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Institutions using or piloting Sakai were studied in order to gather grey literature on their use of Sakai. These documents were analyzed in order to find common themes. From the sample frame multiple institutions were chosen for use as case studies in multiple case study analysis. Bijker's concept of Interpretive Flexibility is used to examine the differences.

Headings:

Instructional technology

MULTIPLE CASE STUDY OF INSTITUTIONS USING OR PILOTING SAKAI

by

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Approved by

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Introduction

About this Document and its Audience

Institutions using or piloting Sakai were studied in order to gather grey literature on their use of Sakai. These documents were analyzed in order to find common themes that cross institutional boundaries. Past research on Sakai has looked for themes across organizational boundaries within the same large institution. This work seeks to break new ground by looking at the use or exploration of Sakai in very different institutional settings.

For an example of past research we can look to Brian Moynihan's 2009 thesis, which analyzed the needs assessment process that lead to the selection of Sakai as a replacement for the UNC School of Medicine's current Learning Management System (LMS). Where that document approached one institution and examined it in fine detail, this work takes a different approach to building our understanding of Sakai by describing more institutions at a lower level of detail.

This document should be immediately useful to information and technology managers and administrators at large doctoral/research-extensive universities similar to UNC, but may also prove useful to smaller colleges and universities, especially those with needs not being met by their current LMS offering.

About Sakai

Begun in 2004 with funding from the Mellon Foundation's Research in Information Technology Program (RIT) and development support from Indiana University, University of Michigan, MIT, and Stanford, Sakai is (among other things) an ambitious project to construct a sustainable Collaborative Learning Environment (CLE) for higher education. The 2003 Mellon Foundation President's report gives both a good introduction to the goals and the novelty of this project:

This project's purpose is to develop an open source course management system that would serve a broad range of institutions of higher education in a much better organized, much more cost-effective way than they are being served now. The Foundation is contributing $2.4 million over two years, and four universities (Michigan, Indiana, MIT, and Stanford) are making an in-kind contribution, primarily staff time, totaling more than $4 million. These universities are joining forces to integrate and synchronize their enormous investments in educational software to create an integrated set of open source tools that would draw upon the "best-of-breed" from among existing open source course management systems and related tools. If successful, the result would be an economically sustainable approach to high quality open source learning software for higher education that would overcome the two main barriers that have consistently impeded such collaborative efforts: (1) unique local architectures, including heterogeneous software, software interoperability requirements between systems, and diverse user interfaces that hinder the portability of software among institutions; and (2) timing differences in institutional funding and mobilization that reduce synergy and result in fragmented, often incomplete offerings and weak interoperability.

[...] SAKAI [sic] is an effort in which the core schools are doing the development themselves (with partial matching support from the Foundation). Each core institution has agreed to provide full-time technical staff that will be under the direction of the SAKAI Board. In addition, a SAKAI Education Partners Program (SEPP) has been formed to permit interested schools to participate in the discussion of the strategic directions for SAKAI. Each of the partner schools will commit to contribute $10,000/year for 3 years. In order to get the SEPP launched, the William and Flora Hewlett Foundation has agreed to provide seed funding of $300,000. So far, without any formal announcement of SEPP, 13 schools have agreed to join, and staff expect that we will attract more than 100 in the next 6 months (Bowen, 2004).

Since that 2004 beginning, Sakai has grown and matured into a system on even footing with commercial products such as Blackboard from the perspective of decision-makers at many institutions of higher learning, but that direct comparison masks both the interpretive flexibility (discussed in the literature review below) of Sakai itself and the common themes seen among successful Sakai deployments.

Sakai is several (sometimes conflicting) things at the same time. Sakai is a collection of software written in Java with data typically stored in an Oracle database and a web interface for end users such as Students, Instructors, and Administrators. Sakai is a community of institutions of higher learning committed to the development
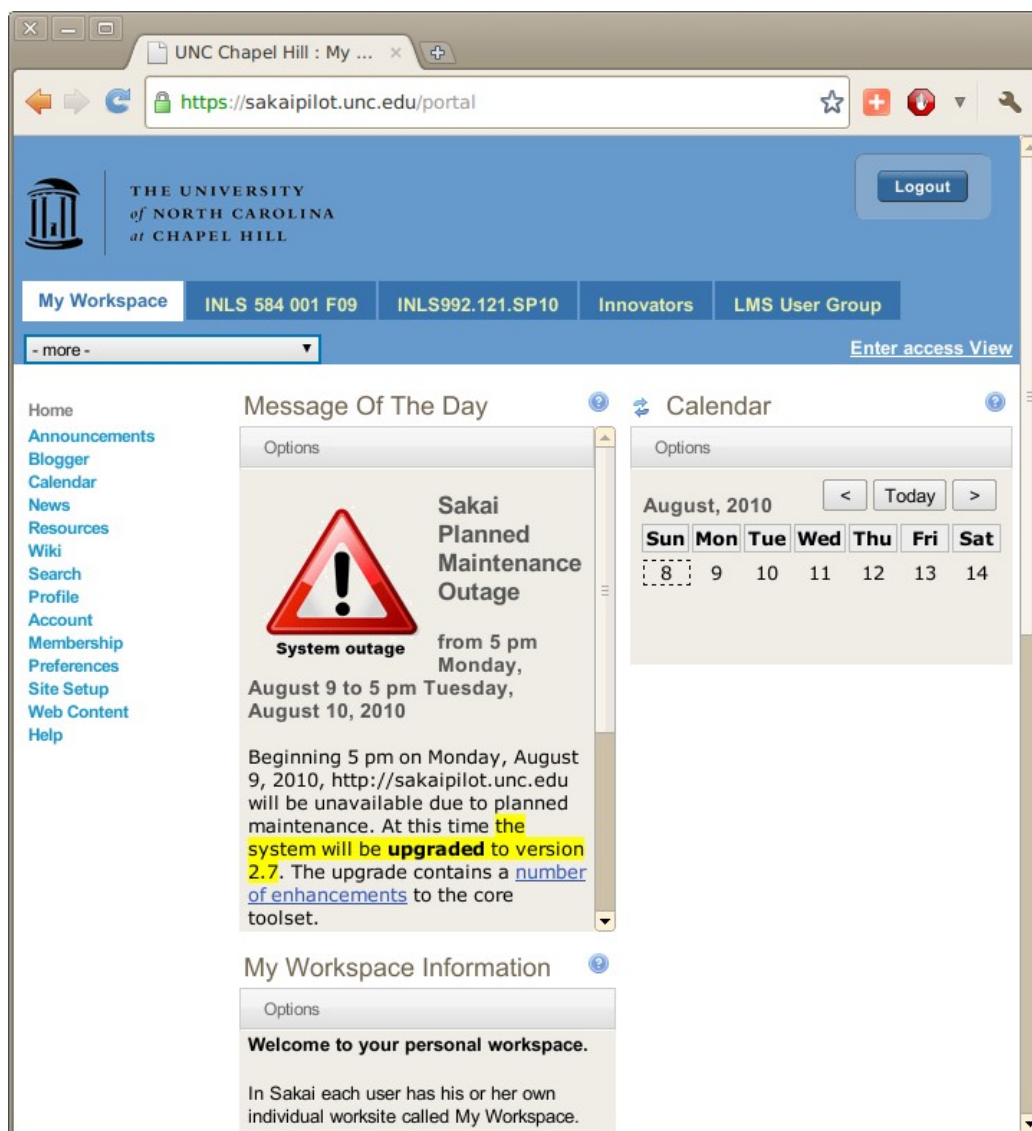
Illustration 1: View of UNC-CH Sakai instance just after login

of that software. Sakai is Open Source. Sakai is a Collaborative Learning Environment, Virtual Learning Environment, or a Learning Management System depending on your choice of term. Sakai looks like this (Illustration 1) when I first log in to the pilot instance at UNC Chapel Hill. Sakai is an opportunity to use software to accommodate existing practice while pushing new or different pedagogy. Sakai allows us to apply and expand on lessons learned from distance education and blended learning, reduce costs, increase coöperation, or replace an obsolete LMS. Sakai is a platform on which to innovate or simply build a tool that meets an existing need. Sakai is a chance for small

service providers to compete for higher education business. Sakai is a software prerequisite for a tool the school wants to use. Sakai is a large, labor-intensive project that can't be properly integrated at the school and should be decommissioned in favor of a tool that better fits the existing infrastructure. We will see Sakai be each of these (sometimes conflicting) things in the case studies.

Describing Sakai and the Rest of the Marketplace

Learning Management System, Course Management System, Collaborative Learning Environment and Virtual Learning Environment are terms used when discussing Sakai, Moodle, Blackboard, and other related software. We explore these terms briefly.

In the Mellon quote above, the term Course Management System is used. This has the unfortunate problem of sharing an initialism with "Content Management System" (CMS), which many IT professionals will associate with a different class of software, notably projects such as Drupal, with which Sakai should not be confused. Arizona's Department of Education (ADE), for example, sponsors a project (IDEAL) that includes both Sakai and Drupal as components fulfilling different roles in the larger system. We will take a moment to examine some of these terms and what they say about the software we are choosing, our thinking about the role of software in learning, and the evolution of the two. We will start with "Course Management System."
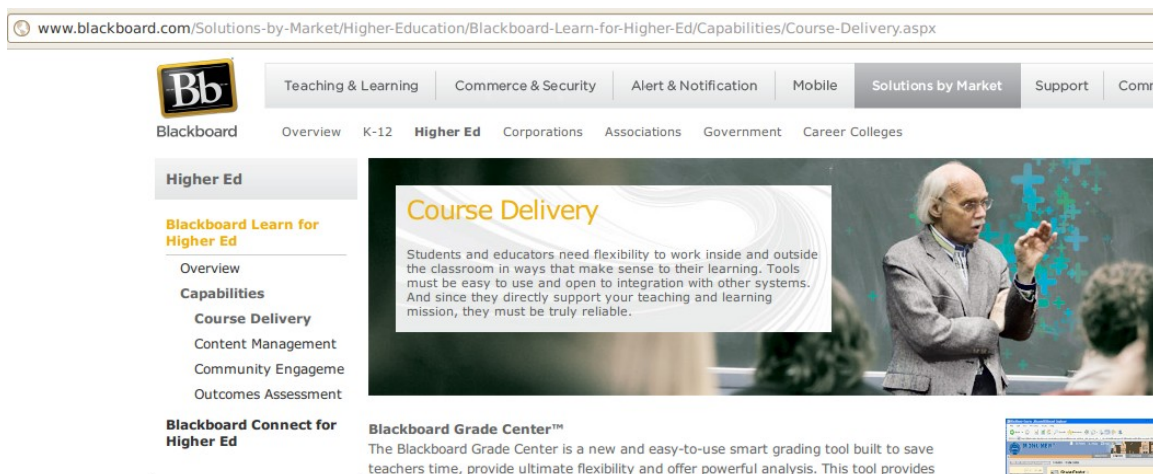
Illustration 2: Blackboard website screen capture

Why not use Course Management System if it was good enough for Mellon in 2004? The emphasis on the concept of a course is problematic both because Sakai (and Moodle, Blackboard, etc.) can provide for other kinds of collaboration that are clearly not a course (such as a research lab with no students, which we hypothesize exists somewhere), and because the term "course" is vague. While an instructor may be necessary for a course to be listed in a University's bulletin and some number of students must register for it to be offered for credit, neither is sufficient to explain learning or justify the deployment of Sakai, and the course as listed in the bulletin is at once an arbitrarily narrow and broad use case, since it can describe everything from a 400-person Spanish lecture or 12-person chemistry lab to a Masters Thesis with one faculty reader. There is also the problem that outside the US the term "course" often means a complete course of study spanning several semesters, and what in the US is called a course might be referred to by some other name, such as unit. As tools such as Sakai are adopted worldwide, then, the term Course Management System has fallen into disuse.

If we were to start afresh and design software to help us implement our pedagogical ideas and leave room for others to come, what core questions might we start with? Certainly after awhile we might ask, "How shall we use software to aid in the process of learning assessment?" But would we not much sooner start with the

question: "How shall we use software to aid in the learning process?" If we accept that as our core question, Learning Management System (LMS) might be a serviceable term, but "management" still presumes a hierarchy or leadership, and much academic learning takes place in a context where there may be a nominal leader, but students may be empowered to take various leadership roles, or perhaps be expected to take more of an apprenticeship or portfolio approach to their learning. What's more, regardless of which people are doing what kind of leading, many (if not most) educators would bristle at the idea of the software doing the leading in their classrooms.

Sakai calls itself a Collaborative Learning Environment, and in that sense is very philosophically similar to Moodle (Modular Object-Oriented Dynamic Learning Environment). Weller (2006) refers to both as second generation Virtual Learning Environments (VLEs), saying: "There is an analogy with plant succession here. When there is a new environment, for example barren rock, a few pioneer species, such as lichens begin to grow" (2006, p. 100). Commercial offerings such as WebCT (now Blackboard) are lichens, then, making the academic environments in which they are deployed more receptive to the more fundamentally disruptive Open Source projects such as Moodle, Sakai, LAMS, and others.

This new generation, the VLE 2.0 generation, is more disruptive at least in part because its designers are not meeting incumbent pedagogical models and practice on their terms, but rather are taking constructivist learning principles and ideas about experiential learning and collaboration and encoding them in their software. These are software architects who very much want instructors to take a seat in the student's desk as in Error: Reference source not found. As we'll see in the literature, whether or not institutions and instructors adopt these principles as their own is another matter entirely.

