Building Good Robots: A Case in Successful Open-Source Learning Management

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We describe our successes and difficulties using open-source learning technologies as a case study for how open-source can fulfill the needs that Grabill identified in his 2016 call for good robots. Specifically, we describe our experiences with developing platforms with open source software, including achieving buy-in from faculty and other stakeholders, addressing users' needs and concerns, and overcoming technical and logistical obstacles. The primary software employed by ISUComm are Moodle and WordPress; both are popular and continually developed by their respective open-source communities. While we neither see open source as a panacea nor as a simple solution, Iowa State's ISUComm Foundation Communication program has enjoyed success with open-source technologies for the past decade or so, and we argue that the benefits of open source outweigh the potentially negative consequences of Grabill's "bad robots."

In his keynote address at Computers and Writing 2016, Jeff Grabill warned of "bad robots," or digital systems created by corporations seeking to profit from student writing. Grabill also suggested that the open-source model, while an attractive alternative to proprietary platforms, is unsustainable: "...[T]here wasn't—and still isn't to this day—a community of writing teachers, researchers, and digital humanists willing and capable of supporting complex, long-term open source or similarly shared projects" (McLeod, 2016, Part 3, para. 9). Grabill proffered his own creation, Eli Review, as a model for communication scholars to build "a good partner for others" (Part 3, para. 14), or what we might call good robots, using a business model to generate the necessary resources to sustain such digital learning projects. Reactions to Grabill's keynote on social media were enthusiastic and positive. Bill Hart-Davidson, Mike McLeod, and Grabill also discussed Eli Review and writers' interactions with robots in Walker et al. (2011).

Here we offer examples of good robots developed in Iowa State's English Department that do not operate on a business model but rather an open-source one. The Conference on College Composition and Communication (CCCC) justified the use of open-source software in their 2008 business meeting statement. They acknowledged that open-source software "allows teachers, students, and institutions to participate in customizing software according to the specific, situated needs of a program or institution" (para. 3; resolution 1). A couple of the authors named here have offered additional justification for open-source software (Lutz, O'Connell, & York, 2014; Lutz, Blakely, Rose, & Ballard, 2016), but here we argue that our systems qualify as good robots because we have made each software package our own, resulting in systems that match our needs and values. Moreover, with our systems no one makes a profit off students' work, and we have control over the student's data, which in turn helps us further develop our systems and our program. While successful open-source ePortfolio platforms are rare (Meeus, Questier, & Derks, 2006), we see these examples as a heuristic for how to effectively use open-source tools to facilitate multimodal composition pedagogy.

In the spirit of CCCC, we have designed several content management systems (CMS) and learning management systems (LMS) that draw upon vibrant communities of developers while using our own scholarship to customize the systems to the context of our curriculum. Specifically, we will discuss ISUComm Courses and ISUComm Sites (and their spin-offs), respectively based on the Moodle and WordPress open-source platforms. ISUComm, a multimodal communication initiative at Iowa State University, seeks to integrate written, oral, visual, and electronic modes in first-year, advanced, and writing-across-the-curriculum communication courses. As current and former members of ISUComm's Online Learning Team (OLT), we discuss the projects' beginnings, their current states, and where we see them headed. We hope our description of the programs will demonstrate the potential benefits and

difficulties of developing home-grown, open-source tools in lieu of adopting large corporations' proprietary learning platforms.

ISUComm Courses, a Moodle LMS

Iowa State University owns licenses for a number of proprietary LMS and CMS such as Blackboard, Canvas, Panopto, and Box. Prominent among them is Blackboard, which is used by a majority of colleges across the campus to support classroom instruction. While Blackboard is a powerful LMS, its for-profit model of education makes us uneasy. Moreover, Blackboard's design prescribes both the ways that instructors can deliver content and the ways that students interact with content. For our department of scholars who study web development, content delivery, and course design, we found Blackboard's prescriptions to be more cumbersome than enabling. We desired more control over the design of our courses sites, and that desire became the exigence for ISUComm to adopt its own LMS developed using open-source tools.

