An online tool for managing student assignment selection

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Learning Management Systems allow the delivery of learning materials to students, facilitate collaboration, and submission of assessable material. One aspect missing in current Learning Management Systems is the ability to manage student assignment selection from a list of topics with multiple markers. This paper describes the pilot assignment allocation system we developed in-house to manage this process. The system was trialled with a third year subject, and functioned well, with positive feedback from users and practical suggestions for the next iteration.

Background

The overall standing of assessment is changing in higher education, particularly with the arrival of more students. The design of student assessment is still particularly important and anecdotally, the reliance on multiple-choice questions is increasing in some areas, particularly when many tools exist for creating these types of assessments particularly within most Learning Management Systems (LMS). The reasons for using essays and other varieties of assignments, provides students a balance and easier ways of providing relevant feedback (Miller, Imrie, & Cox, 1998). In some locations, educators have approached the problem of increased workload of assessment by using automated systems, for example in the United States robot marking systems exists and are available commercially to grade essays (Shermis & Burstein, 2003).

One large study of this in the Australian context was reported in 2002 (James, McInnes, & Devlin, 2002), and contains a series of ideas and resources for quality assessment with many applications. The approach at our University has been to divide the submitted work among several markers and grade one or two topics each. This relies upon not too many students selecting the same topic (or the most "interesting" from the student perspective). The paper describes the in-house development of a system for managing the selection and allocation of student assignments.

Learning environments are changing and reliance upon computer and software tools for all facets of education is increasing – for online, face-to-face and blended delivery modes. Sometimes referred to with other names, such as a Course Management System (or CMS), the uptake and use of tools such as these has been widespread (Vovides, Sanchez-Alonso, Mitropoulou, & Nickmans, 2007).

LMS are now commonplace in Universities, and to a lesser extent secondary schools, in Australia. Probably the most used systems are BlackBoard and WebCT. These have great features for delivery of learning materials (available for download by students), interactive material, quizzes, podcasts, online collaboration, asynchronous and synchronous discussions, and student submissions (uploaded by students). The upload of student assignments, essays, short test responses, and discussion forums has the facility to be time and date stamped electronically to facilitate tracking submissions and verify receipt for the benefit of the tutor and the student. This has benefits for the teacher, tutor, or lecturer in terms of the quality control aspects of completeness of record; and for the student, in terms of the security of verification of submission.

One facet that is missing from the most common systems is the ability to allocate the students to assignment topics, particularly if choice is available for the student. If students are all taking the same topic (perhaps they have no choice), then this poses no problem. Additionally, if one tutor is grading all

the assignments, regardless of the number of topics, then this also poses no problem. However, if two tutors are each grading four questions for a class of 80, then there may be an inequity in the number of assignments allocated to each tutor.

One approach to allocation of assignment topics is to randomly (or deliberately) assign students to particular topics, effectively giving them no choice. This is a pragmatic approach that simplifies systems so that no computing power is required or the allocation. The lack of choice reduces autonomy for students, and runs counter to current thinking that choice is good (Assor, Kaplan, & Roth, 2002). The amount of choice, although needs to be balanced carefully, as too much choice tends to be demotivating (Iyengar & Lepper, 2000).

To ameliorate the effects of this, we wanted to establish an assignment allocation system, which allows an upper limit (or quota) on the number of students who are able to choose an individual topic. Currently we are unaware of any system for managing the allocation of student assignments.

Analogous scenarios exist elsewhere, such as theatre or airline seat allocation, where there may be 200 seats available, in 3 separate categories (economy, business and first class). Customers would choose online their preference and then told the number of seats left in each class. An example of such a system is the Qantas airline online seating system (http://www.qantas.com.au). BlackBoard Classic version 8.0 does not currently have a feature of this type. The authors have been informed that some versions of BlackBoard may have a similar feature. This paper describes the development and operation of the Assignment Allocation System (AAS).

