Salisbury
UNIVERSITY

Honors College

Honors Thesis

An Honors Thesis Titled

How Library Services and Collections Have Been Impacted by Technological Advancements

Submitted in partial fulfillment of the requirements for the Honors Designation to the

Honors College

of

Salisbury University

in the Major Department of

Fulton

by

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Date and Place of Oral Presentation: *SUSRC 4/28/17*

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How Library Services and Collections Have Been Impacted by Technological Advances

Abstract

This paper will be a literary analysis that explores how library collections and services have evolved since the invention of the internet and how technology has enhanced library services over time as well as projections into the future. While increasing cultural importance is being placed on technology, there are some who have begun to wonder where this shift in values leaves libraries. According to Palfrey (2015), many people today experience feelings of nostalgia when recounting memories of libraries as institutions filled with older librarians constantly shushing patrons, rows of musty smelling books, or even a silent reading room filled with old furniture (p.22). As a result, people have antiquated views of libraries that are simply inaccurate compared to the vast majority of services offered in modern libraries, which are paired with highly skilled librarians.

However, libraries today are recognizing the public outcry for modernizing not only the spaces that they utilize, but the services and collections as well. While the digital age has caused some areas of difficulty for libraries, there are many ways that these continued technological advances have greatly improved how we are able to conduct research within libraries and even outside of their walls. Modern libraries are expanding their services to include anything from civic engagement sessions with local representatives to video gaming rooms where teens can learn about coding (Palfrey, 2015, p. 77). The aim of this paper is to argue how technology and the internet have positively impacted libraries today rather than caused them to become obsolete, as well as illustrate some ways that these shifts may change services and collections of libraries in the future. In order to understand the current state of modern libraries, the challenges they

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face, and why they are important to American society, the history of libraries must be understood.

The Evolution of Libraries

In early ages, libraries often consisted of rooms that contained important records and items of cultural or historical importance. Libraries also initially existed primarily in the form of large private collections, rather than as public libraries, which did not come into use until the 4th century BC (Krasner-Khait, 2001, para. 3) The earliest form of a "library," or large-scale private collections of books, belonged to Aristotle, the infamous Greek philosopher (Krasner-Khait, 2001, para. 3). In 300 BC, the Great Library of Alexandria was founded, which was created to share scrolls and other various texts with scholars and other similarly qualified individuals (Krasner-Khait, 2001, para. 4). These early libraries were typically restricted to individuals who could either afford access to them or had the educational merit to prove they would benefit from the collection rather than the general public.

When the Benedictine monasteries were established in 529 AD, they created the concept of inter-library loan by lending materials out to other monasteries (Krasner-Khait, 2001, para. 17). With the advent of universities, university libraries also began to flourish and were predominately created by large-scale donations of private collections, such as Humphrey, the Duke of Gloucester, who donated his collection to Oxford University (Krasner-Khait, 2001, para. 18). During the 17th century, libraries became increasingly popular, so state-funded and national libraries began to pop up around the globe (Krasner-Khait, 2001, para. 20). The earliest public library was founded in 1425 in the UK, but "Once Parliament passed the Public Library Act in 1850, libraries began to

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spread throughout the nation" (Krasner-Khait, 2001, para. 20). In the American colonies,

the first free libraries were established in the 1600s, and the first subscription or

membership libraries were established in the 1700s (Krasner-Khait, 2001, para. 26).

When the first public libraries began to open in the United States, they were

created in the aim of supplementing the existing school system, which was contended by

Shari A. Lee, Assistant Professor, St. John's University (2014), where she states: "The

Boston Public Library, which opened in 1854… affirmed that the overarching goal was to

create a large public library 'as the means of completing our system of public

education.'" The Boston Public Library (BPL) was the first public library to open in the

United States, and it was largely intended to ameliorate the inaccessibility of information

for poor or middle class citizens (Palfrey, 2015, p. 2). As a result of this, libraries were

also aiding in improving access to civic engagement, which allowed individuals to

participate in the democratic system.

BPL was the first institution where information was provided entirely free to

anyone in the public, regardless of social class, educational experience, or anything else

(Palfrey, 2015, p. 1). This is an important aspect of the creation of public libraries when

considering the initial function they were intended to serve, as they largely play the same

essential role today. Despite technological advances, this remains to be central to the

mission of many libraries. Today, librarians are increasingly asked to serve as educators

to the public; whether they educate library patrons on how to access electronic databases,

community information, software, or even physical collections.

This echoes one of the other initial roles that libraries were created to serve,

which is ameliorating the education system. Outside of a formal education system,

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librarians serve as educational tools on a wide variety of topics and tools. One of the most recent trends in research help or instructional design within libraries has been the importance of demonstrating the proper use of technological resources. Despite this continued and evolving role, the growing importance of technology in modern life has had serious effects on libraries. Because of this shift in the importance of technology and online materials, the roles of libraries and librarians in particular have often come into question as we as a society look toward the future.

