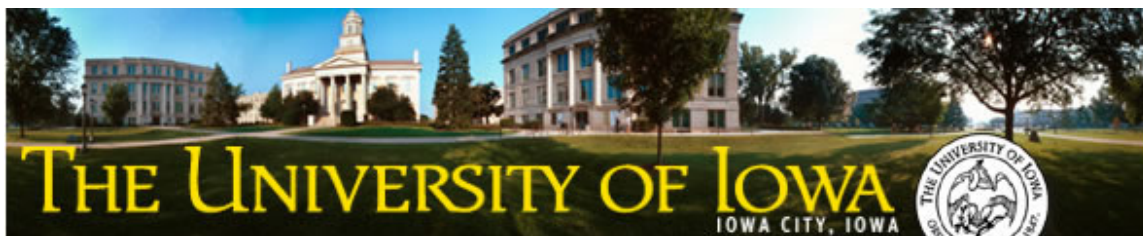
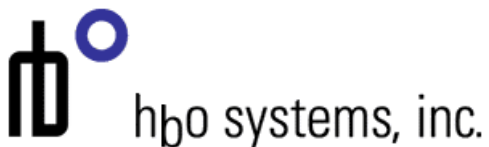

E-Learning Usage Patterns

How Faculty and Students Use and Perceive E-Learning at the University of Iowa

April 2004



in cooperation with HBO Systems, Inc, www.hbosystems.com



By: the University of Iowa E-Learning Core Group

E-Learning Core Group Members

This report was written under the guidance and input of the E-Learning Core Group at the University of Iowa. Members of the Core Group include:

Molly Langstaff, Academic Technologies, ITS, Chair

Jim Duncan, Hardin Library of the Health Sciences

Maggie Jessie, Henry B. Tippie College of Business

Lisa Troyer, College of Liberal Arts and Sciences

Tom Rocklin, College of Education

Phil Hill, HBO Systems, Inc

Introduction

The goal of the E-Learning Assessment project this semester is to assess the current state of e-learning at the University of Iowa. One of the key conclusions from the July meeting of the core group was that we needed to study and document the current usage and perceived needs of e-learning on this campus. Without this basis of understanding, it will be difficult to come up with an effective strategy for how Iowa should be using e-learning in the future.

Our goal is to move beyond simply “which CMS do we use/support” to examining and understanding all the processes associated with electronic learning — creating, preparing, teaching and taking a course with electronic components.

Objectives

- Assess how University of Iowa instructors currently use technology to support teaching and learning.
- Assess how instructors and colleges envision using instructional technologies in the future

The assessment has been broken up into several parts:

- interview campus Deans, administration and IT leaders to understand where the business and academic drivers are, from both a University viewpoint and a collegiate viewpoint
- document usage patterns to visually model how e-learning is used
- collect and analyze data using current system tools and available data logs
- conduct focus groups for faculty and teaching assistants, to engage them in first-hand conversation and input on ‘what do we do’, ‘how do we do’ and ‘what should we be doing,’ and ‘what are the greatest barriers to IT usage in e-learning’

Scope of this report

This report presents a summary of the interviews that have been performed with various college administrators, faculty and students at the University of Iowa. The methodology was to collect information in a series of small group interviews, and to document the results, as well as to document the emergent set of usage patterns surrounding e-learning.

Overview

Common Themes

Although the focus of our interviewing was to discover the academic and collegiate needs related to e-learning, and was not meant to be a thorough, quantitative analysis, some common themes did emerge from the faculty and student interviews. Students used for this report include Teaching Assistants, the members of the Student Technology Advisory Council, and several students selected from representative colleges.

Some of the key themes are as follows:

- Technology is not the real issue in most cases – the real issue is knowing how to effectively use technology as a tool
- Faculty, for the most part, are not trained as educators, and need support in effective pedagogy; technology does not create this need, but technology does raise the awareness of this need
- The two most commonly mentioned uses of e-learning technology is course organization via a web site (e.g. place syllabus, assignments, reading material in one place), and presentation software to be used during a lecture
- Course organization can be used effectively (e.g. allow students to leverage on-line notes to pay more attention during class) or ineffectively (e.g. students using on-line material as an excuse to not attend lectures)
- Presentation software can be used effectively (e.g. interactive material, ability to visualize abstract concepts) or ineffectively (e.g. PowerPoint outline of course notes which is just read by faculty during lecture)
- Using technology to enable interactivity between faculty and students is seen as a key enabler of effective teaching and learning; however, faculty are skeptical of unstructured interactions (e.g. chat rooms), and realize that this interaction can take a lot of their time
- In the same vein, technology for the most part is seen as taking more time and attention from faculty, as opposed to reducing their workload; students appear to benefit time efficiencies from technology, however
- Teaching and Learning is not seen as a high priority at the university, which compounds the issue of technology time consumption (e.g. takes faculty away from their primary duties of research and publication)
- Although large classes appear to be an area ripe for e-learning innovation, there have been almost no innovation in e-learning for large classes (with one or two exceptions)
- On-line courses (e.g. CMS systems or web sites) are not always the appropriate use of technology; often domain-specific material which cannot be displayed or interactively supported by the web are much more effective (e.g. PDF files, Mathematica, financial tools for modeling)
- There was no one who mentioned the need for supporting multiple CMS systems; several people mentioned the need for one centrally-supported CMS, though;

students in particular can get frustrated by having to use multiple systems and know how to go to multiple on-line locations

- On-line grading provides benefits to students and faculty (e.g. FERPA compliance, quick feedback, additional information such as class average); however, the benefits of on-line grading have not been fully realized with final grades, in part due to integration issues between on-line courses and the Registrar's system (e.g. students often have to wait 2 – 3 weeks to see final grades, and faculty have to do duplicate manual entry of grades)
- Both faculty and students appear frustrated at their lack of input into e-learning technology decisions
- Need one place to go for IT-based support; faculty have to know multiple places to go for complete support – each ITS group does a very good job, but it is hard to get the whole support done
- There is very little usage of digital library resources within the context of courses; faculty appear to use the library even less than students do; the concept of a 'free internet' , and the predominance of Google usage, effect the perceptions of both students and faculty, limiting their interest or awareness of library resources

Framework Overview

These days, software systems can provide pretty amazing functionality, compared to only a decade ago. A lot of progress has been made in building and deploying complex systems, from object-oriented technology through componentization and web services.

