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Going Dark: What Are the Consequences of Losing Off-Campus Access to Library Resources?

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Abstract

In October 2013, one of Brandon University's servers was hacked, and the campus's servers were isolated from the internet. This led to the loss of off-campus library services to students and faculty. To investigate the effects of this loss, the authors surveyed Brandon University students and conducted semi-structured interviews with Brandon University faculty. The authors found that 68% of the students surveyed reported that the loss of access to off-campus library services affected them in some measure. The survey provided insight on why some students were not affected by the loss of access. The survey also provided data on how the loss of access affected students. The semi-structured interviews provided perspectives on the difficulties of the situation. Although the authors do not want to ever face this problem again, the study provided important lessons in provision of library service in these situations.

Introduction

Brandon University is a primarily undergraduate university based in Brandon, Manitoba with a satellite campus in Winnipeg, Manitoba. The university has five faculties or

schools (Arts, Science, Health Studies, Education, and Music) with graduate programs in Music, Education, Psychiatric Nursing, Rural Development, and Environmental & Life Sciences. The university has 3,282 undergraduate students, 380 graduate students, and 241 faculty members.

In October 2013, one of Brandon University's servers was hacked. As a result, the university had to isolate its servers from the internet. This meant that the university had to shut down its proxy server for library content. It also meant that the library catalogue, the interlibrary loan software, and the University's version of Moodle, all of which were run from a university server, were unavailable off campus.

All messages about the ongoing difficulties were managed centrally in the university's communications office, with updates being sent to the campus on a regular basis. Any information the library had for students or faculty was included in these updates. The most important library information was the alternate methods created for reaching some of the library content off campus, in particular usernames and passwords for access to EBSCOhost. These usernames and passwords were obtainable by emailing a librarian.

Full access to the proxy server was not restored for three weeks. All library resources remained available on campus, either in the library or through wireless access throughout campus. While we would never choose to subject students or faculty to such hardship, it presented a singular opportunity to examine how such hardship affected the students' information-seeking behaviour and the consequences it had for their coursework.

Affected Library Systems

Multiple library services and systems were affected. For off-campus students, a key part of the infrastructure is the university's proxy server, which allows the student to access electronic material as if the student was on campus. Many electronic resources are made available to university students and faculty based on the university's internet protocol (IP) addresses. The proxy server takes the off-campus IP address and substitutes a university IP address as it relays the request to the resource provider. If a student cannot access the proxy server, then a student's request to the resource provider is met by either a request for a username and password or a request for an access fee.

Off-campus students were also affected by loss of access to the library's online catalogue. The server for the library's catalogue was hosted on campus, and access to all campus servers was restricted to on-campus students and faculty. The library catalogue's web access and Z39.50 protocol access were both affected. The library's holdings were available through OCLC's WorldCat service, but that did not indicate whether a physical item was available on the shelf.

The library's Interlibrary Loan (ILL) system was also hosted locally, and web access to that was only available to on-campus users. However, both students and faculty made

use of email to send requests to the interlibrary staff, who manually entered the requests into the ILL system.

The university's content management system, Moodle, was also affected. The system was not run by the library, but its server was hosted by the university. It was not available off campus. Either off-campus students were forced to come onto campus to retrieve their readings from Moodle, or the professors emailed the readings directly to the students.

In summary, if students were on campus, they had access to all the library and university resources to which they would normally have had access. However, if students were off campus, they could not access the library's catalogue. The students could not access the library's electronic resources, except by asking for an EBSCOhost username and password, and then the students could only access EBSCOhost resources. The students could not access the university's Moodle system, and if the students needed resources on Moodle they had to ask the professors directly for those resources. If the students needed an ILL, they had to email the ILL staff directly.

What Could This Have Meant to Off-Campus Students?

While it is impossible to arrive at an exact figure of how many students and faculty members access library resources from off campus, rather than from computers on campus (either in the library, student computing facilities, or faculty offices), it seems safe to say that the majority access library resources from off campus. In 2012, 66 per cent of the recorded IP addresses accessing EBSCOhost, Brandon University's most used library resource, were from Brandon University's proxy server's IP address. This does not necessarily make them distance students. More likely, these students simply find it more convenient to do their research from off campus.

In general, the use of electronic resources has seen steady growth at the university, increasing from 112,439 downloads in 2006 to 194,674 downloads in 2017. By contrast, the number of circulation loans has decreased from 49,208 in 2006 to 14,173 in 2017. In eleven years, the ratio of electronic usage to print usage has gone from 2.28 to 13.76.