Modern Libraries

Libraries today provide free access to services and information needed to engage in civic life. In his book, Palfrey (2015) discusses some of the ways that libraries provide essential services to the public, such as providing access to daily news, plays or readings of popular literary works, and a temporary shelter for the community's homeless during the day (p. 9). The provision of such services, as Palfrey (2015) would argue, is essential to a modern functioning democracy; in order for all citizens to make educated votes in elections, they need to have access to information that is relevant to today's issues and discussion topics (p. 10). For many people, modern libraries and public libraries in particular are the only place that can provide these resources for free. Additionally, he goes on to say that libraries are providing access to high speed internet for many people who would otherwise be unable to afford the necessary equipment and services that it requires. "For as long as a library exists in most communities, staffed with trained librarians, it remains true that individuals' access to our shared culture is not dictated by however much money they have," (Palfrey, 2015, pg. 9) which further proves the

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necessity for access to libraries across the globe in order for a fair and just society to thrive.

One of the most recent changes in modern library services that have begun to occur is the prioritization of promoting civic engagement. Nancy Kranich (2012) argued in a society that, despite the attempts of social media and technology, is growing more disconnected by the day, the necessity for playing an active role in our communities is indispensable (p. 75). She discussed some of the ways that libraries have begun to create opportunities for its patrons to meet with local representatives, discuss issues of importance, and overall connect with other individuals (p. 75). Kranich (2012) analyzed the effects of this shift in services, claiming: "Their efforts are rekindling civic engagement, connecting citizens, boosting citizen participation, and encouraging increased involvement in community problem solving and decision making" (p. 75). Because libraries were created for the initial purpose of providing free information to all as a means of enabling citizens to make educated decisions, promoting services that include civic engagement opportunities are central. Another way that library services have been improved in the digital age includes a variety of ways that technology has expanded a patron's ability to access information.

In modern libraries, one of the biggest improvements that technology has made possible is the expansion of access to resources outside of a singular library space. Koehler (2004) explains that in previous times, if someone was looking for a particular book or article that their library did not possess or have access to for whatever reason, it was nearly impossible for the patron to get a hold of (p. 405). "With the advent of union catalogs and interlibrary loan, once the desired item was located, it could be requested

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from a reciprocating institution and either the object itself or a copy would be sent by

mail and later by fax," which has greatly improved a person's ability to gain access to a

variety of materials outside of a singular establishment (Koehler, 2004, p. 405).

Reference and User Services Association (2016) describes interlibrary loan, which is an

additional resource technology has made available today, as a tool that provides patrons

with access to materials outside of their own local library. This is just one of the ways

library services have been improved since the advancement of library technology.

All over the world innovations in library services are taking place; Salisbury

University Library (SUL), for example, lists on the "Borrowing Materials" section of its

webpage that they check out not only books, but also iPads, headphones, laptops,

coloring books, and even Fitbits. Other such libraries even check out bicycles or therapy

dogs during stressful exam times (Palfrey, 2015, p. 75). SUL also features an up and

coming MakerLab, which has 4 3D printers, scanners, single-board computers and

microcontrollers (Salisbury University). The MakerLab also has its very own Technology

Librarian, who specializes in the newest technology and devices that are available to the

library. Similar advancements in modernized library services are being made all across

the US. In the Chicago Public Library, a new movement created by YouMedia educates

young people about making new knowledge: "The programs offered through YouMedia

teach children digital literacy and production skills and how to create new knowledge in

interactive formats, publish online in multimedia, and parse credible from less credible

information in digital formats" (Palfrey, 2015, pg. 76). Palfrey (2015) elaborates on

further services modernized libraries are also providing, such as giving video game lovers

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access to gaming rooms, where users are encouraged to create podcasts and blog posts

that rate games (p. 76).

Challenges Faced by Libraries in the Digital Age

One of the biggest ongoing issues that have been noted in many studies is the

need for improved copyright legislation for digital materials that are used by libraries.

Libraries predominately utilized the first sale doctrine in order to justify its distribution of

physical text materials. According to the first sale doctrine, "' [it] holds that a copyright

owner's exclusive right to distribute extends only to the first sale of a copy'" (Ou, 2003,

p. 90). Ou (2003) explains that because of this doctrine, it allows libraries to lend

materials to as many patrons as possible; the copyright holder only possesses privileges

over the materials up until the first sale but not with any future sales or redistributions (p.

90). Libraries clearly fall under this redistribution category, which has provided ease of

mind for institutions who wish to provide materials to their users without fearing

copyright infringement (Ou, 2003, p. 90).

However, digital materials don't fall quite as easily into the first sale doctrine

because redistribution is not explicitly allowed as Ou (2003) further explains (p. 90).

Additionally, the author explains that for libraries who are seeking to create a digital

library of sources, which involves both reproduction and redistribution, it is very difficult

to do so when these two rights are maintained by the copyright holder (2003, p. 90). As a

result, libraries are restricted on what they can or cannot digitize and can face fines of up

to "$30,000 per infringing act" (Ou, 2003, p. 95). While there have been court cases

attempting to amend this issue, it still seems that libraries are at a standstill when it comes

to improved legislation for modernized materials and copyright issues (Ou, 2003, p. 96).

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Another prominent issue for modern libraries can be that of accurately serving a wide array of patrons.

