Implementing student management systems

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Maintaining records of student information is a vital part of any well functioning language department, but one that is often ineffectively handled. In this article, we examine the development of an online student management system at a university in southwest Japan. This system is being developed using Drupal, an open-source content management system. While the system has enormous potential and the students are proving to be reasonably adept at using it, issues have arisen with the degree of staff usage. How the system was developed, why these issues have emerged, and how it is hoped they can be resolved will be discussed.

学生のデータの記録を保管することは、言語系の学科をうまく機能させる上で不可欠であるが、効果的な運用がうまくできない場合もしばしばみられる。本論では、日本の南西部のある大学のオンラインによる学生管理システム開発について検証する。そこではオープンソースのコンテンツ管理システムであるDrupalを利用し、このシステムを開発している。これにより実に様々なことが可能となり、学生も明らかに満足のいく程度にこれを使いこなせるようになっているが、スタッフの使用の度合いによっては問題が生じることもある。本論では、このシステムがいかにして開発されたのか、またなぜこのような問題が生じたのか、そしてどのような解決法が期待できるのか、について検討することにする。

Keeping records of student data and tracking their progress is something most teachers do naturally. Consistent information helps us know our students better, plan their studies more effectively, and evaluate them consistently and accurately. However, teachers often operate in a vacuum, with little or no access to the records that other teachers are keeping of the same students. This is not only inefficient, but can also lead to students in need of help, or at risk of dropping out going largely undetected.

One way around this problem is to set up a centralized data-keeping system that all faculty members have access to. Such a system would allow teachers to quickly access student data, and, through cross-referencing, quickly show which students are experiencing difficulties, thus allowing for more timely intervention. Setting up such a system is potentially a huge task, but, more than that, maintaining the system and ensuring its use would be essential priorities for its long-term viability.

This paper reports on the development of such a system at a university in southwest Japan. The background to the project will be explained, followed by a discussion of the possible solutions that were considered. In this particular situation, the developers opted for an online portal built using the Drupal content management system (CMS). The reasons for this choice will be outlined, along with a detailed explanation of the current state of the system from both a user and a developer perspective. Finally, implementation issues that are being encountered will be discussed, leading to an overview of future development of the system. First, however, we will give a short overview of the value for students in monitoring and tracking their progress.

The value of student records

Within the last few decades in educational psychology, there has been considerable focus on *self-regulated learning*, or the extent to which learners are actively involved in managing their own learning (Dörnyei, 2005). The educational psychologist Barry Zimmerman has devoted considerable research to this field; he defines self-regulated learners as "metacognitively, motivationally, and behaviorally active participants in their own learning process" (Zimmerman, 1989, p. 329). Numerous empirical studies support the argument that self-regulated learners are more effective learners (Bandura, 1991; Zimmerman, 1990, 2002). One key strategy identified in self-regulated learning is that of self-monitoring, or the deliberate attention to some aspect of one's behavior. Here, students keeping records of their progress has been shown to play a part in improving performance on academic tasks. Zimmerman (1989), for example reported that "[t]here is extensive evidence that prompting students to keep records affects their learning, motivation, and self-efficacy" (p. 333), while Lan (1996) found some evidence that graduate students who regularly recorded the intensity and frequency of their learning activities performed better academically than those students who were not self-monitoring. This fits with research by Shapiro (cited in Zimmerman, 2002) who found "simply asking students to self-report some aspect of their learning, such as their completion of assignments often led to 'spontaneous' improvements in functioning." (p. 65). Schunk (1982) in research with elementary school children, argued that self-monitoring heightens senses of self-efficacy and achievement and concluded that "[a] system in which students pursue attainable goals and periodically monitor their progress toward these goals should prove highly effective in cultivating skills and validating a sense of efficacy for applying them" (p. 93). It should be noted that for self-monitoring to be effective, learners need to be encouraged to monitor behavior regularly and close to the time of occurrence (Bandura, 1991), and that "ultimately, success in SRL is dependent on the accuracy of self-observation because this process provides the necessary

information to guide subsequent efforts to self-regulate." (Zimmerman, 2001, p. 20)

Another area of interest is that of student attendance and academic achievement. Newman-Ford, Fitzgibbon, Lloyd, and Thomas (2008), in a review of research on student attendance, show that while earlier research suggested little or no relationship between attendance at learning events and academic success, a number of more recent studies do present empirical evidence pointing to a relationship between attendance and attainment. Their own study looked at attendance rates for students enrolled in humanities and social science courses at a university in the UK, and found a strong statistically significant correlation between attendance and achievement. They also found support for 2 rules of attendance put forward by John Colby (2004) based on his study of attendance records of computer science undergraduates (the first figures are those of Newman-Ford, et al., 2008; the figures in parentheses are from Colby's 2004 results):

- The 70% rule: Students who attend less than 70% of classes have a 33.3% (66.6%) chance of failing, and 85.7% (80%) chance of not achieving a high grade.
- The 80% rule: Students who attend less than 80% of classes have a 33.3% (50%) chance of failing, and 80% (66.6%) chance of not attaining high grades.