We wanted to know how this disruption to library services affected off-campus students. One hypothesis was that the disruption would cause off-campus students to turn to Google and freely available resources on the internet, and would not be greatly affected by the disruption. We will call this the convenience hypothesis, as convenience of access has been shown to be a critical factor in information-seeking behaviour (Connaway, Dickey, & Radford, 2011). The contrasting hypothesis is that off-campus students would be affected negatively by the loss of access to electronic resources provided through the library.

Off-Campus Library Service – A Review

The origins of off-campus library service are found in off-campus education programs. There are two main forms of off-campus education. The first involves face-to-face classroom instruction where traveling or, sometimes, local part-time instructors teach courses at off-campus locations (Slade, 1991). The second is distance education where the instructors and learners are physically separated and the teaching is conducted through print mechanical or electronic devices (Holmberg, 1977).

Service to off-campus students began in earnest in the early 1970s (Kascus & Aguilar, 1988). There were four main service models used:

- The branch library/study centre model where the university rents some remote space for use in the provision of remote classes.
- The trunk delivery system model where the university delivers the resources for the classes from the trunk of a car.
- The partnership with local library model where the university partners with a local public library to provide space for the provision of classes.
- The reading list model where the university sends out a reading list for a course and provides information as to how the items on the reading list can be obtained. (Fisher, 1991; Kascus & Aguilar, 1988; Lessin, 1991)

These models were not exclusive, and many universities used a combination of models. If a recent survey of library services is representative, the first three models are not used significantly anymore, probably replaced by direct delivery to the student (Behr & Hayward, 2016). However, the fourth model has been adapted into content management systems such as Moodle.

All of these models aimed to replicate on-campus library services as much as possible. The Association for College and Research Libraries (ACRL) has produced a set of Standards (called Guidelines until 2008) that cover the services that should be provided for distance learning (ACRL, 2016). As the standards explain when they talk of the changing nature of “distance,” these services have changed in many ways since off-campus library service began, but the underlying principles in providing access to all off-campus library users remain. The standards include a comprehensive list of services, but the emphasis in the service models above was access to collections, access to indexes and catalogues to search for materials, and access to reference services (Kascus & Aguilar, 1988).

By the late 1980s, access to online catalogues and databases could be made available through dial-up services, although many library networks were still reliant on fixed terminals to provide access (Lessin, 1991). Needed materials were provided by a combination of mail, messenger services, and fax (Lessin, 1991; Slade, 1991). The World Wide Web brought the ability for off-campus students to more effectively search

catalogues and indexes by making them more readily available. The next step was the full-text database, which allowed off-campus students to directly access articles when the students were authenticated by their university. This was coupled with the development of the OpenURL link resolvers, which provided students a seamless link from the index to the full text of the article (Bower & Mee, 2010). Further developments like federated searching, campus learning management systems, and library discovery systems enhanced the off-campus library experience. Full text databases did not eliminate the need for interlibrary loan or document delivery services, as there was always demand for resources not available in full text (Dew, 2001).

The ACRL Standards talk about the changing nature of what distance means in distance learning. Students can now be in their family homes, apartments, or dorm rooms, and access library materials in the same way as students hundreds of kilometres away from the library (ACRL, 2016). Students can take traditional courses and online courses in the same semester. Provision of access must encompass all forms of distance learning.

Information-Seeking Behaviour and Distance Learning – A Review

In general, the work of Head (2013) provides a useful overview of the information-seeking behavior of university students. Among the findings reported: college students use a consistent strategy that relies on the same few resources, students tremendously underutilize librarians, ninety percent of students surveyed used libraries for certain online scholarly research databases such as EBSCOhost or JSTOR, and students frequently relied on course instructors for assistance in their research.

Cherry, Rollins, and Evans (2013) used their campus proxy server in a study to measure the correlation between GPA and electronic resource use for a semester. The data demonstrated that students with higher GPAs tended to log in at least once to the library's resources and were more likely to use the resources frequently, providing evidence that these are positively correlated.