While libraries in the 21ˢᵗ century can easily become bogged down by the desire to please tech-savvy millennials, Robert Storer (2014) highlights that there are a wide variety of generations using library services on any given day (para. 8). Today's library could be visited by six different generations on any given day, ranging "from baby boomers to millennials" (Storer, 2014, para. 8). In his blog post, Storer (2014) emphasizes assisting a diverse group of patrons as one of the top five issues facing 21ˢᵗ century libraries (para. 8). Because there is such a wide variety of individuals utilizing library services, a librarian could find themselves showing a technologically challenged adult how to navigate the internet one minute and demonstrating how to use advanced software to conduct research with a tech-savvy teen the next minute (Storer, 2014, para. 8). This means that librarians must not only be prepared for both types of questions, but libraries can't entirely gear their services or collections to one side or the other. Storer would agree that modern libraries are challenged with meeting the needs of all patrons, which may become particularly challenging as the divide between pro-technology and pro-analog becomes increasingly larger.

While both of these issues can be increasingly intimidating to 21ˢᵗ century libraries, they are both situations that can be solved in the coming years as these institutions develop solutions for new problems. In terms of copyright issues, libraries may need to strengthen their staff by incorporating a librarian with a focus on copyright and legal issues if they do not already have one. By having a team of such librarians, these specialists can gather the most updated legal information regarding digital

copyright and supply their employers with the information needed in order avoid fines from incorrectly following copyright laws. Librarians can also serve as advocates for improved legislature on a more national level, even if this might take some time to accomplish. Additionally, libraries can easily ameliorate the issue of properly addressing the growing gap between different patrons by thoroughly training its librarians to deal with questions of all kinds. Librarians who are trained not only on the most updated software and technology, but also on how to work with individuals who are struggling to adjust in the digital age will be far more successful. Proper training must not occur only in the beginning of employment, but also regularly throughout the year as well in order to assure that library staff are fully prepared for nearly any situation or question that may arise.

In the age of constant digital and technological advances, there are some who believe that libraries and their services are unneeded and obsolete, which is another issue that modern libraries face. Taxpayers and the government have begun to wonder why they are providing monetary support for libraries when other institutions like schools and hospitals are requiring higher budgets to provide adequate assistance to the public. In comparison to these services, the so-called antiquated resources that libraries provide aren't considered as important. Tax cuts were a prominent issue in an article written by Agresta (2014), which said, "2012 marked the third consecutive year in which more than 40 percent of states decreased funding for libraries" (para. 4). The decreased funding provides a big issue to overcome for many libraries as their patrons continue to expect more.

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The problem of funding is two-fold because, as mentioned previously, libraries are constantly suffering from budget cuts while also being expected to provide more services. Just this year, President Trump has created a "proposal to eliminate the Institute of Museum and Library Services in his Fiscal Year 2018 budget" (ALA News, 2017, para. 2). The American Library Association News states that this means the proposal would take away virtually all federal funding for libraries of any kind (2017, para. 2). This is discouraging for library supporters because it indicates that members of the public and, particularly, the government no longer seem to recognize the importance of libraries within a functioning democracy. Budget cuts and proposals such as these coupled with growing expectations from library patrons put libraries in a very difficult situation. In order to provide improved access to technology, beneficial services for community members, further database enhancement, and expand digitization efforts, libraries need the funds to do so.

This is especially true when it comes to the argument of creating a more extensive digital library. According to Kuny and Cleveland (2008) "The 'harsh economic realities' are that digital collection development entails heavy costs for implementation, licensing, training, promotion, and the development and support of a technical infrastructure" (p. 10). The authors continue to state that while libraries have always been established under the concept of providing free access to information for all, it is becoming increasingly difficult for them to provide free access to the services that patrons are demanding as they undergo extensive budget cuts (Kuny & Cleveland, 2008, p. 9). Because of this, some libraries are becoming increasingly concerned that creating a digital library would mean providing this service at a cost (Kuny & Cleveland, 2008, p. 9). This would completely

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go against the original purpose of libraries, which is to guarantee that access to information is not limited to those who have money; for individuals who can't afford the newspaper or access to the internet, eliminating public libraries or their funding would mean that they could no longer serve as functioning members of society.

Why Libraries Matter

Even though the size and usage of print materials in libraries may have decreased, the amount of additional services that are being offered has vastly increased. In particular, libraries provide access to wireless internet that many individuals would not otherwise have access to. According to Jaeger, Thompson and Lazar (2012), in 1994 the popularity of the internet amongst universities, government institutions, and research facilities began to greatly increase (p. 77). Once more and more libraries, universities, and other institutions began to have access to internet, they were able to improve existing access to materials through better online databases and catalogues (Jaeger et al, 2012, p. 77). An important transformation occurred under the Clinton administration; Jaeger et al. state that Vice President Al Gore made the suggestion that libraries be used as a means to extend internet services to the public (2012, p. 77). By 1996, 44.4% of libraries were reported to have internet access, and by 2004, 99.6% of the 5,023 libraries that were surveyed had internet access (Jaeger et al., 2012, pp. 78-79). This means that within a period of 8 years, internet access within libraries has more than doubled what it was previously. As a result, individuals across the United States now have improved access to the internet, which can be found at nearly all libraries today.

