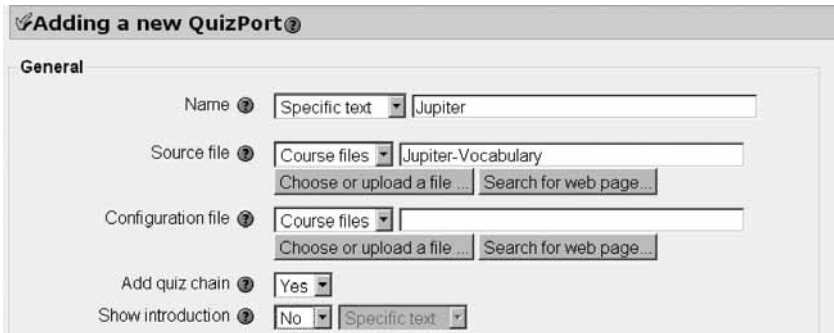


Figure 2. Adding a QuizPort activity

Click “Choose or Upload a file” and a popup window appears which shows the files available for this Moodle course. This is where we will upload the files from the teacher’s PC.

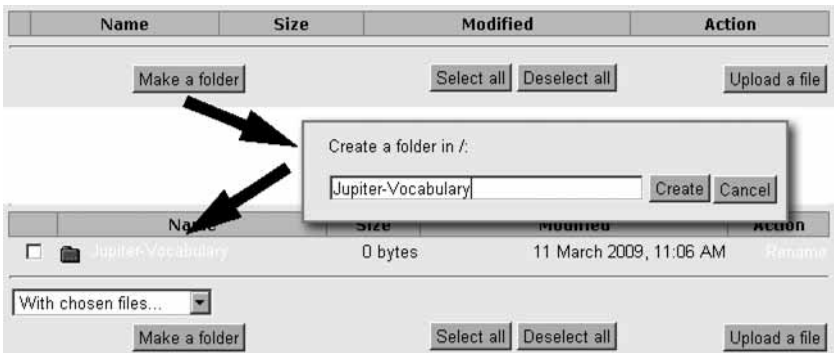


Figure 3. Creating a folder

First click the “Make a folder” button, enter “Jupiter-Vocabulary” for the folder name and click “Create” to create the folder. If you now click the folder name, i.e. Jupiter-Vocabulary, your browser will display the new, empty folder. Upload the sound files and quiz files one by one to this folder using the “Upload a file” button. When all the files have been uploaded, click the “Choose” link by any of the files. The window will then automatically close and the path to the quiz file will be inserted into the text box labeled “Source file.” Remove the file name part of the path so that the box contains only the folder name, i.e. Jupiter-Vocabulary. The other important setting on this page is “Add quiz chain” which you should set to “Yes.” Now click “Save and display” and a new QuizPort activity containing the eight new quizzes will be added to your Moodle course.

8. Add pre-conditions and post-conditions

If the student were to view the QuizPort at this stage, they would be shown a menu of the quizzes that you uploaded and they could choose which quiz they want to take. When all the quizzes had been completed, the entire QuizPort activity would be marked as completed.

However, since we are aiming to create adaptive learning materials, we will now add pre- and post-conditions to guide the students on a particular path through the materials. First, we will add pre-conditions to control which quiz is shown first. Then we will add post-conditions to specify which quiz should be shown next after each quiz is finished.

When a teacher views a QuizPort activity, they can see several navigation tabs at the top of the page. The pre- and post-conditions are added on the “Edit quizzes” tab. Clicking on that tab will display the list of quizzes that were added in the preceding paragraphs (Figure 4).

To add a pre-condition we select “Conditions” from the “Show columns” drop down menu, and then click “Add” in the “Pre-conditions” column for the quiz to which the pre-condition is to be added. In the condition pop-up window, select “Previous quiz” for the “Condition quiz” setting and then click “Save changes.”