One area where software systems and vendors have not been good is ensuring that the *right* system is deployed: the one that really will make their end-users lives easier, and consequently will help their organization succeed. Too often, solutions are quickly designed, selected, and integrated, and once deployed they are not actually solving any specific problem.

Understanding *where* systems are being deployed, *who* uses them, *how* they need to integrate with existing and future systems, and *what* specific educational tasks they automate is key to deploying a successful system.

For the E-Learning Assessment project, we are using a *usage pattern* framework to aid in our understanding of how e-learning is used, and what unmet needs currently exist.

Usage Patterns Analysis Framework

As can be seen by the e-learning situation at Iowa, IT has become an integral part of most organization's operations. In addition, the complexities involved with multiple inter-related IT systems has presented us with new challenges of how to manage IT effectively.

As described in Frank Murphy's *Achieving Business Value From Technology*, 2003, there is no longer any such thing as a standalone IT project. Rather, we now are faced with various educational initiatives with varying degrees of IT involvement. We should no longer manage IT projects independent of the educational context which they serve – in the case of Iowa's e-learning, the academic goals of the University. IT is now interwoven into the fabric of the University – it is a strategic enabler of academic initiatives, and can even drive strategic initiatives.

Usage patterns analysis is a technique to model an organization's processes.

A *process* in this context is a set of activities that deliver a result of value to a user. In other words, the process describes a series of user and system interactions that helps users accomplish something they wanted to accomplish. Stated differently, the process describes HOW users and the system work together to realize the identified feature.

There are two main parts of a usage patterns analysis, the use case model which describes *what* processes are done by the University, and the object model which describes *how* the processes are accomplished.

The approach is best characterized by first viewing software systems as black boxes within the context of the University, and viewing the processes, or usage patterns, from the viewpoint of the end users. In our case, the primary end users are students and faculty.

The focus is on the end-user experience (e.g. faculty and students), and documenting the value of processes.

Methodology for This Report

Based on initial interviews with collegiate administrators (Deans, Associate Deans, and IT Directors, documented in the report Interview Summary), we have set the context within which e-learning serves the needs of the university. These administrator interviews provide a set of high-level processes describing e-learning. By subsequently interviewing various faculty and students (the primary users of any e-learning system), several more detailed processes emerged for modeling how e-learning is used at the University of Iowa. There was a general outline guiding the faculty and student interviews, based on the following questions:

- How do you use e-learning technology?
- For each process described above, why (what benefit do you receive)?
- What barriers exist to effectively using e-learning technology?
- What is the best usage of e-learning technology (emphasis on usage)?
- What is the worst usage of e-learning technology?
- If you had the power, what would you change to best improve how e-learning technology is used at the University (called King or Queen for a Day questions)?

By analyzing the responses and looking at the patterns that emerged, we were able to generate a model of the usage patterns. The model is a simple one that documents the users (or stakeholders) involved, the processes identified, and text descriptions of the processes. The processes can nest in this model, allowing for the model to be developed to an appropriate level of detail.

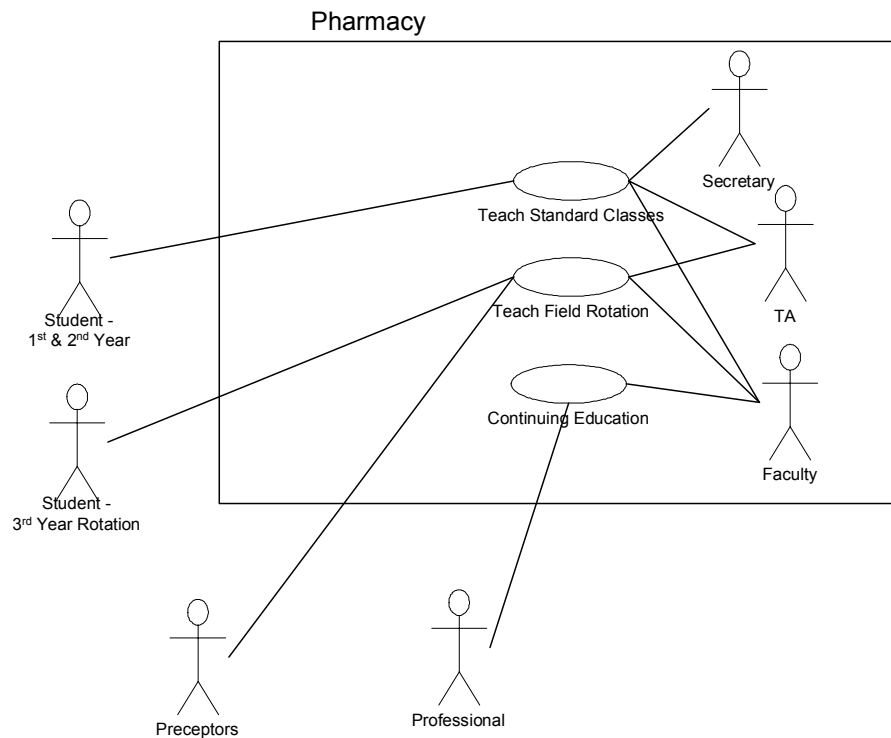
Future Uses of Usage Patterns Model

One of the primary benefits of organizing usage patterns and needs into a model, is the ability of using this model for future requirements documents (e.g. Request For Proposal), and to use for future system acceptance testing. This model will help ensure that future system acquisition, integration and testing occurs within the context of the university's academic and business needs, and not based solely on vendor features. As such, this model is part of future requirements processes.

