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INTRODUCING INFORMATION SYSTEMS THROUGH A DIGITAL BUSINESS COURSE: THE NEW WEB-CENTRIC SKILL SET FOR BUSINESS MAJORS

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Abstract:

Current approaches to the introductory Information Systems (IS) course focus on IT literacy, and developing skills using PC-centric office software. In this paper, we propose a new set of web-centric digital business skills that can be taught to all business majors. We report on three years of experience with a new set of classes that teach non-technical students how to launch, test, and promote their own business websites without programming, using primarily open source software and low-cost web hosting. A digital business focus makes IS relevant to all business majors by allowing students to develop a real product or service, and interact with live customers, during a single course.

Keywords: IS Education, Introduction to IS Course, Digital Business, Web Skills, Open Source

I. TODAY'S INTRODUCTORY IS COURSE: STILL FALLING SHORT?

Why is there a lack of student interest in Information Systems (IS)? The search for answers has often led back to perceived problems with the introductory IS course. Research has shown that non-IS majors are often not interested in the subject matter taught in the course [e.g., Walstrom et al, 2008], and are not enthusiastic about the emphasis on concepts and computer literacy typically used in these classes [e.g., Baugh, 2007]. If business students have little interest in what is taught in the introduction to IS course, don't like how it's taught, and have problems seeing its relevance to real-life business, they are unlikely to start down the path of becoming IS graduates.

Watson et al [2008] have identified some of the fundamental problems with today's introductory IS course: lectures that are too passive, with too much time watching slides; assignments that don't motivate students, and are 'thrown away' at the end of class; a failure to exploit student talent; and the struggle by faculty to keep up to date with the latest knowledge. Improvements can be made to the existing approach, such as using real companies for the hands-on project work. In one case, student satisfaction improved to 58% using this technique, versus a 12% satisfaction rate with learning IS concepts [Baugh, 2007].

At some point, however, questions need to be raised about the traditional approach to introductory IS courses. What is the material that is relevant for all business majors, not just IS specialists? Should the hands-on skills continue to focus Excel, Access, and the PC office suite, or are there other IT-based business skills that deserve consideration?

In this paper, we report on three years of experience with a new kind of introductory technology course for business majors. In these courses, we teach non-technical students how to engage in basic 'digital business' activities, including launching a website, using web services for payments and advertising, simple usability testing, developing content, responding to customer analytics data, and promoting sites through search engine optimization and social media. We argue that technology has progressed to the point where these skills can be meaningfully introduced to all business majors, without requiring programming skills.

This kind of 'digital business' course is immediately relevant for all business majors, we claim, because the digital world gives business students the unique opportunity to launch a live product or service, and interact with real customers, while the course is being taught. It can also spark an

interest in more traditional IS topics (such as databases, networking, programming, security, and user experience design) because increased skills in these areas directly improve the product or service the student can offer to their customers.

Following a review of the useful innovations reported in the IS education literature that have inspired us, we present the basic design for our 'digital business' course. Our course design features a web-centric, rather than an office suite centered, technology skill set that, in our experience, can be taught to any business major. We then report on our experiences and lessons learned, keeping in mind that this new approach for non-majors is still very much experimental and a work in progress.

II. NEW IDEAS IN THE IS TEACHING LITERATURE

In response to the criticisms of IS education, there have been an impressive number of teaching innovations that try to update the IS skill set for a more web- and internet-centric era. Some of the ideas that have particularly inspired us include having students:

- build collaborative documents using wikis [e.g., Watson et al, 2008]
- use, and participate in, open source projects [e.g., Watson et al, 2008]
- build social sites using open source content management systems such as Joomla! and Drupal [e.g., Yue et al, 2009]
- use keyword search advertising to run a real campaign, and use customer analytics and conversion goals to assess its effectiveness [e.g., Rosso et al, 2009]
- perform usability tests [e.g., Snyder, 2009]
- create websites with e-commerce capabilities, allowing revenue collection [e.g., Ballenger, 2007]
- perform 'real world' projects that students care about [e.g., Baugh, 2007].

These educational innovations have been made possible by increases in IT capability, particularly internet-based IT. The power and functionality offered by open source software, freely available web services, free collaboration tools, and low-cost internet hosting have made it possible for any university student to quickly launch the beginnings of a digital business offering, given the right instruction to put all of the pieces together. For a few dollars or euros a month, students can launch a prototype website using the same software that powers giant service providers like Wikipedia, the New York Times blogs, or the largest forum sites. Students can use the same advertising, analytics, and revenue collection services that have been deployed by thousands of real business.