ISUComm Courses began on a small server in a faculty member's office as a humble Moodle installation, a powerful open-source LMS chosen for its great flexibility in course design. Moodle is powerful in that it has a large catalogue of plugins and themes that expand the LMS's capabilities to accommodate different educational contexts. Moodle has a vibrant online support community that consistently works to develop plugins and themes, and our faculty members and graduate students dialogue with that community on its forums on how each plugin could be improved to better serve our instructors. Over time, the popularity of ISUComm Courses grew as the platform evolved to support course sites for the English department generally and Foundation Communication (FC) courses specifically.

Today, much of ISUComm Courses' functions are the product of dialogue between the graduate students and faculty of ISUComm. The early Moodle installation served as a proof of concept that our department used to broker buy-in from the university, and as a result we formed a dedicated group of graduate students named the Online Learning Team (OLT), which grants each member a course buy-out. This culture of graduate student experimentation with open-source software allows us to adapt to global pedagogical needs of our program and local pedagogical needs of instructors. In addition, OLT members gain experience with server-side administration and course design. For example, the OLT performs all Moodle upgrades, and they have written custom CSS rules that range from coding a more unified visual identity for ISUComm Courses to customized CSS buttons, collapsible weeks, and other design features to improve usability and visibility for course sites. This ongoing development allows instructors far more options than the folder-driven layouts of a proprietary LMS like Blackboard.

In short, using a combination of themes, plugins, and custom coding allows us to overcome shortcomings of other systems. Having control over the software and its development also means the technology is distinctively ISUComm; our instructors need not surrender authority to proprietary systems' branding or their vision for education if they do not wish to. Yet, while ISUComm Courses offers instructors considerable flexibility, Moodle's software has a harder learning curve. To mediate this shortcoming, our role as members of the OLT affords us the time to help ingratiate instructors to the system while simultaneously brokering unique opportunities for us as graduate students operating as support for the department.

ISUComm ePortfolios—A Path to Improvement

ISUComm ePortfolios, originally called ISUComm Sites, was developed using WordPress software to support Foundation and Advanced Communication courses and our multimodal pedagogy, wherein we had been teaching students about electronic media as a means to combine multiple modes for added communicative effects, but without enabling students to experience web authorship and experimentation with Web 2.0 technologies. Our WordPress-based platform allows students to experience dynamic forms of authorship and encourages interactivity between students' compositions and their target audiences.

Proprietary systems like Blackboard had an option for ePortfolios, but their model did not enable web authorship. We wanted students to be able to create fully-functioning websites that would serve to showcase students' processes and products as they worked toward becoming better communicators, students, and future professionals.

The early beginnings of ISUComm ePortfolios began in a small closet within the OLT's office. There, three graduate students worked to find a way to better teach the electronic mode of communication: one graduate student set up a secured server hosting three separate WordPress installations, one graduate student assisted in the development and maintenance of the server and a WordPress multisite installation, and all three taught their courses using this setup. This early installation had a public URL; two graduate students had administrative control over all sites, while instructors had administrative control over the students' sites and students were admins on their own site. While having the ePortfolios fully public was not ideal for our context, it was necessary for this early experiment.

WordPress core affords the ability to make posts and pages. But as Kristin Arola (2010) argued, simply posting content into a form is not web authoring (p. 6). To answer her call, we installed several network-wide plugins that afforded custom styling, fonts, and layout options of individual WordPress pages so that students had considerable control over the design of their ePortfolios. On the dashboard, these plugins looked similar to word processors and other familiar tools, but they enabled students to customize the styling and arrangement of content, even at the level of HTML and CSS. These plugins and styles were answers to questions asked during the development of the platform: How can we accommodate students' literacies and varying ranges of experience by enabling web design? How do we enable easy embedding of content such as Word documents or presentations authored with PowerPoint or Prezi? Answering these questions, the small team developed a list of themes and plugins necessary for teaching ePortfolios within the context of ISUComm.