Blackboard (the company) offers a product to higher ed institutions called "Blackboard Learn" (see Illustration 2, above) that has significant overlap with Sakai in terms of low-level functionality, but there is not one term that they give to the whole

package. On their public website they do not call their product a "Virtual Learning
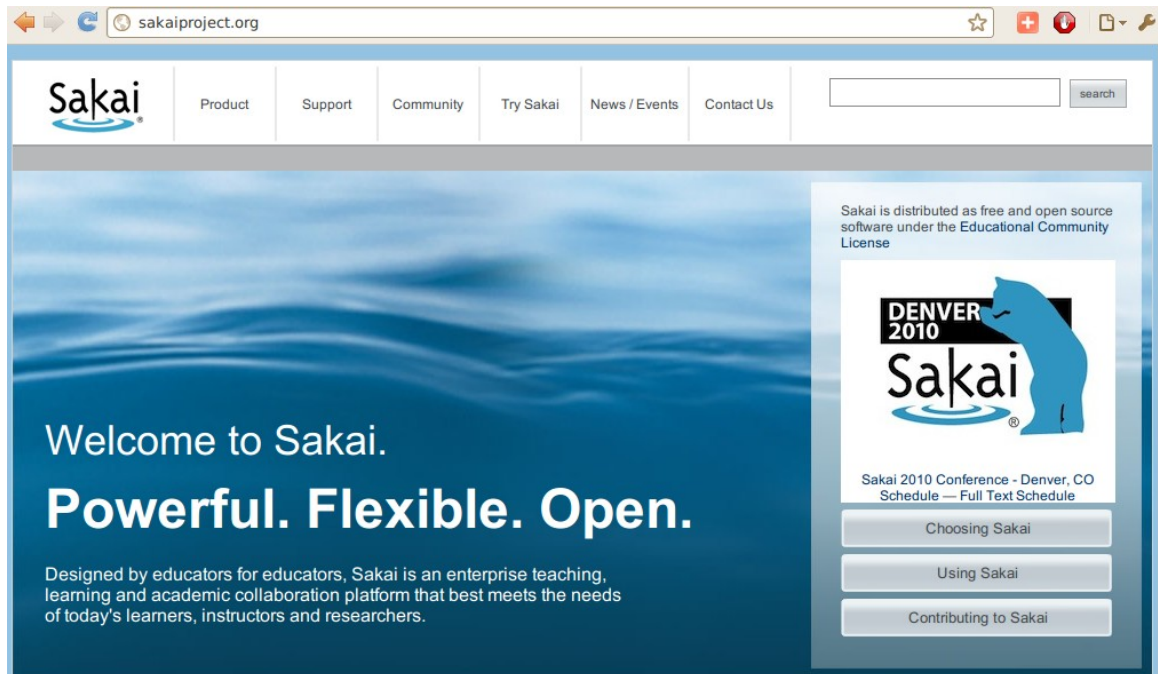
Illustration 3: Sakai website screen capture

Environment" or "Collaborative Learning Environment" or anything else, for that matter. They refuse to be classed, but instead have functional areas listed: Course Delivery, Content Management, Community Engageme[nt], and Outcomes Assessment. Note also the image they use under "Course Delivery" on their site: a white-haired professor in a lecture hall with a cloud of colorful "+" symbols floating out from his the hand with which he is emphasizing a point. Presumably these symbolize the digital value-add to the face-to-face core of the course.

Compare this to Sakai's homepage (Illustration 3): abstract blue water with large, bold adjectives: "Powerful. Flexible. Open." Below this a succinct statement: "Sakai is an enterprise teaching, learning and academic collaboration platform that best meets the needs of today's learners, instructors and researchers." This is rather radical in terms of how little it presumes about who will be using it and how. At the same time we might complain that Sakai is trying to be all things to all people by being intentionally vague. Earlier we complained that Course was vague and broad; we might

easily level the same complaints against "learners, instructors and researchers." Perhaps this vagueness is both intentional and good, since it allows for Interpretive Flexibility.

What terms have people chosen to use when studying software such as Sakai, Moodle, and Blackboard? When shopping for it? When building it? What can we learn from the way people describe this software? Do different people describe the same software (Sakai) in very different terms, perhaps because they see very different things when they look at it?
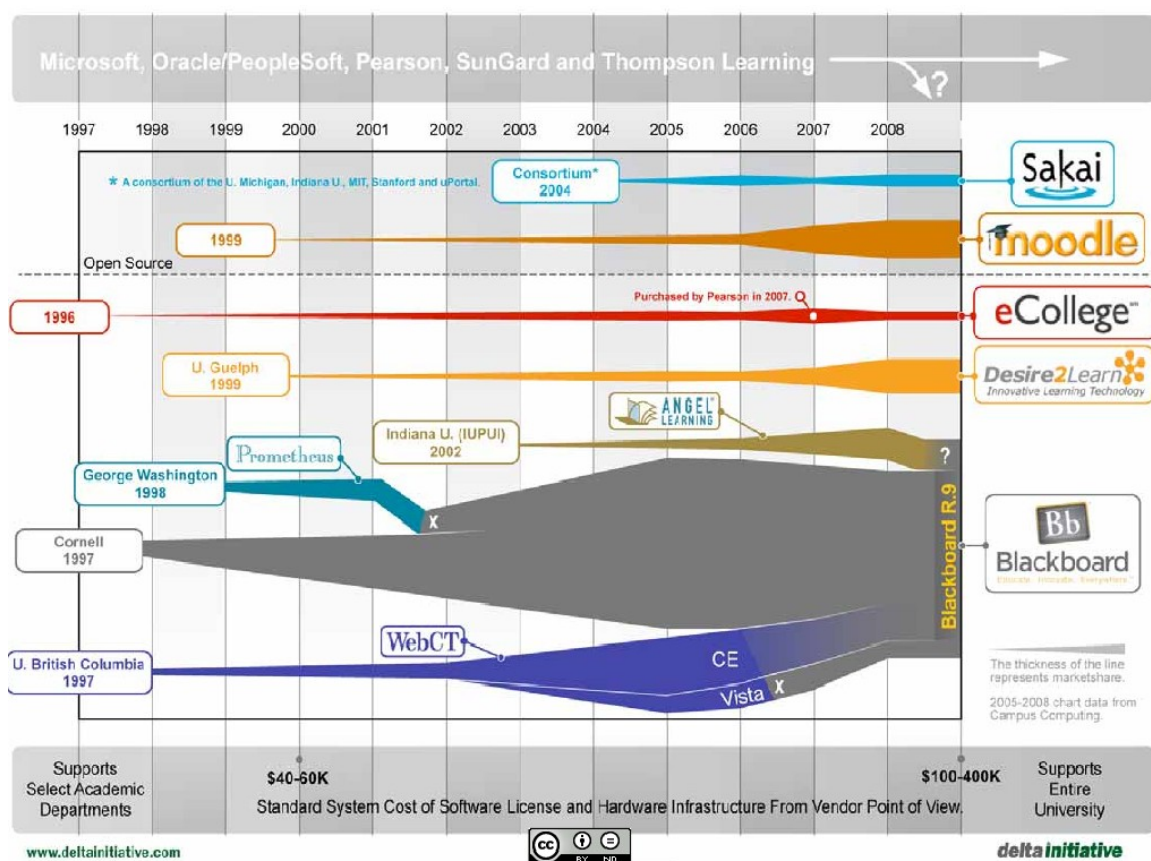
Illustration 4: Delta Initiative LMS timeline

In the next section we will review the existing literature, including literature on systems like Sakai. First we have a brief reality check. The market for VLE/LMS software is very heavily skewed. If you are an employee at an institution that you know is going to need significant outside expertise to implement and maintain your VLE/LMS

(or migrate from an existing LMS to a different one), Illustration 4 above may come as a shock. It comes from a presentation ("webinar") given by the Delta Initiative (DI), a consulting firm based out of Illinois (Hill, Langstaff, & Fernandes, 2009).

DI did not identify any LMS projects that started after Sakai began in 2004, and they highlight Blackboard's acquisition of WebCT and Angel, along with the rocketing licensing costs for the commercial offerings. They also call attention to the stagnation in growth for Open Source systems from 2008 to 2009, but hypothesize that major Student Information System (SIS) players may step into the LMS market, causing another shift. The elephant in the room is the massive Blackboard install base, which dwarfs all the other offerings. Moodle is in second place, but DI rendered it at less than a fourth of the size of Blackboard's total.

With these market realities (from Summer 2009) in mind, we turn to the Literature for more guidance.

Literature Review

SCOT and Multiple Case Study Analysis

Social Construction of Technology is a variety of Social Constructivism, a sociological approach to the development of technologies that has been popular since the 1980s. It is an approach rooted in the work of diverse Philosophers such as Kant, Hegel, Lukács, and Marx (Dusek, 2006, p. 198).

Beyond the philosophical underpinnings, SCOT as presented by Bijker provides a framework for sociological analysis of a technology. For a successful technology, the success is not an explanation but rather something to be explained, since a technology cannot have inherent superiority if it is socially constructed—what we are after is its sociological significance, its social superiority. This ensures a **symmetric focus** on success and failure of technologies (Bijker, Hughes, & Pinch, 1987, p. 24). It is also important to explain the **interpretive flexibility** of technologies in question. Bijker's classic example of interpretive flexibility is the bicycle:

> The bicycle case showed that the development of technical designs cannot be explained solely by referring to the intrinsic properties of artifacts. For example, the high-wheeled Ordinary was at once a dangerous machine, prone to failure in the marketplace, *and* a well-working machine that allowed highly skilled physical exercise, resulting in a commercial success. I showed that this double character could be clarified by looking at the alternative bicycle designs through the meanings attributed to them by relevant social groups (Bijker, 1995, p. 270).

In our cases, Sakai may be an LMS for one institution, while for another it simply provides e-portfolio tools, and another system is used for course management.

Stake (2006) provides guidance on methods, detailing how social science researchers, especially education researchers, might conduct a multiple case study. In a multiple case study, there is a **quintain**. This is a group, category, or phenomenon, and all the individual cases are selected because they are examples of or otherwise help us to better understand the quintain. Stake's cases are country reports for the Step by

Step program, an early childhood education project. Stake presents several country cases and separately gives us a cross-case report. Similarly, we will look at individual cases of Sakai pilots and deployments, later presenting a cross-case summary.

VLE and LMS literature

Research involving systems like Sakai can be found spread across CMC literature, education literature, management literature and other disciplines. We take *Online learning* (Dabbagh & Bannan-Ritland, 2005), which takes an education perspective, as our starting point and branch out, tying the literature to Sakai and giving more background on Sakai where possible. Dabbagh gives us the following categories for "online learning" research: asynchronous vs. synchronous learning, interactivity, online learning communities, hypertext and hypermedia, web-based instruction, student perceptions of online learning, and faculty and instructor perspectives (2005, p. 68). With each of these, the summary and emphasis are on effective instructional strategies suggested by the literature. In the case of of asynchronous learning, for example, a suggested strategy is to "Use asynchronous tools such as issue-based forums or debates and comment labeling for deeper discussions" (2005, p. 75). This and much more of the advice in Dabbagh is platform-agnostic; it could be implemented with the forum tool in Sakai, a similar tool in another VLE, or with an independent forum tool or service.

By contrast the section on synchronous communication cites Chou (2001), which singles out WebCT (purchased by Blackboard in 2006) as having had initially poor reviews by students, with impressions of the tool improving with use, such that one of the suggested instructional strategies is "Teachers must provide time for students' adoption of a new instructional system" (Dabbagh & Bannan-Ritland, 2005, pp. 77-79).

Tu makes the connection between social presence and social learning theory, and in the process lists the factors of social presence as social context, on-line communication, and interactivity (2000, p. 34). Dabbagh highlights interactivity as the key factor impacting instruction, and while both Dabbagh and Tu acknowledge the

importance of social presence in online learning, only Dabbagh (leaning on McIsaac et al. 1999) suggests "providing face-to-face opportunities before meeting online" as necessary (2005, p. 83). Kreijns et. al. (2003), by contrast, in their list of strategies to avoid the "pitfalls for social interaction in computer-supported collaborative learning environments," list interactivity and social presence separately, but note that their categories are not necessarily independent (2003, p. 346).

Kreijns goes on to caution that the lack of social interaction negatively impacts the learning outcomes we may have hoped for from our collaborative learning tools. They may be based on social construction of knowledge and competence-based learning principles, but the "lack of social interaction is due to the assumption that social interaction will automatically occur because the environment permits it," and our forgetting that people "are looking for affiliation, support and affirmation," or in other words: community (2003, p. 349). This connects nicely with Dabbagh's section describing research on online learning communities, which touches on issues of social support, bonding, and (without framing it explicitly this way) regular social grooming that will prevent online learners from "fading back" away from the community that is necessary to have a successful course (2005, pp. 84-87).

It is worth giving a brief nod at this point to the flaws in "community" as a model, since our immediate goal is to effect mobilization of social relations in support of learning outcomes, not to build a community for its own sake. Furthermore, Latour (2005) would caution us that we risk making "the social" some ephemeral other with explanatory power, some force distinct from the technologies (software, pedagogical, organizational) rather than critically examining the associations at play. Postill (2008) suggests:

> The concept of 'social field' [is] one possible way of overcoming the community/network impasse. Put simply, a social field is a domain of practice in which social agents compete and cooperate over the same public rewards and prizes (Martin, 2003). One advantage of 'field' is that it is a neutral, technical term lacking the normative idealism of both public sphere and community (2008, p. 418).

