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For Canadian academic libraries, the emergence of the COVID-19 pandemic necessitated an unprecedented shift to virtual services. An abrupt halt to in-person activities required libraries to make use of new technologies (and existing technologies in new ways) in order to ensure patrons had access to services. While the Academic Data Centre (ADC) at the Leddy Library at the University of Windsor has traditionally offered both physical and online services, the ADC pivoted to exclusively online service provision in response to the pandemic. Through new initiatives such as remote desktop access to statistical software, embedded virtual spaces for consultation and breakout discussions, online workshops and teaching, and the use of social media, the Academic Data Centre was successful in supporting the data and statistical needs of student and faculty. While virtually scaling up data services was essential to avoid disrupting researchers, the shift to online services also presented an unexpected opportunity to reflect on the way the ADC meets the data needs of users and to strategize about the ways to be responsive and innovative in data service delivery in the future. Three themes emerged from this reflection: emphasis on greater accessibility; more flexible instruction; and the benefits for cultivating a data community. As the library and the institution emerges back from the pandemic, the ADC expects to further embrace newly implemented technologies and virtual services to further scale and augment research data service support in consideration of these three themes.

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Virtualization of Research Data Services during the COVID-19 Pandemic as an Opportunity to Enhance Research Data Support

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ABSTRACT

For Canadian academic libraries, the emergence of the COVID-19 pandemic necessitated an unprecedented shift to virtual services. An abrupt halt to in-person activities required libraries to make use of new technologies (and existing technologies in new ways) in order to ensure patrons had access to services. While the Academic Data Centre (ADC) at the Leddy Library at the University of Windsor has traditionally offered both physical and online services, the ADC pivoted to exclusively online service provision in response to the pandemic. Through new initiatives such as remote desktop access to statistical software, embedded virtual spaces for consultation and breakout discussions, online workshops and teaching, and the use of social media, the Academic Data Centre was successful in supporting the data and statistical needs of student and faculty. While virtually scaling up data services was essential to avoid disrupting researchers, the shift to online services also presented an unexpected opportunity to reflect on the way the ADC meets the data needs of users and to strategize about the ways to be responsive and innovative in data service delivery in the future. Three themes emerged from this reflection: emphasis on greater accessibility; more flexible instruction; and the benefits for cultivating a data community. As the library and the institution emerges back from the pandemic, the ADC expects to further embrace newly implemented technologies and virtual services to further scale and augment research data service support in consideration of these three themes.

Keywords: Academic Data Centre, COVID-19 pandemic, Research Data Management, Virtual Research Data Services, Educational technologies

INTRODUCTION

The onset of the COVID-19 pandemic forced all areas of academic libraries, including research data services, to re-think the way users use library services in support of their research and teaching activities. In March 2020, the services models of most North American academic libraries transitioned quickly to the virtual environment. The Academic Data Centre, in the Leddy Library at the University of Windsor, was no exception. If the pandemic would have lasted only a few months, the transition would have been an isolated incident with a corollary goal of returning to a

face-to-face model as quickly as possible. However, the effects of the pandemic have been enduring and the impact is expected to continue for years (Brennan et al, 2021). In turn, the focus is no longer on shifting to a remote service model. Rather, this period of change has created an opportunity to reflect on ways to enhance and improve data service provision in the long term. In addition to meeting users' academic needs, the pandemic pressed libraries to think about user needs more holistically.

Rather than merely chronicle how the Academic Data Centre moved from a face-to-face to virtual services model, this paper presents a reflection of the ADC services and its users with an eye to consider how the present virtual service delivery model can be embraced and extended in order to enhance services into the future. Three themes that have emerged that will inform future (post-pandemic) data services will be explored:

- the development of services that promote greater accessibility for students, regardless of restrictions such as time, place, and differences in mobility;
- the delivery of instruction with greater flexibility and with content that can be re-accessed by students and faculty to encourage self-learning; and
- the development of a community of users that can seamlessly connect and inform the growth of the ADC in ways that address user needs.

