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Librarians Beyond the Brick and Mortar: A Framework for Embedding STEM Library Services in Virtual Spaces

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Abstract:

Colleges and universities across the world continue to shift degree programs from learning in physical spaces to asynchronous and synchronous learning in virtual spaces. Students, who have access to brick and mortar libraries at their academic institution are sometimes unable to utilize resources because of time constraints and responsibilities outside of the classroom. Reference and information services must evolve to meet the needs of students who are unable to access the brick and mortar library physically. Facilitated by a science librarian who created a framework to deal with these issues, this workshop offers participants the opportunity to explore new methods of outreach for both distance learning students and non-traditional students and find solutions that can be implemented in their institutions. The focus of this session is library services for Science, Technology, Engineering, and Mathematics. However, attendees will learn that the framework can be applied to any subject area. Within the framework, librarians and information professionals investigate traditional library services and potential roadblocks both distance learning, and non-traditional students encounter when library services become a necessity for their collegiate success. Additionally, participants learn how to migrate existing library services and identify and implement new services into virtual spaces. We look at usability tools and methods that help identify student needs that the library service supports, evaluate cloud applications and collaborative tools essential for facilitating the transition and discuss what new skills current professionals must ascertain, and what topics library and information science schools should consider integrating into the curriculum to prepare future professionals. The session begins with a discussion on how a software engineering workshop and plagiarism school service was virtualized for the benefit of distance learning students. Participants work in groups with scenarios to analyze and provide virtual solutions for specific library services.

Keywords: Embedded Library Services, STEM, Cloud Applications, Reference, Information Services.

Introduction

Colleges and universities across the world continue to shift degree programs from learning in physical spaces to asynchronous and synchronous learning in virtual spaces. Allen and Seman point out that the shift can be attributed to the continued growth of distance learning in institutions, where, in the United States, data shows that students who took a distance learning course increased by 3.9% between 2014-2015 (2017). Technological advancement continues to cause the e-learning ecosystem to evolve, with Learning Management Systems (LMS) as the core engine that powers these virtual learning environments (Fındık-Coşkunçay, Alkış, & Özkan-Yıldırım, 2018). LMS are web-based learning environments that provide teachers the interactive tools needed to deliver course materials online (Ergul & Koc, 2018; Lamb, 2018). LMS give teachers the ability to organize coursework, assess learning, and facilitate interactions between students, instructors, co-teachers, and embedded librarians (Holmes, & Prieto-Rodriguez, 2018). Academic library services have evolved to support virtual and blended learning environments by offering previously recorded online learning modules and tutorials to teach students how to search databases, the library's catalog, or assist with certain search-related assignment tasks (Webb & Hoover, 2015). Additionally, other services such as virtual reference or chat reference allow students who can't come to the library, connect to a librarian for inquiries online in real time (Keyes & Dworak, 2017; Katherine & Nancy, 2011). Students, who have access to brick and mortar libraries at their academic institution are sometimes unable to utilize resources because of time constraints and responsibilities outside of the classroom. Distance learners may never be able to access brick and mortar services and are at the mercy of whatever service they can get online to support their online education. In this paper, the context of what virtual means, regarding library services slightly differs and extends beyond the scope of how it is defined. While virtual reference is similar, it still lacks the one feature that is proposed in this study—visual presence of the librarian in real time providing the service. This paper introduces the Library Services Virtual Framework to discuss the process of virtual conversion of brick and mortar services. At the time of the completion of this paper; the science librarian found no literature with similarities of the services described throughout the paper.

Software Engineering Workshop

Kent State University began annually holding a Fashion/Tech Hackathon in 2015. In the first hackathon, the science librarian was asked by the Dean of University libraries to serve as a mentor to student participants. After meeting with organizers of the event, he was asked to also hold a workshop on coding for high school girls. The workshop was open to the public. The workshop generated so much buzz that it had to be moved to a larger venue to accommodate the vast number of students who signed up. A part of the design of the workshop was identifying possible information literacy opportunities to integrate into the session, which consequentially highlighted both resources and services offered at the university library. The reasoning behind incorporating this component into the workshop design was threefold. First, workshop attendees who were also hackathon participants used the resources as supplementary material to aid in their projects. Second, workshop attendees who were also Kent State University students, and unaware of services and resources offered at the library, were informally introduced. Finally, hackathons are great places to recruit students for STEM. Every event held on a university campus, or grounds presents the chance to promote the university and libraries to current and potential future students. The Fashion/Tech Hackathon coding workshop was attended by undergraduate students from