And they introduced a further 90% rule: Attendance of less than 90% of classes gives a 25% chance of failing, and a 75% chance of not getting a high grade (Newman-Ford et al., 2008).

In a study looking at the relationship between attendance and test scores, Clump, Bauer, and Whiteleather (2003) concluded "the current study and previous research continue to indicate the effect of attending classes on grades in the course with more attendances increasing overall test scores" (p. 223). Gump (2005) meanwhile found a clear link between attendance and grades in his study of attendance patterns of students in discussion classes on Japanese culture at a US university. His conclusion was that attendance is one of many variables affecting academic achievement, but attending class is one of the easiest things students can do to increase their grades. Halpern (2007) in a study involving students of business management at a UK university came to a similar conclusion—attendance has an effect on achievement, but it is one of a number of factors, and "it is likely that students who attend are already predisposed to academic achievement" (p. 346).

It seems fairly clear then, that keeping accurate and clear student records is going to help identify students who may be at risk of under-achieving or failing in a course, allowing for any necessary intervention to help the students increase their chances of success. It could also serve to help students with their longer-term goals; as Newman-Ford et al. (2008) state: "Chronic absenteeism can result in other negative consequences, as students who are not in class have fewer opportunities to learn material that enables them to succeed academically in later life" (p. 702).

Bowen, Price, Lloyd, and Thomas (2005) point out that monitoring attendance, and acting on potential issues, draws students' attention to the importance placed on attendance. Monitoring of attendance and other student records also

serves a useful global function. Departmental—or university-wide—accessible data on group trends and patterns can aid in the development of strategies to better assist students with their studies (Bowen et al., 2005).

One further strength of a longitudinal collection of student achievement indices is that it serves as a record of student progress. Whilst a little more modest than an academic or learning portfolio, the records can be conceptualized as an achievement portfolio. When entering the job market following graduation from university, an exemplary record of event attendance and achievement stretching over a student's academic career would hopefully be appealing to potential employers. To what extent this would be motivational for students is unclear. Given that the goal of most students is to find employment after graduation, we would assume that introducing a system that could potentially help students meet this goal, and clearly situating this system in relation to that goal, would have some positive effect on student performance.

Project background

Seinan Jo Gakuin University in Kitakyushu, Japan has a roll of approximately 2,400 students, of whom about 240 are studying in the English Department of the Faculty of Humanities. Whilst the majority of students approach their studies in a dedicated manner, there is the ongoing problem of a number experiencing attendance and classroom-related problems, requiring guidance to help them successfully complete their studies. After a discussion on how best to deal with these students, it was decided that some kind of portfolio system was needed so that teachers could collaborate with record keeping. The hope was that by identifying students with problems at an early stage, a more efficient intervention system could be implemented. Initial discussions centered on the use of A4-sized cards that could be passed around between teaching and administrative staff. However, it soon became obvious that there would be considerable logistical problems with this method. The cards would need to be stored in a secure central location. Access would need to be monitored, particularly because the information on the cards would be sensitive and confidential. Because of the physical nature of the media, the amount of information that could be entered on the cards would be severely limited. Finally, it would take a considerable commitment by staff to actually maintain the records, analyze the information, and identify possible problems students were experiencing.

Because of this, it was proposed by the authors that a more effective computerized database-driven solution be investigated. We based our proposal on the following advantages:

- Access would be Internet-based, allowing broader accessibility.
- Access could be granted to a wider range of people than just teaching staff as was originally proposed. Students could get information necessary for their classes, and parents could ostensibly follow their children's progress.
- The system would be flexible, so development could be ongoing.

- Information could be added or edited in real time by anyone permitted to do so.
- Security would be assured through a personalized password-protection system.
- Layers of user status would mean that users would only be able to access information and data they were permitted to see.

The following table illustrates a possible model that was presented to the staff of how information would flow.

Options

The faculty gave the go ahead to look into the proposal further, at which point available options were investigated. We identified the following possibilities:

- To build from scratch using a combination of programming and database tools. While this would be doable using the scripting abilities of the team members, the time and resources required would far outweigh the benefits that would be gained. In addition, there would be serious concerns about security, extensibility, and upgrading.

Table 1. Read and write status of student specific information

Student specific content	Student READ	Student WRITE	Parent READ	Parent WRITE	Teacher READ	Teacher WRITE	Admin READ	Admin WRITE
General information	O	O	?	X	O	O	O	O
Course information	O	?	?	X	O	O	O	O
Course progress	O	?	?	X	O	O	O	O
Internal assessment	O	X	?	X	O	O	O	O
External assessment	O	O	?	X	O	O	O	O
Internal attendance	O	O	?	X	O	O	O	O
Event attendance	O	?	?	X	O	O	O	O
Student comments, goals	O	O	?	X	?	X	O	O
Teacher comments	?	O	?	X	O	O	O	O
Careers & employment	O	O	?	X	?	?	O	O

O = accessible, ? = limited access, X = no access

- To outsource construction. This was seriously explored, and tenders were called for at various online sites (such as <guru.com>) that act as agencies for programmers. Numerous responses were received, but were eventually discounted because of the lack of accountability.
- To buy "ready made". A number of options are available, but these were rejected because of costs, restrictive licenses, and the lack of any product that adequately and flexibly covered our needs.
- To use the current course management system, an installation of the Moodle open source software package. This is used for course modules and assessment purposes, but was discarded as an option because of Moodle's rigid structure. It is difficult to script, and there are too few modules available to augment its functions. It also has speed issues, especially when the server is under load.
- To explore other open-source options. This was the option we eventually selected, as will be explained in the following section.