LITERATURE REVIEW

The Academic Data Centre at the University of Windsor is physically located within and administratively tied to the operations of the Leddy Library. The literature review focuses on the nature of research data services within the context of academic libraries.

Development of Data Services in Academic Libraries (Pre-Pandemic)

Data services, particularly in the social sciences, existed in major data archives such as ICPSR (Inter-University Consortium for Political and Social Research) since the early 1960s. Likewise, professional data organizations like IASSIST (the International Association for Social Science Information Services and Technology) have provided data support for the international data community since 1976. Because data services were typically located in major archives or university computing centres, libraries and librarians were rarely involved in data services prior to the 1980s (Gray & Hill, 2016). While this history of data services is out of scope of this paper, this earlier period is worth a brief mention as it provided a foundation for the development of data services within libraries.

With few exceptions, Canadian university libraries did not perceive data as part of their service mandate until the mid-1980s (Gray & Hill, 2016). Data transitioned from mediated in-person access to data residing on magnetic tapes. With the advent of the Internet in the latter part of the 80s, data services emerged in libraries with a focus on the development of tools for delivering data to users' desktops. Helping researchers locate and readily access secondary datasets continues to be a central component of library data services; however, during the 2000s library data services started to consider the broader needs of users (Read, 2011). A focus on data and

statistical literacy emerged during this time and data instruction flourished (Kellam & Peter, 2011; Shield, 2005). Concurrently, research data management was also identified as a key component for library data services (Carlson & Garritano, 2010; Searle, 2009).

While key areas for data services in libraries emerged out of need, the operationalization of data services has varied greatly across academic libraries. Levels of data service differ based on available resources within institutions (Geraci, Humphrey & Jacobs, 2012). Geraci et al. (2012) outline five levels of data reference services for academic libraries with each level requiring more involvement, knowledge, and skill. The level of service is dictated by the availability of staff, the skills and knowledge of available staff, availability of funding, user needs, computing resources; as well as related services on campus (Read, 2007). Notwithstanding these differences, library data services broadly focused on four main areas: data collection, data reference, data computing and research data management.

In response to the sustained growth of data-intensive science, the increased availability and promotion of open government data, and the implementation of research data management mandates by federal funding agencies, there is to-date a growing emphasis on data-driven research and teaching across all academic disciplines (Tenopir et al., 2015). This broader trend has presented potential for evolving data service models (Guss, 2016). New models for data services have not only addressed a broadening of scope, but also have presented new service delivery modalities.

Response to the COVID -19 Pandemic by Academic Libraries

Existing library service models experienced a significant shift in March 2020 due to the onset of the COVID -19 pandemic. Institutions of higher education moved courses online. Most teaching faculty were required to adapt to new online teaching technologies as nearly 90% of all learners attended campuses remotely (Falt, 2020). Across North America there was varying levels of library service disruption (Harpreet & Preeti, 2020), however, most academic libraries were pushed to innovate their existing ways of reaching and supporting remote users.

Recent literature exploring the dedicated efforts of libraries in providing remote access to collections and services underlines the significant investment of time, budget reallocation, and effort required for updating digital infrastructure and library systems (Harpreet & Preeti, 2020; Rafiq et al., 2021; Seale & Mirza, 2020). During the pandemic, many libraries further promoted their digital services (Dar, 2020; Dodd & Kotaska, 2020; Mehta & Wang, 2020). This rapid shift to remote service provision was documented early on in the pandemic by Hinchliffe and Walff-Eisenberg's (2020) survey of academic libraries which detailed how libraries were responding to the crisis. Their preliminary results revealed that while on March 11, 2020 65% of academic libraries continued with traditional reference services, within two weeks of their survey launch 96% of those academic libraries offering traditional reference support switched to exclusively online reference services (Hinchliffe & Wolff-Eisenberg, 2020). A clear relationship between pandemic library closures and the transition to online library instruction and reference support emerged early (Anderson, Fisher & Walker, 2021). Radford, Costello, and Montague's 2021 study of how services and relationships evolved within academic libraries during the pandemic also

noted a clear surge in online reference service support. Additionally, the results suggested that librarians were well-prepared for the transition to provide reference and instruction exclusively online.