Timetabling and scheduling systems, such as described by (Carter, 2001) and the development of these for Australian Universities to handle the 'big' tasks such as class scheduling, lecture and tutorial class allocation have emerged and been refined in recent times. One example of this is Allocate Plus system (http://allocateplus.com.au). While these systems could conceivably be used for smaller tasks such as assignment topic selection and allocation, the systems involved are large and of limited flexibility for this type of activity.

Technical specifications

The AAS was specified to have the following features:

1. Set the number of topics within each assessment (between 1 and N)
2. Set the maximum number of students able to choose that topic (quota)
3. Set the topic details for students to read at the time of selection
4. Assign the topics to a tutor (between 1 and M)
5. Allow only one choice per student (with valid student ID)
6. Ability for the tutor to remove a student from a topic (if they selected the wrong topic)
7. Provide a downloadable CSV (Comma Separated Variable) file for the reference of the tutor or unit convenor
8. Flexibility to maintain and update the software if required

Design

The software was designed using to run on a Linux webserver, using PHP (version 5.2.9) and a MySQL database and implemented to run under a standard browser (such as Firefox, Internet Explorer, Safari) on Windows, Mac and Linux environments.

While it runs on a stand-alone platform, it also designed to be accessed via a link from within the LMS (in our case, BlackBoard), to make the selection and allocation easy for students. The operating environment did not allow us to take advantage of students' BlackBoard login details being carried forward, necessitating a separate student login when the link from BlackBoard is followed.

Database structure

The AAS database comprises three tables, (as illustrated in Figure 1):

1. Assignments – stores details of each assignment, including subject name and code, year, semester, staff member responsible and number of questions

2. Questions – stores details of each question (generally each assignment has multiple questions) including the assignment it relates to, the question text, the supervisor name, the URL of an optional PDF question sheet and the number of student registrations allowed for the topic
3. Registrations – stores details of student registrations including a question ID, a student ID and a timestamp to prove the time a registration took place
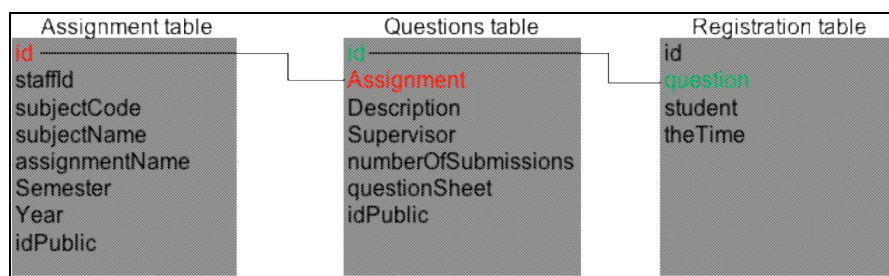
Figure 1: Structure of the database for the assignment allocation system

Staff interactions

Staff interactions with the system are for one of three purposes (as illustrated in Figure 2):

1. Entering a new assignment
2. Managing (view, download and if required remove registrations of a current assignment)
3. Retrieving the URL to the student registration page

Staff log into the system using an OPAX (staff ID) number and associated (SIMS) password. The password and username are allocated to staff on commencement of employment by the human resources department and used for other University systems. Staff can use an independent self-service portal to change their password at any time.

Tutors are given the option of setting up a new assignment or accessing details of an existing assignment. If entering a new assignment, the staff member first enters details of the overall assignment, then each details of each individual topic on its own screen.

If accessing details of an existing assignment the staff member can view student registrations, either on screen or download a CSV file containing the details or view and copy the URL for student access.

Student interactions

Student interactions are for the sole purpose of registering for an assignment topic, and are shown in Figure 3. Students log into the system with an OPAX (student ID) number and associated (SIMS) password. The student ID and password are allocated to the student on enrolment and are used for other University systems. Students can use an independent, self-service portal to change their passwords at any time. Students are presented with a list of possible topics. Each topic provides the number of places available at the time the page was generated and a button labelled "Register for topic". To register students press this button. Should available places have been filled between the time the student accesses the page and presses the appropriate "Register for topic" button, the student receives a warning message and is given the opportunity to return to the topic list.