These early experiments were the foundations of creating a Beta Platform, where we extended the user base to include a pilot cohort of instructors of ISUComm Foundation Courses. Just as with Moodle, the early successes of this pilot meant we had a proof of concept as a means to achieve buy-in from the college and resources for ongoing service and support. While there have been considerable successes, there were a number of stops and failures early in the project. Our early negotiations did not meet our university's expectations for security and support, and we had not negotiated the competing and complementary visions for how such a platform could be secured, developed, and maintained in useful and pedagogically sound ways (Lutz et al., 2016, "Developing the Platform as an Online Environment," para. 6). This meant that moving forward with the project was often done without full consensus of everyone involved (Lutz et al., 2014). Moreover, as the user base for ISUComm ePortfolios expanded, this demanded more involvement from the OLT to provide instructor training on the platform while also providing context-specific support for instructors and students. These challenges were immense. But with the concerted effort of ISUComm faculty and the still-growing OLT to garner support, the ePortfolio platform continues to grow.

Digital Repository for Academic Writing—Collaborative Pedagogy

As our primary platforms grew, so too did the need for pedagogical support, which necessitated an effort to create spaces where instructors could help each other. As part of this effort, two grad students developed a WordPress site that would allow instructors in the English department to contribute teaching ideas to a central repository containing teaching ideas, lesson plans, activities, and tips that instructors could share amongst themselves. The project came to be known as the Digital Repository for Academic Writing, or DRAW, and has served dozens of writing teachers since its inception in 2013. Similar projects to DRAW include the Sweetland Digital Rhetoric Collaborative of the University of Michigan and the multi-institutional Corpus & Repository of Writing (CROW).

As happens with so many graduate student projects, however, DRAW fell into danger of extinction as Tom Lindsley, the last of the two students, prepared to graduate. Tom tried to find a graduate student successor who would be willing to take over DRAW and continue maintaining and developing the

platform. The timing ended up being quite fortunate as ISUComm Sites had by this point entered its pilot phase, and the OLT was in a good position to take over DRAW. Because DRAW is another WordPress platform, the question of where to host the system was easily resolvable by integrating the custom-designed theme and the pages and posts of DRAW into a new site on ISUComm Sites' WordPress multisite network. Requesting a domain name, draw.isucomm.iastate.edu, and integrating DRAW into the Sites network, were easy enough challenges to overcome. Authentication and account creation, however, proved more difficult.

When DRAW was hosted on the grad students' own server, account creation could be handled using their own system's protocols and processes. Once DRAW became a part of a university-owned and operated system, however, account creation and handling was more complicated. Ultimately, the OLT decided that DRAW could best meet the needs of our users if it authenticated through the university's LDAP authentication system, but that it would be best if only instructors in the English department were able to log in to contribute activities. This required setting up Active Directory (AD) integration for the system, which allowed us to restrict access to those users whose Net IDs were part of the English department's email listserv for instructors and staff. Now all instructors and staff in the English department can log into DRAW with their Net ID and password, without creating a separate account, and contribute projects to the repository freely (Figure 1).