Open source software

Open source refers to software that is created in a transparent manner by a community of developers, free from restrictive licenses, and available at no cost to users. According to the Open Source Initiative <opensource.org>, open source is:

> ...a development method for software that harnesses the power of distributed peer review and transparency of process. The promise of open source is better quality, higher reliability, more flexibility, lower cost, and an end to predatory vendor lock-in.

There are many examples of open source software in popular use, such as *Open Office*—a popular, full-featured alternative to Microsoft's ubiquitous *Office* package, or the above-mentioned *Moodle*, an online course management system that is used by educational institutions around the world. Our decision to opt for an open source solution was driven by these factors:

- Extremely cost-effective, with the software being provided for free in almost all cases.
- They are under constant development by teams of software developers.
- They are usually extensible, as many packages offer the option to add plugins, modules, and themes.
- Security is relatively assured through regular updates as security flaws are uncovered.
- Upgrading, when necessary, is relatively straightforward and reliable.
- Popular open source packages have a large user base with many users willing to share their experiences and offer support when problems are encountered.

Because of our needs (a package with both scripting and a database backbone), our experience, and our resources, we only examined packages that utilised PHP—a widely-used, freely-licensed programming language used to create dynamic web pages—and the equally ubiquitous and zero-cost MySQL database management system. Most prominent in the area of data management were Drupal (www.drupal.org), Joomla (www.joomla.org), and XOOPS (www.xoops.org). Of these, we felt that Drupal offered the greatest extensibility through its large community of module and theme developers, the greatest adaptability to our needs, the strongest security, and the best server performance.

Drupal

Drupal is an open-source web content management system (CMS), i.e., a system allowing the user to create and easily run dynamic, interactive websites. It is comprised of a number of scripts written in the PHP programming language, which are uploaded to an Internet server, and which function as the administrative backend as well as the interface to present content to visitors to your site. The system also requires an online database for data storage. Drupal has a lightweight, easy-to-install core, which allows for fast, simple construction of basic websites, yet is simple to extend and use to build powerful interactive sites due to its modular

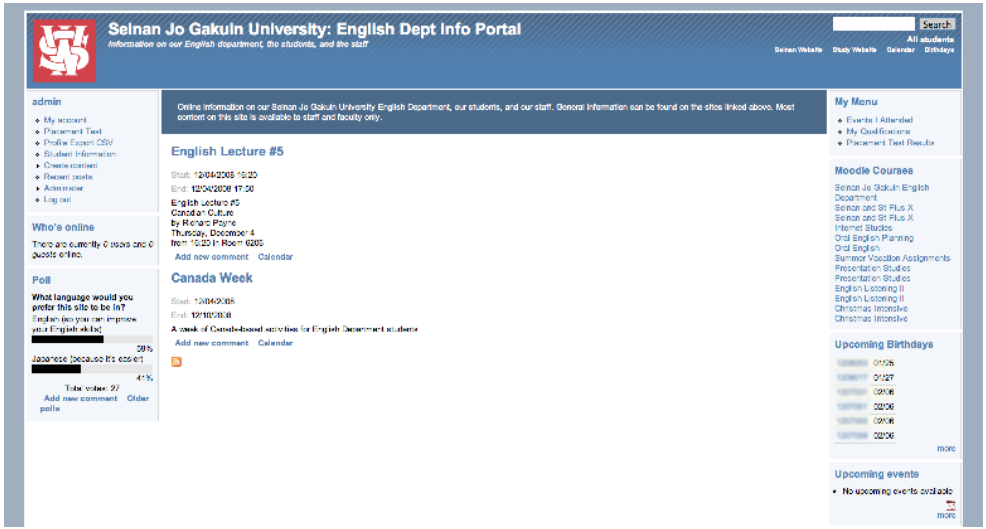

Figure 1. Portfolio front page

framework. One of the main purposes of the system is to allow the creation of community-based dynamic websites, where users can contribute and share information with other site visitors. At the time of writing, there are two main versions of Drupal available, and receiving active support from developers, versions 5 and 6.

Extensibility and themes

One of Drupal's main strengths is its modular framework, allowing for easy extensibility. Numerous third-party modules (over 2,500 at the time of writing <drupal.org/project/Modules>) have been developed by an active development community; these modules can be easily added to the Drupal core to allow for increased functionality of the CMS. Furthermore, the look of the site can be easily modified by adding third-party themes. With a little scripting and website creation experience, it is possible to theme the system to, for example, match a school website or Moodle installation. Theming is a very powerful aspect of the system, with the use of content-type templates and theme snippets enabling control of data presentation at the page or content level.