If places are still available, the student is registered for their selected topic and is not permitted to make any further selection. The student receives a confirmation message. Should the student wish to change their selection, they need to approach the staff member who created the assignment and request to be released from that topic so a new selection can be made.

Limiting registrations

Several options for the student interaction were explored. Placing a hold on an assignment topic the way a hold is placed on an airline seat while the passenger is purchasing it was deemed overly complex for this application. We decided that a '*first come first served*' model would be adopted. This allowed the possibility of a student trying to register for a topic which was no longer available. A simple error message was introduced to warn the student if this situation arose.
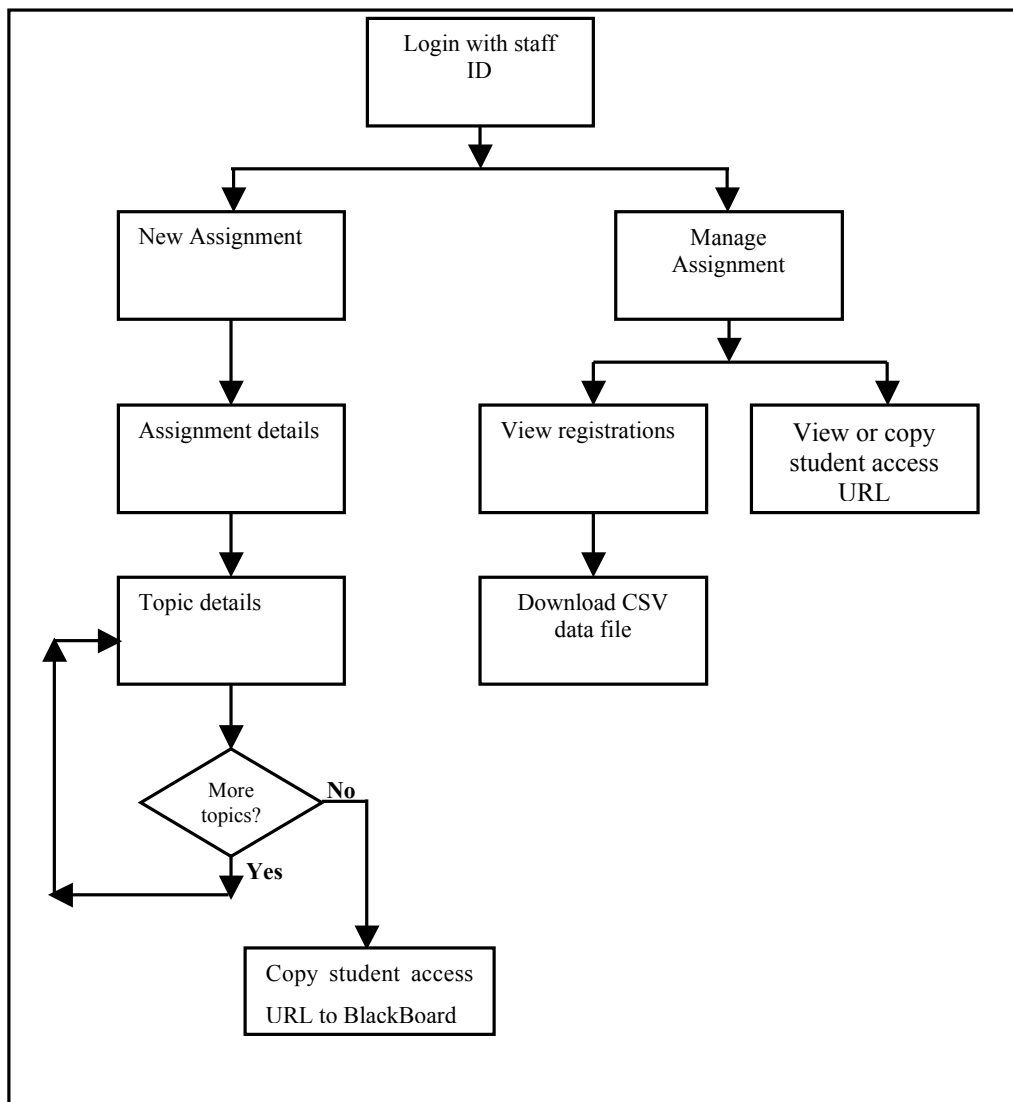
Figure 2: The process as seen by staff member, and the choices available in the menu structure