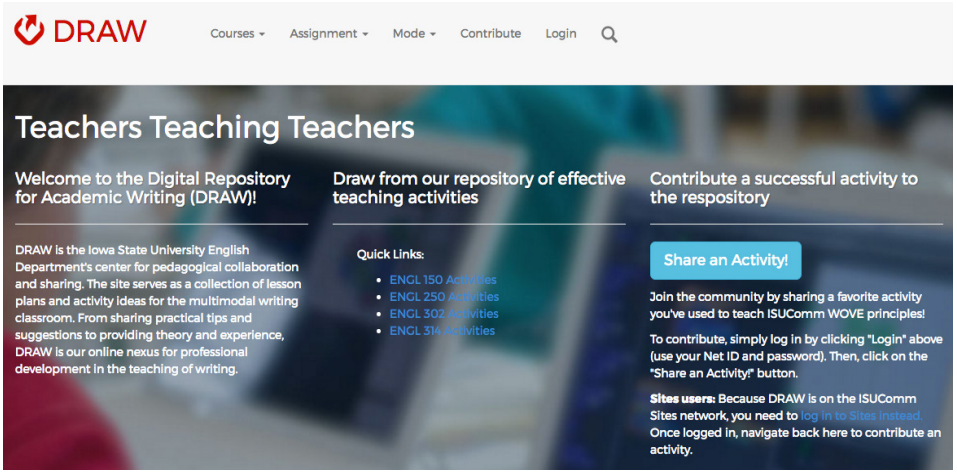

Figure 1: The homepage for DRAW offers quick links and an opportunity to log in and share an activity.

We face ongoing challenges with DRAW, the largest being a resilient lack of awareness of the platform and an occasional reluctance to use a system separate from other resources that are already used for similar purposes, such as the university's version of Box.com, CyBox. Yet we feel that DRAW offers real advantages for professional development and pedagogical collaboration, the largest being its multimodal capabilities of hosting embedded images, audio, and video. WordPress's categories and tags systems have also been used to full advantage with the platform, and finding activities for a particular course or even a particular assignment is relatively quick and easy. As the OLT moves forward with other initiatives and projects, DRAW remains one of our powerful aides for teachers of writing.

ISUComm eProfiles—Focusing on Students' Futures

Following the success of ISUComm Sites' ePortfolio beta testing and DRAW, the OLT began to anticipate a growing user base with various needs. ISUComm ePortfolios exists primarily to serve ISUComm's Foundation Communication (FC) program. To help students navigate the FC curriculum, the OLT, collaborating with the ISUComm WPA, created the unique user role of student for ePortfolio users to limit the administrative capabilities of FC students within WordPress, lest any unassuming student create technical problems with the platform. However, an even greater concern for ISUComm ePortolios within FC was how to handle students' privacy.

Both the Dean of Arts and Sciences and ISUComm's WPA, whom the OLT works with closely, have been concerned about students' work being available for viewing by others students and instructors on the site's network. All stakeholders agreed that students releasing that content prematurely might compromise the learning experience for students who are just learning to write for the web for the first time. Working with our WordPress technician, the OLT created an ePortfolio privacy plugin that restricts access to only the administrative user (the student) and a registered user (the instructor) to protect student privacy. Yet the long-term potential for ePortfolios is that students can create professional websites for going on the job market, meaning that students' ePortfolios must eventually be available on the World Wide Web. This led the OLT to expand our WordPress network by creating a new domain: eProfiles.

EProfiles allows users to create outward-facing websites that can be used to increase digital visibility for entering the job market. The OLT identified multiple levels of potential users for eProfiles: undergraduate students, graduate students, and faculty. The goal for the eProfiles network is to provide personal websites for users. With that goal in mind, the privacy plugin is deactivated by default, but the OLT still keeps it available for users to decide when they are ready to open their site to the rest of the web. More administrative privileges are also granted so users can activate plugins from a selection the OLT has already provided. Since eProfiles is a separate domain on the network and serves a different purpose than ePortfolios' FYC users, a new homepage (Figure 2) was created and designed as an example layout for users to see how they might envision their own professional site. Here new users can see the potential and request a profile for themselves.