Tury, Robinson, and Bawden (2015) surveyed 649 students in 81 countries and then selectively interviewed four distance learners to better understand their information-seeking behaviour. They found that ease and speed of access and familiarity of sources are seen, for the most part and with important exceptions, as more important than issues of quality, reliability, and comprehensiveness. Dew (2001) and McLean and Dew (2004) surveyed off-campus students at the University of Iowa about library needs and preferences. The off-campus students valued access to electronic resources highest, followed by access to document delivery, followed by access to reference help, followed by access to instruction. Hensley and Miller (2010) surveyed 146 distance learners on their perceptions and use of library services. They found that distance learners were making relatively robust use of electronic journals and course reserves, but few users were making use of document delivery, instruction, or virtual reference services. They also found that 73% of the distance learners were unaware of the expertise of subject specialist librarians.

Brooke, McKinney, and Donoghue (2013) surveyed distance learning students at a United Kingdom university and distance learning support librarians in the United Kingdom to understand best practices. When they asked students who had not used distance services why they had not made use of the distance services, 77.8 percent of students responded that they found information resources elsewhere, and 80 percent stated that they lacked awareness of the service.

Pitts, Coleman, and Bonella (2012) surveyed distance undergraduate students, distance graduate students, and faculty and instructors teaching distance classes about awareness and usage of library resources at Kansas State University. They found “an alarming number of students at both the graduate and undergraduate level expressed little to no awareness or usage of any library resources or services. The vast majority of distance students indicated they rarely used library resources, and instead favored ‘free resources from the internet’ to conduct their research” (p. 144).

Methods

We developed a 13-question survey for Brandon University students. After receiving approval from the Brandon University Research Ethics Committee, we sent out an email to the campus asking if professors would let us into their classes to distribute the survey. We received 18 positive responses from professors and distributed the survey to 25 classes in person in December 2013 and January 2014. The questions asked can be found in Appendix A.

In February and March of 2014, nine of the 18 professors of the classes to which we distributed the surveys agreed to be interviewed by us. The choice and consent to be interviewed was the professor’s. The semi-structured interviews covered the same subjects as the surveys but in a more free-form manner. The initial questions we used in these interviews are included in Appendix B.

357 students answered the student survey. Enrolment in all 25 classes totaled 804 students, so the apparent response rate was 44.4%. However, some students were not in class when the survey was handed out. Some students could have been enrolled in multiple classes. Therefore, a response rate of 44.4% is just an estimate. Because we were limited to handing out surveys in the classes of professors who agreed to help us, we had no control of the distribution of the students answering the survey. The 357 students that returned the survey are not a representative sample of the Brandon University student population as a whole. Any results of the survey can therefore not be generalized beyond the participants of the survey.

The survey asked students to judge how they were affected by the loss of access. This judgement will be affected by the student’s memory, the choices of the survey, and perhaps a subconscious attempt to please the researchers. The answers are qualitative rather than quantitative. Not all students answered all the questions. Even within these limits, we believe the data are meaningful.

Objective Measures

While there is evidently a decline in the use of library resources in October and November of 2013 as compared to October and November of 2012 (see table 1), it is difficult to ascribe that decline wholly to the loss of off-campus access. The first problem is establishing a baseline of what use of the library resources would have been had off-campus access not been lost. In the case of borrowing library material, the general trend has been downwards since 2005. In the case of full text downloads, both from EBSCOhost (which hosts our most used general purpose databases) and from scholarly journals (from 17 different platforms, the same platforms for all years to keep the comparison constant), the number of downloads follows no particular pattern from year to year. Sometimes the numbers are up a little, sometimes down a little. The second major problem is that a faculty strike in 2011 caused the usage of all library resources to decline sharply in this time period.

To create a baseline for the library usage in October and November, we created a weighted average of the library usage from 2009, 2010 and 2012. The weighting was (1 x 2009 usage numbers + 2 x 2010 usage numbers + 3 x 2012 usage numbers)/6. We chose this weighting system because it gives more weight to the more recent year in the expectation that the 2012 usage numbers are more predictive of the 2013 usage numbers without omitting the 2010 and 2009 usage numbers. It also omits the anomalous 2011 usage numbers. The weighting system is an imperfect representation of library usage, but it provides a useful perspective beyond a direct comparison with only 2012 usage numbers. Comparisons to the weighted averages show a sharper decline in usage for both the number of library loans and full-text downloads from EBSCOhost, but the number of downloads from scholarly journals is close to being the same. The data are never going to be explicitly clear.

Interestingly, the 2014 statistics showed that library circulation continued to decrease in these two months while the number of EBSCOhost full text downloads rebounded slightly and the number of full text downloads directly from scholarly journal publishers dramatically increased by 25%. These two-month trends reflect the overall yearly library statistics for 2014, where circulation was more or less steady (up by 1% from 2013), full text downloads from EBSCOhost were up by 11% from 2013 and full-text downloads directly from scholarly publishers were up by 20%.