Model Notation

The following example is based on the College of Pharmacy, and is provided to help the reader understand the notation used in this report. The College of Pharmacy has three primary modes of teaching – 1) first, second, and third year students in a classroom or laboratory environment, with major emphasis on team case-based projects, 2) fourth year students in a field rotation with preceptor support, and 3) continuing education of professionals.

When documenting the usage patterns model which emerged from the interviews, we graphically show users as stick figures, processes as ovals, and associations between and among users and processes as straight lines.



The process itself can be documented as simple text, or in certain cases as an activity diagram. In addition to the model itself, we have also included bullet-level documentation of the actual interview responses to show direct answers to the questions listed above.

Organization of This Report

We will first show a high-level model of the primary usage patterns identified for e-learning at the University of Iowa, based on the previous interviews with collegiate administrators. This high-level model will provide a context for understanding the responses of faculty and students.

The next section will summarize the faculty interviews, based on the prior questions, along with the resultant processes the faculty have described (which is the next-level of detail in the overall model).

The next section will summarize the student interviews, based on the prior questions, along with the resultant processes the students have described (which is the next-level of detail in the overall model).

The final section will show the overall process model.

High-Level University Processes, and Collegiate Processes

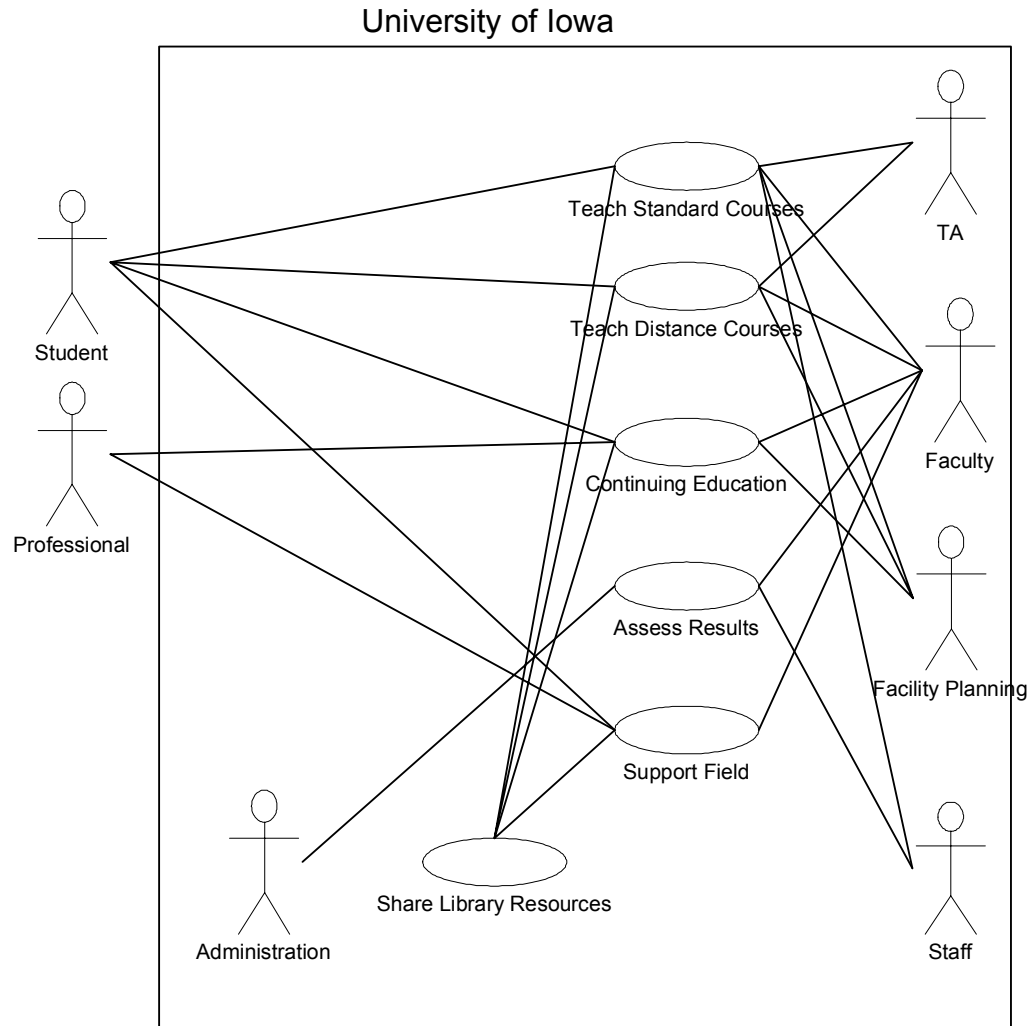
From a high-level, the collegiate interviews identified six primary processes in teaching and learning, spanning across the university.

- Teach Standard Courses – Delivering a classroom-based course, with some level of technology to support
- Teach Distance Courses – Delivering a course to remote students who do not physically come to a classroom on campus
- Continuing Education – Deliver courses and material to alumni and professionals that are not part of the undergraduate or graduate programs.
- Assess Results – Determine the teaching and learning effectiveness of a course or program
- Support Field – Support the educational efforts of students and support staff (e.g. preceptors) at remote locations, as part of an undergraduate or graduate program
- Share Library Resources – Integrate and leverage the digital library resources to directly support teaching and learning

Overall Processes

The following diagram shows the primary academic processes being served by e-learning systems, or which soon need to be served by e-learning systems.