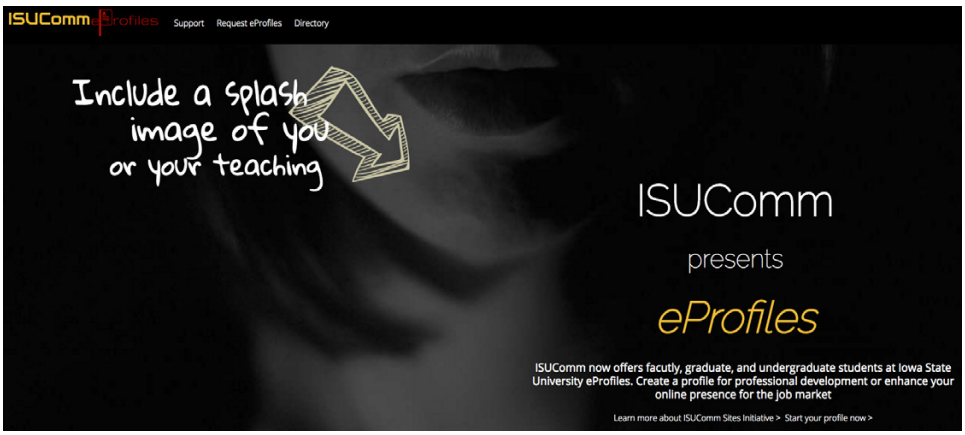

Figure 2: The eProfiles homepage is designed in such a way that it serves as a model for the intended purpose of the outward-facing platform. When users visit the site, they can scroll down and see the potential for their own site.

To slowly introduce this new multi-network option, the OLT worked in conjunction with the ISUComm teaching proseminar by piloting eProfiles with first-year graduate students. Teacher mentors ask these teaching assistants to create a teaching philosophy and portfolio, essentially beginning their professional development. EProfiles fits perfectly with this context as it helps new scholars begin their academic career with a web presence that they can develop throughout their time as students and teachers.

While the OLT sees eProfiles as the platform with the most potential to reach across the university, it still needs development and promotion. Specifically, the site request process is more nuanced than ePortfolios and thus needs careful planning. The OLT anticipates mostly single users requesting sites, but there needs to be an option available to instructors wanting to request sites for classes; in the first semester offered, one instructor requested eProfiles for a graduate-level class on teaching language learning with technology. Even more so than the functionality of the site, promoting eProfiles to the English department and, hopefully, the university is our biggest roadblock. The OLT is continuing to develop the site, but attracting users will take time as people are only recently becoming aware of its

existence. The creation of eProfiles also fueled the conversation of user needs, leading the OLT to plan a new network, eProjects, to accommodate another purpose for our WordPress platform.

ISUComm eProjects—Rethinking Digital Collaboration

Until recently, all of ISUComm's platforms have been tailored to collaboration either between instructors or between instructors and students. Only recently has the OLT tried to best accommodate two related pedagogical needs that had been brought to their attention by instructors. First, instructors needed a web platform for class projects that were separate from class portfolios. Some professors simply used the ePortfolios platform, but many would use a third-party site such as Weebly, Wix, or Blogger. The use of third-party platforms was in part due to the second issue: the need for collaboration and publicly viewable websites. EPortfolios are linked directly to a single student's Net ID and password, meaning only they can sign in to work on it. Also, as was mentioned briefly, only the student and instructor can see ePortfolios. As the OLT looked to expand our platforms, we wanted to make sure we had a medium for online, collaborative project creation. This became eProjects, a platform purposed toward student-to-student collaboration within a single website. Part of designing eProjects focused on making sure that groups, or even whole classes, could work on one site. Based on feedback from the professors we knew needed this type of platform, we decided that the sites would be publicly visible by default. The public visibility, however, has raised concerns with the instructors who would rather keep their students' projects private. We are currently working through this problem and how best to use our privacy plugin.

Testing for eProjects started small, in the fall of 2016. Two OLT members tried it out in classes they were teaching—business communication and technical communication—and tried to anticipate any potential issues that instructors would need to be aware of. Members of the OLT also used eProjects in classes they were taking in order to have working examples of what students and instructors could potentially use eProjects for. Through connections with professors who were already using ePortfolios, the OLT was able to have a few other departments try out eProjects. This included a landscape architecture class, which used one eProjects site as a whole-class project, and a meteorology class, who used eProjects for group work. The landscape architecture class, in particular, fully embraced eProjects and used their site as both a collaborative project and the nucleus of course information and materials (Figure 3).