While many households today are fortunate enough to have high-speed internet, there are still many lower socioeconomic areas in the US that can't afford access to

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internet at home. For these people, visiting a library is one of the very few ways that they can access Wi-Fi free of charge. This is particularly important for students of any age. The public school system today has placed increasing importance on an online component, which means that students are required to go online to complete homework after school. While many of these students have access to free computer labs within the school system, there are still many hours after the schools have closed that the students will be unable to access them. By providing something as simple as free internet access, libraries are helping students to better succeed in school.

Even in college, many university libraries provide computers or even allow students to rent out laptops free of charge, such as at the Salisbury University Library. For the students who can't afford a computer or laptop of their own, this service could mean the difference between failing out of school or successfully completing assignments. For college students who are maxed out on loans and struggling to pay for the essentials like rent, tuition, and food, libraries lessen the load by providing free access to both internet and the tools necessary to access the internet. Someone who is forced with making a choice between rent and a computer or internet will likely choose the necessity; however, libraries make it so that students aren't forced to choose between the two. Although today's library users aren't necessarily checking out as many physical books as in previous years, there are other ways that libraries are booming in the Digital Age.

According to Gwen M. Gregory (2001), some may claim that libraries often experience either stagnation or declination in patrons entering libraries or coming to reference, but this does not necessarily indicate that the use of library services are in

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decline (p. 49). Gregory emphasizes that gauging library usage simply through physical

numbers or visits to the reference desk can not only make libraries seem like they are not

generating much business, but it can also ignore an entire aspect of modern library usage

(p. 49). There are many services being provided within today's libraries that don't

necessarily require a physical presence: "Some examples are the number of virtual

reference transactions, the maximum speed of public-access Internet workstations, and

the number of database sessions" (Gregory, 2001, p. 49).

Additionally, like the Salisbury University Library, many other libraries rent out

items such as laptops or headphones, which generate a large amount of traffic in many

institutions. Since previous measurements of library services did not include these kinds

of uses, let alone the many other technological advances that have impacted library

services, it is vital to include these different sources of information moving forward in

comprehensive library studies. Because we, as a society, have shifted our focus to

technology and internet, libraries need to shift their data measurement tools to accurately

address how and what patrons are using in these realms as well. Another argument

related to the popularity of library services is the reliability of its databases in comparison

with other, more easily available online resources.

Some may think that the necessity for library databases is fading out now that

nearly anyone can access limitless information through Google or other similar resources.

However, there have been many studies that prove the information provided through

library databases is far superior to that of anything found through simply "surfing the

web" at home. In order to describe the effectiveness of modernized library databases, it is

first essential to examine some of the history that discusses their evolution. According to

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Jaworski and Sullivan (2010), the Machine-Readable Cataloging (MARC) system frequently used in libraries was considered the most cutting-edge technology at the time, but it is under consideration whether or not internet search engines are beginning to catch up with MARC (p. 107).

Jaworski and Sullivan (2010) explore some counterpoints of this issue, which state: "As it stands today Wikipedia is almost as reliable as Encyclopædia Britannica for information, and in terms of accuracy" (p. 116). This may come as a surprise to many of today's research professionals, and especially educators, who have often argued that Wikipedia is not to be used as a reliable source. While many of these same individuals would quickly concur that Encyclopædia Britannica is a noteworthy source that can be used for research, this would mean that their opinion of Wikipedia and what is determined as respectable is skewed. Along with these misconceptions and recent innovations in outside resources, libraries and other institutions have begun to research exactly what it is that draws today's savants and amateur analysts alike to library databases. Today's tech-savvy users can access limitless information from their phone, tablet, or computer all without leaving the house. So, this poses the question: why utilize library databases when other options can often be more easily accessible?

Jaworski and Sullivan (2010) provide a comparison of library databases and outside sources by saying Online Public Access Catalogs or OPACs, which are library databases used to access both physical and digital collections, are considered to not be as user friendly as other mediums like Google Scholar or Yahoo (p. 108). The authors explain that when a person is first conducting research on a library database, they often struggle to do so without the assistance of a research librarian due to the complexity and

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required knowledge of libraries required to do so (p. 108). As a result of this and other

difficulties that library databases may pose, a study by OCLC also showed that only 1%

of users begin research on library databases, which means that 99% of users begin their

research through other means (Jaworski & Sullivan, 2010, p. 109). However, students are

reported to perceive library databases as cleaner, uncluttered, and possessing higher

quality information in comparison to search engines (Jaworski & Sullivan, 2010, p. 109).

While this still leads many researchers to utilize library databases, they are not issue free.

They are also constantly in competition with other rivalry resources, such as Google.

Grafton (2009) contends that tools like the Google Library Project, which is more

popularly known as Google Books, have largely affected libraries because they have

made scholarly resources available to just about anyone, inside or outside of a library (p.