Figure 1. University High-Level Processes



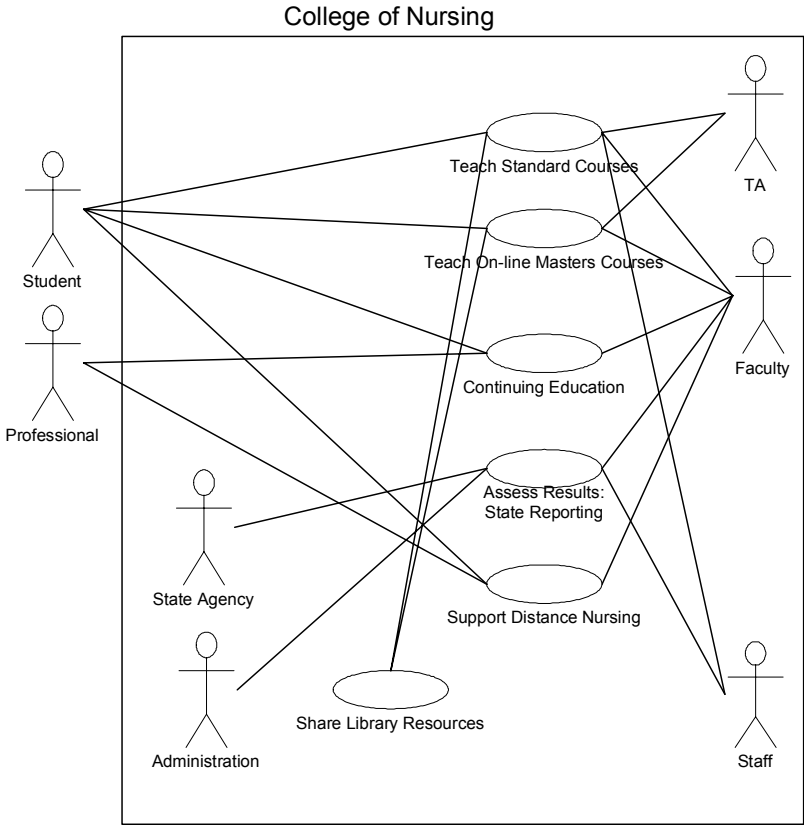
Unique College Processes

Several colleges have unique processes based on their business model and strategic needs for e-learning. In addition to the example provided above for the College of Pharmacy, there are other unique processes worth noting (this is not meant to be exhaustive, just provided as examples for understanding college needs).

College of Nursing

The College of Nursing strategically views technology as part of their teaching and learning, as they are at the forefront of nursing informatics. A major part of their teaching is to teach the use of technology itself – letting students and faculty gain experience in courses using hardware and software. They provide a significant amount of distance learning, reaching out to all of the state.

The most significant driver for using technology appears to be that UI is the only publicly supported nursing program in the state, and they would like to stay that way. For this reason, the College of Nursing looks to solve diverse problems for the whole state.

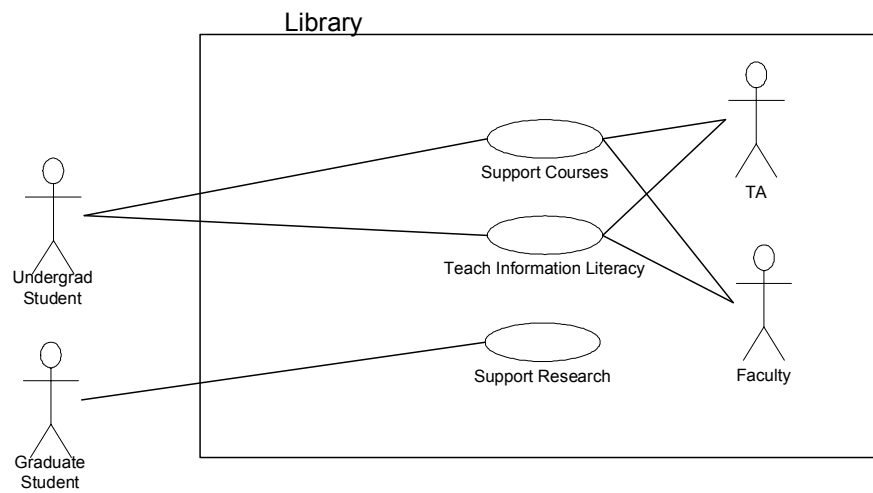


University Libraries

Although the University Library and its resources are a supporting service for the colleges, it is important to call them out as their own process with associated needs. Many of the colleges (and the University at large) are significantly supported by the library and its resources.

The over-riding theme of the library interviews was the need to integrate their technology and services into the University more effectively. The tools and support exist, but many faculty and students are not aware of how to use the Libraries. A major goal is to teach faculty and students how to find data, and to dispel the notion that all information is available on the 'free internet', using Google searches.

Training, the Libraries believe, should be based on a 'just in time' model, where information and services are available when needed (directly within a class) and in the proper context.



Model Summary

Given this high-level development of a model, we shall now turn our attention to the faculty and student interviews.

Faculty Interviews

The following sections summarize the results of interviewing faculty in various one-on-one meetings. The interviews were designed to allow faculty the flexibility to speak their minds on how they use technology, and to freely express their perception of key e-learning issues.

How is Technology Used in Teaching and Learning

By taking a “black box” approach to technology, faculty were asked how technology is used in the context of teaching and learning.