neighboring universities (potential graduate students), and area high schools (potential undergraduate students). The workshop was an introduction to problem-solving and programming using the Python programing language. In this one-hour session, the science librarian covered algorithms, flowcharts, the Python syntax, and Python programming concepts and techniques. Attendees worked collaboratively to develop two small applications, learned how to search for additional python resources and other programming language resources using the library's catalog, and a brief tour of both the Institute of Electrical and Electronics Engineers (IEEE) and Association for Computing Machinery (ACM) databases. At the end of the workshop, several students asked whether the library held similar software engineering workshops throughout the year. None existed at that time. All inquiring students were current students enrolled in either Computer Science, Mathematics, Digital Science, or Aeronautics and Engineering. After building a duplicate workshop to hold in the library, an email and follow-up phone calls were sent to faculty in each discipline, to promote the workshop and have interested students or faculty RSVP for the event. It was during this communication that a few desired to attend the session but could not because it was scheduled during the day when they were not available. They all preferred an evening workshop, because they either worked full time during the day and took classes part-time in the earlier part of the evening on some days during the week, had family obligations during the day and were only available during the evening, or worked full-time midnight shifts and went to school full time during the day. This was when the thought of creating an online workshop was born. A doodle poll was sent to the respondents to ascertain dates and times of availability.

Virtualizing the Software Engineering Workshop

The initial thought was to use video conferencing software and an integrated development environment (IDE) like Eclipse and share a desktop session with multiple participants. However, the approach would have proved futile because the effectiveness of the workshop is predicated on the ability of participants to follow along and write and execute the code simultaneously in real time with the instructor. Additionally, valuable time would be lost if participants erred in the installation of the application. A search for a cloud-based collaborative development environment (CDE) led to Cloud9 which was recently acquired by Amazon and is now called AWS Cloud9. Cloud9 is a Software as a Service (SAAS) application that takes the traditional IDE environment that is usually installed locally on a desktop or laptop that users are accustomed to and make it available from anywhere on any device that has a browser and is connected to the Web (Martin, 2017). The librarian can simply add students to their account and share a workspace. The problem with Cloud9 is that there is no way to communicate with others outside of the inside chat feature where they can visually see the instructor. To truly replicate the workshop required that component. Using Zoom video conferencing software in conjunction with Cloud9 for the session proved adequate.

The first step involved setting up a time for the session outside of regular operating business hours of the library conducive to the availability of those who could not attend the workshop in the library. Fortunately, the results of the doodle poll showed everyone was able to participate in the online session on the same day (Wednesday) and time slot (7:00pm). Next, an email went to all respondents two weeks in advance of the online workshop with specifications regarding preparation before the session, including instructions for using Zoom and Cloud9. A time was set for a week in advance in the evening to check connections and configurations. It was essential to ensure that ample time was afforded to everyone to help

with troubleshooting before the session rather than spending time dealing with issues during the session. On the day of the online workshop, there were no issues, and feedback from the students (via email) was all positive.

Plagiarism School Service

In 2012, Kent State University implemented Plagiarism School, ran by University Libraries to deal with issues of plagiarism (Schnall, 2013). Using plagiarism detection software tools like Safe Assign, professors sanction students who plagiarize their work, and they are referred to university libraries to meet with a librarian to resolve the issue. "Plagiarism School referrals are maintained in a centralized database in the Office of Student Conduct to make it easier to identify and track students" (Schnall, 2013). Selected subject librarians have access to the database of first-time offenders. Previous plagiarizers and students identified for committing plagiarism in their work that is considered excessive are not referred to the Plagiarism School, rather, the faculty member that reported the work may bypass Plagiarism School and pursue other avenues of redress (Schnall, 2013). Students are usually paired with a subject librarian knowledgeable on the topic of the work under suspicion. During the process, students are sent an email by the system for dates (selected by the librarian) in which they can meet with the librarian in person in the library to go over their work. Once students commit to a date, they are expected to honor it. Multiple failures to do so after committing to a date can result in failing Plagiarism School. A consequence of failing Plagiarism School usually means the student fails the course. There was one circumstance in which a student was unable to meet because of family obligations, a full-time schedule of classes for the semester, and they worked during the day. What's more is that the student had at least a one-hour commute to campus each way. After a brief consultation with the student over the phone, a date and time was set in the evening to review the paper in question.

Virtualizing the Plagiarism School Session

Google Docs and Zoom proved to be the most appropriate platforms for the plagiarism session online. Prior to the meeting, the student uploaded his work and invited the science librarian to edit the document. Google Docs' most significant feature is the ability to collaborate and publish a document in real time (Holzner & Conner). Zoom was an essential component because a required part of the session is to review anti-plagiarism techniques and writing style resources through the web. The student reviewed the American Psychological Association (APA) writing style guide, which they were instructed to follow the course assignment. The session concluded with the editing of some mistakes in the paper and guidance on an approach for them to correct the rest.