89). In order to maintain interest in libraries, they provide fast enough WiFi accompanied

by enough computers for all of the users (Grafton, 2009, p. 89). Additionally, the

materials that are supplied by the library are often considered higher quality to that of

Google Books, which may be accessible outside of libraries (Grafton, 2009, p. 89). They

are also able to share copyrighted materials in a better format both visually and

technologically (Grafton, 2009, p. 89). The author explains that databases like JSTOR,

Project Muse, EEBO, and EEO, which he considers superior to other resources, provide

access to countless books and articles, and many of which are only accessible with library

login information (Grafton, 2009, p. 89). Unfortunately, Grafton (2009) goes on to say

that the budget that is used to pay for the subscriptions to these databases is often being

taken from money used for purchasing print materials (p. 89). Because print materials

sales are also booming, this makes it difficult to acquire both print and online resources

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for a library (Grafton, 2009, p. 90). This juxtaposition in services is a large issue that many of today's libraries are struggling to grapple with. Some libraries have responded by seeking to eliminate all or the majority of their physical collections, while others still cling to their archives of books and other documents.

If libraries take note of the results that the studies mentioned in Jaworski and Sullivan's (2010) article, there are many ways that libraries could continue to easily become more competitive with and even surpass other online resources. Because many of these are still developing, there is always room for improvement and feedback from patrons is a large part of that. Library databases are an essential aspect of modern libraries, and they need to continue to evolve around patron's expectations and interests as we move into the future. Even still, the current state of the databases is regarded as higher quality than even some of the best outside sources, which is comforting to library professionals. In a world of so many options for finding resources, it seems that library patrons return to databases time and time again because of their reputation for quality and direct information that is free of cost.

While it seems that many individuals might not immediately turn to library databases, they utilize them because of the reliability and consistency in quality that simply cannot be found through other resources. Additionally, Google Scholar and other such resources can be easily swayed by advertisements and monetary contributions from organizations who want their articles and information to be placed at the top of the list when someone searches for information on a related topic. Any company or organization can have their listing put at the top of particular searches even if they are not the best resulting item in regards to what a person is looking for. In contrast, library databases

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maintain a lack of bias in ordering results that cannot be impacted by money or politics,

and instead are governed simply by what results best match what the user is searching

for. Even though library databases seem to have a secure reputation for quality

information, some may wonder still if librarians will someday be a thing of the past.

While some argue that libraries may become obsolete once eBooks and other

online resources begin to take over, the necessity of both libraries and librarians can be

easily proven. Libraries serve as a safe and quiet space for many types of learning:

whether it is collaborative and noisy learning or silent and contemplative (Palfrey, 2015,

p. 67). For many, libraries are one of the singular spaces where distractions are slim,

opportunities to meet with fellow learners are often, and chances to learn and research are

endless. Reference librarians will become particularly key in the digital era for the simple

fact that even though so much information is available one click away through a Google

search bar, this information is not always the highest quality (Palfrey, 2015, p. 68). This

can be problematic for anyone seeking scholarly information, but this is where the

importance of reference librarians will remain essential.

These individuals have varying areas of expertise, research tips, and advice

available at no charge for anyone looking to learn. Although recent studies show that

students are less likely to come to a librarian for research help first, it is important to

retain a reference librarian's role as a guide to the highest quality resources and

information (Palfrey, 2015, p. 104). While research may not necessarily begin with either

library databases, as mentioned before, or utilizing librarians, they have maintained their

standing as a central source of a wide variety of information that can be utilized entirely

for free (Palfrey, 2015, p. 73). Librarians are often trained in a variety of content areas

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and have been asked questions ranging from how can I find more books by this author to

how can I find sources to help me with my PhD dissertation? This prepares reference

librarians for many questions in a wide variety of topics and expertise levels.

While there have been efforts within many libraries to attempt a more digital-

friendly reference format, such as chat windows or emails, but many have been

unsuccessful (Palfrey, 2015, p. 69). For the average library user, it is far easier to

approach a librarian and explain a research question rather than type it up in a chat

window or through an email. Patrons who have the ability to physically visit a library will

often ask questions in person rather than opting to discuss research with librarians online.

While this may come as a surprise considering today's generation's love for online

communication or instant messaging, there still seems to be an obvious preference for

meeting with an individual librarian in order to learn about whatever topic is at hand. The

preference for face-to-face interaction is promising for those who wonder whether

libraries as physical spaces and librarians will exist in the coming years (Palfrey, 2015, p.

70).

Despite this preference for in-person communication, there are still those who

believe libraries could be completely automated and online in the future. However, it is

difficult to see a world without reference librarians to guide their communities through

the world of information. According to Chowdhury (2002), there have been several

attempts to create online resources to either replace or augment reference services within

libraries (p. 259). The Library of Congress has established the Collaborative Digital

Reference Service (CDRS), which aims to provide "'professional reference service to

users, anywhere anytime, through an international, digital network of libraries'"

How Library Services and Collections Have Been Impacted by Technological Advances (Chowdhury, 2002, p. 270). This is just one example of how technology can be a positive aspect of change within libraries. Being able to communicate with patrons across time zones, oceans, and possibly in different languages would expand services almost limitlessly for those who wish to learn from librarians. While this particular resource forwards questions amongst participating libraries, there are other resources that don't necessarily require the presence of a librarian or to be anywhere near a library, such as online search engines like Google or Ask.com.