- Communicate with students – announcements, material, large documents, office hours; better solution to the same problem
- Distance Learning
- Chat Sessions – interaction with students or group of students; like to spawn student-student discussions
- Grading on-line – privacy, convenience, secure access
 - more for component grades than final grades
 - not all do this – still rely on paper and face-to-face
 - allows multiple TA entry of grades for a large class
- Self-assessment – practice quizzes
- Digital drop box for submitting assignments, reports
- Interactivity is key – technology that allows or encourages interaction between students and faculty
- Create course material
- Prepare course - register students; see who will be attending; archive locally, clean out old students
- On-line survey twice per term – assessment
- Augment course material
- Large classes – on-line homework, quizzes (for feedback), collect and spot grading; randomization of test questions or homework (sat in large lecture, watched homework get copied and passed across the classroom)
 - Presentation
 - Asynchronous competencies
 - Virtual office hours
 - Occasionally can use team effort to develop content

- Discussion sections
 - group work, with interactive tools
 - simulation-based (for chemistry)
- Laboratory – data collected into PC
 - shortens time spent on data collection, shifts effort away from collection to interpretation, and more iterations of data
 - better, visual graphics to understand concepts
 - computation intensive (GIS) – need problems to be realistic, not toy problems
- Field work – collecting data in the field to analyze in labs or classes
- Exam Testing Services, particularly for large classes
- Electronic textbook – interactive PDF files holding complete text, along with Flash animation and Mathematica simulations; complete source of several courses; interactivity and animation work much better in this format than on-line courses, and web has no good way for inputting formulas
- Within past few months, outreach to state – allow K-12 to use UI resources
- Technology proficiency, for such items as e-portfolio, DVD editing creation

Issues

The following issues emerged during the interviews.

- Students like on-line grades, but Registrar very concerned about physical signatures; leads to cumbersome manual process, done 3 times per semester
- Importing grades from Exam Testing Services for a large class can be time consuming – big problem resolving conflict or wrong entry of 8-digit ID (e.g. 1000 students, 30 put their SSN into the ID, 30 – 40 put in the wrong ID; faculty must manually resolve each one)
- How to effect change at the University
 - make change easy, don't force change; share best practices informally
 - transparency – make methods and results available, will be accountability and innovation
 - easier where the teaching is in an area that is a challenge to the practitioner, or overlaps with their research
 - won award in 2001, created department based on innovative use of technology in teaching

- It appears that people in the mathematical-based sciences (math, geography) tend to use CMS in a basic way, and concentrate on the specific tools (e.g. Mathematica, GIS computation)
- 20 years ago the leaders in research were also the leaders in teaching; now, different institutions tend to focus on either
- Students seem more aware and concerned of the 2-3 week delay in getting final grades through the Registrar
- Biggest issue with team content creation and sharing – who is going to pay for it? it takes time to develop and index a shareable repository
- Most faculty are not trained as educators

Needs

During the interviews, faculty expressed their perceived needs relating to e-learning technology.

- More interactivity supported by technology
- Pick one CMS system – sooner, rather than later; need good support to help transition
- Need more knowledgeable support people; faculty often know system as well or better; need user perspective of technology from support people
- Better technology for student tracking
- Asynchronous testing, especially for large classes – solves cheating, scheduling; also, would allow testing in smaller chunks
- Better graphing for grades, and grade entry form
- Need a substantive e-portfolio to help students develop work, and to market themselves for a job
- Support to impart basic help, especially to humanities faculty, where there is little or no local support
- More flexibility in evaluating technology needs, and more faculty input
- Need one place to go for IT-based support; faculty have to know multiple places to go for complete support – each ITS group does a good job, but it is hard to get the whole support done

Best Use of Technology

Faculty were asked what they perceived as the most effective usage of technology within the context of e-learning.

- Automated registration script written by ITS (CMS Reg) is very useful
- “Best technology in the classroom is slate blackboard and chalk, for interactivity”

- Interactive on-line presentation software, such as maps, images, non-text sources “students love this”
- Use technology to match learning style – multi-modal

Worst Use of Technology

Faculty were asked what they perceived as the least effective, or most problematic usage of technology within the context of e-learning.

- Very little usage of library resources by faculty within courses
- Presentation software when used inappropriately (particularly PowerPoint) – prepared materials, no interactivity, no ‘what if’s
- Centralized IT (whether by Dean’s office or by ITS) decision making based purely on the “cost” of IT, and not the “value” of IT
- Using technology for technology’s sake – there is a lack of instruction on teaching

Student Interviews

The following sections summarize the results of interviewing students in various small group meetings (either one or two students at a time). The interviews were designed to allow students the flexibility to speak their minds on how they use technology, and to freely express their perception of key e-learning issues.

How is Technology Used in Teaching and Learning

By taking a “black box” approach to technology, students were asked how technology is used in the context of teaching and learning.

- Presentation in class (e.g. PowerPoint); for clarity and organization
 - Presentation and technical software in parallel during class (can be a problem if not easy to switch or do both)
 - Visualization and modeling to help understand abstract concepts
- Most usage does not involve interactivity in class, just syllabus and information push
- Asynchronous communication with professor
- Improve efficiency of student experience, allow focus on learning
- Notes posted on-line; can concentrate better in class using notes as organization of personal notes; allows students to not suffer as much for a missed class
- Personal Trainer (financial coach) in accounting; provides immediate feedback
- System flexibility, faculty can add / change content on a whim
- Dynamic display, to show details that wouldn't be possible statically; gives deeper knowledge, and can make abstract concepts real; key is dynamic interaction
- Use CMS for organization – particularly if students' organizational skills are weak; everything is there, such as notes; keeps everyone on the same page
- Internet – resources to complement / augment course (e.g. MIT Open Courseware)
- Student – student interaction; break down social barriers; collaboration within groups
- History department – rebelling against on-line; believes taking notes personally provides better active learning; concern about attendance dropping if notes available on-line (which is a valid concern)
- Use CMS to get grades; mostly component grades, and occasionally final grades
- Use notes as an outline for note-taking in class (not everyone likes to do this – prefer complete note taking)
- There are “bad” or even “terrible” homework software packages (e.g. Wiley eGrades)
- Collaboration – share MS Office documents within group

- By getting grades on-line, can see class averages, points available
- Use presentation software for student presentations; group collaboration
- Use internet (Google) for research; some use of EBSCO Host through library (found out about resources through a class which included library links in CMS course)
- Research, especially for upper level and graduate courses; Google for small parts & concise summary, as well as figures and images to help explain or show concepts
- Use digital library, almost daily for graduate work, through the library web site (before technology, had to physically go to the library)
- Marching band class – drill charting software; completely has changed how marching band is taught
- E-mail of class notes in psychology

Issues / Observations

The following issues emerged during the interviews.