Keeping secure and up-to-date

With any online system, keeping on top of security updates and bug fixes is crucial for the safety and integrity of user data, in addition to the smooth operation of the system, and to protect the hosting environment from malicious attacks or unauthorized access. Due to the nature of the student data stored in the portfolio database, it is extra-important for the administrators to keep up to date on the current status of the CMS, and be aware of important security issues. In this respect the choice of Drupal takes some of the burden off the portfolio administrators. Key members involved in the development and maintenance of this open-source project have assembled an active security team of some 30 members at time of writing <drupal.org/security-team>. They are tasked with ensuring that both the core system and contributed modules are free of potential security weaknesses, as well as keeping the user base informed of security updates. Keeping track of these updates to the system is as simple as enabling the *status report* module. This indicates when new versions of the system and contributed modules are available along with the relative importance of the updates. Automatic notification of these updates via email is easily configurable. The update process itself is both straightforward and relatively fast, usually just a matter of a few configuration steps in the administration section, replacing files on the server, and running an automatic database update script. Upgrading to new versions of contributed modules is a similarly trouble-free procedure.

User interface language

Another factor in Drupal's favor is the ease of creating multilingual sites, and of switching the user interface to a language to suit the users. Whilst the majority of our users are comfortable with the site in English (a poll of student users showed 59% preferred the site in English to 41% in Japanese), having the option to easily configure the site to enable users to switch to a language they are more comfortable with if encountering difficulties navigating the

site will certainly help increase accessibility and usability of the system.

Site content access

The extent to which site users/site visitors can access information is highly configurable. This makes it very easy to control which information will be displayed to visitors, and which information will only be accessible to users in certain authorized roles. Furthermore, the ways in which site content can be presented or displayed to users is also highly configurable, making it possible to ensure users can easily access only that which is relevant to them, without having to search through numerous screens of information.

Due to this powerful granular-level access control, along with the ability to set up and apply varying permissions to multiple roles, the Drupal platform presented itself as an ideal candidate to run the student portfolio on.

Setup

The Drupal software (version 6) was installed on a web server maintained by one of the authors and used for hosting other content and applications provided for students. The server is configured with a standard LAMP setup (Linux operating system, Apache web server, MySQL database and PHP programming language), the preferred hosting environment for installing and operating Drupal <drupal.org/requirements>. Once the Drupal software had been installed on the server, and initial site configuration carried out, a user profile form was created to allow students to record required general, personal, and school information. Users were required to create user accounts to access the site content, initially all accounts were set up by importing a CSV file containing usernames (for students this was student number; for admin and teachers surnames were used) and other profile details.

Users and roles

As well as the standard Drupal roles of anonymous and authenticated user, new roles for administrator, parent, student, sub-administrator, and teacher were created. Different levels of access control were then assigned to these roles to enable the users to access content and use the site in different ways.

- The *administrator* role was given full control over managing content and users, as well as site configuration. *Sub-administrator* was given a more limited set of access rights, allowing for more limited editing and user management rights. This role was set up for people in admin positions within the department who would have deeper access to data, but not to the inner workings of the site.
- *Teachers* were given similar access rights as students, but obviously with greater content-creation permission so as to be able to add to or edit student records where necessary.
- The *student* role was given permission to view certain content posted by other users (comments by advisors, site news, details of upcoming school events, and so on) as well as the necessary