Table 1

Comparison of Library Circulation in October and November 2009-2014

Time	Library Circulation
October/November 2009	8035
October/November 2010	8079
October/November 2011	3759
October/November 2012	5372
October/November 2013	4542

Time	Library Circulation
Decline from 2012 to 2013	-15%
Weighted Average of 2009, 2010, 2012	6718.17
Percent Decline to 2013	-32%
October/November 2014	4422
Change from 2013 to 2014	-3%

Table 2

Comparison of Full Text Resources in October and November 2009-2014

Time	EBSCOhost Full Text	Scholarly Journals Full Text
October/November 2009	17025	20084
October/November 2010	19219	17195
October/November 2011	10322	13267
October/November 2012	15531	24976
October/November 2013	14475	20902
Decline from 2012 to 2013	-7%	-16%
Weighted Average of 2009, 2010, 2012	17009.33	21567.00
Percent Decline to 2013	-15%	-3%
October/November 2014	15307	26198
Change from 2013 to 2014	+6%	+25%

We were not able to keep accurate gate counts because of a broken library gate and can therefore not analyze if physical traffic to the library increased during this time period. What we do have are the answers to the survey questions, which show that 19% of students reported that they spent a lot more time in the library due to the outage and that 48% of students indicated that they spent at least a little bit more time in the library, which would suggest that the loss of off-campus access to library resources encouraged more students to come to the library. However, the number of reference transactions recorded in the months of October and November was remarkably steady.

Table 3

Comparison of Reference Transactions in October and November 2009-2014

Time	Reference Transactions
October/November 2009	490
October/November 2010	458
October/November 2011	188
October/November 2012	456
October/November 2013	454
Decline from 2012 to 2013	-0.4%
Weighted Average of 2009, 2010, 2012	462.33
Percent Decline to 2013	-1.8%
October/November 2014	440
Change from 2013 to 2014	-3%

Results of the Student Survey

245 students of the 356 students surveyed (68.6%) reported being affected by the loss of off-campus access to library resources (see Table 4). 1 student did not fill out the question.

Table 4

Effect of the Problem

Effect	Frequency	Percent
It hasn't affected my ability to do my assignments	111	31.1
It has affected my ability to do my assignments a little	133	37.3
It has affected my ability to do my assignments noticeably	64	17.9
It has affected my ability to do my assignments a lot	48	13.4
Did not fill out the question	1	n/a
Total	357	100.0

111 students of the 357 students surveyed (31.1%) reported that they were not affected by the loss of off-campus access to library resources. The most common reasons given for this were “I didn’t have any assignments that needed library resources” (70 of 111, 63.1%) and “I could do my research through Google and didn’t need the library resources” (41 of 111, 36.9%). Students could give more than one answer to this question. Table 5 summarizes the reasons.

Table 5

Reasons Why Students Reported the Loss of Off-Campus Did Not Affect Their Ability To Do Assignments

Reason	Frequency	Percent
I didn’t have any assignments that needed library resources	70	63.1
I could do my research through Google and didn’t need the library resources	41	36.9
I could do my assignments with books and articles I already had	24	21.6
I could do all my research in the library or the computer labs on campus	20	18.0
I could do my assignments with books and articles I got from my professors	11	9.9
I live in residence	9	8.1
I could do my assignments with books and articles on reserve at the library	6	5.4
I could do my assignments with books and articles I got from other students	4	3.6
I could do my assignments with the EBSCOhost username and password that I got	1	0.9

Table 6 shows a strong relationship between students reporting being affected by the loss of off-campus access to library resources and their reporting coming to the library to research. This relationship is a significant one (chi square test, df=2, p<.02). When students report that lack of access affects them “noticeably” or “a lot,” over 70 percent of the students report coming to the library for research. Students who reported not being affected by the loss of off-campus access did not answer this question.

Table 6

Effect of the Problem Cross Tabulated with Students Doing Research in the Library

Effect of the Problem	Frequency	Came to the Library to do Research	Percent
It has affected my ability to do my assignments a little	133	76	57.1
It has affected my ability to do my assignments noticeably	64	50	78.1
It has affected my ability to do my assignments a lot	48	34	70.8
Total	245	160	65.3

This contrasts with what the affected students reported when asked if they came to the library more often. This had a much stronger relationship with the students reporting being affected by the loss of off-campus access to library resources (chi square, df=6, p<.01). The more the students reported being affected by the loss, the more likely they were to report spending more time in the library (see Table 7). Students who reported not being affected by the loss of off-campus access did not answer this question.