Before adding the post-conditions, let us pause to clarify what conditions we wish to add. Remember that we have created eight quizzes of increasing difficulty. We want to allow able students to pass quickly through the quizzes while requiring less able students to spend time becoming more familiar with the target vocabulary. To achieve this we will arrange the quizzes in a linear fashion and set post-conditions based on the score achieved in each quiz. If students score 90–100% we will let them skip the next quiz. If they score 80–89% then can proceed to the next quiz. If they score 70–79% then must redo the quiz, and if they score less than 70% they go back to the previous quiz.

We will start by adding a post-condition to the quiz for “Stage 1.” Click the “Add” link in the post-conditions column for the “Stage 1” quiz.

Sort order	Edit	Name	Default	Select	Scoring method	Score limit	Pre-conditions	Post-conditions
			<input type="radio"/>	<input type="checkbox"/>	Highest score	100%		
			<input type="radio"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
10	<input type="checkbox"/>	STAGE 1	<input type="radio"/>	<input type="checkbox"/>	Highest score	100%	Add	Add
20	<input type="checkbox"/>	STAGE 2	<input type="radio"/>	<input type="checkbox"/>	Highest score	100%	Add	Add
30	<input type="checkbox"/>	STAGE 3	<input type="radio"/>	<input type="checkbox"/>	Highest score	100%	Add	Add
40	<input type="checkbox"/>	STAGE 4	<input type="radio"/>	<input type="checkbox"/>	Highest score	100%	Add	Add
50	<input type="checkbox"/>	STAGE 5	<input type="radio"/>	<input type="checkbox"/>	Highest score	100%	Add	Add
60	<input type="checkbox"/>	STAGE 6	<input type="radio"/>	<input type="checkbox"/>	Highest score	100%	Add	Add
70	<input type="checkbox"/>	STAGE 7	<input type="radio"/>	<input type="checkbox"/>	Highest score	100%	Add	Add
80	<input type="checkbox"/>	STAGE 8	<input type="radio"/>	<input type="checkbox"/>	Highest score	100%	Add	Add

Figure 4. Editing multiple quizzes in a QuizPort activity

Adding a new pre-condition		Adding a new post-condition	
Condition quiz	Previous quiz	Condition score	>= 90 <input type="checkbox"/> Disable
Condition score	>= 0 <input checked="" type="checkbox"/> Disable	Attempt count	>= 0 <input checked="" type="checkbox"/> Disable
Attempt count	>= 0 <input checked="" type="checkbox"/> Disable	Attempt type	Any attempts
Attempt type	Any attempts	Attempt time	<= 00 00 00 <input checked="" type="checkbox"/> Disable
Attempt time	<= 00 00 00 <input checked="" type="checkbox"/> Disable	Next quiz	Skip next quiz
Save changes Cancel		Save changes Cancel	

Figure 5. Adding conditions to a quiz

In the condition pop-up window, locate the “Condition score” line and if necessary uncheck the “Disable” checkbox. Make sure the comparison symbol is “>=”, “greater than or equal to”, and then enter 100 in the score box. For the “Next quiz” setting, select “Skip next quiz” and then click “Save changes” to create the new post-condition. The post-condition settings have been remembered, so you can now easily add the same post-condition to quizzes for stages 2 to 6 by clicking “Add” to each quiz in turn. When that is done, return to the post-condition column for “Stage 1” and click “Add.” Set the score condition to >= 90% and the “Next quiz” setting to “Next quiz.” Click save changes and then add a similar condition to the quizzes for stages 2 to 7. For “Stage 8”, use the same score condition, but set the “Next quiz” setting to “End of unit.” Now add post-conditions for all quizzes where the “Condition score” is >= 80% and the “Next quiz” is “Same quiz.” Finally add conditions for the quizzes for stages 2 to 8 where the “Condition score” is disabled and the “Next quiz” is “Previous quiz.”