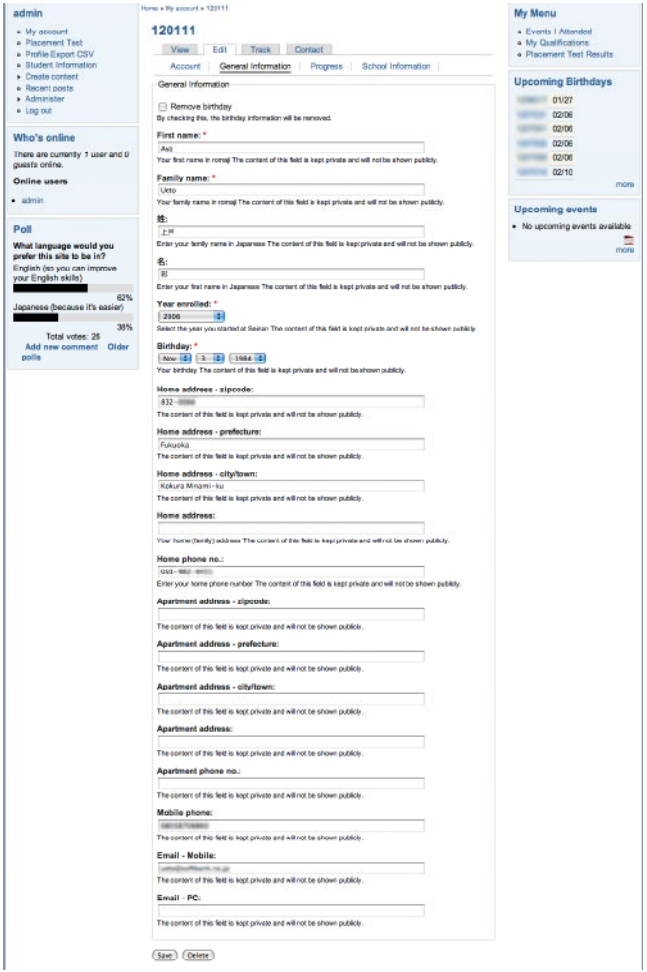

Figure 2. Edit general profile page

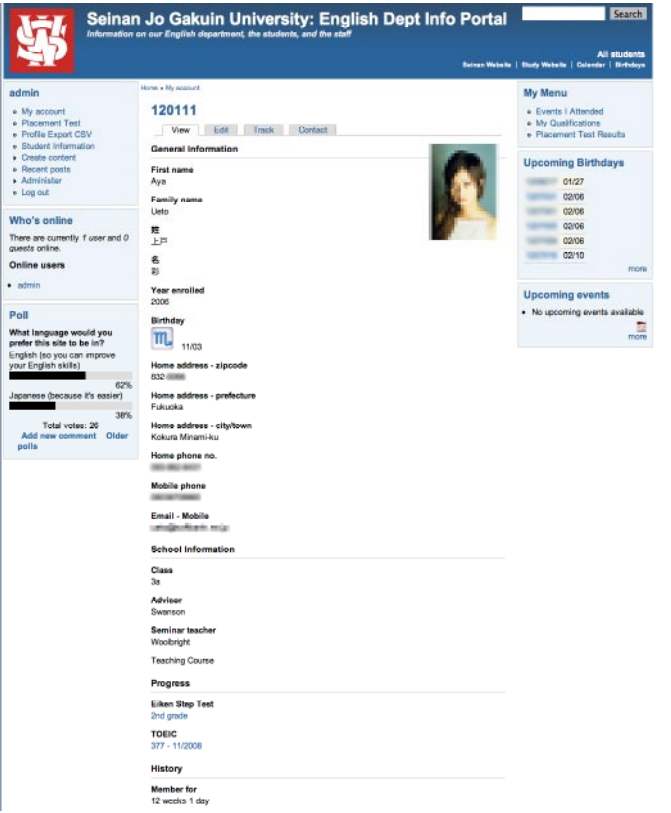

Figure 3. Example of a student profile page

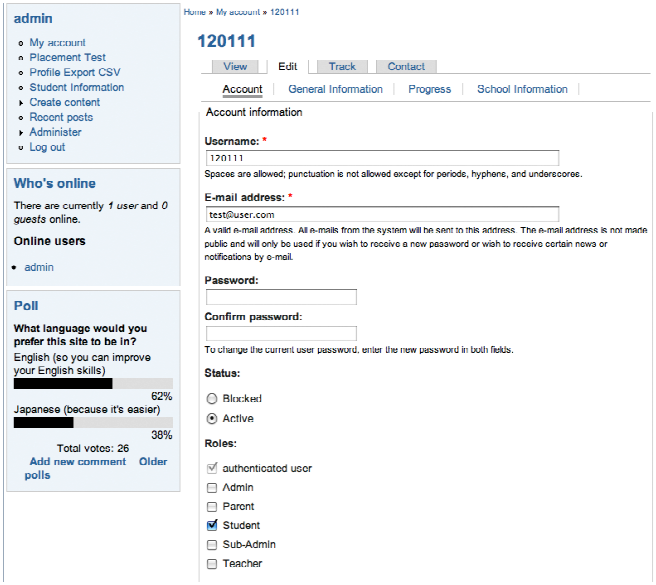

Figure 4. Profile page allowing for setting of user roles

permission to edit their profiles and to update their academic record where required.

- The *parent* role has still to be finalized, but it is planned to set this up to allow parents to access their children's academic progress reports, and view comments made by teachers or advisors.

Basic content types

For the basic portfolio, it was decided to allow students to keep records of:

- Personal data, such as contact, health, and social information
- Extra-curricular events attended
- Qualifications gained through English-proficiency test (TOEIC, TOEFL, Eiken STEP)
- Academic and future employment goals.

Using the *Content Construction Kit* (CCK) module, input pages were created to allow students to enter and edit these records, whilst the *Views* module was used to control how the particular records would be displayed and accessed—individual students were limited to only their data, whilst administration and teachers could access all student records.

The CCK module was also used to create an input form for teachers to use to record results of student placement tests for years one through four.

Access control

Due to issues of privacy, limiting access to student records was a major concern in the development of the site. User profiles, which contain personal details such as student addresses and telephone numbers, were made private, accessible only to students, administrators, and teachers. Content-wise, the core *permissions module* was configured to control which roles could access, create, and edit certain content.