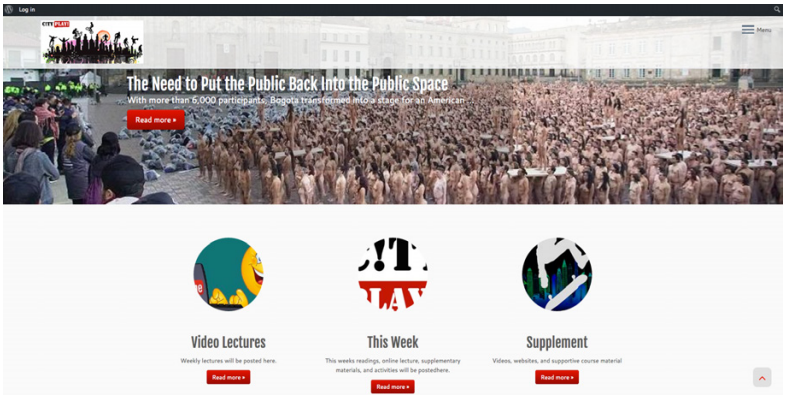

Figure 3: A landscape architecture class took full advantage of the affordances of eProjects by using the site as a collaborative space for class projects in addition to hosting class materials.

As with eProfiles, the OLT is looking to market wider usage of eProjects. More professors in the English department are starting to look into using eProjects outside of FC courses. However, we believe that the success of eProjects outside of the English department could be expanded well beyond two departments. Currently, the OLT is working with Iowa State's human development and family services, accounting, and biology departments to prototype examples of projects that could be developed with the

use of an online platform, and a few other departments have expressed interest. The eProjects platform is slowly, but steadily, gaining ground as a way to incorporate electronic communication into various classrooms.

ISUComm Support—Building Trust through Ongoing Assistance

The success of the OLT and its use of open-source technologies have mostly been a result of the support that the graduate students working for the OLT offer. Each semester and throughout the summer, we hold a weekly meeting to discuss technical issues, project updates, visitor and email conversations and to coordinate writing instructional articles and workshops. It is in these meetings that we keep our team focused on our large user base for each of our platforms, asking ourselves how we can improve upon the technologies, what kind of support the users need, and how we can meet those needs in the best way possible.

As of this writing, the OLT has written over 120 support articles on various topics, ranging from simple tasks such as adding a label to complex Moodle activities like setting up and using a gradebook. The articles are housed on yet another WordPress site called support.isucomm.iastate.edu. Using the KnowHow theme for a simple design, we take full advantage of WordPress' post capabilities, similar to our DRAW site, by sorting articles with categories and tags. We feature a prominent search bar to prompt searches, a tag cloud showing most popular posts, and other sidebar widgets for improved browsing and usability.

In addition to support articles, we offer personal consultations and quick email responses for technical issues. Our best tech support often comes from low-tech in-person visits in our office. The beginning of each fall semester, the team works with incoming teaching assistants and provides group training on ISUComm Courses and ePortfolios. Each year, the writing program administrator has scheduled more time to this training as the technology is valued as an integral component to teaching FC. The OLT also holds workshops each semester for continued training on the WordPress platforms. Attendees hold various levels of technical knowledge, so the OLT has tried to plan workshops accordingly, presenting both introductory help and more advanced material.

Conclusion

The goal of this proceeding is not to laud our own program and systems. Rather, we hope we have demonstrated some of the benefits and challenges of implementing open-source software. While open-source systems offer a number of benefits for students and instructors, they can also serve as learning tools for graduate students. In developing and maintaining these systems, we learn about security, server-side administration, curricular development, and how an LMS can best facilitate the workflow of a classroom. We learn about support and documentation by offering context-specific instructions to students and instructors through our ISUComm Support website. We also gain administrative experience by working closely with the director of ISUComm FC to create trainings, workshops, and other presentations necessary for supporting ISUComm's multiple platforms. In short, the OLT is made up of teachers of ISUComm who are not just tech consultants; we are consultants on how to effectively incorporate technology in the classroom.

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