The method of limiting numbers was to simply add a database record in the registrations table for each possible registration at the time the assignment was being set up by a member of staff. The question field was automatically completed with the appropriate id from the question table and an arbitrary value of zero entered in the student field.
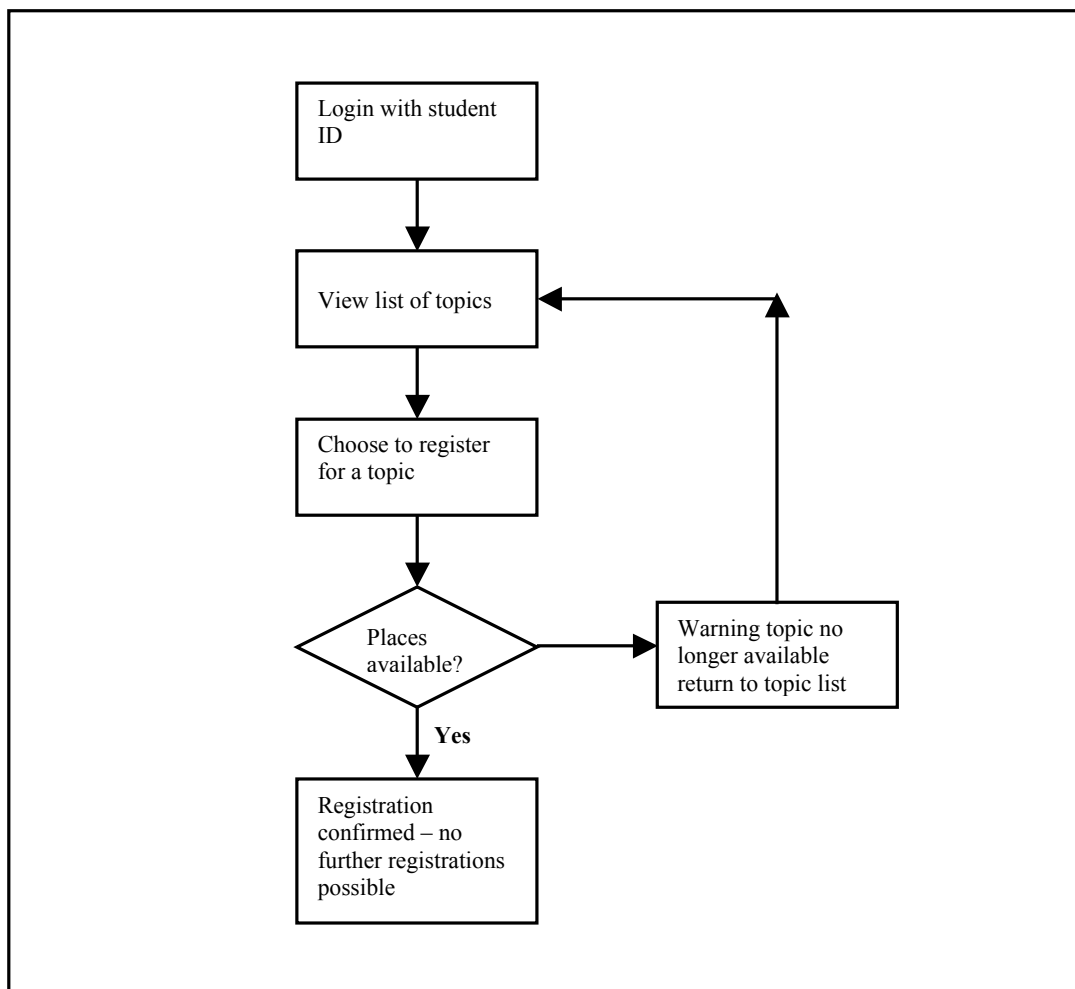
When it came to a student registering, conditions were put on the MySQL insert statement to write to a record where the student id was equal to zero and limit the writing to one record. If an update was successful, the student receives a success message; otherwise the student receives a warning suggesting they choose another topic.