Flierl (2021) who also noted a significant shift to online reference services, extends this discussion by presenting three opportunities for reference services in a post-COVID environment, namely: the evolution in technologies, distributed staffing models, and measuring efficacy against student learning and success. Similarly, Askey and Bratland (2021), in a high-level progress report of the University of Alberta Library's response to the COVID-19 pandemic, highlighted not only enhanced access to digital content, but also the institution's strategic approach to become a "digital-first" organization that supports a complex ecosystem of online services and platforms.

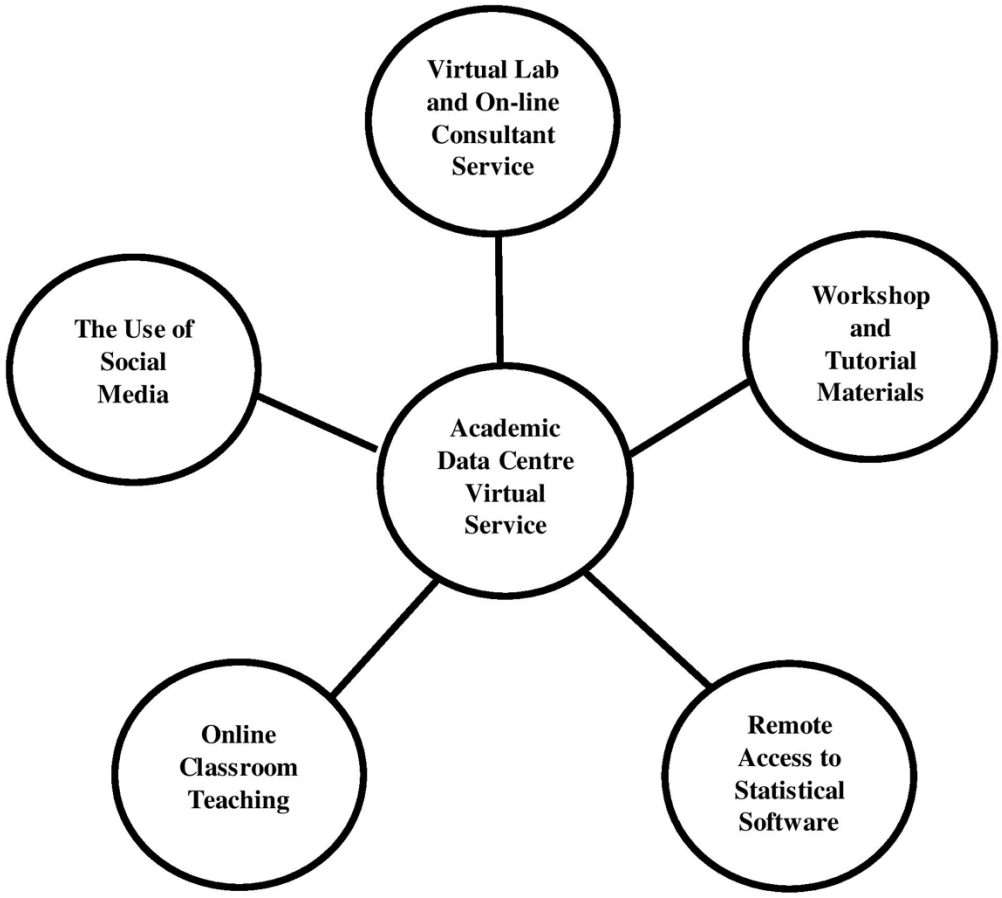
To date, there is little discussion that specifically details the impact of the pandemic on the provision of virtual research data services (Cooper et. al., 2021). Of note is a recent academic presentation by Ossom-Williamson, Khan, and Williams (2020) which reports how the research data library services unit at the University of Texas at Arlington began offering online services in a collaborative environment to promote data literacy and data archiving during the pandemic. What stands out in this presentation is the keen observation that data librarians already had a strong virtual focus prior to the pandemic which positioned them well for the necessary transition to meet new needs during global crisis.