To date, however, the innovations mentioned above have been spread throughout the curriculum. They are also typically used in advanced elective courses. In our proposed 'digital business' course, we start business majors with basic versions of many of these skills, with an overall goal of being able to launch a digital product or service on the web, interact with real customers, and respond to customer feedback. The benefit of this approach is the clear objective it provides for business students throughout the course–a website that real people interact with. Possibly the biggest downside of this approach is that much of the traditional content of an introductory IS course has to be postponed to later courses. However, we argue that students will be more motivated to learn traditional IS content if they can see how these skills will improve their existing digital business offering, and how they fit into the overall IT picture. For example, open source content management systems allow students to customize their user interface without knowing web design or programming. But if a student learns a little HTML, CSS, Javascript, or Flash, they will be able to customize their sites to more precisely match what they want to achieve. Instead of forcing students to learn a basic level of HTML and CSS before they begin, this approach creates a working website that students are free to modify, depending on the amount of additional skill they acquire.

Another issue with these learning innovations is how they are packaged and labelled for business students. These skills are often presented as part of an Information Systems course, or IS curriculum. In our experience, it has been helpful to define the content of the course in a way that

is clear, attractive, and recognizable for all business majors. We propose using the term 'digital business'. Though the term is by no means a perfect one, we believe that the word 'digital' is both broad and precise in a very attractive way for business students. We notice that prominent business publications, such as the Financial Times ('digital business') and the Wall Street Journal ('all things digital'), use the term, as do many prominent academic institutions, such as MIT's Center for Digital Business.

III. THE NEW WEB-CENTRIC SKILL SET FOR BUSINESS MAJORS

In place of the traditional PC-centric skill set for introductory IS courses, based mostly on Microsoft Excel and Access, we propose the following web-centric skill set for business majors. The skill set is intended to be a minimal set of skills that will allow a student to launch a prototype 'digital business' product or service through a website.

Business students should have the ability to:

1. **Establish a web presence**. Students should be able to acquire and set up a domain name and a web hosting service. Students should be able to upload basic content (simple web pages and images) up to their site.

2. **Launch a functioning website**, using freely available software. Web hosting services offer the ability to easily create new sites based on content management, forum, wiki, social networking, and other open source software packages. Students should be able to launch new sites using this capability, and do basic configuration.

3. **Modify the functionality and user interface of a site**, using freely available add-ons, modules, and themes.

4. **Use freely available web services to perform basic business functions** on a site, particularly revenue collection and advertising.

5. **Define the basic functional requirements of a site, and perform simple usability tests** to improve its interface.

6. **Add content** to a site, including content from other websites and web services.

7. **Collect user analytics** data on a site. Students should be able to set measurable targets, and assess whether those targets are being met.

8. **Promote a digital offering** through basic search engine optimization, and social media.

With these skills, a business student should have enough ability to launch a site that can interact with real customers. Certainly, there is much more about each individual skill that a digital technology specialist can and should know. Our philosophy is to provide a minimal starting point that works, and that simultaneously exposes students to most of the traditional IS teaching areas in the context of achieving business objectives with customers.

IV. COURSE DESIGN

Covering this material in a single course is a challenge, particularly with a mixed group of majors and non-majors. We have experimented with four semester-length course offerings: two small group MBA courses (10-15 students), one small group undergraduate course (15 students), and most recently one larger undergraduate course (30 students). Our university does not have an IS major, so all of our students are non-majors by definition. There are no technical prerequisites for the course.

For a fifteen week semester, the current form of the digital business class has the following structure (with one week of flexibility for initial orientation, extra project time, or an additional topic area):

Table 1: Course Design for a Semester-Length Digital Business Course

Week	Content	Deliverable (Scenario)
1	Web Page Basics	Create a web page that describes an important personal accomplishment. The web page must include a list, an image, and a link to another page. The page must also use a CSS style sheet with at least two formatting rules. Add page URL to the class wiki.
2	Connecting to Outside Services	Create a donation page for a cause or organization. Include a PayPal donation button, and a widget that links to another web service of your choice.
3	Web Hosting and Domain Name Basics	Select web host and domain name; be able to edit files on host easily via FTP or equivalent. Upload a web page to your host and add URL to the wiki.
4	Content Management	Create a blog on a topic you are passionate about personally. Install WordPress on your web host; create at least one content page and two posts; configure your blog with an uploaded theme and at least one custom plugin. Add your blog URL to the wiki.
5	Content Management II	Create a directory-type site (e.g., restaurant listings) by installing Drupal or Joomla! on your web host. Create at least three directory entries; associate appropriate categories with your content page; upload a new theme. Add your site URL to the wiki.
6	Online Community	Create a discussion forum site by installing phpBB on your web host. Create at least three discussion threads; create a 'sticky' thread'. Add your site URL to the wiki.
7	Launching Other Sites	Install a wiki (MediaWiki), social networking (elgg) platform, or other open source application of your choice by manually downloading software to your web host, and configuring a database. Add your site URL to the wiki.
8	Project Proposal	Write a two page description of the goals, major functional requirements, and major technical requirements of your final project website. Add the proposal URL to the wiki.
9	Online Advertising	Integrate Google Ads (or equivalent) and Amazon Associates (or equivalent) to one of your websites from a previous assignment. Add your site URL to the wiki.
10	'Alpha Release'	Present initial prototype of final project site in class. Write a one page report on how well functional requirements are being met, and how they need to change. Add the report URL to the wiki.