Postill uses this framework to examine a Malaysian suburb (notably discussing a web forum focused on that suburb), and finds that, "In common with countless people around the globe, they are appropriating internet technologies selectively for specific purposes" (2008, p. 427). Whether we use a "social field" or an "online learning community" as our model, Postill and Latour remind us to re-evaluate those models as we examine a particular milieu.
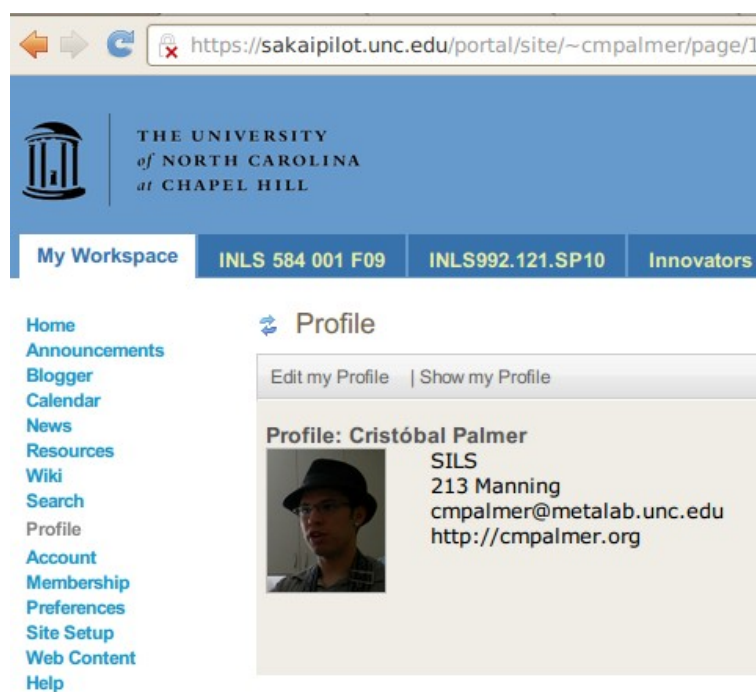
Illustration 5: Profile tool in Sakai

Sakai offers instructors and administrators a variety of tools to help promote social presence, interactivity, and promote social bonding and grooming. Two tools that we can focus on briefly are the Profile tool (Illustration 5) and the Discussion Forum tool (Illustration 6). Some institutions (such as UNC Chapel Hill) make the ID card pictures (which are stored in the SIS) of students on the class roster available to the instructor for every class. If system administrators set up the necessary links between the SIS and the VLE, the students' Profile tools could be populated with these pictures, such that the entire class would have access to them. The Profile tool also allows for the uploading of an arbitrary image, which allows for more personalization

and expression, though in personal communication with administrators at the UNC School of Medicine, it came to light that some faculty were concerned that this would undermine the expectations of professionalism they had for their students—or perhaps wanted to project onto them. Since Sakai is an Open Source product, it is possible to explore the disabling of the feature that would allow students to alter their profile pictures without any need for interaction with a vendor. Students would still be able to list other information such as email address, website, phone number, and arbitrary text.

The Discussion Forum tool in Sakai (http://www.etudes.org/jforum.htm) was developed by a Brazilian (Rafael Steil) and integrated into Sakai by Etudes. It takes the popular phpBB interface and makes it available as a java package that can be added as a tool in a a Sakai site. This is rather remarkable: a popular php-based forum tool was

Illustration 6: Discussion Forum tool in Sakai

ported to Java by a Brazilian, then further ported to work with Sakai 2.5.x by Etudes staff with funding from The William and Flora Hewlett Foundation and from the California Community Colleges Chancellor's Office. This tool, then, is an asynchronous communication tool that in addition to being used to submit reading responses (and

other similar uses) can be used for social support, building shared meanings, etc. The forum pictured in Illustration 6 was for a graduate course with in-person class meetings multiple times per week. Note that the class was divided into five groups for an assignment, and each group was required to post its summary to the forum under the "Discussion of Garcia…" section. There were no responses from students to these posts. That is, it was merely used to submit work, with no student replying to any of the summaries. Contrast this with the "Student Lounge" section of the forum, which saw 64 messages across 40 topics (right-most columns in the image).

Returning to the literature, we have already mentioned Weller (2006), which analogizes plant succession that alters the environment to make it more hospitable for other species to VLEs such as WebCT that open the door for a new generation of VLEs— VLE 2.0 as Weller calls it—such as Sakai or Moodle. We borrow Weller's VLE 2.0 concept diagram to aid in a brief explanation.

VLE 2.0 leans heavily on concepts from Software as a Service (SaaS) and Open Source. We've already seen how the Forum tool is a reusable component; all Sakai tools are designed this way. This is also an example of lightweight programming, in which features are "loosely coupled, rather than

Illustration 7: The VLE 2.0 Concept from Weller (2006)

tightly integrated" (Weller, 2006, p. 104). Harnessing collective Intelligence and Students as co-creators are both very much Open Source principles, but not simply Open Source *Software* principles. As Weller points out, Wikipedia is an excellent

example of a project that uses this principle to great effect. He also emphasizes that a 2.0 VLE need not be licensed with an Open Source license, but it must follow principles of Open Architecture, ie. guaranteeing that functional parts are based on standards and are therefor interchangeable. We discussed personalization above, so lastly we focus on continual updating, or as Weller calls it, the perpetual beta. Say for example a newer, better Forum tool were to be built. A university operating under this model might make it available to a limited number of students or classes (eg. a class within the School of Medicine), and after confirming that it works as expected, it would fully replace the old Forum tool for all students.

Ozkan and Koseler (2009) propose a six-factor assessment model they call HELAM (**h**exagonal **e**-**l**earning **a**ssessment **m**odel) and an associated survey instrument that they validated as a measure of student satisfaction with U-link, the VLE developed in-house at Brunel (in the UK) in 1999, which they still use and maintain. Their six factors were: (1) system quality, (2) service quality, (3) content quality, (4) learner perspective, (5) instructor attitudes, and (6) supportive issues. Again, note that while instructor attitudes is a factor, their instrument was validated as a measure of learner satisfaction only. Interestingly, the Delta Initiative also used a six-factor model in discussing LMS adoption, though they divide their model into two major areas: educational practice and support structures, with three factors in each (Feldstein, 2009).

Chang (2008) examined faculty perceptions of Blackboard at Ohio University. This research was divided into two quantitative research questions and a free response section. While there were problems (such as low response rate) with the quantitative portion, there are valuable analysis and findings, along with enlightening quotes from faculty. For example, the gradebook feature as one of the most convenient and most used (72.9% of respondents used the gradebook), but at the same time many faculty members complained that the gradebook lacked sophistication, for example by not allowing an instructor to use only the top 5 quiz scores out of 6 quizzes (2008, pp. 211, 217).

Tu and Corry (2003)

Continuing with the theme that increased interactivity improves learning outcomes, Northrup uses Moore's theory of interaction as a starting point in "A Framework for Designing Interactivity into Web-Based Instruction" (Rossett, 2002, p. 127). Sakai provides various tools that, combined with the best practices articulated in the literature, promote better learning outcomes, but how well are instructors and learners putting these tools to use? How does their use compare with use of Moodle, Blackboard, and other tools? Since our focus is on Sakai, and especially on publicly-available information about its use, these questions are left to future research.

For now the conclusion that we can draw from the literature is that a classroom model of instruction is the focus of research on improving learner outcomes. That is, even when distance learning is the focus, the models for improving outcomes do not yet discuss innovations such as ePortfolio extensively. Instead, experiences in distance education and blended learning are sharpening the focus on concepts variously referred to as LMS, CMS, and VLE. This becomes relevant again as we look across all our cases for patterns in Sakai success and failure. First we turn to a discussion of our research methods.

Methodology

This is a multiple case study roughly in the vein of Stake (2006), with the quintain being institutions that are using or have piloted Sakai. Cases, therefore, were not chosen by random sample, nor because they were assumed to allow coverage of cells in our typology, but rather because they "seem to offer the opportunity to learn a lot" and were highly accessible (2006, p. 25). Having said this, the cases chosen give us diversity in some key ways. For example, there are large and small institutions, public and private, and successful deployments along with a college that chose not to deploy to production after a pilot of Sakai. We set out to be more descriptive than scientific, then, but still with the goal of making meaningful generalizations about the quintain—Sakai deployments and pilots—in the end.

Beginning with a convenience sample of institutions that are using or have at least piloted Sakai found on the Sakai Project website, we collected data on 98 institutions, most of which were colleges or universities, and some of which were sub-units of others. For example, Scripps College is one of the colleges in the Claremont Colleges Consortium. Data collected include approximate student population, religious affiliation or lack thereof, public/private status, whether the institution is a member of a consortium, whether the institution is in the United States of America, the status (live or not) of the Sakai instance, and publicly-available statements about use of Sakai at the institution.

Student population is collected as a loose proxy for Sakai deployment size, but just as importantly to explore whether institutional size plays some role in how the institution characterizes its use of Sakai. Put another way, are large Sakai deployments and small Sakai deployments fundamentally different things?

Religious affiliation may play a minor role at an institution, or it may be more all-encompassing and integral to its function, such as Abilene Christian University.

Colleges and Universities (such as Columbia—formerly King's College) which long ago had religious connections or seminaries were not described as having a religious affiliation. If a separate seminary was closely related but not part of the institution (again, see Columbia), it was not listed as having a religious affiliation. In short, if the institution has a seminary and lists its religious affiliation (eg. with a Christian denomination such as the Churches of Christ in the case of Abilene) prominently, it is considered to have a religious affiliation for the purposes of our study.

Large state land grant colleges and small private liberal arts colleges in some ways have very different needs. We have already tried to account for size as the difference. What about public vs. private? We use this in the American sense of the term, meaning that a college or university is only listed as public if it receives a significant part of its budget from a state appropriation, its facilities from a land grant, etc. While making this determination can be slightly problematic, especially for institutions outside the US, in the vast majority of cases deciding whether to call an institution public or private was an obvious choice. Similarly, determining whether an institution was a member of a consortium for the purposes of this study was at times problematic (see limitations below), but some very clear-cut examples of consortia such as the Claremont Colleges and ETUDES merit more detailed analysis. Here we will use the Claremont Colleges as one of our cases.

Having gathered publicly-available data, we set whether Sakai is running as the dependent variable. Assuming independence of the other data and using the R statistics package, we state the Null Hypothesis that none of our independent data account for a significant percentage of the variance in the dependent variable. We build all possible models (31 in total) and build an AIC table to determine the model with the best goodness of fit. We find that the best model accounts for only 21% of the variance of the dependent variable. We have failed to reject the Null Hypothesis, and decide that (this particular) quantitative analysis alone was insufficient to provide meaningful insight into Sakai use and its interpretive flexibility (See Appendix 1: tabulated data, Appendix 2: script for processing with R, and Appendix 3: results of R processing for full

details). The data still offer an opportunity to perform multiple case study analysis as described by Stake and Eisenhardt. We present the case studies below.

Results and Analysis

Charles Sturt University

About CSU

Charles Sturt University (CSU) is a public, multi-campus university in Australia with approximately 30,000 students. The Distance Education website says that

Illustration 8: CSU Interact site, About Sakai page

approximately 21,000 students take distance courses, but it is not clear to what extent this number overlaps with the 30,000. The nine campuses are located in New South Wales, the Australian Capital Territory, Ontario (Canada), and Victoria.

Sakai at CSU

CSU calls its Sakai deployment **CSU Interact**, and they take the time to explain both what Sakai is and why it is good for the University. It is worth quoting the *about* page at length:

> CSU Interact is the name given to CSU's scholarly online environment for research and collaboration as well as learning and teaching. The technical framework used for this environment is known as Sakai.

> CSU implemented Sakai as the framework for our online learning environment. Sakai is a type of open source system called community source, which provides a collaboration and learning environment to meet the needs of higher education. Sakai's framework can support a wide range of collaboration tools which can be mixed and matched to suit the needs of the particular scholarly environment in which it is deployed.

I want to draw attention to three major points in this description. The first is the repetition of the words collaboration and environment. The second is the time spent explaining the general class and more specific class of license (and linking to Wikipedia for further explanation). The third is the phrase "mixed and matched," which emphasizes flexibility. Note that so far there is no mention of cost or contract with an external support entity. The emphasis on licensing is an indication of the level of engagement of CSU staff in Open Source development, and engagement in the sakai-dev mailing list by Matt Morton-Allen is even clearer evidence of this ("Removing the login button," 2006). Returning to the *about* page, we see that after pointing to some large, notable institutions that also use Sakai, we are given the following explanation and bulleted list of benefits:

> As a community source approach, Sakai offers many benefits to the University, including:
>
> - Interaction with a growing community of wide-ranging perspectives from learning and teaching, technical and research areas
> - Ability for customisation, further development and enhancements meeting the unique requirements of CSU
> - Consistency in user interaction within the environment including the interface, navigation, communication and appearance
> - Intuitive to use hence minimizes training and support
> - Facilitate access for those with disabilities
> - The ability to use more integrated online teaching and recording of data
> - The ability to bring together content, resources and services into a seamless interface
> - Reusability of learning objects (import/ export objects)
> - Provision of a collaborative environment within the University for researchers

Again, note the emphasis on priorities that largely align with Weller's (2006) VLE 2.0 framework. For CSU, then, Sakai brings with it the opportunities for reusable content and components, collaboration tools that can be used just as easily for research collaboration as for teaching and learning, and the flexibility of a lightweight programming model.

Beyond this introductory *about* page, there is also a Microsoft Word document (.doc) prepared by Mr. Morten-Allen for a working group which consisted of a Library Services representative, a representative from the Center for Research and Graduate Training (CRGT), a Student Services representative, a representative from the Center for Enhancing Learning and Teaching (CELT), and finally Mr. Morton-Allen from the Division of Information Technology (DIT). The document describes the conclusions of the requirements-gathering phase for CSU Interact (Morton-Allen, 2007). The document divides the requirements into Overarching, Research, Collaboration, Learning and Teaching, and finally Organizational and Professional Development. From the start, then, CSU was focused on identifying or building a VLE solution that promotes a collaboration, but this is not seen necessarily as having to do with teaching. That is, "collaboration" is not a shibboleth indicating CSU as an institution puts an emphasis on constructivist learning.

The specific requirements were that the Overarching system allow for `Integration`, eg. a research project might be part of a course site; that the system have `Consistency` in appearance and functionality; that the system be `Silo-less`, ie. that it not reinforce organisational boundaries but rather allow users to more easily span them; that the system promote `Ad-hoc` usage; and finally tha there be a `Single point of access`.

When discussing research more specifically, CSU wanted `Remote Access`, a `Secure` space for sensitive materials, and a `Slight learning curve`. The two requirements to promote collaboration were that the system provide for `Discoverability` of people and sites, and that it promote the `Transferability` of materials.

CSU's large Distance Education program depends heavily on CSU Interact, so the Learning and Teaching section is broken out and given to a separate group to manage.

As with all Sakai deployments, an administrator has chosen which of the many core and community-contributed Sakai tools to enable for use in Sakai sites (see

Illustration 9). Notable tools include EASTS, a CSU-developed Electronic Assignment Submission Tracking System. This custom development is one indicator of CSU's commitment to Sakai as a platform for future growth and development, but for a a better window into that commitment, the reader is directed to review the many presentations made available on the AuSakai 09 Conference website. CSU hosted the AuSakai Conference at its Bathurst campus, and 20 of the presentations at the

CSU Interact Tools

CSU Interact became available to the CSU community in January 2008.