VIRTUALIZATION OF RESEARCH DATA SERVICES AS AN OPPORTUNITY TO ENHANCE RESEARCH DATA SUPPORT

Prior to the Academic Data Centre's (ADC) physical closure in response to the pandemic, University of Windsor faculty and students in need of data-related assistance either visited the ADC for in-person assistance during regularly scheduled drop-in hours or contacted the ADC through email for asynchronous consultative support. During drop-in hours, data users were also provided with access to a well-equipped physical lab with a full suite of statistical software applications, including SPSS, SAS, Stata, R, MATLAB, ArcGIS, and NVivo. Prior to the pandemic, ADC staff also regularly hosted in-person workshops. ADC research data services are offered by a team of three full-time data specialists. A GIS analyst supports geospatial data discovery and spatial analysis. A statistical analyst provides high-level statistical consulting in support of publication and dissertation research. Finally, a research data librarian supports the development and implementation of research data management services for the University as well as coordinates the services of the ADC.

The physical space closed on March 20, 2021 and has remained close for 18 months (October 17, 2021). For virtual research data services to emerge successfully, it was deemed imperative that consultative services as well as access to resources and statistical software continue to be made available. This ensured faculty and student access and use of research data for teaching and research, as well as the continued development of statistical computing skills. This reflective case study shares our experiences in planning and delivering virtual data services (Figure 1) which allowed for greater accessibility, flexibility and data community building. A discussion of the challenges and lessons learned for enhancing data services in an academic university context is also included.

Figure 1. Academic Data Centre Virtual Service Model



Methods of Improving Accessibility and Flexibility

Virtual Lab and Online Consultant Services

In order to maintain the high-level consultation services that users heavily accessed prior to the pandemic, the ADC data specialists set up a virtual drop-in consulting service using the University's instance of Blackboard Collaborate (a learning management system). The virtual drop-in consulting services supported key data and statistical service areas including discovering data, interpreting statistical methods and procedures, managing research data, data visualization as well as mapping and GIS. As a web-based teaching platform supporting the teaching and learning needs of all University of Windsor students, Blackboard Collaborate provided an opportunity to set up synchronous virtual lab services in an environment familiar to many students. The Virtual Data Lab fostered a positive learning environment through real-time online consultations. Key benefits associated with the adoption of Blackboard Collaborate included interactive and immediate support for data analysis and research methods, increased time availability for service, the ability to readily share and disseminate links to data resources for users to access at a later date, as well as overall improved communication through a synchronous and asynchronous platform.

One of the most critical benefits of this service was the ability for users to connect to the ADC Virtual Data Lab from anywhere in the world. This feature was of great value throughout the pandemic when international travel restrictions necessitated many international students (who represent 23% of the University of Windsor's student body) to attend University from their respective country. This was also of value to students who reside out of the City of Windsor. Despite the large number of international students, the majority of University of Windsor students come from Windsor and Essex County (University of Windsor, 2018). While the City of Windsor covers only 146 square kilometers, the surrounding County (Essex County) spans more than 1,850 square kilometers. As such, the travel distance to the library for even "local" students can pose significant barriers. Remote access to consultation services may increase accessibility for select users who face travel and mobility barriers.

The platform also supports improved communication through select Blackboard features that promote discussion, announcements, and an ability to send a mass email to those enrolled in the ADC Blackboard site. A virtual drop-in lab service also enables users to connect with the ADC data specialists at any time during defined service hours. Of key benefit, Blackboard also makes it possible to simultaneously provide statistical consulting services to multiple students through small breakout rooms, thereby reducing waiting times and ensuring students receive timely assistance.