11	Analytics	Integrate Google Analytics (or equivalent) into your final project site. Write a one page report on the three most important analytics measures you will monitor on your site, and your numeric targets. Add the report URL to the wiki.
12	Usability/'Beta Release'	Write a two page report on the results of your usability test, with at least 5 users. Add the report URL to the wiki.
13	Promotion and SEO	Come to class prepared to discuss your plans for generating traffic to your site, and for keeping people engaged on your site.
14	Final Project	Present your final project site in class. Submit up to 5 page report on project goals, functional requirements, technical requirements; analysis of analytics data; analysis of usability data; promotion strategy; and community development strategy. Add the site URL and report URL to the wiki.

In our design, all assessment of learning is done through the scenarios and project reports, rather than examinations of textbook content. In our experience, as long as assignments are completed individually (see the next section for a discussion of this point), working deliverables and written reports are a sufficient indicator of student learning, though traditional examinations could easily be added if required.

We have found it useful to treat every student assignment as a URL to be added to a class wiki site. This facilitates grading, but more importantly reinforces the idea that all work on the internet is publicly available.

By the end of the class, students have a working website. They have real users, and can track user actions via analytics. They can modify their sites based on usability tests and user feedback. They can collect revenue and post advertisements. Even for the simplest projects (for example, a blog site with specialized content), students leave with a project that is visible, and that they care about.

V. EXPERIENCES AND LESSONS LEARNED

In this section, we list some of the key lessons we have learned from early versions of our proposed 'digital business' course.

DIFFERENT TECHNICAL SKILL LEVELS IN STUDENTS

At first glance, it seems difficult to believe that students with absolutely no technical experience could successfully complete this course. We were not convinced at first. But after four class offerings, we have yet to see a student who was not able to complete a project, and at least the majority of the deliverables. Dividing up the work into specific, concrete deliverables is essential for managing any difficulty and anxiety that non-technical students might feel with the material. In the later stages of the course, involving more planning, testing, and user interaction, the more technically skilled students are not necessarily at an advantage, or possibly even at a disadvantage. We have certainly seen more than one example of a student who succeeded fairly easily on the narrow technical tasks, but struggled with more business and user community issues.

We have also found it useful to have a flexible timeline for students to turn in the first set of technical assignments. Rather than have an assignment due every week, students could turn in

the first four assignments, for example, at the end of the month. This lets students of varying ability work at their own pace, giving the less experienced students time to ramp up their basic web skills.

INDIVIDUAL VS. GROUP ASSIGNMENTS

We recommend that all assignments in these courses be individually completed and graded. In our experience, it is simply too difficult to disentangle the contributions of various individuals in a group assignment. Students that have not contributed to early assignments can fall dangerously behind when it comes to the later stages, and their final project. We feel strongly that every student needs to go through the process of launching a digital product or service. Students are encouraged to seek help from anyone, including other students, but the work they turn in is their own.

SAMPLE PROJECTS

We have found that students have little difficulty generating project ideas, whether it be a digital service for high-end athletic shoe enthusiasts, a mechanism for communicating with potential customers of a small art gallery, a forum for drivers of a particular car, or a classified advertisement site for students seeking to exchange books and find apartments to rent. Students are exposed to open source software that creates the foundation of a blog site, content site, or forum, and most of the projects build on those foundations. Roughly 10% of the students are motivated to use a different software package tailored to other kinds of sites, such as collaborative wikis. If a student doesn't know where to begin, we would suggest starting with a blog site on a specialized topic of interest to the student, and that is open to community contributions. Even a simple blog site can become a fairly sophisticated business offering with the addition of customer analytics and web services.