- Emphasis should be on how to use technology effectively, and not just on actual system
- Updates to technology can be time consuming
- When asked to put grades on the web site, faculty responded “I can’t do that”, indicating a lack of technology proficiency
- Switching between technologies in the classroom can be time consuming and takes away from the class quality
- “Older” faculty are perceived as unwilling to use technology
- Student expectation of free software (e.g. MP3, pirated SW, Google searching); this is different than their expectation of books; the lines between the sources of information on the web have been blurred
- There seems to be a correlation between traditional / non-traditional students and strength of expectations
- Would love to take advantage of distance or hybrid courses, but can’t get credit
- Many students don’t have any perspective of life before e-learning usage
- Many students have to wait 2-3 weeks to see final grades on ISIS
- No assessment tools for self-assessment and self-knowledge
- Apparent dilemma – best possibility
- Most large classes done the same way – just use information push, with PowerPoint, script, and very little interactivity; no innovative use of technology

- Most changes seem to come through philanthropy – Pappajohn, Tippie, Carver
- Huge difference in technology usage and pedagogy, especially between LAS and Business (or between technical faculty and non-technical faculty)
- Students want more usage of technology, especially for interactivity, but there is little feedback to get this message across

Needs / Desires

During the interviews, students expressed their perceived needs relating to e-learning technology.

- Student input on technology usage and selection – no feedback mechanisms in place
- Could use a FAQ for classes – save time on repetitive tasks
- Likes ePortfolio idea; need to do more to communicate with students

Changes in Technology During Students Time at Iowa

Students were asked how they have perceived changes in the use of e-learning technology and usage during their time at Iowa.

- Over past 6 years has seen dramatic change from non-usage of technology to almost daily usage of technology
- Issues have not changed – they are consistent
- Improvements have been seen (e.g. single password)
- Faculty have evolved – don't just rely on textbooks for reference; will point to a place on-line for extra searching

Best Use of Technology

Students were asked what they perceived as the most effective usage of technology within the context of e-learning.

- Check grades from home – save time
- Notes from lecture – all professors should do so
- Efficiency of tools and resources
- First-hand experience (e.g. telescope in Arizona, with quick access)
- Interaction with other students
- Group presentations – can post and review as a group without requiring face-to-face time; results in more group learning
- Visual presentation in class, particularly by visualizing abstract concepts and providing interactive visualizations, and providing live, dynamic resources (e.g. internet access during lecture)

- Teaching 'how to' use technology in class, by observing a demonstration; allows the student to compile and use code interactively out of the classroom
- How technology complements a course; ability to search related content; extends course in time and space
- Time savings – lecture notes, email, availability of resources, save trips to see professor
- E-mail communication with professors
- Course material availability
- Availability anytime of material
- Communication with faculty

Worst Use of Technology

Students were asked what they perceived as the least effective, or most problematic usage of technology within the context of e-learning.

- There seems to be a lack of training of faculty for usage, particularly for older and non-technical faculty
- Faculty expect students to learn any software with quick learning curve; they ignore the time impact with unreasonable expectations
- Technical availability (e.g. telescope in Arizona is down, but faculty insist on that telescope being used for project, despite alternatives that were available) (e.g. Blackboard down for a week); when there are problems, we don't know what to do, as we rely on technology being available
- Too much ineffective use of PowerPoint; reading notes only during class
- Inconsistent availability of faculty or TA for asynchronous communication; always affected by the "weakest link"
- Training on how to use technology appropriately for teaching vs. teaching technology itself (there should be a minimum technology proficiency among faculty)
- Lack of continuity – switch between CMS (e.g. one semester, had one class use Blackboard, one class use WebCT, one class use TWIST, and one class nothing) "would like to go to one place to get all courses"
- Lack of faculty face time; "email me" instead of office hours
- Iowa culture is cynical of technology; view that technology will kill personal interface instead of augmenting it
- Not using technology
- Faculty not knowing how to use the technology, and fumble with it during class

- TA told student to use information on EBSCO Host, but no one told her how to find this information
- Unorganized courses (and therefore technology) – inconsistent grading and feedback; don't see relationship of material to courses