However, even resources that allow patrons to remotely contact librarians and ask questions are still utilizing library services such as the CDRS. As mentioned before, many of these attempts have not been as popular amongst its users, which mean that many patrons still prefer to physically come to a library and talk with a librarian in person. During a typical day working at the Salisbury University Library Research Help Desk, there are far more students who come to the desk rather than utilize the library chat tool that is available online. More often than not, students would end up coming to the desk to further discuss and explain what they are seeking, rather than continually type out potentially confusing information in a chat box.

It seems that this preference for face-to-face interaction stems from the ease that discussing a topic in person provides, whereas providing context and other extensive information via a chat can be difficult. Often, it is easier to explain in depth what a person is looking to learn or to find rather than typing up an extensive chat that may or may not be understood. That being said, there are still many populations who would argue that having resources such as the CDRS further allows librarians to extend the reach of their assistance. For distance learners or people who are unable to physically come into a

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library location, this can be a better option. Depending on perspective, these types of

resources could be invaluable for educating and providing outreach to library users across

the globe. Additionally, efforts have been made to create more complete versions of

digitalized materials accessible via the internet all over the world.

  As technology advances and boundaries began to decrease even further, it is easy

to wonder if one day an entirely digital library will exist where researchers have

boundless access to information from Washington, D. C. all the way to Tokyo. While it is

unlikely that a single global digital library will be created, there have been nation-wide as

well as world-wide efforts to establish an interconnected digital library. According to

Palfrey (2015), the Digital Public Library of America (DPLA) is one such example of

this, which aims to establish a national library platform and began working towards this

goal in 2010 (p. 16). However, this will not eliminate the need for physical institutions;

rather, it will provide librarians with the opportunity for new ways to research (Palfrey,

2015, p. 17). By allowing libraries, archives, and even museums to share materials

through a national portal such as the DPLA, any librarian anywhere in the world would

be able to easily find materials ranging from rare artifacts from Einstein's personal

studies to an article evaluating the impact of rap music on preteens. The possibilities

would be endless, which means that librarians would have limitless access to materials,

allowing them to help patrons to the full extent of their means.

  Another argument for why libraries cannot simply exist in digital forms is that

even though digitized materials are easier to access than ever, it is difficult and expensive

to preserve. According to PCMag's Encyclopedia, data rot or data degradation can be

defined as "The slow deterioration of storage media until the data are no longer

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readable." In order to prevent data rot and preserve meaningful materials, skilled and

tech-savvy librarians will need to sort through what information online needs to be saved

and what doesn't (Palfrey, 2015, p. 34). Palfrey explains that since so much information

is constantly recorded online, deciding what should be preserved and what shouldn't is a

key aspect of retaining materials. Because preservation of digital materials is so difficult,

we may be losing a large amount of these materials over time due to poor or lack of

preservation, which is a key issue in digital preservation highlighted by Palfrey (2015, p.

35).

Additionally, libraries are still figuring out how to best preserve these digitally

born materials, and, as a result, we may be losing a large portion of these materials

because of inefficient methods of preservation (Palfrey, 2015, p. 35). Digital formats are

changing constantly and materials created a few years ago could soon be inaccessible,

which also means that preservation methods must continue to evolve as well (Palfrey,

2015, p. 34). Libraries who are unable to keep up or who have not yet figured out how to

preserve digital materials of certain types will be losing these materials to issues like data

rot (Palfrey, 2015, p. 34). Online materials are constantly emerging in new formats,

which are another contributing issue to preserving them as older formats become

outdated and are difficult to access (Palfrey, 2015, p. 153). Maintaining the tools

necessary to view these materials can be cumbersome, but without doing so, libraries will

no longer be able to access outdated resources.

Future Projections

In formulating predictions for the possible future of what libraries and their

services may look like, an important aspect to consider is the concept of virtualization.

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Virtual reality can be defined as "a realistic and immersive simulation of a three-dimensional environment, created using interactive software and hardware, and experienced or controlled by movement of the body" (Virtual Reality & Augmented Reality, para. 1). Virtualization is becoming a trending topic in the technological world. The concept of virtualization could even extend past the usage of simply having librarians or patrons exist in virtual worlds and could be expanded to include materials or collections as well. Accessing a book or article in a virtual world could mean that patrons are able to physically view the materials as if they are looking at them, which would be especially meaningful for rare materials that cannot be easily handled or accessed. Just imagine being able to virtually pick up a copy of the United States Constitution and being able to turn it over, examining the marks of wear and tear that have been created over the years.

A similar item, which is augmented reality, can be defined as "an enhanced image or environment as viewed on a screen or other display, produced by overlaying computer-generated images, sounds, or other data on a real-world environment" (Virtual Reality & Augmented Reality, para. 1). While both topics may sound similar to anyone unfamiliar with the focus area, they are both key aspects of developing technology that can be applied to the library world. William Dougherty (2009) wrote an article discussing the topic of libraries in relation to virtualization and stated that "Envisioning a collaborative space, served either by an institutions' own computing infrastructure or through an Internet based service… where a librarian avatar would… 'moderate access' to information for patrons is not only probable, it is almost imperative" (para. 14). Since a large amount of today's libraries already have some form of digital reference help, such

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as through an instant messaging application or chat tools, it is viable to imagine a future where libraries provide virtual reference assistance as well.