The tools that are available in *CSU Interact* subject sites are:

Fixed Tools (appear by default)	Elective Tools (can be selected)
Announcements	Blog
Forum	Calendar (= "Schedule")
EASTS	Chat Room
Evaluation	OASIS
Subject Outline	Group email
Home	Modules
My Workspace tools	News
Presence	Polls
Resources	Site Stats
Site info	Test Centre
	Web Content
	Wiki

The following tools are not at use at CSU in 2009:

Not for use at CSU in 2009	
Agora	Assignment
Discussion	Drop Box
Forums	Grade Book
Messages	Post 'Em
Page Order Tool	Roster
Profile	Profile2
Section Info	Syllabus
Podcasting	Search

These choices as well as more information on the categories and the categorisation of the tools are explained in the Tool Selection Recommendations document (.pdf).

Illustration 9: Sakai tools at CSU screen capture

conference were from CSU employees (Charles Sturt University, 2009).

Summary

Charles Sturt University is a large public, multi-campus university that has heavily invested in Sakai. It has hosted a Sakai conference and developed a Sakai tool, EASTS, to meet its specific needs. CSU brought together stakeholders from the Library, IT, Student Services, and other parts of the organization to specify their VLE needs, and their articulated needs closely match the VLE 2.0 concept articulated by Weller (2006). Sakai is an excellent example of software that lives up to this concept, so it is no surprise that Sakai has been a big success at CSU.

Claremont Colleges Consortium

About the Claremont Colleges

The Claremont Colleges include five undergraduate colleges (in order of founding: Pomona, Scripps, Claremont McKenna, Harvey Mudd, and Pitzer) and two graduate institutions: Claremont Graduate University and the Keck Graduate Institute. The "Claremont University Consortium" is a separate entity and "the central coordinating and support organization" that provides financial services, facilities management, and other services to the campuses (Claremont University Consortium, 2009). The loosely-affiliated Claremont School of Theology shares some resources with the consortium and was considered part of the consortium for purposes of data analysis, but is not an official consortium member.

Collectively, the Claremont Colleges have approximately 6,000 students. They share a library system, athletic and other facilities, and can cross-register, but the Colleges retain an independent identity. Harvey Mudd, for example, is known for its Engineering program, while Scripps is a women's college.

Claremont (the city) is approximately 33 miles East of downtown Los Angeles, California. All of the five Undergraduate colleges are in a walkable cluster, while the Keck Graduate Institute and the Claremont School of Theology are located a few blocks away in different directions.

Sakai at Claremont

Sakai is provided to all the colleges at sakai.claremont.edu, but staff at Harvey Mudd are primarily responsible for provisioning, maintenance, and Tier 3 support. While Harvey Mudd has played and continues to play a lead role, other institutions in the consortium have made major contributions, so it is worth examining the statements made by each of the institutions about Sakai on their websites, along with statements made by staff about the use of Sakai across all the colleges.

At the July 2009 Sakai conference in Boston, a group from the Claremont Colleges presented "Sakai at the Claremont Colleges" (Hodas, Royas, McMahon, Dean,

& Roig, 2009). The group was: Elizabeth Hodas (Director of Educational Technology and Media Services at Harvey Mudd), Benjamin Royas (Instructional Technology Specialist at Claremont McKenna), Mary McMahon (Director of Instructional Services at Pomona), Jezmynne Dean (Science Librarian), and Susan Roig (Director of Academic Technology at the Claremont Graduate University).

In the presentation Hodas explains that Sakai started as a pilot at Harvey Mudd in 2005, and by Fall 2006 it had `replaced WebCT` at all of the Claremont Colleges. (It is worth mentioning that Blackboard purchased WebCT in 2006, having announced an intended merger on 12th October 2005.) Hodas further explains that course sites are created automatically for all courses at the Claremont Colleges, and that registered users can create project and portfolio sites. Claremont even grants their registered users the permission to create guest accounts on the sites they own. As mentioned, Harvey Mudd provides Sakai hosting and support for all the campuses, but tiers 1 and 2 on the other campuses are handled locally. For example, Mr. Royas tells us that reports of login failures by Claremont McKenna students are fielded by tier 1 staff within that school, and at that school guest account creation is handled by tier 2 support. His examples tier 3 issues include "Academic dishonesty/data verification."
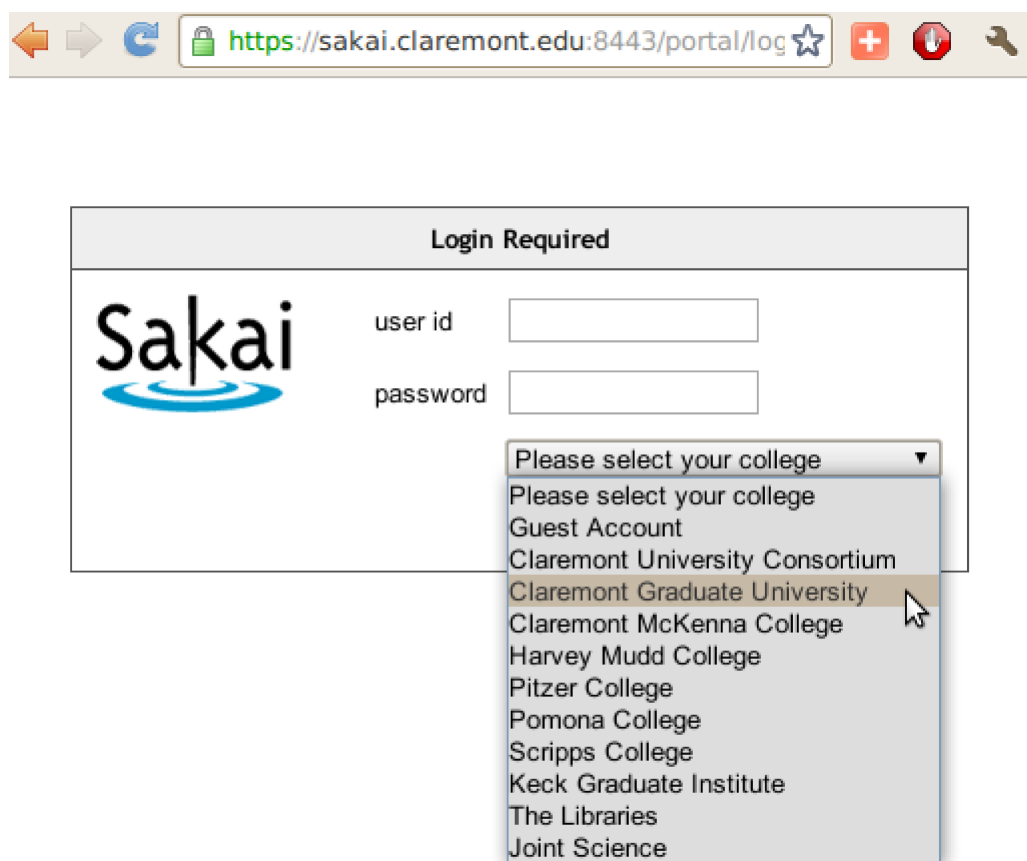
Illustration 10: multi-campus login screen at Claremont

When Sakai was first implemented across the campuses, a **Sakai Implementation Team (SIT)** was convened with a member from each of the member institutions and one more from the Libraries. After the successful implementation, the team was renamed the Sakai Administration Team (SAT), which continues to hold monthly meetings. The team is responsible for testing new Sakai tools and reporting on them, bringing bug reports and other concerns to the group, and votes on issues such as the default tool set on sites and timing of upgrades.

Ms. McMahon quotes an assistant Dean as saying that Sakai has improved confidentiality in handling Personnel matters, and she gives several other examples of **non-course use of Sakai**, including a physics and astronomy wiki site that tracks alumni, a site that acts as a repository for first year seminar curricular resources, and

even residence hall management. The major themes of use of Sakai by administrators are listed as: materials repository, de facto standard, ease of access, and communication.

Ms. Dene highlighted the (lack of) integration of electronic reserves and Sakai. Library staff deposit requested materials in a folder which the instructor has access to, but the instructor must then take the step of copying that material to the resources section of the course site. This avoids the "political issue" of library staff being given a level of access that would give them the ability to place resources directly into a course site resources folder, but at this level of service, it becomes more convenient for the instructor to simply download a PDF file and place it in the course reserves system, circumventing the electronic reserves system entirely, which creates copyright infringement concerns for the library. As an aside, in the period from 2002 to 2010 we have neither seen nor heard of a course that had an intuitive, seamless integration of E-Reserves and LMS.

Finally, Ms. Roig discussed ePortfolio at Claremont Graduate University, which at the time of the presentation was not yet live to all students.

Summary

Collectively, the Claremont Colleges are a medium-sized private University with no religious affiliation, while its member institutions are small undergraduate colleges, a graduate school, and a management and financial services entity. Investment in Sakai began at Harvey Mudd and was quickly expanded to include all member institutions. Governance in the form of a Sakai Implementation (later Administration) Team was established, such that stakeholders had a seat at the table from the very early stages. At the time that Sakai was chosen, the Claremont Colleges chose it as a replacement for WebCT rather than continue under the merged WebCT/Blackboard company, but since choosing Sakai, its use has expanded well beyond its initial LMS role. The member institutions are using it for ad-hoc collaboration, Administration functions, and ePortfolio, among other uses.

Columbia University

About Columbia

Columbia University in the City of New York is a large (26000 student) private, urban research university in Manhattan. Founded as King's College (1754) and affiliated with the Church of England, Columbia no longer has a direct religious affiliation.

Sakai at Columbia

Columbia began a Sakai pilot in 2006, which as of 30th December 2009 was listed on the Sakai Foundation tracker as having moved from a pilot url to a production URL, and a Sakai FAQ is available from CUIT (Columbia University Information Technology) which indicates Sakai is in production use, but there is a paucity of documentation, announcements, etc. from CUIT related to Sakai (Fleming, 2006; "[#PROD-57] Columbia University deployment data - Sakai," 2009; "Sakai Support," n.d.). This may be at least in part because **responsibility** for Sakai is **split** institutionally between CUIT and and the Columbia Center for New Media Teaching and Learning (CCNMTL), with CUIT handling implementation and CCNMTL handling front line faculty support ("CULIS Strategic Plan 2010-2013," 2010, p. 12; "Events | Sakai: Getting Started," 2010).

There is plenty of evidence in the archives of the Columbia Spectator that **funding** is a major factor in the drawn-out pilot (or perhaps now "soft launch" production system), with articles from 2008 and 2009 discussing the delay of the planned switch to Sakai from the existing Prometheus-based courseworks.columbia.edu system (Davis, 2009; Husk, 2008; Johnston, 2008). The University Library also explicitly mentions funding for Sakai in its strategic plan: "Partnering with CUIT, gain funding support to fully implement the Sakai course management system, replacing the aging Prometheus system currently used to manage courses across the University. Ensure that the Sakai installation meets faculty and library needs and provides a smooth transition from the old to the new system" ("CULIS Strategic Plan 2010-2013," 2010, p. 12).

As we saw in Illustration 4 above, Prometheus was purchased by Blackboard and terminated as a product in 2002, so Columbia has been maintaining it and adding

functionality for eight years. It is understandable that a transition from that system would be long, delicate and possibly bumpy, to the point that the migration is mocked by the informal CU wiki: "They expect this to take at least 5 years as of January 2007. The fact that by the time they implement an already old technology in 5 years will mean that Columbia will be close to a decade late in implementing technology around since 2002 has apparently been lost on everyone" ("Sakai - WikiCU, the Columbia University wiki encyclopedia," 2010).

Summary

Like Charles Sturt, Columbia is a large public University, but where CSU was heavily invested in Sakai, Columbia has not even customized the text on the "About Sakai" page, since its deployment has been continuously in a pilot phase since 2007. While responsibility for Sakai at CU seems to be split across organizational boundaries, there is no public evidence of a team with members from the various units that meets to plan and push forward Sakai implementation. The student newspaper and wiki report delays in deployment with distance and derision, with bright spots of excitement about Sakai's features fading into the increasingly distant past of 2008.

Graham and Charles Schools

About the Graham and Charles Schools

The Graham Family of Schools are institutions based in Columbus, Ohio that practice and promote experiential education for students from middle school through early college. Named for Russell E. Graham, a federal appraiser and later entrepreneur who never attended high school because he failed a qualifying exam, the Graham School is a public charter high school that opened in 2000 (The Graham School, 2010; The Graham School, n.d.). The Charles School is a public, tuition-free "five-year Early College High School in partnership with Ohio Dominican University" (The Charles School, n.d.). Students graduate from the Charles School with not only a high school diploma, but up to 62 hours of college credit. CELLT (Center for Experiential Learning, Leadership and Technology) is an entity that provides curriculum and IT support to the other Graham institutions and the world since it makes a commitment to both

Creative Commons and Open Source solutions: "CELLT releases all of its work under the Creative Commons attributions license so that any organization may use or redistribute any of our content (provided they attribute the original work to CELLT). Open Content is the future of education, and CELLT is proud to be a part of this open standard." (CELLT, n.d.).

Sakai at the Graham and Charles Schools

The Sakai instance for the Graham and Charles schools is hosted by the Longsight Group (a consulting firm that provides hosting for select Open Source products) and can be found at skills.cellt.org. These institutions have built an extensive **experiential learning** curriculum, so it makes sense that the **ePortfolio** tool provides the core for their use of Sakai, but is not the only tool that they use, as the introductory exercises also walk students through use of the Discussion Forum tool.

CELLT makes it clear in their materials that Sakai is an LMS, and compares it directly to Moodle, Angel (now owned by Blackboard), and Blackboard (CELLT, 2008, p. 31). Furthermore, CELLT teaches in this "Sakai Introduction and Review" document that the purpose of an LMS is classroom enhancement: "LM systems are powerful tools that can be used to enhance and document student learning and growth" (CELLT, 2008, p. 31). Both the Forum tool and the Profile tool are part of the exercises described in this lesson.