Sort order	Edit	Name	Default	Select	Pre-conditions	Post-conditions
				<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10		STAGE 1	<input type="radio"/>	<input type="checkbox"/>	Add	<ul style="list-style-type: none"> • >=90%: Skip next quiz • >=80%: Next quiz • Same quiz Add Delete all
20		STAGE 2	<input type="radio"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Previous quiz Add	<ul style="list-style-type: none"> • >=90%: Skip next quiz • >=80%: Next quiz • >=70%: Same quiz • Previous quiz Add Delete all

Figure 6. Display conditions on a quiz

9. Add media players

The final step is to make sure that the media players to play the sound files specified with the square bracket notation are inserted into the quizzes. We first edit one quiz to use the required setting and then set all the other quizzes to use the same setting. Click the edit icon in the “Edit” column for “Stage 1.” In the “Display” section of the quiz settings page, set the “Use media filter” setting to “QuizPort media filter”, then click the “Save changes” button at the bottom of the page. You will then return to the “Edit quizzes” page, where you now select “Display” from the “Show columns” drop down menu. Click the left most checkbox in the top row of the “Select” column and confirm that the checkboxes for all

quizzes are checked. Then check the checkbox in the second row of the “Use media filter” column. Now scroll to the bottom of the page and select the radio button marked “Apply selected default values.” (Figure 7)

What we have done here is to specify that the default setting for “Use media filter” is to be applied to all the quizzes in the unit. To apply the new settings, click the “Save changes” button at the bottom of the page.

Conclusion

The adaptive learning unit is now complete. Students will be shown “Stage 1” first and they will progress through to “Stage 8” at a pace which adapts to their level. This activity appears as the “1b. Meaning Matcher” on the BaBeeBoo.com web site (<http://www.babeeboo.com/mod/quizport/view.php?id=307>).

Figure 7 shows a screenshot of a Moodle quiz configuration page. At the top, there is a 'Show columns:' dropdown menu set to 'Display'. Below this is a table with columns: Sort order, Edit, Name, Default, Select, Output format, Navigation, and Use media filter. The table lists eight stages (STAGE 1 to STAGE 8) with their respective settings. The 'Use media filter' column for the second row is checked. Below the table, there is a section for 'Apply selected default values' with a radio button selected for 'Selected quizzes in this course'. At the bottom left, there is a 'Save changes' button.

Sort order	Edit	Name	Default	Select	Output format	Navigation	Use media filter
			<input type="radio"/>	<input checked="" type="checkbox"/>	JMatch (v6+) from xmi	Moodle navigation bar	quizport
10	<input type="checkbox"/>	STAGE 1	<input type="radio"/>	<input checked="" type="checkbox"/>	JMatch (v6+) from xmi	Moodle navigation bar	<input checked="" type="checkbox"/>
20	<input type="checkbox"/>	STAGE 2	<input type="radio"/>	<input checked="" type="checkbox"/>	JMatch (v6+) from xmi	Moodle navigation bar	
30	<input type="checkbox"/>	STAGE 3	<input type="radio"/>	<input checked="" type="checkbox"/>	JMatch (v6+) from xmi	Moodle navigation bar	
40	<input type="checkbox"/>	STAGE 4	<input type="radio"/>	<input checked="" type="checkbox"/>	JMatch (v6+) from xmi	Moodle navigation bar	
50	<input type="checkbox"/>	STAGE 5	<input type="radio"/>	<input checked="" type="checkbox"/>	JMatch (v6+) from xmi	Moodle navigation bar	
60	<input type="checkbox"/>	STAGE 6	<input type="radio"/>	<input checked="" type="checkbox"/>	JMatch (v6+) from xmi	Moodle navigation bar	
70	<input type="checkbox"/>	STAGE 7	<input type="radio"/>	<input checked="" type="checkbox"/>	JMatch (v6+) from xmi	Moodle navigation bar	
80	<input type="checkbox"/>	STAGE 8	<input type="radio"/>	<input checked="" type="checkbox"/>	JMatch (v6+) from xmi	Moodle navigation bar	

Apply selected default values

Selected quizzes in this course

Save changes

Figure 7. Applying selected values to multiple quizzes