King or Queen For a Day

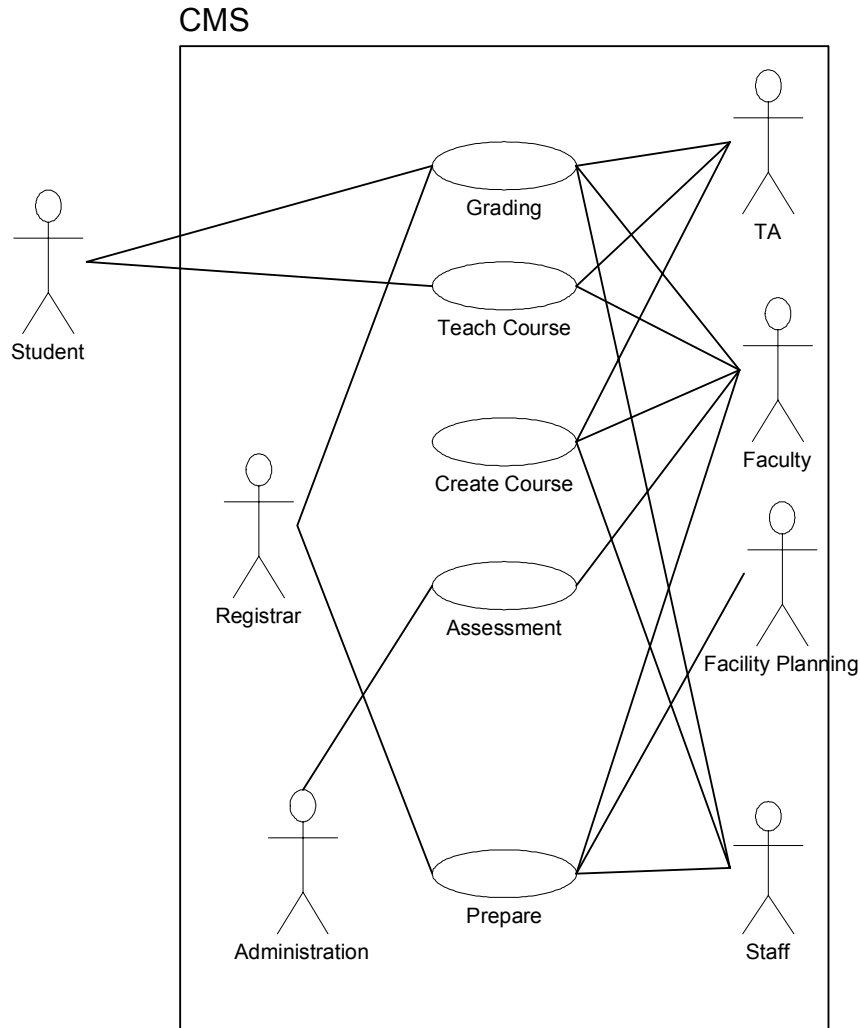
Students were asked what one change they would make if they were King or Queen for a Day, and needed to make the most effective change for the benefit of the University of Iowa.

- Mobile workstations for all students, with ubiquitous wireless network; concept of ubiquitous computing vs. ITC
- Bridge the gap between students and faculty; need student input on teaching (assessment)
- Software tool availability (e.g. Visio)
- Consistent use of Course Management Systems – this has two issues
 - 1) one place to go for all courses (much more important than 2)
 - 2) consistent technology (same CMS vendor), but this depends on how intuitive the software is
- Student feedback on courses, instructors, how courses are done
- Train faculty in technology usage
- Could like more consistency in pedagogy
- Allow for learning styles and learning pathways
- Change or eliminate general education – want more choices of courses in chosen discipline

E-Learning Processes

Based on the interviews, there are several processes identified which can augment the detail of our high-level model. One area to show additional detail is the set of processes which are traditionally served by a Course Management System (but may be served by other e-learning technologies as well).

Figure 2. E-Learning Processes



Teach Course

The specific Teach Course process, which can be seen as the primary process of teaching and learning, can further be broken down as follows.

Figure 3. Teach Course

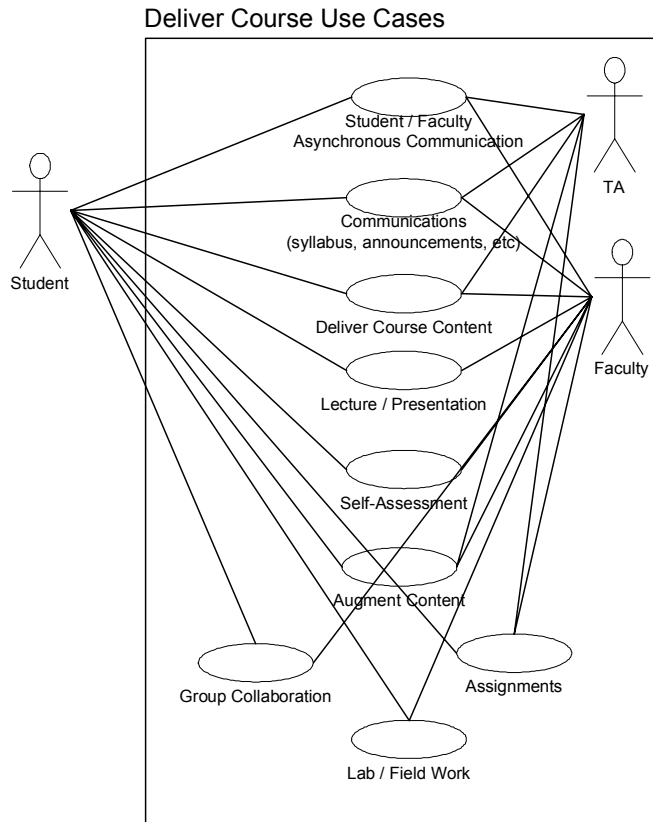
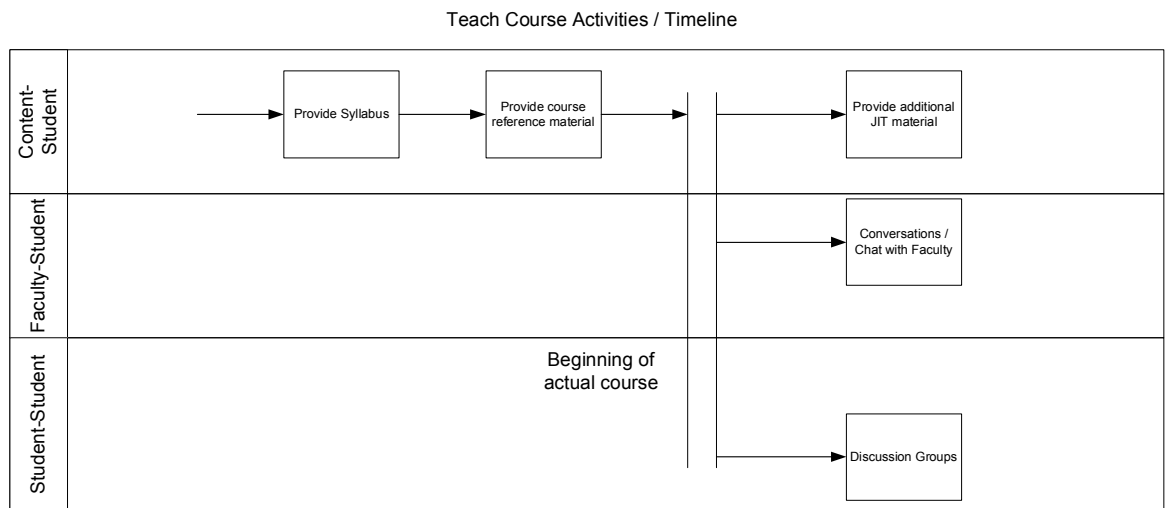