Security

Both staff and students require a valid OPAX number and password to access the system. The administration area where assignments and topics are entered and registrations accessed requires a valid staff login.

To protect against inquisitive students trying to manipulate the system and register for assignments they are not supposed to register, all assignment and topic reference numbers passed between the user and system are '*double salted*' and then encrypted using MD5 encryption. When passed in a URL, the result looks like:
http://www.swinburne.edu.au/lss/assignment/assign.php?ast=f2b31dcd1864766aa709ddbbdc24631a .

```
            ┌──────────────┐
            │ Login with student │
            │ ID           │
            └──────┬───────┘
                   │
                   ▼
            ┌──────────────┐      ┌──────────────┐
            │ View list of topics │◄────────┐
            └──────┬───────┘                │
                   │                        │
                   ▼                        │
            ┌──────────────┐                │
            │ Choose to register │           │
            │ for a topic  │                │
            └──────┬───────┘                │
                   │                        │
                   ▼                        │
               ╱────────╲     ┌──────────────┐
              ╱  Places  ╲───►│ Warning topic no │
              ╲ available?╱    │ longer available │
               ╲────────╱      │ return to topic list │
                   │           └──────────────┘
                 Yes
                   │
                   ▼
            ┌──────────────┐
            │ Registration │
            │ confirmed – no │
            │ further registrations │
            │ possible     │
            └──────────────┘
```

Figure 3: The process from student point of view for their topic selection

The last 32 characters are the *double salted* encrypted data. This greatly reduces the chances of a student guessing another assignment number over a URL which looks like:
http://www.swinburne.edu.au/lss/assignment/assign.php?ast=7.

With the latter URL, a student could reasonably guess that the previous assignment in the system was number 6 and the next assignment in the system will be number 8. With the former URL, such a guess is considerably more difficult, and can probably be ignored.

Operation

A trial of the system ran in semester 1 2009. It was a limited trial to allow students to select an assignment topic in a third year unit of study in a face-to-face taught program. Approximately 75 enrolled students were given a choice of 6 essay topics being assessed by 3 assessors. So that each assessor had a similar number of papers to grade, there was a limit to the total number of students that could select each topic.

Some screenshots are shown of the screens from the staff side and the student side. The student login while existing on a separate server, can be accessed via BlackBoard if the link generated by the software is placed within BlackBoard. As such, it can also be accessed independently of BlackBoard. Figure 4 shows the staff screen when entering the system after login.

Once staff have selected a new assignment, they see a screen as illustrated in Figure 5. Here they enter the details of the subject (code and name), the assignment number, name and number of topics to choose from.

Figure 4: Initial login screen for staff—with new assignment or existing options

Figure 5: New assignment entry screen for staff

Once the details are completed, the assignment has its unique URL generated for student access and can be posted to BlackBoard or used in a standalone mode. The URL screen appears in Figure 6

**Figure 6: Copy URL screen for staff, providing a URL
to email to students or post to BlackBoard**

Students then login and can view the assignment topic screen by accessing the website and viewing the availability of topics and illustrated in Figure 7 with a hypothetical assignment.