Library Services Virtual Framework

The Library Services Virtual Framework is a framework that can be used by both academic and public libraries to convert brick and mortar library services to virtual library services. Moreover, it provides steps for academic libraries to embed these services in virtual spaces. The framework consists of four stages. The first stage requires librarians to gather information about the needs of the community in which the library serves. Subject librarians in academic libraries should have a general understanding of the number of degree programs in their area of responsibility that shifted from brick and mortar to entirely online or a hybrid of both, and programs that are in the process of making the shift. This information helps to

identify what services need virtualization and presents the opportunity to discover new services that could support the program. For example, subject librarians that are embedded in online courses could easily create workshops and seminars and conduct them in real time. Rather than upload previously recorded learning modules in the LMS, or have the instructor provide a link to the learning modules via the syllabus, time could be set aside each week where students could use services in a participatory way, such as an information literacy instruction section in real time. Survey tools could be used to gather non-intrusive information about students who are not distance learners, to better understand the population and get an idea of how many non-traditional students will benefit from the added service. Reference librarians in public libraries could identify patrons in the community who could benefit from the online service conversion, such as patrons who are physically unable to come to the library for services that are only held in the library.

Questions to Consider in Design

The second stage requires design. Migration may incur modification. If a current service is virtualized wholesale changes may not be necessary, however, a new facility will require a design before implementation. The following are questions to consider during the design stage:

- What tool or tools are required and essential to facilitate the service online?
- Are potential users of this new service technologically, digitally, and computer literate?
- What potential roadblocks should be accounted for in the design of a new service when applicable?
- What about assessment?
- How will impact be measured?

Current subject librarians for STEM fields should look specifically at ways in which they can provide an online service for a service that currently exists in the library or create one. For example, there are several academic libraries that hold LaTeX workshops in the library for students and faculty interested in using the software to construct their manuscripts. There are LaTeX SAAS tools, such as Overleaf and ShareLaTeX that can be used to conduct the workshop online in real time. Most researchers in STEM use LaTeX. Engineering librarians could use Autodesk SAAS tools. Video conferencing software is probably the most important tool to consider no matter the discipline, because should no SAAS tools exist, if part of the workshop, seminar, or talk requires the demonstration of software that is only available through installation, the desktop can still be shared to all online participants. Most importantly, the attendees will be able to see the librarian. Knowing the limitations of user's literacy competency (technology, digital, computer, etc.) helps to prepare the literature needed to assist them should they need to install and configure something on their own prior to the session. This is important for distance learning students. Some potential roadblocks to consider are accounting for participants with disabilities, language barriers, and a slow internet connection (low bandwidth) to name a few. If a student has a hearing disability or is visually impaired, or if the native tongue of the presenter is not the first language of the participant, Tywi would be a better web conferencing solution. The way in which impact and assessment of the online session are measured should mirror the brick and mortar session. The third stage is testing and implementation. Before promoting the online real-time service, it should go through a dry run first with colleagues, students, or both to determine if any

additional issues could occur during the session. Take the appropriate steps to mitigate any problems should they arise. The final stage is evaluation. Results of the pre-assessment and post-assessment give valuable feedback from participants and determine the longevity of the service.

Conclusion

Distance learning at Non-profit and for-profit institutions will continue to grow as more people attend universities to obtain degrees and foster their professional growth (continuing education). Libraries will need more librarians that graduate from iSchools with the requisite skills to reimagine, reconceptualize, and transform library services to deliver content to users no matter where they are. Traditionally librarians have a keen knowledge of how to navigate reference resources, conduct the reference interview, the ability to provide information literacy instruction, and a decent exposure to information technology, however, information technology knowledge is not a highly sought attribute in the job market (Haddow, 2012). iSchools can help prepare students who are looking to become subject librarians or liaisons in STEM by creating information technology tracks that include more rigor with a focus on students interested in becoming liaisons to the sciences. Integrating the learning of subject related SASS tools (Workshop, seminar, or courses) and seeking partnerships with STEM departments on campus that offer classes in AutoCAD (engineering), software engineering, robotics, etc. would be a great way to improve the curriculum and expose them to disciplines for which they will one day serve.

Future Work

At Kent State University, the science librarian virtualized the following services (workshops):

- Software Engineering with Python
- Software Engineering with C++
- Introduction to Reaxys: Creating chemical structures, patent and document search
- Introduction to LaTeX

Future work includes creating a pre-assessment and post-assessment component to virtualized services to measure impact and to conduct a comparative analysis between brick and mortar services and virtualized services.

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