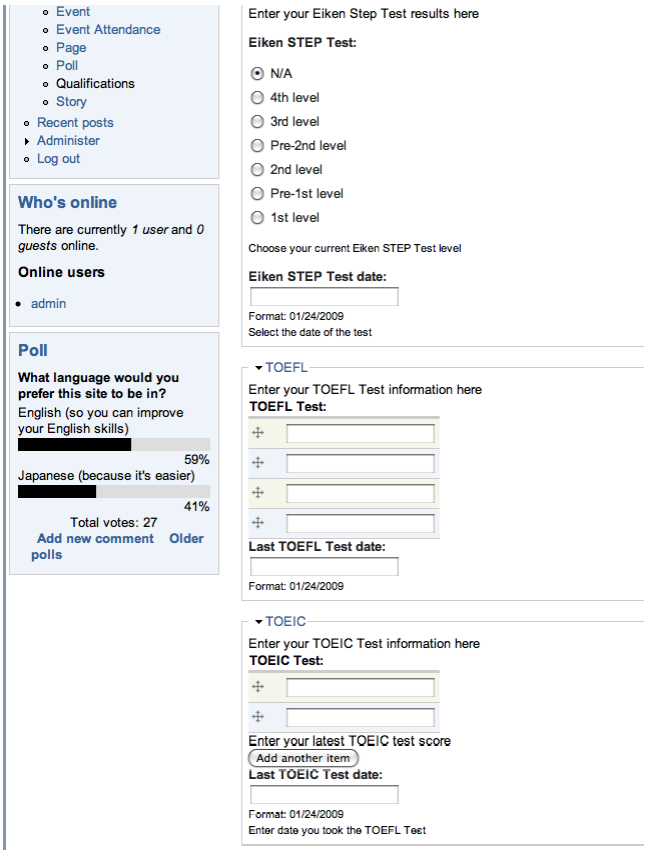

Figure 5. Example of student input page

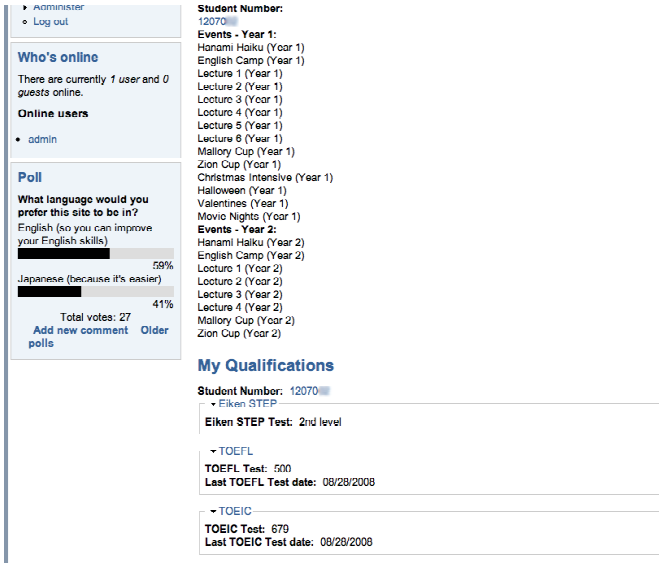

Figure 6. Student records as viewable by admin and teachers

To further protect the privacy of student-entered records, the *taxonomy access* module was employed. Drupal allows content to be tagged with certain taxonomy terms or vocabulary, allowing for easy classification and display of data; the taxonomy access module adds another level of access to the content based on the terms or vocabulary by which data is classified. So, for example, tagging content with the term "student records" would then allow us to restrict access to that data to only those user roles who have been assigned permission to view data tagged with that particular term.