Absolutely essential to our philosophy of student projects is to expose a project to real users well before the end of the course. Students have to go through at least one complete cycle of targeting their offering at users, testing, examining the analytic data, and making adjustments to better suit customer preferences. Projects need to go live with real users. Student need to reflect on their own work with this data in hand, and argue for a coherent change plan.

EVALUATION

Our grading for the course is a mix of assignments, final project, reports, and contribution in class. For the more technical assignments, we have found it helpful in our grading rubrics not to assign the highest grade simply for completing an assignment. As an example, completing an assignment successfully might earn a 'B' grade. To earn the equivalent 'A', an assignment needs to go beyond the minimum required work, either in technical functionality, professional appearance, or additional content. This evaluation standard allows students who go above and beyond to be rewarded.

STANDARDIZATION

This course makes use of a wide variety of software and services. In teaching situations like this, there is often a desire to enforce standardization. For example, requiring every student to use the same web hosting service (e.g., GoDaddy or BlueHost) makes demonstrating how to set up a website easier. Requiring every student to use a particular advertising (e.g., Google AdSense) or analytics (e.g., Google Analytics) service has a similar effect.

Though we see the benefits of not tying student understanding to a particular product or service, for practical reasons we standardize on almost every software package and service in the course. The one exception area is web hosting. Because students are paying for this themselves, we tend to give them the freedom to choose any web hosting service that supports the basic requirements needed for the course.

A suitable web hosting service must have the ability to do easy installations of the major open source packages used in the course (sometimes called 'one-click install' or 'install scripts'). Almost all web hosting services now have this ability. The web hosting service also needs to allow a sufficient number of database-backed websites to be created on a single account. In practice, a web hosting service for this course needs to have easy installs for WordPress (blogging software), phpBB (forum software), and Drupal/Joomla! (content management software), and allow a subscriber to have at least 10 MySQL databases (each software installation typically requires one MySQL database). We suggest that you make any web hosting recommendation carefully, because most students will follow your advice exactly.

CLASSROOM MANAGEMENT

Our class sessions have typically been structured as once a week, for four hours in the evening. Lecturing, demonstrations, and discussion typically take up the first half of a class session, with the remainder devoted to hands-on work related to the current topic.

With smaller class sizes of under 15 students, the class instructor was almost always able to keep up with individual demands for attention during the class session, although it was important to have an explicit mechanism for showing the order in which students would be helped individually (in our case, a list of names on the board). When we increased the class size to 30, we found it difficult for the single instructor to cope with the load of individual requests for help. This was reflected in the student evaluations, where a few students commented that they felt the instructor spent more time with some 'favorite' students than others. For classes of this size and above, we would recommend having a TA or student assistant to help with the volume of individual requests during class.

TEACHING BURDEN

One area of concern when we started these classes was teacher burnout. How would an instructor be able to cope with the open-ended and individually-varying nature of many of the assignments and projects? Would there be too much different material to grade? Could a single instructor 'stay on top' of so many different technologies?

In our experience, two key points are very helpful for keeping the teaching burden at a manageable level. First, the assignment scenarios have to be as straightforward as possible. That removes the burden of constantly explaining what needs to be done, and how it will be evaluated. Second, it is important that the instructor complete all of the assignments themselves, and complete them successfully, before the course begins.

There are many ways that student assignments can go wrong, especially when they involve live products and services on the internet. It is important for instructor sanity to recognize that he or she does not need to fix every conceivable problem with a student assignment. He or she only needs to be able to show a student at least one path that works. Often times, when something is going wrong for a student, the guidance to them needs to be, 'start over with a clean install, and work from there'. In the web world, it is easy to create new sites–don't have yourself or your students waste time trying to debug something that might never work. If it doesn't work, try something else.

In terms of teaching burden, the good news is that, more often than not, things 'just work'. Thousands, if not millions, of other people are using these software packages and services routinely. The help resources online are highly developed. Often times, it is extremely easy for students to unlock the vast power of these digital resources. And when they succeed, you get the credit!

STUDENT PERCEPTIONS

For all four of our course offerings, the student evaluation numbers have been at or above the business school average in all seven of our university's evaluation factors, and often significantly

higher. Informal evaluations in the middle of the course have revealed a good level of satisfaction, as long as students feel they are getting the attention they need from the instructor, or at least an equal amount of attention to everyone else. Although this student concern is not unique to this course, it is especially important near the beginning when students without any technical background might require more personal attention.

The student perceptions have been positive enough that our business school administration has approved making this course a requirement for all undergraduate Entrepreneurship majors, and has increased the number of course offerings. Overall student satisfaction in four course offerings has ranged from 4.4-4.9 on a 5 point scale, with 5 being the highest score attainable. Adjustments to the course over time have been to standardize the topics and weekly assignments in response to student feedback.