Since virtualization could be potentially applied to both librarians and library collections, there are many other claims for how this technology could be utilized with libraries. Currently, there are already some libraries, such as the D. H. Hill Library and the James B. Hunt Jr. Library at North Carolina State University, that already have virtual reality software and tools (Virtual Reality & Augmented Reality). Both the Hill and the Hunt library "… lend VR/AR equipment and host spaces for experiences, games, and development" (Virtual Reality & Augmented Reality, para. 2). Amongst some of the resources available for rent is software like Adobe Premiere Pro, Autodesk Maya, and iMovie (Virtual Reality & Augmented Reality). They also provide tools like the Samsung Gear VR, Recoh Theta S 360 Camera, and the HoloLens (Virtual Reality & Augmented Reality). While not all libraries provide access to these materials, they are becoming widely popular and may soon be available at locations across the globe.

While virtual reality is one option for connecting users to more seamless information services, communicating across borders with other scholars and experts within their respective fields will likely become an important aspect of research in future libraries. In an article on the Library of the Future Blog through the American Library Association (2017), some of the possibilities that technology creates for learning were discussed: "From Skyping with Rube Goldberg's granddaughter to facilitating a video conference between a professor from Cornell University's Lab of Ornithology and a budding middle-school ornithology expert, Plemmons showed new ways to open the classroom learning experience to conversations with established and emerging experts"

How Library Services and Collections Have Been Impacted by Technological Advances (para. 4). Before technology like Skype or video conferencing was available, achieving interactions like these would have been a distant and nearly impossible dream. I believe utilizing tools such as these to further facilitate learning and research will be an important component in future libraries.

One invention that is steadily gaining popularity today that could be useful for libraries of the future is drones. While people may think of drones as being used for surveillance, as a toy for some children, or even for film production, there are several ways that drones could be utilized as an additional library service in the coming years. In the simplest form, drones could be added to list of materials that patrons are able to check out and use for a few hours. Because they have become so widely popular, allowing patrons to have access to this technology in libraries would be an excellent opportunity. Additionally, drones could even be used for delivery services; for individuals who are homebound or otherwise unable to come into a library, drones could be utilized to drop off collections or equipment. This would eliminate barriers that prohibit individuals from having access to physical resources provided in a library if they are unable to come in because of issues like handicaps or injuries.

One of the most exciting possibilities that could provide further access to individuals who aren't able to physically come to a library is the concept of utilizing drones to provide internet access in remote areas. According to the American Library Association, "Drones could help improve internet access in underserved areas. Google has included drones along with balloons (Project Loon) and low orbit satellites as possible means of providing internet access, especially in remote places" (para. 6). Because Google is already using drones in this way, it is not unforeseeable for libraries to

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jump on this trend and allow patrons boundless access to free internet. While there may

be limitations, the concept of providing free internet to patrons is one of the most well

used services today and one of the most important for many, so this would be an

excellent addition to libraries of the future.

Another important projection for the future of library services could be the

potential for higher usage of self-checkout kiosks, rather than circulation desks staffed

with librarians. Just like a self-checkout kiosk at a grocery store, libraries may one day

decide to eliminate the need for circulation librarians entirely. Since the majority of their

job could be easily and skillfully replaced by a machine, it is likely that this transition

will eventually occur. Additionally, I've found that libraries, such as the James B. Hunt

Library at North Carolina State University, have been revolutionizing the field of

librarianship through the use of technology such as the bookBot:

> The Hunt Library bookBot… can store up to two million items in a climate-
> controlled environment and deliver any of them within five minutes of a click in
> the online catalog. Requiring 1/9 the space of conventional shelving, the bookBot
> helps transform this 21st-century library from a storage facility into a rich
> environment of learning and collaborative spaces. (Hunt Library: bookBot, para.
> 1)

Innovations like the bookBot provide just a glimpse into how technology can not

only provide quicker and more efficient services, but they can also improve the physical

space and organization of our libraries. This tool also allows patrons to virtually browse

any given shelf where books are contained in order to research by subject (North Carolina

State University Libraries, para. 3).

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While the bookBot is simply one example of how robots can be incorporated into libraries, this may be a trend that we continue to see in libraries of the future. Library advocates have expressed concern over this trend because it may displace workers; however, "educational institutions may have a role in developing new skills for displaced workers and/or improving skills so that workers can transition to new roles and responsibilities in environments where robots assume significant portions of the workflow" (Robots, para. 6). Robots can also shift monotonous and simplistic responsibilities away from librarians, so that they are able to focus their time and talents on more pressing matters. This may be more problematic for circulation librarians, but this does not mean that their skills cannot be reallocated to a different field or taught new skills.

An additional aspect of technology that the future could hold for libraries involves gamification or game-based learning, which has many benefits, such as: "promoting the spatial reasoning, math, and logic often required for game mastery, skills that have become more important with a focus on STEM… promoting curiosity, socialization, and the continuous processing of information" (Gamification, para. 2). These benefits can be particularly applied to libraries, where providing video games and other gaming consoles can improve social skills (Gamification, para. 7). Additionally, utilizing these forms of learning can encourage critical thinking and digital literacy for library patrons (Gamification, para. 8). Gaming consoles already exist in a large amount of today's educational institutions, but further providing them in libraries across the United States could provide greater access to learning in an unconventional manner. This could

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especially appeal to today's teens and preteens, which would enjoy playing games while simultaneously learning new skills.