Permission	anonymous user	authenticated user	Admin	Parent	Student	Sub-Admin	Teacher
(dangerous - grant with care)	☐	☐	☑	☐	☐	☐	☐
content_permissions module							
edit field_advisor2_commenta	☐	☐	☑	☐	☐	☐	☑
edit field_advisor2_commentb	☐	☐	☑	☐	☐	☐	☑
edit field_advisor3_commenta	☐	☐	☑	☐	☐	☐	☐
edit field_advisor3_commentb	☐	☐	☑	☐	☐	☐	☐
edit field_advisor4_commenta	☐	☐	☑	☐	☐	☐	☐
edit field_advisor4_commentb	☐	☐	☑	☐	☐	☐	☐
edit field_comment_a	☐	☐	☑	☐	☐	☐	☑
edit field_comment_b	☐	☐	☑	☐	☐	☐	☑
edit field_eiken	☐	☐	☑	☐	☑	☐	☑
edit field_eiken_date	☐	☐	☑	☐	☑	☐	☐
edit field_events_1	☐	☐	☑	☐	☑	☐	☐
edit field_events_2	☐	☐	☑	☐	☑	☐	☐
edit field_events_3	☐	☐	☑	☐	☑	☐	☐
edit field_events_4	☐	☐	☑	☐	☑	☐	☐
edit field_student_number	☐	☐	☑	☐	☑	☐	☐
edit field_toefl	☐	☐	☑	☐	☑	☐	☑
edit field_toefl_time	☐	☐	☑	☐	☑	☐	☑
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edit field_toeic_date	☐	☐	☑	☐	☑	☐	☑
edit field_year1	☐	☐	☑	☐	☐	☐	☑
edit field_year1_score	☐	☐	☑	☐	☐	☐	☑
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edit field_year2_score	☐	☐	☑	☐	☐	☐	☐
edit field_year3	☐	☐	☑	☐	☐	☐	☐
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edit field_year4	☐	☐	☑	☐	☐	☐	☐
edit field_year4_score	☐	☐	☑	☐	☐	☐	☐
view field_advisor2_commenta	☐	☐	☑	☐	☑	☐	☑
view field_advisor2_commentb	☐	☐	☑	☐	☑	☐	☑
view field_advisor3_commenta	☐	☐	☑	☐	☑	☐	☐
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view field_advisor4_commentb	☐	☐	☑	☐	☑	☐	☐
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view field_comment_b	☐	☐	☑	☐	☑	☐	☑
view field_eiken	☐	☐	☑	☐	☑	☐	☑
view field_eiken_date	☐	☐	☑	☐	☑	☐	☐
view field_events_1	☐	☐	☑	☐	☑	☐	☐
view field_events_2	☐	☐	☑	☐	☑	☐	☐

Figure 7. Example of content access control using the permissions module

By controlling which role can see individually-tagged content, it can be assured that the privacy of student records can be maintained, and that a rich level of data can be built up without the concern of people accessing material not meant for their eyes.

Extending the site

As mentioned, extending the functionality of the Drupal system is quite straightforward: as simple as identifying a third-part module (or scripting one) that suits a particular need, installing it on the web server in the appropriate directory, and enabling it through the Drupal administration interface. Whilst the portfolio site was originally set up as a system to allow sharing of student records, it has already been expanded to include news and information pages, polls allowing students to vote on various relevant topics, and an events calendar. It is also linked in to the departmental Moodle installation, meaning students can easily access their Moodle pages from within Drupal. Users of other computer-based content or course management systems tend to use the systems more extensively or intensively as their experience with the system grows (cf. Morgan, 2003). Adding increased functionality to the CMS may encourage users to experiment with the new features and help create a richer, stronger tool to both aid with student management and create a valuable online community for both students and staff.

Potential problems

The software

One criticism leveled at Drupal is its rather high learning

curve and confusing user interface, especially for administrators new to the system. Usability studies carried out by the University of Baltimore showed problems with the administration user interface (Scollan, et al., 2008); although the current version of Drupal (version 7) under-development plans to address the issues raised in this study (Wikipedia, 2008). Whilst the authors are comfortable with the use of the site, it will be crucial to ensure the other teachers who are to be responsible for maintaining records are familiar with exactly what they can and cannot do, and how to use the site. Creating well-designed input forms for both teachers and students, and creating a site architecture that allows for easy and logical access to content will be one of the keys to the success of this particular project.

General issues

Another possible limitation is the need to enter student data manually, meaning any immediate value of time-sensitive data, such as attendance records, could be lost if not entered in a timely manner. Bowen et al. (2005) identify the importance of tracking attendance as a way to identify students experiencing possible difficulties that may cause them to withdraw from the course or university. They also point out that monitoring and acting on non-attendance can signal to students the importance placed on attending class. However, for the attendance data to be of any potential use, "...[it] must be complete, up to date, accurate, and usable" (Bowen et al., 2005, p. 337). It will be challenging to ensure that all teachers maintain accurate attendance records in the portfolio if this data is in fact recorded.

One further issue relates to the accuracy of data as entered by students. As with any record-keeping system, it is difficult to ensure the data entered is 100% accurate. By stressing to students the positive aspects of recording their data, and how they can use the data to monitor their progress, communicate with staff, and access course-specific information should hopefully encourage them to be accurate and honest in their data-entries.

Adoption of the system

With the portfolio system in place, it remains to be seen to what degree it will be adopted and implemented by the faculty and students. Rogers (2003) has put forward one of the most widely-accepted models of the decision process involved in the adoption of new ideas, or *innovations*. Within an organization, Rogers (2003) has outlined a five-stage "innovation process" required for the successful adoption of new ideas. This process consists of two broad subprocesses; initiation and implementation. These can be further broken down as:

I. Initiation

   1. Agenda-setting: A need for innovation is recognized, and possible innovation to match problems/issues identified.
   2. Matching: Fitting problem with innovation to determine the potential usefulness of the innovation.

II. Implementation

   3. Redefining/restructuring: The decision to adopt the innovation has been made; next comes a

process of social reconstruction of the innovation and organization to mutually fit needs.

4. Clarifying: As use of the innovation spreads, its usefulness is clarified as the meaning of the innovation becomes clearer to organization members.