In addition to virtual drop-in Blackboard lab hours through the Virtual Data Lab, the ADC continues to provide longstanding micro-team consulting services through scheduled virtual appointments. These consultations supplement synchronous virtual lab hours and provide in-depth support to more students and faculty. The consultation team has also maintained and expanded email support.

As of October 17, 2021, ADC usage statistics reveal a 78% increase in users contacting data specialists virtually since March 2020. Since the unprecedented switch to fully remote work, the ADC logged over 500 user queries between March 20, 2020 and October 17, 2021 which reflect a combination of email (asynchronous) and Blackboard consultations (synchronous). In terms of disciplinary reach, nearly all disciplines of the university including the School of Social Work, Nursing, and Biology represent the composition of attendees. As direct testament to the effectiveness of our virtual services, a number of researchers have included acknowledgments of support for the ADC data specialists in their research theses and papers. The array of possibilities to access consultation services offers users flexibility of options.

Online Workshops and Tutorials

In the same way teaching faculty across campus had to find ways to deliver course content effectively online, it was paramount that our data specialist find ways to deliver impactful online data workshops. The ADC curated 13 workshops which were designed to introduce students and faculty to an array of data and data-related concepts. More specifically, the workshops focused on best practices for research data management, the use of statistical software for analysis, as well as data visualization and using geographic information systems for spatial analysis. The workshops were free and took place during the "lunch hour" throughout the Winter 2020 semester using Blackboard Collaborate. To further promote ongoing learning, as well as to address numerous requests for post-workshop access to teaching materials, several workshops were recorded for faculty to release to students in their classes.

For the online lunch-hour workshops, 135 individuals (representing faculty and students) attended. The average participating time was 47.80 minutes with a standard deviation of 27.08 minutes. Table 1 shows that 99 (73.34%) individuals attended the workshop activities for more than 30 minutes, and 21 (15.56%) individuals stayed less than 10 minutes.

Table 1. Intervals of Participating Time*

Participating Time (minutes)	Total Number of Individuals	Percentage (%)
(0,10]	21	15.56%
(10,20]	9	6.67%
(20,30]	6	4.44%
(30,40]	9	6.67%
(40,50]	11	8.15%
>50	79	58.52%
Total	135	100.00%

*Note: data resources: Blackboard Report.

To further enhance data and statistical literacy, the ADC consulting team also made online tutorials available from the ADC's website as well as from within the ADC Blackboard site. These linked resources represent a hybrid of materials used in workshops as well as those created based on perceived need (e.g., questions asked during consultations). More specifically, online tutorials step through how to discover and transform data, choose statistical techniques and interpret inferential statistical analyses, map and spatially analyze geospatial datasets, as well as provide guidance for best practices for research data management. Previous workshops materials (i.e., handouts and datasets) were shared and made available indefinitely. The accessibility to these resources in the long-term provides flexibility for users to revisit content and to view at their leisure.

Online Classroom Teaching

In addition to the creation of workshop programming and online tutorials to promote data and statistical literacy, ADC data specialists also provide online classroom instruction for faculty requesting guest lectures during the pandemic. These lectures often align closely with data-intensive student assignments. Unlike prior to the pandemic when guest lectures took place in-person, ADC data specialists have successfully accommodated faculty instruction requests by visiting virtual classrooms. The online platform used for guest lectures coincides with that used by individual faculty members and has therefore varied significantly. Predominantly, lectures have taken place in Blackboard, Zoom and Teams. In each online classroom teaching session, students are guided through the discovery process of finding relevant domain-specific datasets from multiple sites and required analysis to better support the completion of assignments and graduate