**Figure 7: Example selection screen for students, showing the
availability of the first and unavailability of the second topic**

After students have selected and registered for their topic, the details of student IDs and topics can be viewed from the manage assignment screen. These details can also be downloaded as a CSV file. A screen shot of the registration is illustrated in Figure 8.

Figure 8: View registrations screen—screenshot of partial list from semester 1 subject

Feedback

Staff feedback

One academic staff member (author MS) tested the assignment allocation system during semester 1 2009, in a third year unit for two assignments. Additionally, after the trial, several other members of academic staff were shown the system and invited to comment on its operation, flexibility and suggestions for streamlining in the future. As a result of the trial and the additional feedback, the following suggestions were aggregated from the intensive trial and additional feedback.

1. Allowing editing of questions and topics after entry
2. Removal and addition of topics
3. Default values for some of the fields so that if missed, they do not have null values
4. Rollover of assignment topics from previous semester or year
5. Ability to change number of available spaces in the topic quota to accommodate late enrolments, or changes to assessor availability
6. Upload of questions from a CSV or other file

Some comments:

- Incredibly useful and simple to use, with the potential for team teaching and marking. GK
- I would use this in my smaller post first-year classes. PL
- Can you let me use this in second semester, please…? JC

Student feedback

Students were invited to give some quantitative and qualitative feedback on their experience of using the system for assignment topic selection and allocation. 20 students responded to a brief survey (7 questions) on the assignment allocation system.

1. I was aware of the AAS   91%
2. I used the AAS to choose my assignment   100%
3. Using the AAS was straightforward   82%
4. The AAS was flexible to use   56%
5. I found the graphics and text easy to read on the AAS   87%
6. Do you have any suggestions for improvement for future users…   ?
   - Perhaps making it possible/easier to change your option just in case you had selected the wrong one, of course being based on selection availability.
   - A counter displaying the number of available 'slots' for each choice would be useful. As would the ability to see the other choices after you've made a selection.
   - …a button which opens a confirmation notice 'click okay to select X assignment'.
   - There should be an easier system set up just in case you selected the wrong one.
   - Make it more flexible for the student to change their choice if they want to.
7. Do you have any general comments?
   - Could add the due date of the assignment on the system.
   - I thought it was fine. I'm sure it is much easier to manage than having students tell you (in person, by phone, email, pigeon) but doesn't make much difference to me.
   - My only complaint would be that this method of topic selection favours those with faster internet access, as well as those who had timetables which gave them access to the internet as soon as the time for selection opened.

Discussion

Several of the suggestions from staff and student users coincided such as *Self-removal (i.e. by student) from an assignment*

We plan to add the self-removal feature to future versions. Initially, we wanted to keep the system as simple as possible and considered that this may confuse students, but the voice of the users is fairly clear here, and there are no reasons why this should not be permitted. If this is coupled with the ability to see the spread of assignments left on offer, and permit the students to effectively change their topic without tutor intervention (subject to availability), then the system would be more flexible, and the perception of student friendly would be increased.

From the staff point of view, the ability to edit questions and topics, as well as add and remove topics, and/or change the quotas allows much more flexibility to the management side of the system. Providing that there is protection for topics chosen by students in good faith, this is achievable.

The feature allowing rollover of assignment topics from previous year or semester (in conjunction with ability to edit) is seen as particularly useful, as this will save time, and potentially reduce transcribing or typing errors. Similarly the use of a spreadsheet (CSV) file to upload questions, quotas, and other information will reduce time taken to create new assignments for the system. This is in contrast to one of the authors (MS) also making use of this for 75 individual topics, requiring the 75 iterations of the process!

Future directions

We plan to implement the changes and carry on the trial with the refined version of the software in semester 2 with more academic staff using this in several areas of the faculty and across the university. From this second trial, we will be in a better position to further expand the system. And assess the potential for extending this across the university.

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