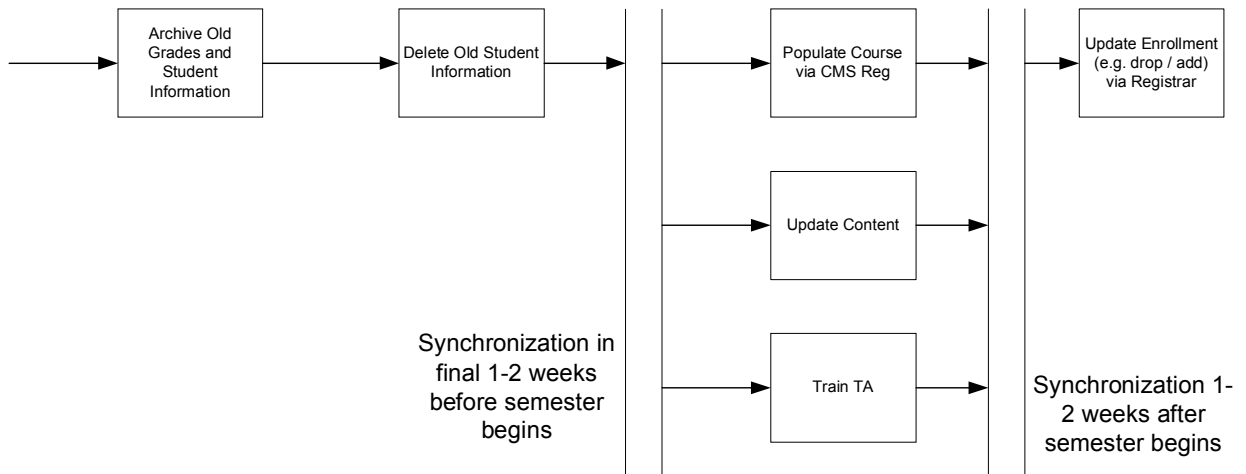
Figure 4. Teach Course Activities



Prepare Course

The Prepare Course process has several activities, as follows. The reason for using an Activity Diagram instead of a further breakdown of processes is to show the timing issues of preparing a course due to semester schedules.

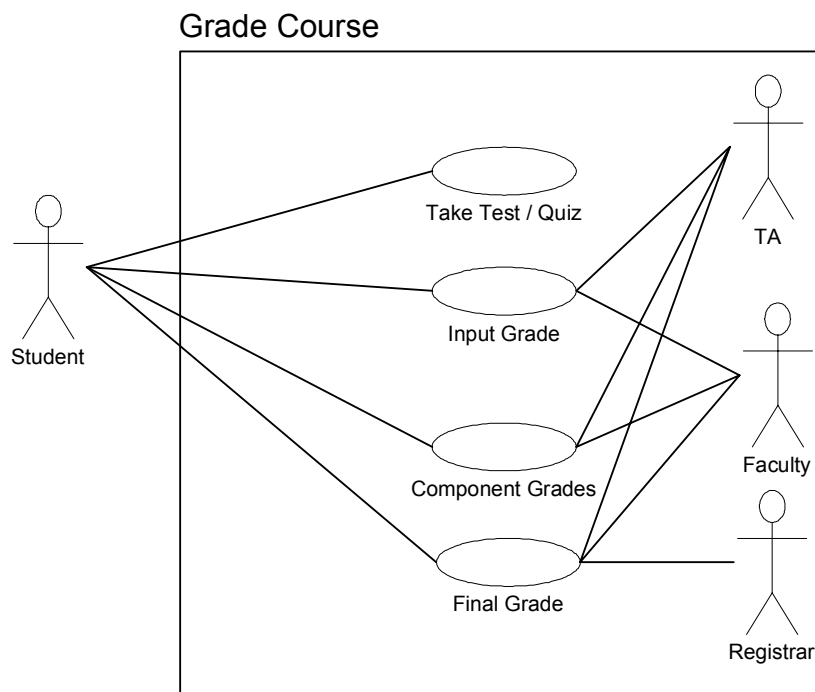
Figure 5. Prepare Course Activities



Grade Course

The Grade Course process can be broken down into the following diagram.

Figure 6. Grade Course Activities



Assess Course

The Assess Course process can be broken down as in the following diagram. Please note that there is not a significant amount of emphasis placed on this process currently, but it is expected to grow in importance based on accreditation issues and general trends in education.

Figure 7. Assess Course Sub-Processes