Additional innovations like Amazon Go and dual screens at research help desks have inspired a great deal of change within library services. In particular, these inventions further prove that circulation librarians may quickly become outdated and unnecessary with upcoming technology. However, the necessity for educating patrons on how to navigate the realm of information and conducting research will be more present than ever. Because such vast amounts of information are and will be accessible online, it is vital to have reference librarians and instructional libraries who will guide the public. While institutions may shift away from circulation, I believe higher importance will be placed on the individuals who educate patrons on services, collections, and resources.

In terms of physical spaces, libraries in the future may look entirely different than we are accustomed to today. Libraries may move away from placing such high importance on housing as many physical collections and move less popular materials to off-site housing. This does not mean that patrons will no longer be able to utilize these materials; it just might take a little longer to access them. Libraries may take this as an opportunity to collaborate further on their collections, rather than treating them as a chance to grow the largest and most diverse collection under one roof. Rather than aiming to all house the same materials collectively, institutions may aim to gather materials together and share further so that no single library is left managing a massive collection that it can no longer house or afford. By collaborating like this and collectively storing these materials off-site, institutions will be able to better use the spaces that they have for other services. They could be free to provide more computers, technology such

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as 3D printers, gaming rooms with virtual reality capabilities, and even more user-friendly reading rooms. Having quiet spaces to study and learn, even if it is with a tablet rather than a book, will continuously be a large part of libraries for the future.

Another aspect of physical spaces that is likely to change in the coming years is the necessity for offering other educational services to patrons within the library as a kind of "one-stop shop" for learning. There are many academic libraries that are already following this trend according to an article by Bryan Irwin (2016) "The library has been welcoming new neighbors. Specifically, programs that support student and faculty success such as math emporiums, writing centers, academic enrichment programs, and excellence-in-teaching centers, are now being given prominent real estate within the library" (para. 1). This shift in integrating other types of educational services within the same building could prove to be very beneficial for both library patrons and libraries themselves. By expanding services within the library to also include tutoring for students or other similar resources, libraries are showing the importance that they place on education itself.

One change that has already begun to take place within many libraries that will continue for libraries of the future is the necessity for spaces that allow both noisy collaboration and independent silent study. Within many modern libraries, there are typically quiet spaces for patrons who wish to read or learn in silence, and there are also collaborative areas that allow patrons to work and learn with others. Some libraries provide whiteboards or chalkboards, group study rooms that can be reserved, meeting spaces, couches and other comfortable seating rather than the standard table and chair, and even assembly halls for large events or meetings. This variety of physical spaces

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allows patrons to learn in a variety of ways, rather than the standard hushed image of a library space that comes to mind. This need for two entirely different types of spaces is created by today's generation, who often views studying and learning as a social activity. For many, simply sitting next to another person and silently studying provides reassurance and comfort. For others, working together and talking through materials allows for optimal learning.

Final Thoughts

While librarians can often be overlooked when considering how many other services are required in the public, they are extremely essential to a functioning democratic environment. Some think that the digital age will soon result in the extinction of libraries altogether, but the services and resources that these institutions provide are vital. The internet allows anyone to find almost anything no matter where they are or what time it is. However, today's internet user is often left struggling to figure out how to find just what they're looking for, how to find scholarly and reputable information, and even how to improve their research skills. This is where librarians are essential and will continue to be for the foreseeable future. Acting as information guides, librarians educate the public on all the best ways to find the information that a person is seeking. Libraries in the next 50 years may put less emphasis on physical spaces and storing materials than in the beginning of their history, but this does not mean that the services and resources that will be provided will be any less vital to the public. Libraries of the future may look very different, but they will not be obsolete in the foreseeable future.

Since the advent of early libraries, there have been a lot of changes and development. In terms of collections, libraries have been able to expand them beyond just

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physical materials; many libraries have countless databases that provide access to even further books and articles than any library could house itself. Libraries originally focused on retaining materials as a means of preserving historical records rather than providing the public with a place to learn and explore what they had to offer. The services that these early libraries provided were almost non-existent; instead, materials were rarely browsed and used by anyone who wasn't a scholar. With the creation of public libraries came the expansion of services, which today can include loaning out laptops, providing video games and movies, and allowing patrons to use new technology such as 3D printers,

While it can be easy to imagine an outdated library that relies primarily on its physical collections and assume that technology will eliminate their purpose entirely, this is not the case when it comes to modernized libraries and their services. Technology has positively impacted today's libraries because it has almost entirely eliminated the boundaries that once existed in regards to access to information. The internet is a central aspect of how technology and the innovations that come along with it have improved library services. Library patrons are now able to access databases online, which includes full text articles, EBooks, and even digitalized materials. Simply providing free access to the internet itself has greatly improved the lives of many individuals across the country who cannot afford access to it on their own. While libraries were originally created in order to provide free access to information for all, this tenet still holds true today because that access has simply been expanded and boundaries to it have been nearly eliminated. As we begin to look towards the future, this philosophy will still hold true – however different it may look.

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