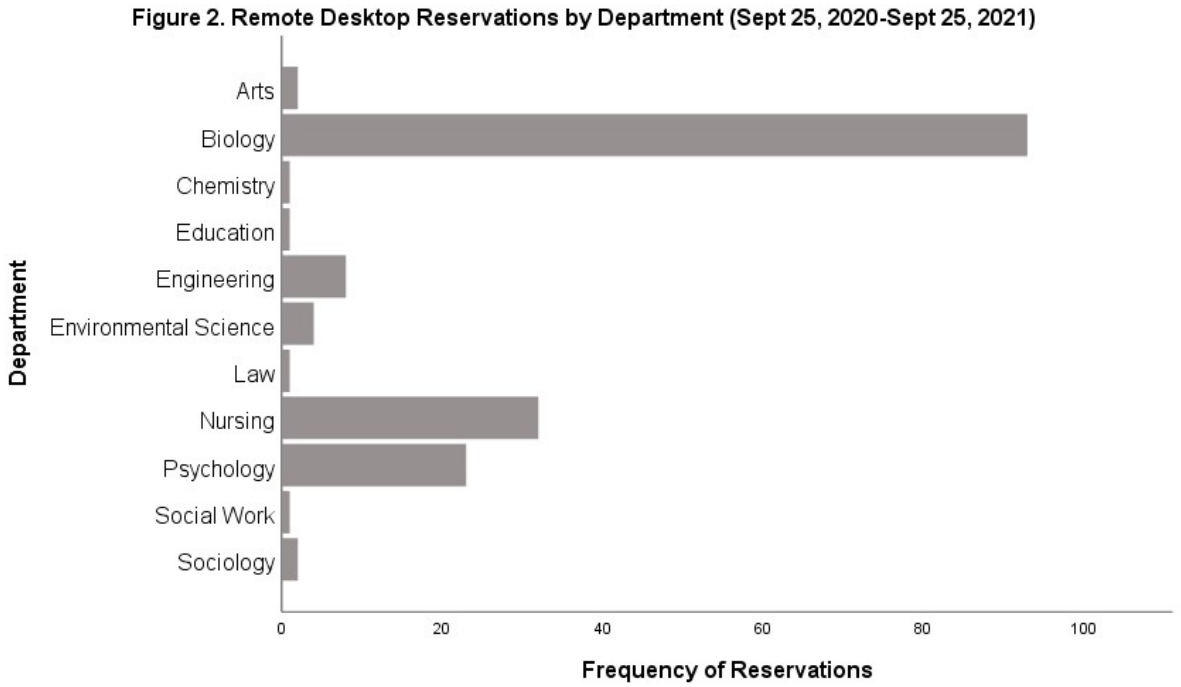
research. ADC data specialists also release recorded classroom instruction through Blackboard upon faculty request. This allows increased accessibility and more flexibility for students to study and learn the content.

Remote Access to Statistical Software

Access to statistical software is an essential component of comprehensive data services. The physical space of the ADC provides faculty, students, and staff with access to often expensive licenses that individuals may not be able to afford. In an ideal statistical environment, researchers would more fully embrace open-source statistical platforms such as R; however, disciplinary norms, learning curves, and specific and sophisticated data analysis needs, regularly warrant the adoption of a full spectra of proprietary platforms including but not limited to: SPSS, Stata, SAS, MATLAB, MPlus, ArcGIS Pro. Prior to the pandemic, a key component of in-person, drop-in support was to therefore facilitate access to physical workstations dedicated to hosting a full suite of statistical applications.

To minimize the impact of the closure of the physical space and to ensure continued access to statistical applications, the ADC worked with the library systems department to deploy virtual access. Using Remote Desktop Protocol (RDP), researchers were able to access a dedicated ADC workstation from 7AM-12AM Monday through Sunday from any remote location. Given the finite number of workstations in relation to the number of students and faculty on campus, it became readily apparent that a reservation system was also needed. Following initial compatibility testing between remote desktop applications and available booking systems, a workable solution emerged with the adoption of Apache Guacamole (an open-source, remote desktop gateway), integrated with Springshare's LibCal space and equipment booking platform. Some further pragmatic solutions included spacing workstation reservations a half hour apart to avoid congestion between users, as well as incrementally scaling up the number of available workstations so that any unforeseeable systems issues could be addressed readily. The initial hours of remote desktop availability were confined to coincide with working hours of staff so that IT and data service support were readily available. A key component of the set up was the review of the terms of statistical software licenses to ensure legal compliance with making applications available remotely.