5. Routinizing: The innovation becomes part of the everyday routine of the organization. (Rogers, 2003)

The innovation process can fail at any one of these stages, and even after it has been routinized, there is still the issue of sustainability—how likely is the innovation to continue to be used once the initial drive to have it implemented has finished? In our case, we have reached the implementation stage; here, as with any other stage of the above process, the role of individual promoters of the innovation (what Rogers, 2003, refers to as *champions)* will play a major part in ensuring further progress. Equally important are the users' perceptions of the innovation. To construct a shared, and ideally positive, understanding of the role and meaning of the student management system, it is important users are encouraged to discuss their experiences in its use.

Individual implementation

In many instances, individual adoption of an idea canot take place until it has been adopted by an organization. The innovation-decision process individuals pass through is similar to the organizational process above, moving through initial *knowledge* of the innovation; *persuasion* to start using it, a *decision* to either accept or reject, *implementation*, and final *confirmation* that the individual has made the correct choice. Here, as adoption and diffusion of the innovation spreads, successful and continued implementation becomes important (Surry & Ely, 2001); without individual support the innovation will ultimately fail. Note that implementation is different from adoption, with the latter being the processes that lead someone to decide to use an innovation (similar to the initiation stage above), while implementation is the actual use and integration of an innovation (Rogers, 2003; West, Waddoups, & Graham, 2007). Ely (1990) has shown eight conditions important in the implementation process, these conditions having been shown to apply across various institutions and cultures. Ely's conditions are:

1. *Dissatisfaction with the status quo*: There is a feeling that change is needed.

2. *Knowledge and skills exist*: Those who will implement the innovation must have the necessary knowledge and skills required to facilitate the change.

3. *Resources are available*: The materials required for the innovation to proceed must be available.

4. *Time is available*: Time for learning, practice, and evaluation of the innovation is essential.

5. *Rewards or incentives exist for participants*: Incentives — extrinsic or intrinsic — are necessary to motivate change.

6. *Participation is expected and encouraged*: Those who are expected to make use of an innovation should be involved in its implementation.

7. *Commitment by those who are involved*: It needs to be shown that key players in an organization or group support the innovation.

8. *Leadership is evident*: Supervisors or group leaders need to provide encouragement and support, and show enthusiasm for project.

These conditions are interdependent on one another, with the absence of any of the conditions leading to an increased likelihood of unsuccessful implementation (Ely, 1990). Later research by Surry and Ensminger (2002) identified Skills and Knowledge (2), Resources (3), and Participation (6) as those conditions regarded most important by educators: "... the education group perceived that in order for an innovation to be successfully implemented, workers need supporting resources, a sense of ownership in the decision making process, and the skills and knowledge necessary to use the innovation effectively" (p. 7). Obviously, by considering and adapting these principles, the portfolio system will have a better chance of being effectively utilized.

To date, the problems we have encountered deal specifically with these areas:

2. *Skills at the teacher level*: While the students have had little trouble accessing and utilizing the system, few of the faculty have been able to administer the system with any ease. This is not a weakness of the system per se, but a general lack of media competence by the staff themselves.

4. *Time*: As in any academic institution, all the staff are busy with teaching, administrative, and committee obligations. Finding time for staff orientation has been an issue, and perhaps reflects on their sense of priority for this project.

6. *Expectation*: Following on the comments regarding time, until this project receives any validation, then there is no sense of requirement by the faculty, so learning to use the portfolio tends to be put on the back burner.

7. *Commitment*: While the initial impetus for the project did come from the leaders within the department, there has been insufficient follow-through from them that would indicate support for the project. Without this, staff generally have shown little commitment.

Consequently, the question arises as to whether there is any viability in the project, and whether development is worth continuing.

The future

Currently, we have a robust framework in place that has the potential to act as an effective portal for student data. It is being regularly maintained and developed, and it is hoped that over the next 6 months, most of the modules and functionality required for our purposes will be implemented, tested, and enabled. Drupal itself continues to be developed, and as noted, the next version will address many of the usability issues associated with the current installation.

As regards users, we have to examine the system from two viewpoints: that of the students and the faculty. The students themselves have shown they are reasonably adept at using the inputting forms, and at accessing and updating their data.

They are accustomed to using similar systems through their use of Moodle, and they understand what it is we are trying to achieve. Our focus over the coming year is to make the whole website a place they visit and use regularly as a normal part of their study cycle. We are confident that over time, they will maintain their side of the portfolio and visit it regularly.

The challenge will be to address the faculty issues, and to some degree we need to reconsider some of the basic structure of the way in which we are attempting to implement the project. The conditions detailed by Ely (1990) will need to be addressed through greater simplification of the interface, regular and ongoing staff training, a greater commitment to the project from the faculty leaders (who, after all, floated the original idea), and in all likelihood a number of test sessions where the usefulness and depth of the system can be demonstrated.

With these factors in mind, we intend to continue development until the end of the next academic year, at which stage we will reassess the situation. At that time, we should have a clearer picture of the usage and effectiveness of the system and will be able to make an informed decision as to whether development should continue or not.

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