Illustration 11: Site search of CELLT Sakai instance showing no courses after Fall 2009

It is not clear that all is well with the Sakai deployment, however. As Illustration 11 below shows, there are no new courses in their Sakai instance after Fall of 2009. We cannot know why this is, nor whether new classes will appear when the Fall 2010 courses begin. It is possible, however, that TGS has abandoned Sakai. There is public evidence that would indicate they have abandoned it in favor of another LMS or no LMS.

While TGS has made use of Sakai for a range of its classes and for several administrative functions, observing the Sites Search results shows that each of these was created by hand. That is, there is **no integration with an SIS**, which is something we also see at Lagrange (this document, p. 41).

Summary

TGS is unique among the schools under study both in its strong emphasis on ePortfolio and in its population, which is mostly high school age. While the Charles School is an early college in partnership with Ohio Dominican University and therefore has needs similar to some liberal arts colleges, it deals with students starting at 9th grade and at a smaller scale than most colleges. With the support of the Longsight group, TGS was able to deploy Sakai and use it as their primary LMS and ePortfolio platform. It is not clear whether there use will continue, however, since there is some evidence that Sakai has not been used at TGS since Spring 2010.

Hiram College

About Hiram College

Located in Hiram Ohio, Hiram College is a small (1500 student) liberal arts college founded as the Western Reserve Eclectic Institute by the Disciples of Christ (Hiram College, 2009a, 2009b). The "nonsectarian and coeducational" Hiram College today boasts of high acceptance rates to medical schools, both a nearby field station and another on Michigan's upper peninsula, and a marine lab in Maine (Hiram College, 2009a, 2009c). Hiram makes use of these field stations during three week seminar-style session. The traditional semester is split into a longer 12-week and a short 3-week session at Hiram. Hiram offers distance courses, but does not advertise them prominently (Hiram College, 2008).

Sakai at Hiram

Originally deployed on Sakai 2.3.x as http://courses.hiram.edu, that URL no longer loads (Whyte, 2007). There is evidence that Hiram was pulling in different directions with regard to Sakai at different times in the recent past. For example, an August 2009 help desk blog post declares "If you are class of 2012 or later then you will use a service called Live Text in place of Sakai because Sakai is being phased out" (McCarty, 2009). Sakai does not show signs of being phased out, however, as can be seen by searching for first year courses at its current home, http://lms.hiram.edu (Hiram College, 2009d; "Hiram College Course Server (Sakai) : Gateway : Welcome," n.d.). One

clue to this mystery is the fact that courses.hiram.edu still exists in DNS, and the IP that it points to is not within Hiram's IP range, but is a Global Crossing (a colocation provider) IP address. The new home at lms.hiram.edu does point to an IP address under Hiram's control, however. This suggests that Hiram originally **outsourced** (at least some portion of) their Sakai deployment, but for some reason was unsatisfied with the deployment and for a period of time considered changing LMS software completely, but instead changed their hosting arrangement.

A follow up interview with Hiram staff is warranted and would likely yield insights into possible problems with Sakai deployment and their workarounds. It would also reveal to what extent the effort to switch away from Sakai had to do with Sakai failing to meet some set of internally-articulated expectations of what Sakai is and does.

Summary

Hiram College is a small liberal arts college that uses Sakai as its primary LMS. While in the Fall of 2009 Hiram staff expressed that the college was moving away from Sakai, exploration of the Sakai instance indicates that it is still being actively used for first year classes. There is not publicly-discoverable evidence that Hiram has invested heavily in the Sakai development community, and yet deployment of Sakai seems to have momentum that carries it forward.

Hebrew Union College—Jewish Institute of Religion

About HUC-JIR

Hebrew Union College is a private religiously affiliated institution with four campuses: Cincinnati, New York, Los Angeles and Jerusalem. It is both the oldest Jewish seminary in the Americas and the only seminary for Reformed Judaism in Israel. They describe themselves as "Intellectual, academic, spiritual, and professional leadership development center[s] of Reform Judaism" (HUC, 2010).

Sakai at HUC-JIR

The consortium-wide deployment of Sakai may in part be a reflection on HUC-JIR's progress toward more coördinated planning an action in areas that affect all campuses, which would have been motivated in part by findings from an accreditation report:

> One of the unique challenges this institution confronts is related to data gathering and the sharing of information among the New York, Cincinnati and Los Angeles campuses. It appears that although they are one institution, they function together in some departments but quite separate in others. It appeared that the Cincinnati office controlled the recruitment and admissions data and had not disseminated it to the New York staff. There was also no evidence of a written strategic plan, annual plan, five-year plan or a financial plan (HUC, 2002).

Given the above and other such reports, it makes sense that HUC would explore a low-cost, 3rd-party hosted LMS, but this is not sufficient to explain why they chose Sakai. Exploration of HUC-JIR's process of selecting Sakai shows, for example, that cost was a minor, implied factor in the decision.

Many successful deployments of Sakai included a **blog** that tracked the selection and pilot phases. HUC-JIR is one such institution, and the second blog post in their blog gives us insight into their framing of Sakai and is worth quoting at length:

> HUC-JIR's decision to adopt the Sakai platform reflected practical, technological and ethical concerns. These concerns are reflected in our choice to become an active member of a vibrant and diverse community of higher education institutions, rather than just a client of a commercial product. Sakai is being created and managed by an international community of 100's of major universities including Stanford, UC Berkeley, Indiana, Michigan and MIT, just to name a few. While not all of the tools within Sakai are as mature as those in commercial products such as Blackboard, we are convinced that, in the long run, the Sakai platform will continue to grow and surpass any other commercial or open source product currently available. The Sakai community is designing its 3.0 release which will be a major step forward in innovation, flexibility and user-based design. Although Sakai requires no license, we have also chosen to operate Sakai in partnership with a commercial vendor in Arizona who is focused solely on servicing the educational community and also has expertise in the development of ePortfolios, which is a significant aspect of HUC-JIR's long-term plans (HUC, n.d.).

The most interesting thing about this explanation of Sakai and why it was chosen is the assertion (without elaboration) that there are **ethical concerns** that Sakai satisfies. It would be interesting to know whether HUC-JIR avoids elaboration out of legal concern or because they believe (for example) that the ethical benefits of Open Source Software and Creative Commons licensed media are obvious. Since it is framed negatively, perhaps the concerns involve the Desire2Learn patent suit (settled in 2009) or one of several Blackboard acquisitions.

The Arizona-based commercial Sakai vendor referenced in the quote is rSmart, who began hosting the HUC-JIR instance on Sakai 2.5.1 in early 2008 (Whyte, 2008). Despite starting on and continuing with a Sakai instance hosted by a third party, HUC-JIR identifies itself an active member of the Sakai community. After identifying key members of that community, HUC-JIR bets on a more collaborative, coöperative future. Note, then, that HUC-JIR has not focused on one particular aspect of Sakai (eg. Its licensing), but rather has sounded a generally hopeful note based on a collection of factors, including a broad view of Saka's role: "The Sakai CLE, which is currently providing support for on-site courses, projects and programs, will also serve as our learning space for online and hybrid course development" (HUC, n.d.).

Summary

Hebrew Union College—Jewish Institute of Religion is a consortium of small geographically diverse college campuses. Despite their distance and limited resources, they were able to engage rSmart to provide Sakai for all the campuses. It is also clear that HUC-JIR views this engagement as a collective investment in the future of higher learning technologies that aligns with their goals and identity as an institution. For them it is not simply a cost-saving measure.

Abilene Christian University

About Abilene Christian

A mid-sized (approximately 5000 student) private university located in urban Abilene, Texas, ACU has an extensive page on their commitment to and relationship with the Churches of Christ. They have not only undergraduate and graduate programs

in ministry and theology, but a required daily chapel and "All faculty, staff, administrators and members of the Board of Trustees are Christians." (Abilene Christian University, 2001, 2009a, 2010c).

ACU is primarily an undergraduate teaching institution, boasting of high acceptance rates to law and medical schools elsewhere. It has 25 master's degree programs, but only one doctoral program: Ministry (Abilene Christian University, 2009a). In Computer Science and related fields ACU only offers undergraduate degrees, but it gained press attention for a technology decision in 2008: giving iPhone and iPod touch devices to incoming freshman (1105 Media, 2008). The timing of this mobile learning project may help explain the failure of ACU's Sakai pilot.

Sakai at Abilene Christian

ACU began a Sakai pilot in June 2007, and the domain name (eportfolio.acu.edu) makes it abundantly clear that ACU was exploring Sakai **not as an alternative to the LMS** it had been using since 2002—Blackboard—but for the very limited use of the popular **ePortfolio** tool. Just a few months earlier in April of 2007, ACU had held the first meeting of what would become the mobile learning initiative (Abilene Christian University, 2009b). While there are no updates to the Sakai project entry for ACU past October 2008 and the eportfolio.acu.edu host no longer responds, the mobile learning initiative has grown, including additional press coverage and a $1.8 million award from AT&T toward expansion of the program (Abilene Christian University, 2010b; McCrea, 2010).

ACU's investments in **mobile learning** also include hosting ConnectEd 2009, a conference that exceeded their attendance expectations and included corporate attendees from companies such as AT&T and Blackboard (Abilene Christian University, 2010a). The relatively minor Sakai ePortfolio project simply lacked oxygen, so to speak. With the energy and funds directed at mobile learning, ePortfolio fell by the wayside.

Summary

Abilene Christian University explored use of Sakai only for its ePortfolio tool in 2007 and 2008, but never went beyond the pilot phase. Instead, ACU put

Illustration 12: Campus technology at ACU screen capture

its energy and resources into a mobile learning initiative centered on Apple's iPhone and iPod Touch products. ACU's LMS was and continues to be Blackboard.

Lagrange College

About Lagrange

Lagrange College, in Lagrange Georgia, is a small (1000 student) private liberal arts college affiliated with the United Methodist Church. In addition to its undergraduate curriculum, Lagrange offers Masters degrees in Education and Organizational Leadership. The Organizational Leadership program is offered from the Albany Georgia campus, some 130 miles South of the Lagrange campus (Lagrange College, 2010).

Sakai at Lagrange

As with Claremont, Lagrange chose Sakai as a **replacement for WebCT**, but at Lagrange the public champion of Sakai is a **single individual**: the chair of the Biology, Chemistry & Physics department, Dr. Bill McCoy, who also spends time managing instructional technology for the college (McCoy, 2009). He has named their Sakai instance "Mentor", and has prepared videos, PDFs, and other materials to help students and faculty get started with Mentor.

Illustration 13: Lagrange Mentor workshop slide

Dr. McCoy spends much of a PDF slide presentation on Mentor (designed as an introduction for faculty) explaining the differences between Sakai and WebCT and giving a guided tour of common tasks such as editing which tools are available to a course site, uploading materials, and making the site "joinable" since at the time of the presentation there was **no SIS integration** (McCoy, 2008).

Early in the presentation, Dr. McCoy talks about what Sakai is. Here are his bullet points:

Sakai is :
- Open Source
- No fees or seat restrictions
- User/Developer supported
- Active international organization based in the US
- Originally funded by NSF
- Built upon the home-grown U. Mich.: CHEF
- Named for one of the first Iron Chef'sn [sic] Hiroyuki Sakai

Note the very second bullet point is about cost. This may have been related as much to the timing of the presentation, which was the middle of a financial panic in the Fall of

2008, as it was to any perceptions of what is most important about Sakai. Also note that where Claremont pitches Sakai as being supported by a list of well-known and well-respected institutions, Dr. McCoy focuses on its "home-grown" roots at Michigan.

Summary

Lagrange is a small liberal arts college with **one individual**, a multi-talented faculty member who manages course creation in Sakai and instructor training. Like other small institutions, Lagrange lacks integration of its Sakai instance with an SIS, but public documentation on their Sakai instance, Mentor, shows satisfaction. Unlike the institutions in several other case studies, Lagrange is not shy about emphasizing the lack of licensing **costs** associated with running Sakai, especially when the migration to Sakai is happening in the middle of a recession.

Discussion and Cross-case Analysis

While there were no predictive patterns found in the quantitative analysis, several themes emerge when examining the cases together. The first we have just mentioned: Student Information System (SIS) integration is often not implemented at small institutions. While tools are available for large institutions to connect Sakai and Peoplesoft (for example), many small institutions lack the large-scale SIS or the in-house expertise to connect Sakai to their SIS. Fortunately, for an institution of 1000 students or fewer, the burden on staff to create courses by hand is not too much to bear. It is not clear at what institutional size the management of courses by hand would become untenable, and this is likely an area of possible improvement for the Sakai project. Lower administrative burden may encourage more small institutions to consider Sakai.

Regardless of institution size, successful Sakai deployment comes from investing in Sakai primarily as an LMS. While several institutions that piloted Sakai did so primarily for its e-portfolio features (notably Abilene Christian) and later abandoned Sakai, several institutions that first chose Sakai as an LMS later pursued e-portfolio. While direct comparison of Sakai to Blackboard (for example) is problematic, it is warranted in that an institution should consider Sakai first and primarily as an LMS. Counter-examples do exist outside our group of case studies, however. The Chariho Regional School District in Rhode Island, for example, uses Sakai primarily as an ePortfolio tool (Chariho Regional School District, n.d.).

Another common theme among highly successful, visible deployments of Sakai was the existence of a team of stakeholders. This could be found at all but the very smallest institutions, and was exemplified by both Charles Sturt and Claremont.

The last cross-case finding was not so much a pattern as a sometimes-pleasant, sometimes-bewildering diversity of pilots and production deployments. Specifically, many outsourcing options were in use, but outsourcing yields mixed results. Where HUC-JIR is in its third year with a 3rd party hosting provider, Hiram has apparently

switched to self-hosting. It was not just hosting options that were varied, however. It was all the factors that we considered as we began our research. As mentioned above and described in detail in the appendices, we failed to reject the null hypothesis that some combination of institutional student population size, religious affiliation, public/private status, consortium status, and geographic location (within the US or outside it) would account for whether a Sakai pilot or production deployment listed on the Sakai website would still be running.