VI. OBJECTIONS AND LIMITATIONS

As a significant departure from the standard introductory IS course, there are common objections that are usually raised about the structure and content of a 'digital business' course such as the one proposed here. The most common objection, in our experience, is to argue that the proposed course is merely a technical 'web site development' course, or an updated version of a classic 'e-commerce' course from the dot.com era. A related criticism is to ask, where is the explicit coverage of standard IS topics?

We argue that offering a digital product or service is different from teaching web site development, even though a web site is used as the means for interacting with customers. By using standard open source software, the initial coding and development work is already completed. Much more of the focus has to be on developing content, testing concepts with customers, responding to real-time customer data, search engine placement, and potential revenue generation. The ability for non-technical specialists to 'close the loop' with customers is what differentiates a 'digital business' course from the 'e-commerce' course of 5-10 years ago, along with a much-expanded range of revenue and value-generating models. Many of the assignments require students to report and reflect on their work and its business value. These reports are evaluated as academic work, not just technical proficiency.

A limitation of this course is that standard IS topics are introduced indirectly. The course provides an entry point to a number of IS topics, including:

- Databases – Every 'digital business' offering is a database-backed website (most often using MySQL). Students are exposed to working databases, tables with live data, user accounts, and permissions.

- Networking – Every 'digital business' offering requires a level of basic network understanding, including domain name registration and configuring name servers. Network performance is an issue that often arises, compelling students to find solutions.

- IT Architecture – Students are exposed to modern internet-based architectures (most often LAMP: the Linux operating system, Apache web server, MySQL database, and PHP/Perl/Python application programming language). Working with extensions such as plug-ins and themes introduces students to the importance of modularity. Incorporating other web sites and services introduces students to integration and standards issues.

- Security – Students have to work with security updates, and make decisions about potential incompatibilities. Students are exposed to basic user management and configuration of permissions.

- User Experience Design – Students have to test the usability of their digital offering, and make adjustments through configuration and, if necessary, changing the user interface (most often by changing CSS style sheets).

- Programming – All of the open source code is available to inspect and modify. Students are shown where this code is, and how to change it.

Teaching web-centric business skills does take time away from standard IS textbook readings and tests, a tradeoff that has to be considered carefully. The preference in this design is to offer traditional IS topic information in small pieces, as needed in the process of offering a digital product or service. By leaving out some web-centric business skills, it would be possible to have more traditional coverage of selected IS topics, and perhaps create a course that is a hybrid between the 'digital business' approach advocated here and the traditional introduction to IS. Otherwise, it might be worthwhile to consider moving some traditional IS topics to a course after the general introduction for all business majors–perhaps to a first course for all IS majors.

Another limitation is that general computer literacy, and proficiency with PC-based office software such as Excel and Word, are not covered in this course. As mentioned in the experiences section, we are not finding business undergraduates at our institution who lack basic computer literacy skills. Excel proficiency is covered extensively in our statistics and decision modeling classes, and tutorials are offered through our computing center for PowerPoint, Word, and other personal productivity tools.

VII. CONCLUSION

In this paper, we have reported on a different approach to an introductory IS course designed for all business majors. We emphasize web-centric 'digital business' skills, and the launching of a business website with real customers. We have successfully offered four versions of the course at an AACSB-accredited business school. The courses have been generally well received by students and administration. A case module from this course was nominated as a finalist for best teaching case in the inaugural WITS Technology and Business Instruction competition [Allen, 2008].

Returning to the basic problems with introductory IS courses listed by Watson et al [2008], our proposed 'digital business' course appears to address all of them except one. Our 'digital business' course helps remove the passivity of canned PowerPoint slides and multiple choice tests; provides assignments that students care about, even to the point of continuing to develop them after the course is completed; and brings out the talent in business students who never saw themselves as technologically adept. The one problem our course design doesn't address is the challenge of faculty struggling to maintain their knowledge. In fact, it requires faculty to learn new technology, and keep up with the latest developments. We would argue, however, that there are techniques we have used to manage this problem successfully, and in any case it's unlikely that a modern IS instructor can, or should, avoid this problem.

We offer this course design as one possible solution to the criticisms of the introductory IS course. The introductory IS course should not surrender its ambitions to be a course that every business major wants to take, and needs to take. At a time when information technology struggles to assume a place as a core business discipline, this kind of 'digital business' course tries to turn the argument on its head. Not only is 'digital business' central to all modern business, but 'digital business' is the only place in the business curriculum where students can get live experience with real products, and real customers.

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