While the number of remote workstation reservations were modest to begin with, this service has scaled up since its implementation in September 2020. Over 232 reservations representing 654 hours were logged between September 25, 2020 and September 25, 2021. A log analysis conducted on September 25, 2021 further reveals that students (with a small handful of faculty) across a variety of disciplines are reserving workstations. Particularly high usage is noted in the disciplines of Biology, Nursing and Psychology (see Figure 2). An analysis of university status by workstation reservations further shows the following profile: 2% faculty, 22% graduate/post-doctorate fellows, 76% undergraduate students (mostly in 3rd and 4th years).



One significant issue presenting across both physical and remote access modalities is ensuring that researchers save their work to an external device or cloud-based storage system prior to the end of their session. This is required for security purposes as the workstations reboot after each use and wipe out previously saved files. This is not unique to the remote environment but continues to be a challenge as more and more students use the service. Given the positive uptake of this service, our hope is to continue with a hybrid of remote and in-person specialized workstation access even when in-person services are restored.

Building a Data Community

The crisis caused by the COVID-19 pandemic has contributed to significant isolation for members of the campus community. The ADC data specialists seek to utilize innovative methods and approaches to better establish an engaged and sustainable community of practice at the University of Windsor. Already, researchers are encouraged to self-enroll in the ADC-dedicated Blackboard organizational site as regular users. By virtue of self-enrollment, researchers demonstrate an interest in virtual ADC data services and can opt to receive email announcements which provide up-to-date information about ADC research data services and encourage participation in upcoming workshops. The dedicated site also provides access to workshop materials for anyone interested in further learning opportunities. The platform also has discussion boards and other communication channels that help build community embedded within.

The pandemic also encouraged increased use of social media channels, including Twitter and Instagram by the ADC data specialists. Given the ubiquitous utilization of social media by students especially, the opportunity to keep connected with users presented itself. For example, we began following more researchers and students, we were tagged more often, and we tagged more students and research groups. Social media became a way to informally and effectively engage with communities of researchers in the virtual spaces they occupy. In addition to social media,

several additional methods of outreach to market ADC services were employed. For example, workshop information is further promoted on library websites and through internal university media releases. Additionally, given the mass adoption of Blackboard at the University for teaching and learning, the ADC has embraced posting service announcement on Blackboard subsites such as "BBCafé" and a graduate student channel. Incorporating information about ADC services in online newsletters sent by the University of Windsor's International Student Centre has also effectively helped in outreach to the international student population.

FUTURE CONSIDERATIONS

To date, the ADC has implemented new online services using a multitude of virtual channels and platforms to provide research data management, statistical analysis, and GIS support during the COVID-19 pandemic. The usage statistics from the workstation bookings, workshop attendance, online tutorial use, virtual reference assistance, and consultation services lend preliminary support for the enthusiastic uptake of new virtual services. Apart from devoting time to develop and implement these new virtual services, adopted solutions to date have been relatively low-cost and highly adaptable opportunities for the ADC to better support remote researchers.

Despite many clear advantages of embracing greater accessibility, flexibility, and data community building for virtual data service provision, certain elements of in-person support have proven somewhat difficult to replicate virtually. For example, during in-person drop-in hours students with similar questions often naturally formed group clusters. For instance, students often arrived at the ADC from the same class and preparing for the same upcoming assignments. In some cases, the ADC data specialists even encouraged the spontaneous creation of study groups by offering impromptu small group workshops and encouraged in-depth discussion in the ADC space using large screen technology. Such study groups offer opportunities to actively engage in the learning process by virtue of peers simply conversing and connecting socially. While virtual lab services would benefit from these rich experiential opportunities, creating such interactive opportunities to help students develop as learners online (Madland & Richards, 2016) are admittedly difficult to organize through online study rooms available in Blackboard. As such, ADC data specialists are motivated to find effective ways of helping students use study groups in the Blackboard virtual space while restoring in-person support as an essential compliment to virtualized support.