Stated positively, we could say this means "Sakai can and does work for all kinds of schools." If we wanted to be more negative, we could say, "From the outside looking in, we can't know with confidence whether Sakai is right for your institution." The most concise statement would more likely be that quantitative analysis of successes and failures of Sakai deployments using only publicly-available information is insufficient.

In that vein, we could ask what information institutions likely already collect that might help researchers and managers predict whether a deployment of Sakai is feasible and likely to succeed. First would be what mechanisms your institution has in place for managing learning technologies. If management is spread between organizational units, and especially if costs are controlled by those units, then some amount of formalized coöperation will be necessary. A board or committee that has the authority to direct the planning of pilots and deployments of VLE/LMS technology will be necessary. Next up would be where and how student information is stored, and who on staff manages either that information store or the relationship with a vendor. Another piece of information might be technology expenditure per student, student to technology staff ratio, total learning technologies budget, etc. Yet another source of information that might not be formally tracked but would be easy to ask for if access to staff were available would be satisfaction with an LMS product, vendor, and licensing cost.

Unless they are considering a change, institutions may not be tracking some information that would be very useful in predicting the success of a future Sakai pilot

or deployment. Here we are thinking specifically of the recommendations from literature for use of technology in classroom contexts. Are faculty using LMS/VLE technologies primarily for the gradebook and posting of a syllabus, or are they making extensive use of the tools at their disposal to improve learning outcomes? Ongoing engagement with faculty and students about their use of LMS/VLE technologies such as in Chang (2008) will help guide any LMS/VLE decisions, and, given the recommendations from literature, are likely to steer institutions toward systems that will allow for the selective replacement of tools. Currently that would mean the selection of a VLE/LMS system such as Moodle or Sakai, but in the future that might also be Blackboard.

Limitations and Future Research

A Word about Consortia

Many of the institutions under study are members of some sort of Consortium for various purposes, such as sharing of faculty, cross-registration, cost savings, etc. For the purposes of this study, however, institutions were only listed as being members of a Consortium if their Consortium status had some relationship to their use of Sakai. For example, Columbia was not listed as being part of a Consortium, though it has various Consortium or Consortium-like relationships with nearby institutions such as Barnard College, Teachers College, NYU, etc. Readers are strongly encouraged to review consortium status, since some of these relationships are relatively dynamic, and while some relationships may not have had any impact on Sakai usage when this study was conducted, such an impact may now exist. The reader is further cautioned that the term Consortium may be weak in that some large research universities are more loosely federated in terms of IT than some Consortia of small colleges.

Enrollment Numbers

While some colleges and universities make full accreditation reports and related documents easy to find and review, others only supply a few summary documents, so it is impossible to say how consistent universities are in their reporting of enrollment numbers. For this reason, where one or a pair of snapshot numbers was given (eg. 9800 undergraduate students, 600 graduate students) a single number, usually with only one significant figure, was used (eg. 10000). Where exact enrollment numbers for a range of years were available, this was again reduced to a single combined enrollment average with one significant figure. A more thorough study would have a better standard for evaluating population size for Sakai use; one which would be both more precise and more consistent across cases. Specifically, based on past experience at UNC Chapel Hill, there are likely to be institutions in our broad sample frame which have Sakai deployments that are under-utilized either because they are in a pilot phase or because Sakai is in use primarily by a smaller organizational unit within the university. Surveying faculty and/or staff at institutions under study is likely the solution here.

Grey Literature

At the outset we had the idea that there was more information about Sakai and its use available on the public Internet than could be reduced to one paper, and in a way that is true, but there are also major limitations when one excludes collecting new data from human subjects. This is especially true when looking at institutional decision-making that may be kept relatively private. For example, there were clues in several cases that which Student Information System a school uses might be a significant factor in Sakai deployment, for example, but finding reliable public information on the SIS a school uses is often as difficult or more difficult than finding public statements about the LMS in use.

Interviews

Future research might benefit from constructing a simple survey instrument asking about motives for piloting Sakai and test its validity as a predictor of the

respondents' satisfaction with Sakai. Possibly the best approach would include open-ended interviews with a limited number of institutions and then follow up structured interviews conducted with a larger group.

Such an interview process would begin by asking respondents about the process for selection, deployment, and maintenance of learning technologies at their institution, along with broader questions about their institution and narrower questions about the VLE/LMS in use. Example starter questions could include:

1. Briefly describe your institution and how learning technology responsibilities are distributed across it.

2. What Learning Management System (LMS) or Virtual Learning Environment (VLE) software is currently in use at your institution?

3. What are the ideal roles of LMS/VLE software at an institution like yours?

4. Briefly, what roles does LMS/VLE technology play at your institution?

5. When and how was that technology selected? Who was involved in the process?

6. How do faculty use LMS/VLE software at your institution?

7. Who is responsible for training new faculty or supporting faculty in their use of VLE/LMS technology? Describe the mechanics of that training and support.

8. Similarly, how are new students trained in the use of the LMS/VLE technology? Who is responsible for that?

9. What Student Information System (SIS) [software that tracks official enrollment, grade, and other student data] is in use at your institution? Is there more than one for different organizational units? Is there integration with a VLE/LMS?

Part of the key here would be to ask these questions of a variety of constituents at an institution. Key constituencies to include would be technology managers responsible for learning technologies (possibly multiple such people if it is a large university with responsibilities split across organizational units), faculty members, administration, and (if possible) students. One of the purposes would be to identify differences across such constituencies, since these may be an impediment to successful LMS/VLE change.

Higher Granularity of Social Groupings

With more time and significantly different data collection methods, opinions on Sakai from Faculty, Administration, Students, and Technologists would be separately analyzed to see if attitudes in a particular group have a significant impact. This would likely be three closely related studies using Ozkan and Koseler (2009)as a model. With funding, such a study could reasonably be fielded for assessing Faculty attitudes to existing LMS installations at institutions in the UNC system.

Finding more failures

Early drafts of this research allocated more space to examining Sakai's failures, and more specifically what was believed to be a failed pilot at Dana College, but in fact the entire college had folded while under study, which cannot rightly be called a failure of Sakai. The only failure at Columbia is one of delay and at least a partial lack of student buy-in, and the partial failure at Hiram is not clear. Part of the problem here is also the convenience sample we used. For example, LSU never piloted Sakai, but did in fact consider it before choosing Moodle (Schaffhauser, 2010). The several defunct e-portfolio pilots also merit further study.

Future Quantitative Study

In order to build robust, predictive models for success or failure with Sakai, it will first be necessary to engage (possibly with semi-structured interviews) administration and staff at institutions that have never considered Sakai, that have piloted and abandoned Sakai, and that are using Sakai in production. With this broader

feedback from decision-makers within the institutions, we may find factors that were masked from our public grey literature research due to privacy or other concerns. In short: more exploratory research is required before a large-scale quantitative analysis can be performed.

Conclusion

Using Bijker (1995) we have a program for analysis of each of our cases: we describe the relevant social groups and examine what meanings they attribute to the technology under study. In our case we found that there is a shared core of recognizing both the fact of Sakai's Open Source license and attributing a positive utility to it. As the Delta Initiative authors noted, Open Source is not a panacea, but institutions of all stripes recognize that there are valuable Open Source products that may play a role in their organizations.

Given our limitations, we defined our social groups very broadly, mainly staying at the campus level and asking if broad institutional characteristics predict the meanings attached to Sakai by those institutions. We did not find meaningful correlations at this level.

We did, however, find several trends. First was that for all but the smallest independent institutions, a **team of stakeholders** that meets regularly, produces reports and drives a process of selection and deployment seems necessary for a timely move. The Columbia case shows us what happens when such a team is missing or fails to be vocal. Second was that while ePortfolio and other new pedagogical tools are important selling points for Sakai, institutions must consider Sakai both primarily an LMS and their future **primary LMS** (VLE, CLE, etc.) when they choose to pilot it, but note that in some cases this may mean the primary LMS for an organizational unit and not the one LMS for the entire organization. For example, the school of engineering might use Sakai and the school of Education might use Moodle.

tool, also use Sakai as their primary LMS. Contracting with an **external support** entity for a Sakai pilot or full deployment can be a major factor in satisfaction and ultimate success, as we saw with the Longsight-hosted Graham Schools and the rSmart-hosted HUC-JIR.

Another salient pattern was the presence of both **push and pull** in the decision to deploy Sakai. That is, the institution was pulled to Sakai by attractive features, flexibility, licensing, availability of multiple vendors, and possibly other reasons, but just as importantly it was pushed by an issue with its current LMS. In the Claremont case the timing suggests it was the sale of WebCT to Blackboard. In the Lagrange case the cost of WebCT was a factor. For Columbia, updating Prometheus to meet the University's needs was unsustainable.

The short, subjective predictor we have settled on is this: institutions that convene a broad-based team of stakeholders to publicly articulate both the immediate unmet needs and institutional aspirations for an LMS are likely to have Sakai success, especially when individuals within the institution identify with and are empowered by the coöperative, Open Source, highly participatory ethos of the Sakai community.

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page=com.atlassian.jira.plugin.system.issuetabpanels%3Achangehistory-

tabpanel

Appendix 1: tabulated data

Available for download here: http://www.ibiblio.org/cmpalmer/Sakai-
sites-data-for-R-import-20100818-final.csv

```
0;"institution name";"Approx institution student pop
size";"religious affiliation";"Pub-priv";"consortium";"Non-
US";"Sakai running";"Special notes"
1;"Abilene Christian
University";5000;"yes";"priv";"no";"no";"No";"Piloted Sakai
solely for ePortfolio. Lack of oxygen due to focus on mobile
learning."
2;"Albany Medical College";600;"no";"priv";"no";"no";"Yes";"NA"
3;"Allegheny College";2000;"no";"priv";"no";"no";"Yes";"Longsight
Group Hosted."
4;"Annaba University POLLES
Algeria";45000;"NA";"NA";"no";"yes";"No";"NA"
5;"Antioch University";4000;"no";"priv";"yes";"no";"Yes";"Half a
dozen associated colleges"
6;"Appalachian College
Association";42000;"NA";"priv";"yes";"no";"Yes";"College
association"
7;"Arizona State
University";68000;"no";"pub";"no";"no";"Yes";"NA"
8;"Arteveldehogeschool";10000;"yes";"priv";"no";"yes";"Yes";"Dutc
h."
9;"Australian National
University";12000;"no";"pub";"no";"yes";"Yes";"NA"
```

10;"Bell College";"NA";"NA";"NA";"yes";"yes";"No";"Association of colleges in UK, Sakai project link seems to be broken."
11;"Boston University School of Management";3000;"no";"priv";"no";"no";"Yes";"sakai project codename: isaak"
12;"Brock University";17000;"no";"pub";"no";"yes";"Yes";"NA"
13;"Cairo University, Faculty of Engineering";15000;"no";"NA";"NA";"yes";"Yes";"NA"
14;"California Northstate College of Pharmacy";"NA";"no";"priv";"no";"no";"Yes";"Project name: asap"
15;"California State University Fresno";21000;"no";"pub";"no";"no";"No";"Piloted both Moodle and Sakai explicitly for the ePortfolio tools that each can offer. Currently uses Blackboard 9.1"
16;"Catholic University of America";7000;"yes";"priv";"no";"no";"No";"Sakai site is down with message: Coming back soon!"
17;"Cerritos College";23000;"no";"pub";"no";"no";"Yes";"has page of entitled: sakia success story"
18;"Chariho Regional School District";4000;"no";"pub";"yes";"no";"Yes";"Regional school district in Rhode Island. Appear to be using Sakai for ePortfolio for the whole school system."
19;"Charles Sturt University";30000;"no";"pub";"yes";"yes";"Yes";"Most useful site so far: many public statements across several contexts. Public meeting summaries and documents from administrative groups involved with Sakai."
20;"Claremont Colleges Consortium";"NA";"no";"priv";"yes";"no";"Yes";"Consortium of seven Claremont colleges, all using the same sakai portal

Replacement of WebCT with Sakai mandated by Academic Dean's Council in April 2006 for all seven schools."
21;"Claremont Graduate University";2000;"no";"priv";"yes";"no";"Yes";"Part of Claremont Colleges."
22;"Claremont McKenna College";1000;"no";"priv";"yes";"no";"Yes";"Part of Claremont Colleges."
23;"The Claremont School of Theology";500;"yes";"priv";"yes";"no";"No";"Affiliated with the Claremont Colleges."
24;"Harvey Mudd College";1000;"no";"priv";"yes";"no";"Yes";"Part of Claremont Colleges."
25;"Keck Graduate Institute";90;"no";"priv";"yes";"no";"Yes";"Part of Claremont Colleges."
26;"Pomona College";1500;"no";"priv";"yes";"no";"Yes";"Part of Claremont Colleges."
27;"Pitzer College";1000;"no";"priv";"yes";"no";"Yes";"Part of Claremont Colleges."
28;"Scripps College";1000;"no";"priv";"yes";"no";"Yes";"Part of Claremont Colleges."
29;"College of the Redwoods";7000;"no";"pub";"no";"no";"Yes";"NA"
30;"Columbia University";26000;"no";"priv";"no";"no";"Yes";"Very drawn out pilot process. Sakai will replace Prometheus."
31;"Cornell University";21000;"no";"priv";"no";"no";"No";"Original code that became Blackboard developed at Cornell in 1996/1997. Cornell piloted Sakai for ePortfolio. Listed site with rSmart no longer live. Plans to upgrade to Blackboard 9.1 in June 2011."

32;"Dana College";600;"no";"priv";"no";"no";"No";"College now defunct. See http://www.dana.edu/news/1144"
33;"Bakersfield College";18000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
34;"Berkeley City College";5000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
35;"Cogswell College";300;"no";"priv";"yes";"no";"Yes";"part of ETUDES"
36;"College of Alameda";7000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
37;"College of the Siskiyous";3000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
38;"East Los Angeles College";20000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
39;"El Camino College";29000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
40;"Foothill College";18000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
41;"Imperial Valley College";7000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
42;"Lake Tahoe Community College";4000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
43;"Laney College";12000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
44;"Los Angeles City College";17000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
45;"Los Angeles Harbor College";9000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
46;"Los Angeles Mission College";3000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"

47;"Los Angeles Mission,
ITV";"NA";"no";"pub";"yes";"no";"Yes";"part of ETUDES"
48;"LA Valley College";17000;"no";"pub";"yes";"no";"Yes";"part of
ETUDES"
49;"Mira Costa College";14000;"no";"pub";"yes";"no";"Yes";"part
of ETUDES"
50;"Merritt College";6000;"no";"pub";"yes";"no";"Yes";"part of
ETUDES"
51;"Porterville College";3000;"no";"pub";"yes";"no";"Yes";"part
of ETUDES"
52;"Mendocino College";5000;"no";"pub";"yes";"no";"Yes";"part of
ETUDES"
53;"San Joaquin Delta
College";19000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
54;"Taft College";8000;"no";"pub";"yes";"no";"Yes";"part of
ETUDES"
55;"West Los Angeles
College";10000;"no";"pub";"yes";"no";"Yes";"part of ETUDES"
56;"EU-Asia Link Program
HPC/GC";"NA";"NA";"NA";"NA";"NA";"No";"NA"
57;"East Carolina
University";28000;"no";"pub";"no";"no";"No";"Part of pilot of
both Moodle and Sakai. ECU continues with Blackboard."
58;"EISTI: Ecole Internationale des Sciences du Traitement de
l'Information";1000;"no";"priv";"no";"yes";"Yes";"Looks like a
default 2.2.2 install with zero configuration/customization.
Probably not actually in use despite being created 8th May 2007"
59;"FIDM/The Fashion Institute of Design and
Merchandising";8000;"no";"priv";"no";"no";"Yes";"NA"
60;"Georgia Tech";20000;"no";"pub";"no";"no";"Yes";"NA"

61;"Glasgow Caledonian
University";17000;"no";"pub";"no";"yes";"No";"Uses Blackboard:
http://blackboard.gcal.ac.uk/webapps/portal/frameset.jsp. Had
piloted 2.1.1, but linked Sakai pilot is dead."
62;"Graham and Charles
Schools";"NA";"no";"pub";"yes";"no";"Yes";"Has lesson plans to
explain what Sakai is and is good for:
http://www.cellt.org/content/21st-century-skills-digital-library"
63;"Hawaii Department of Public Safety Education
Unit";"NA";"no";"pub";"NA";"no";"No";"Prisoner Education"
64;"Hebrew Union
College";200;"yes";"priv";"yes";"no";"Yes";"Great blog:
http://elearning.huc.edu/wordpress/hucelearning/?page_id=2"
65;"Hiram College";1000;"yes";"priv";"no";"no";"Yes";"IT blog
predicts Hiram decommissioning Sakai, but it is still in use."
66;"Hong Kong University of Science and
Technology";9000;"no";"pub";"no";"yes";"Yes";"Replaced WebCT
(which was deployed in 2000) with Sakai."
67;"Hosei University
ITRCsheet";30000;"no";"priv";"no";"yes";"Yes";"Non-US institution
with a campus in California. It is this campus that is known to
use Sakai"
68;"Huron Valley
Schools";11000;"no";"pub";"yes";"no";"Yes";"Public k12 district
in Michigan."
69;"Arizona Dept. of Ed.
IDEAL";"NA";"no";"pub";"yes";"no";"Yes";"larger system includes
Drupal and Sakai as components, with Drupal as CMS and Sakai as
LMS."
70;"Indiana University";100000;"no";"pub";"yes";"no";"Yes";"one
of the founding campuses of the Sakai project"

71;"Indiana University of
Pennsylvania";14000;"no";"pub";"no";"no";"No";"Piloted Sakai,
Moodle, and Blackboard for replacement of WebCT. Went with
Moodle."
72;"Instituto Politecnico de
Braganca";"NA";"no";"NA";"NA";"yes";"Yes";"Sakai release 2.5.5,
Site in Portugues."
73;"IIHEM: International Institute for Higher Education in
Morocco";"NA";"no";"priv";"no";"yes";"Yes";"Courseware site."
74;"Johns Hopkins
University";19000;"no";"priv";"no";"no";"Yes";"Note: ep.jhu.edu
site is subpage of engineering site of JHU."
75;"Kaiser Permanente Physical Therapy
Fellowship";10;"no";"priv";"no";"no";"Yes";"Uses default Sakai
verbiage. Hosted by Longsight Group-- a group that builds sights
based on Sakai, Drupal and Dspace."
76;"Kapi'oloni Community
College";5000;"no";"pub";"no";"no";"Yes";"rSmart provider."
77;"La Institución Universitaria
CEIPA";"NA";"no";"NA";"NA";"yes";"No";"NA"
78;"LaGrange
College";1000;"yes";"priv";"no";"no";"Yes";"MentorWorkshop.pdf-
see pages 1 and 2"
79;"Lahore University of Management
Sciences";4000;"no";"priv";"no";"yes";"Yes";"Used as primary LMS:
lms.lums.edu.pk"
80;"Lake Erie College";900;"no";"priv";"no";"no";"No";"While
iLearn (their Sakai instance) is still a link in the sidebar
under Non-Traditional on many pages, the domain (ilearn.lec.edu)
is not in DNS, and other pages link to the proprietary Jenzabar

instance (http://leo.lec.edu/ics) which incorporates campus
portal, CMS, and LMS functionality."
81;"Lancaster
University";17000;"no";"pub";"no";"yes";"Yes";"Sakai instance is
branded with the Management School information. See:
https://sakai.lancs.ac.uk/portal"
82;"Lasalle
University";8000;"yes";"priv";"no";"no";"No";"Blackboard/WebCT in
use. Pilot of TaskStream for ePortfolio in Fall 2007, Sakai 2.5.1
ticket in Fall 2008. No references to Sakai anywhere on public on
LaSalle site."
83;"Longsight Group";"NA";"NA";"NA";"NA";"NA";"NA";"Consulting
firm that: [supports] carefully-selected open source applications
for higher education."
84;"Lourdes College";2000;"yes";"priv";"no";"no";"Yes";"Longsight
Group Hosted."
85;"Marist College";5000;"yes";"priv";"no";"no";"Yes";"With
coöperation from IBM, implemented WebSphere Application Server
(IBM product roughly equivalent to Tomcat) port of Sakai"

Appendix 2: script for processing with R

Available for download here:

http://www.ibiblio.org/cmpalmer/stats.txt

```
# Use "R CMD BATCH /path/to/this/file/stats.txt" to run this.
# Output will be in stats.txt.Rout
# Special thanks to Grant Williamson for help with R.


# Nice library for making AIC tables
library(AICcmodavg)
```

```
# Read the data, sep is ;
g = read.csv("http://www.ibiblio.org/cmpalmer/Sakai-sites-data-
for-R-import-20100818-final.csv",sep=";")


# Convert the dependent variable to binary
g$Sakai.running <- as.character(g$Sakai.running)
g$Sakai.running[g$Sakai.running == "Yes"] <- 1
g$Sakai.running[g$Sakai.running == "No"] <- 0
g$Sakai.running <- as.numeric(g$Sakai.running)


# Function to calculate percentage deviance explained
ch.dev <- function(x) ((( as.numeric(x[12]) -
as.numeric(x[10]) )/ as.numeric(x[12]))*100) ## % change in
deviance, where x is glm object


# Set up global model for a first look
model <- glm("Sakai.running ~ Approx.institution.student.pop.size
+ religious.affiliation + Pub.priv + consortium +
Non.US",family=binomial(link="logit"),data=g)


# Model summary
summary(model)


# Model %Deviance
ch.dev(model)


#  Multi-model inferences
#  Construct models
#  Put each in here in every combination, but not enough data to
try interactions
```

```
#  Probably an automated way to do this.  combn() is useful.

mod1 ="Sakai.running ~ Approx.institution.student.pop.size"
mod2 ="Sakai.running ~ religious.affiliation"
mod3 ="Sakai.running ~ Pub.priv"
mod4 ="Sakai.running ~ consortium"
mod5 ="Sakai.running ~ Non.US"


mod6 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation"
mod7 ="Sakai.running ~ Approx.institution.student.pop.size +
Pub.priv"
mod8 ="Sakai.running ~ Approx.institution.student.pop.size +
consortium "
mod9 ="Sakai.running ~ Approx.institution.student.pop.size +
Non.US"
mod10 ="Sakai.running ~ religious.affiliation + Pub.priv"
mod11 ="Sakai.running ~ religious.affiliation + consortium"
mod12 ="Sakai.running ~ religious.affiliation + Non.US"
mod13 ="Sakai.running ~ Pub.priv + consortium"
mod14 ="Sakai.running ~ Pub.priv + Non.US"
mod15 ="Sakai.running ~ consortium + Non.US"


mod16 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + Pub.priv"
mod17 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + consortium"
mod18 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + Non.US"
mod19 ="Sakai.running ~ Approx.institution.student.pop.size +
Pub.priv + consortium"
```

```
mod20 ="Sakai.running ~ Approx.institution.student.pop.size +
Pub.priv + Non.US"
mod21 ="Sakai.running ~ Approx.institution.student.pop.size +
consortium + Non.US"
mod22 ="Sakai.running ~ religious.affiliation + Pub.priv +
consortium"
mod23 ="Sakai.running ~ religious.affiliation + Pub.priv +
Non.US"
mod24 ="Sakai.running ~ religious.affiliation + consortium +
Non.US"
mod25 ="Sakai.running ~ Pub.priv + consortium + Non.US"


mod26 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + Pub.priv + consortium"
mod27 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + Pub.priv + Non.US"
mod28 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + consortium + Non.US"
mod29 ="Sakai.running ~ Approx.institution.student.pop.size +
Pub.priv + consortium + Non.US"
mod30 ="Sakai.running ~ religious.affiliation + Pub.priv +
consortium + Non.US"


mod31 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + Pub.priv + consortium + Non.US"
mod32 ="Sakai.running ~1"

# Run models

fit1 <- glm(as.formula(mod1),family=binomial(link="logit"),
data=g)
```

```
fit2 <- glm(as.formula(mod2),family=binomial(link="logit"),
data=g)
fit3 <- glm(as.formula(mod3),family=binomial(link="logit"),
data=g)
fit4 <- glm(as.formula(mod4),family=binomial(link="logit"),
data=g)
fit5 <- glm(as.formula(mod5),family=binomial(link="logit"),
data=g)
fit6 <- glm(as.formula(mod6),family=binomial(link="logit"),
data=g)
fit7 <- glm(as.formula(mod7),family=binomial(link="logit"),
data=g)
fit8 <- glm(as.formula(mod8),family=binomial(link="logit"),
data=g)
fit9 <- glm(as.formula(mod9),family=binomial(link="logit"),
data=g)
fit10 <- glm(as.formula(mod10),family=binomial(link="logit"),
data=g)
fit11 <- glm(as.formula(mod11),family=binomial(link="logit"),
data=g)
fit12 <- glm(as.formula(mod12),family=binomial(link="logit"),
data=g)
fit13 <- glm(as.formula(mod13),family=binomial(link="logit"),
data=g)
fit14 <- glm(as.formula(mod14),family=binomial(link="logit"),
data=g)
fit15 <- glm(as.formula(mod15),family=binomial(link="logit"),
data=g)
fit16 <- glm(as.formula(mod16),family=binomial(link="logit"),
data=g)
```

```
fit17 <- glm(as.formula(mod17),family=binomial(link="logit"),
data=g)
fit18 <- glm(as.formula(mod18),family=binomial(link="logit"),
data=g)
fit19 <- glm(as.formula(mod19),family=binomial(link="logit"),
data=g)
fit20 <- glm(as.formula(mod20),family=binomial(link="logit"),
data=g)
fit21 <- glm(as.formula(mod21),family=binomial(link="logit"),
data=g)
fit22 <- glm(as.formula(mod22),family=binomial(link="logit"),
data=g)
fit23 <- glm(as.formula(mod23),family=binomial(link="logit"),
data=g)
fit24 <- glm(as.formula(mod24),family=binomial(link="logit"),
data=g)
fit25 <- glm(as.formula(mod25),family=binomial(link="logit"),
data=g)
fit26 <- glm(as.formula(mod26),family=binomial(link="logit"),
data=g)
fit27 <- glm(as.formula(mod27),family=binomial(link="logit"),
data=g)
fit28 <- glm(as.formula(mod28),family=binomial(link="logit"),
data=g)
fit29 <- glm(as.formula(mod29),family=binomial(link="logit"),
data=g)
fit30 <- glm(as.formula(mod30),family=binomial(link="logit"),
data=g)
fit31 <- glm(as.formula(mod31),family=binomial(link="logit"),
data=g)
```

```
fit32 <- glm(as.formula(mod32),family=binomial(link="logit"),
data=g)

# Put models in a list

Cand.models<-list()
Cand.models[[1]] <- fit1
Cand.models[[2]] <- fit2
Cand.models[[3]] <- fit3
Cand.models[[4]] <- fit4
Cand.models[[5]] <- fit5
Cand.models[[6]] <- fit6
Cand.models[[7]] <- fit7
Cand.models[[8]] <- fit8
Cand.models[[9]] <- fit9
Cand.models[[10]] <- fit10
Cand.models[[11]] <- fit11
Cand.models[[12]] <- fit12
Cand.models[[13]] <- fit13
Cand.models[[14]] <- fit14
Cand.models[[15]] <- fit15
Cand.models[[16]] <- fit16
Cand.models[[17]] <- fit17
Cand.models[[18]] <- fit18
Cand.models[[19]] <- fit19
Cand.models[[20]] <- fit20
Cand.models[[21]] <- fit21
Cand.models[[22]] <- fit22
Cand.models[[23]] <- fit23
Cand.models[[24]] <- fit24
Cand.models[[25]] <- fit25
```

```
Cand.models[[26]] <- fit26
Cand.models[[27]] <- fit27
Cand.models[[28]] <- fit28
Cand.models[[29]] <- fit29
Cand.models[[30]] <- fit30
Cand.models[[31]] <- fit31
Cand.models[[32]] <- fit32


# Not giving real model names for 31 models

Modnames<-paste("mod", 1:length(Cand.models), sep="")

# Construct AIC Table
tab = aictab(Cand.models,Modnames)

# Display AIC table - Model 11 wins on a technicality

tab

# %Deviance of model 11

ch.dev(fit11)

# Variable importance measures - if any of the w+'s score over .
8, we have a winner.

importance(Cand.models, "Approx.institution.student.pop.size",
Modnames)
importance(Cand.models, "religious.affiliationyes", Modnames)
importance(Cand.models, "Pub.privpub", Modnames)
importance(Cand.models, "consortiumyes", Modnames)
```

```
importance(Cand.models, "Non.USyes", Modnames)
```