A continual challenge which transcends both the in-person and virtual environment is attracting a sizable number of workshop participants. While this challenge is longstanding, the Blackboard usage statistics did provide valuable and surprising insights. Usage statistics indicate that certain times during the semester are better suited than others for programming; however, the statistics also reveal slightly higher attendance (on average) than for previous in-person workshops. This modest increase in workshop attendance should be monitored over the course of more workshop offerings. Given that the majority University of Windsor students originate from the surrounding environs, it will be particularly valuable to assess through workshop registration data whether future virtual offerings break down previous attendance barriers for local commuters, especially students with greater commuting distances than those residing in the City of Windsor. It is possible that the virtual environment has allowed those who previously faced barriers to attend in-person to now attend.

Varied reasons may account for greater online participation. One potential explanation may be that the removal of commuting time may provide greater flexibility to attend a multi-hour virtual workshop. Similarly, participants can briefly turn their video off to attend to other competing priorities during the session. Also, the virtual experience may enhance the responsiveness of data specialists to participant queries. In other words, links to datasets and documentation can be readily shared immediately after and even during an online session through chat to all participants within a learning management system. Another potential benefit may be the extent to which participants can more effectively engage directly in a workshop and learn experientially. For example, student appreciate sharing their screen to elaborate on a point made by an instructor or sharing unique challenges associated with their thesis research data.

Finding times congruent with student and researcher schedules is also critical. For example, holding events on Fridays during less busy times of the year yielded larger participation. Conversely, holding events during reading week or campus holiday closures can mean minimal participation. Promotion of virtual lab hours and workshops is helpful, but in general, marketing of events (regardless of medium) remains a distinct challenge.

Also noteworthy are the occasionally time-intensive requests by researchers requiring deep and extended support which exceed ADC service capacity due to our broad mandate of supporting all students, faculty and staff. While a lack of clarity in service-level expectations presents in both virtual and in-person contexts, the issue becomes exacerbated in the current online environment as ADC data specialists continue to adapt to the demands of new educational technologies and tools. A handful of intensive and time-sensitive requests have related to COVID-19-critical research projects. For optimal outcomes, these projects require data specialists to collaborate very closely with researchers throughout the entire project life cycle—extending from project inception to the stages of analysis and report-writing.

In an effort to address the chronic issue of time-intensive requests and limited capacity, the data specialists have recently launched a new online research collaboration form to help manage expectations. Specifically, the form explicitly explains that: “The ability to partner on longer-term projects is based on staff availability and project scope.” The new webform also emphasizes data specialists’ involvement as active researchers versus pure service providers to help rationalize spending more time on intensive projects.

While challenges remain and often lack immediate resolution, virtual research data support services, as noted in feedback from researchers and as evidenced in usage statistics and informal observation, show a positive uptake and the ADC is seen as a focal point for remote research support across the research data life cycle.

CONCLUSION

From our experiences since March 2020, there is a great appreciation that the pandemic has globally changed people’s lives. The myriad of ways researchers were accustomed to accessing, managing, and analyzing data has also been impacted. While the pandemic necessitated an immediate abrupt shift to online support (without affording the necessary time to plan systematically), over one and a half years of new service experimentation presents an opportunity to innovate. The resulting services have facilitated greater data service accessibility, more

flexibility for users, and increased opportunity for community building around data services. While resumption of in-person data support is expected in the foreseeable future, the continuance of many of these new services is expected. Specifically, there will be a continuance of regularly scheduled virtual data lab hours, online workshops, supporting a greater number of remote consultations via video teaching technologies (i.e., Blackboard Collaborate) and offering remote access to workstations dedicated to hosting sophisticated statistical and GIS applications. In order to move forward knowledgably and confidently, additional formal assessment is needed to determine how a hybrid model of virtual and in-person research data support will continue to ensure greater accessibility and flexibility in data services while fostering an engaged community of users.

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