Appendix 3: results of R processing

Available for download here:

http://www.ibiblio.org/cmpalmer/stats.txt.Rout

```
R version 2.11.1 (2010-05-31)
Copyright (C) 2010 The R Foundation for Statistical Computing
ISBN 3-900051-07-0


R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

  Natural language support but running in an English locale

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[Previously saved workspace restored]

> # Use "R CMD BATCH /path/to/this/file/stats.txt" to run this.
> # Output will be in stats.txt.Rout
> # Special thanks to Grant Williamson for help with R.
```

```
>
> # Nice library for making AIC tables
> library(AICcmodavg)
>
> # Read the data, sep is ;
> g = read.csv("http://www.ibiblio.org/cmpalmer/Sakai-sites-data-
for-R-import-20100818-final.csv",sep=";")
>
> # Convert the dependent variable to binary
> g$Sakai.running <- as.character(g$Sakai.running)
> g$Sakai.running[g$Sakai.running == "Yes"] <- 1
> g$Sakai.running[g$Sakai.running == "No"] <- 0
> g$Sakai.running <- as.numeric(g$Sakai.running)
>
> # Function to calculate percentage deviance explained
> ch.dev <- function(x) ((( as.numeric(x[12]) - as.numeric(x[10])
)/ as.numeric(x[12]))*100) ## % change in deviance, where x is
glm object
>
> # Set up global model for a first look
> model <- glm("Sakai.running ~
Approx.institution.student.pop.size + religious.affiliation +
Pub.priv + consortium +
Non.US",family=binomial(link="logit"),data=g)
>
> # Model summary
> summary(model)

Call:
```

```
glm(formula = "Sakai.running ~
Approx.institution.student.pop.size + religious.affiliation +
Pub.priv + consortium + Non.US",
    family = binomial(link = "logit"), data = g)
```

Deviance Residuals:
```
    Min      1Q   Median      3Q      Max
-2.3759   0.1993   0.2431   0.4851   1.2202
```

Coefficients:
```
                                     Estimate Std. Error z value
Pr(>|z|)
(Intercept)                          1.047e+00  7.230e-01   1.449
0.1475
Approx.institution.student.pop.size  3.358e-07  2.997e-05   0.011
0.9911
religious.affiliationyes            -1.148e+00  9.700e-01  -1.183
0.2367
Pub.privpub                         -4.039e-01  9.835e-01  -0.411
0.6814
consortiumyes                        2.861e+00  1.158e+00   2.470
0.0135 *
Non.USyes                            1.434e+00  1.166e+00   1.230
0.2188
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

(Dispersion parameter for binomial family taken to be 1)

```
    Null deviance: 60.886  on 69  degrees of freedom
Residual deviance: 46.583  on 64  degrees of freedom
```

```
  (15 observations deleted due to missingness)
AIC: 58.583

Number of Fisher Scoring iterations: 6

>
> # Model %Deviance
> ch.dev(model)
[1] 23.49100
>
>
> #  Multi-model inferences
> #  Construct models
> #  Put each in here in every combination, but not enough data
to try interactions
> #  Probably an automated way to do this.  combn() is useful.
>
>
> mod1 = "Sakai.running ~ Approx.institution.student.pop.size"
> mod2 = "Sakai.running ~ religious.affiliation"
> mod3 = "Sakai.running ~ Pub.priv"
> mod4 = "Sakai.running ~ consortium"
> mod5 = "Sakai.running ~ Non.US"
>
> mod6 = "Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation"
> mod7 = "Sakai.running ~ Approx.institution.student.pop.size +
Pub.priv"
> mod8 = "Sakai.running ~ Approx.institution.student.pop.size +
consortium "
```

```
> mod9 = "Sakai.running ~ Approx.institution.student.pop.size +
Non.US"
> mod10 = "Sakai.running ~ religious.affiliation + Pub.priv"
> mod11 = "Sakai.running ~ religious.affiliation + consortium"
> mod12 = "Sakai.running ~ religious.affiliation + Non.US"
> mod13 = "Sakai.running ~ Pub.priv + consortium"
> mod14 = "Sakai.running ~ Pub.priv + Non.US"
> mod15 = "Sakai.running ~ consortium + Non.US"
>
> mod16 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + Pub.priv"
> mod17 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + consortium"
> mod18 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + Non.US"
> mod19 ="Sakai.running ~ Approx.institution.student.pop.size +
Pub.priv + consortium"
> mod20 ="Sakai.running ~ Approx.institution.student.pop.size +
Pub.priv + Non.US"
> mod21 ="Sakai.running ~ Approx.institution.student.pop.size +
consortium + Non.US"
> mod22 ="Sakai.running ~ religious.affiliation + Pub.priv +
consortium"
> mod23 = "Sakai.running ~ religious.affiliation + Pub.priv +
Non.US"
> mod24 = "Sakai.running ~ religious.affiliation + consortium +
Non.US"
> mod25 ="Sakai.running ~ Pub.priv + consortium + Non.US"
>
> mod26 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + Pub.priv + consortium"
```

```
> mod27 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + Pub.priv + Non.US"
> mod28 ="Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + consortium + Non.US"
> mod29 = "Sakai.running ~ Approx.institution.student.pop.size +
Pub.priv + consortium + Non.US"
> mod30 = "Sakai.running ~ religious.affiliation + Pub.priv +
consortium + Non.US"
>
> mod31 = "Sakai.running ~ Approx.institution.student.pop.size +
religious.affiliation + Pub.priv + consortium + Non.US"
> mod32 = "Sakai.running ~1"
>
> # Run models
>
> fit1 <- glm(as.formula(mod1),family=binomial(link="logit"),
data=g)
> fit2 <- glm(as.formula(mod2),family=binomial(link="logit"),
data=g)
> fit3 <- glm(as.formula(mod3),family=binomial(link="logit"),
data=g)
> fit4 <- glm(as.formula(mod4),family=binomial(link="logit"),
data=g)
> fit5 <- glm(as.formula(mod5),family=binomial(link="logit"),
data=g)
> fit6 <- glm(as.formula(mod6),family=binomial(link="logit"),
data=g)
> fit7 <- glm(as.formula(mod7),family=binomial(link="logit"),
data=g)
> fit8 <- glm(as.formula(mod8),family=binomial(link="logit"),
data=g)
```

```
> fit9 <- glm(as.formula(mod9),family=binomial(link="logit"),
data=g)
> fit10 <- glm(as.formula(mod10),family=binomial(link="logit"),
data=g)
> fit11 <- glm(as.formula(mod11),family=binomial(link="logit"),
data=g)
> fit12 <- glm(as.formula(mod12),family=binomial(link="logit"),
data=g)
> fit13 <- glm(as.formula(mod13),family=binomial(link="logit"),
data=g)
> fit14 <- glm(as.formula(mod14),family=binomial(link="logit"),
data=g)
> fit15 <- glm(as.formula(mod15),family=binomial(link="logit"),
data=g)
> fit16 <- glm(as.formula(mod16),family=binomial(link="logit"),
data=g)
> fit17 <- glm(as.formula(mod17),family=binomial(link="logit"),
data=g)
> fit18 <- glm(as.formula(mod18),family=binomial(link="logit"),
data=g)
> fit19 <- glm(as.formula(mod19),family=binomial(link="logit"),
data=g)
> fit20 <- glm(as.formula(mod20),family=binomial(link="logit"),
data=g)
> fit21 <- glm(as.formula(mod21),family=binomial(link="logit"),
data=g)
> fit22 <- glm(as.formula(mod22),family=binomial(link="logit"),
data=g)
> fit23 <- glm(as.formula(mod23),family=binomial(link="logit"),
data=g)
```

```
> fit24 <- glm(as.formula(mod24),family=binomial(link="logit"),
data=g)
> fit25 <- glm(as.formula(mod25),family=binomial(link="logit"),
data=g)
> fit26 <- glm(as.formula(mod26),family=binomial(link="logit"),
data=g)
> fit27 <- glm(as.formula(mod27),family=binomial(link="logit"),
data=g)
> fit28 <- glm(as.formula(mod28),family=binomial(link="logit"),
data=g)
> fit29 <- glm(as.formula(mod29),family=binomial(link="logit"),
data=g)
> fit30 <- glm(as.formula(mod30),family=binomial(link="logit"),
data=g)
> fit31 <- glm(as.formula(mod31),family=binomial(link="logit"),
data=g)
> fit32 <- glm(as.formula(mod32),family=binomial(link="logit"),
data=g)
>
> # Put models in a list
>
> Cand.models<-list()
> Cand.models[[1]] <- fit1
> Cand.models[[2]] <- fit2
> Cand.models[[3]] <- fit3
> Cand.models[[4]] <- fit4
> Cand.models[[5]] <- fit5
> Cand.models[[6]] <- fit6
> Cand.models[[7]] <- fit7
> Cand.models[[8]] <- fit8
> Cand.models[[9]] <- fit9
```

```
> Cand.models[[10]] <- fit10
> Cand.models[[11]] <- fit11
> Cand.models[[12]] <- fit12
> Cand.models[[13]] <- fit13
> Cand.models[[14]] <- fit14
> Cand.models[[15]] <- fit15
> Cand.models[[16]] <- fit16
> Cand.models[[17]] <- fit17
> Cand.models[[18]] <- fit18
> Cand.models[[19]] <- fit19
> Cand.models[[20]] <- fit20
> Cand.models[[21]] <- fit21
> Cand.models[[22]] <- fit22
> Cand.models[[23]] <- fit23
> Cand.models[[24]] <- fit24
> Cand.models[[25]] <- fit25
> Cand.models[[26]] <- fit26
> Cand.models[[27]] <- fit27
> Cand.models[[28]] <- fit28
> Cand.models[[29]] <- fit29
> Cand.models[[30]] <- fit30
> Cand.models[[31]] <- fit31
> Cand.models[[32]] <- fit32
>
> # Not giving real model names for 31 models
>
> Modnames<-paste("mod", 1:length(Cand.models), sep="")
>
> # Construct AIC Table
> tab = aictab(Cand.models,Modnames)
>
```

```
> # Display AIC table - Model 11 wins on a technicality
>
> tab

Model selection based on AICc :

       K  AICc Delta_AICc AICcWt Cum.Wt      LL
mod11 3 56.10       0.00   0.18   0.18 -24.88
mod24 4 56.42       0.32   0.15   0.33 -23.93
mod17 4 57.13       1.03   0.11   0.44 -24.26
mod28 5 57.69       1.59   0.08   0.52 -23.38
mod25 4 57.96       1.86   0.07   0.59 -24.70
mod22 4 58.13       2.03   0.06   0.65 -24.79
mod13 3 58.23       2.12   0.06   0.71 -25.95
mod30 5 58.36       2.26   0.06   0.77 -23.75
mod19 4 58.85       2.75   0.05   0.82 -25.12
mod29 5 58.98       2.88   0.04   0.86 -24.03
mod8  3 59.04       2.94   0.04   0.90 -26.34
mod26 5 59.41       3.31   0.03   0.94 -24.23
mod31 6 59.92       3.82   0.03   0.96 -23.29
mod21 4 60.27       4.17   0.02   0.98 -25.84
mod6  3 63.12       7.02   0.01   0.99 -28.38
mod16 4 64.86       8.76   0.00   0.99 -28.12
mod18 4 65.03       8.93   0.00   0.99 -28.21
mod4  2 65.27       9.17   0.00   1.00 -30.56
mod7  3 65.96       9.86   0.00   1.00 -29.80
mod27 5 66.94      10.83   0.00   1.00 -28.00
mod15 3 67.35      11.25   0.00   1.00 -30.52
mod20 4 67.96      11.86   0.00   1.00 -29.68
mod10 3 68.80      12.70   0.00   1.00 -31.23
mod1  2 69.28      13.18   0.00   1.00 -32.56
```

```
mod3  2 70.29      14.19   0.00   1.00 -33.06
mod23 4 70.67      14.57   0.00   1.00 -31.06
mod2  2 71.33      15.23   0.00   1.00 -33.59
mod9  3 71.46      15.36   0.00   1.00 -32.55
mod14 3 72.02      15.92   0.00   1.00 -32.85
mod12 3 73.49      17.38   0.00   1.00 -33.58
mod5  2 81.98      25.88   0.00   1.00 -38.92
mod32 1 83.85      27.75   0.00   1.00 -40.90


>
> # %Deviance of model 11
>
> ch.dev(fit11)
[1] 20.81181
>
> # Variable importance measures - if any of the w+'s score
over .8, we have a winner.
>
> importance(Cand.models, "Approx.institution.student.pop.size",
Modnames)


Importance values of ' Approx.institution.student.pop.size ' :

w+ (models including parameter):  0.41
w- (models excluding parameter):  0.59


> importance(Cand.models, "religious.affiliationyes", Modnames)


Importance values of ' religious.affiliationyes ' :

w+ (models including parameter):  0.71
```

```
w- (models excluding parameter):  0.29

> importance(Cand.models, "Pub.privpub", Modnames)

Importance values of ' Pub.privpub ' :

w+ (models including parameter):  0.41
w- (models excluding parameter):  0.59

> importance(Cand.models, "consortiumyes", Modnames)

Importance values of ' consortiumyes ' :

w+ (models including parameter):  0.99
w- (models excluding parameter):  0.01

> importance(Cand.models, "Non.USyes", Modnames)

Importance values of ' Non.USyes ' :

w+ (models including parameter):  0.46
w- (models excluding parameter):  0.54

>
> proc.time()
   user   system elapsed
  0.790   0.060   0.957
```