Table 7

Effect of the Problem Cross Tabulated with Students Spending More Time in the Library

Effect of the Problem	Frequency	A lot more time	A little more time	Same amount of time	Never in library
It has affected my ability to do my assignments a little	129	14 (10.9%)	59 (45.7%)	54 (41.9%)	2 (1.6%)
It has affected my ability to do my assignments noticeably	63	25 (39.7%)	26 (41.3%)	11 (17.4%)	1 (1.6%)
It has affected my ability to do my assignments a lot	47	26 (55.3%)	13 (27.7%)	7 (14.9%)	1 (2.1%)
Total	239	68 (27.8%)	104 (42.4%)	83 (33.9%)	4 (1.6%)

Table 7 note: 6 students did not fill out the question.

An interesting result was that the year of the student had a significant relationship (chi square, df=20, p<.01) with the level they reported being affected by the loss of off-campus access to library services. Students in their first year reported being less affected by the loss, while students in their third and fourth year were more affected by the loss (see Table 8). If one compares the decrease in percentage in the responses to “It hasn’t affected my ability to do my assignments” to the increase of the sum of the percentages of “It has affected my ability to do my assignments noticeably” and “It has affected my ability to do assignments a lot,” one sees a crossing decrease/increase pattern as in Chart 1.

Table 8

Year of Student Cross Tabulated with Effect of Problem

Year of study	Hasn't affected ability to do assignments	Has affected ability to do assignments a little	Has affected ability to do assignments noticeably	Has affected ability to do assignments a lot	Total
First	46 (42.2%)	44 (40.4%)	9 (8.3%)	10 (9.2%)	109
Second	25 (32.5%)	30 (40.0%)	14 (18.2%)	8 (10.3%)	77
Third	17 (23.3%)	27 (37.0%)	21 (28.8%)	8 (11.0%)	73
Fourth or more	19 (21.6%)	31 (35.2%)	17 (19.3%)	21 (23.9%)	88
Master's student	2 (28.6%)	1 (14.3%)	3 (42.9%)	1 (14.3%)	7
Total	111 (31.3%)	133 (37.6%)	64 (18.1%)	48 (13.6%)	354

Table 8 note: two students did not fill out their year and one student did not answer if it had affected the student's ability to do his or her assignments.

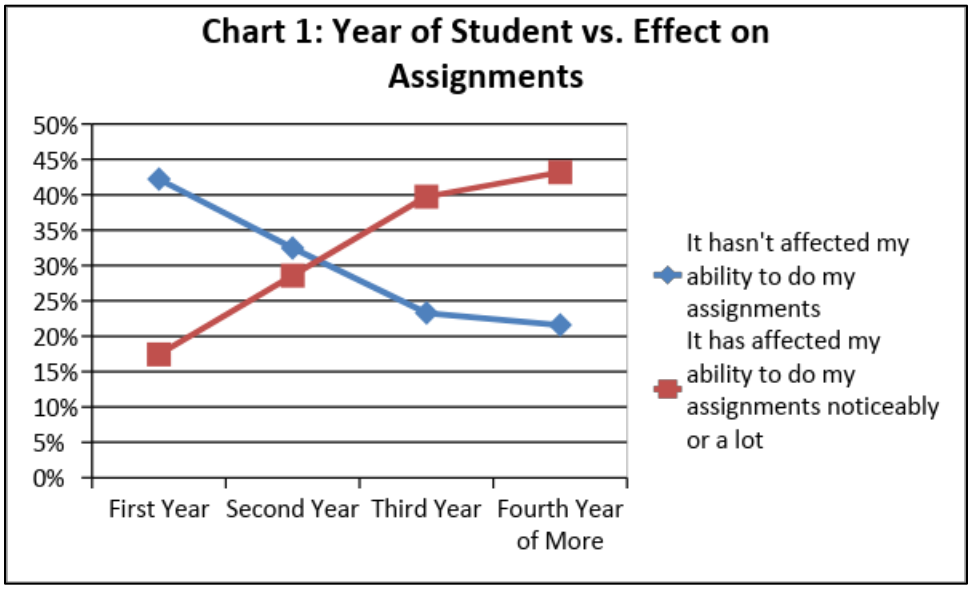

Chart 1: Year of Student vs. Effect on Assignments

We also examined if there was a relationship between the declared major of the student and the effect on the assignments. There was no statistically significant effect. Table 9 summarizes the data:

Table 9

Year of Student Cross Tabulated with Effect of Problem

Major	Hasn't affected ability to do assignments	Has affected ability to do assignments a little	Has affected ability to do assignments noticeably	Has affected ability to do assignments a lot	Total
Arts	20 (20.6%)	35 (36.1%)	21 (21.6%)	21 (21.6%)	97
Science	54 (39.1%)	46 (33.3%)	22 (15.9%)	15 (10.9%)	138
Health Studies	16 (25.8%)	29 (46.8%)	8 (12.9%)	9 (14.5%)	62
Education	12 (37.5%)	12 (37.5%)	7 (21.9%)	1 (3.1%)	32
Music	2 (33.3%)	3 (50.0%)	1 (16.7%)	0 (0.0%)	6
Other	7 (31.8%)	8 (36.4%)	5 (22.7%)	2 (9.1%)	22
Total	111 (31.1%)	133 (37.3%)	64 (17.9%)	48 (13.4%)	356

Table 9 note: One Science student did not answer the question. The other category includes undeclared, music education and the combined major of arts and sciences.

The students were asked what databases they regularly used in their research (they could indicate as many as they used). When compared with the student's reported effect on assignments caused by the loss of off-campus access, there was a significant relationship between the regular use of EBSCOhost (chi-square, df=3, p<.01), JSTOR (chi-square, df=3, p<.01), Google (chi-square, df=3, p<.01), and the library catalogue (chi-square, df=3, p<.01) (see Table 10). There was no significant relationship with regular use of Web of Science. In the cases of EBSCOhost, JSTOR, and the library catalogue, the general rule is that the more the students regularly used the resource, the more likely they were to be affected by the loss of off-campus access. The relationship with the regular use of Google is not as clear, although it is noteworthy that the highest percent of regular Google users were the students who were not affected. We asked about Google as it was the only resource that was not affected by the loss of access to on-campus resources and is widely used by students (Connaway et al., 2017).

Table 10

Regular Use of Library Databases Cross Tabulated with Effect of Problem

Effect	Total	EBSCO host	JSTOR	Web of Science	Google	Library Catalogue
It hasn't affected my ability to do my assignments	111	41 (37%)	16 (14%)	13 (12%)	74 (67%)	15 (14%)
It has affected my ability to do my assignments a little	133	99 (74%)	26 (20%)	20 (15%)	59 (44%)	43 (32%)
It has affected my ability to do my assignments noticeably	64	49 (77%)	22 (34%)	10 (16%)	36 (56%)	32 (50%)
It has affected my ability to do my assignments a lot	48	35 (73%)	20 (42%)	9 (19%)	19 (40%)	25 (52%)
Total	356	224 (63%)	84 (24%)	52 (15%)	188 (53%)	115 (32%)

Table 10 note: one student did not answer if it had affect the student's ability to do his or her assignments

We asked the students who were affected by the loss of access what they were not able to do because of the lack of access. The results are summarized in Table 11. The two most common activities that the students were unable to do were finding journal articles for their assignments (79% of responding students) and using Moodle (71% of responding students). Comparatively, not being able to use the library catalogue was only indicated by 37% of responding students.

Table 11

What Students Were Not Able To Do Because of the Loss of Off-Campus Access

Task	Indicated Yes	Indicated No	Percent Yes
Find journal articles for my assignments	195	51	79.3
Use the library catalogue to search for library books for my assignments	91	155	37.0
Use RefWorks to create bibliographies for my assignments	38	218	14.8
Place Interlibrary loan requests	25	221	10.2
Use Moodle	175	71	71.1
Use Naxos to listen to music	8	238	3.3
Other	52	194	21.1

Table 11 note: This question was only answered by the 246 students who answered that they were affected by the loss of access.

We asked the students what actions they took because of the loss of off-campus access. The results are summarized in Table 12. The most common action the students took was to come to the library to do their research, which 67% of the responding students reported doing. This contrasted with the 34% who used only what they could access from home. An interesting result was that only 10% asked their professor for help and only 13% asked other students for help.

Table 12

What Actions Students Took Because of the Loss of Off-Campus Access

Action	Indicated Yes	Indicated No	Percent Yes
Came to library to do my research	166	80	67.5
Came on campus to access wireless	89	157	36.2
Used only what I could access from home	83	163	33.7
Asked my professor for help	25	221	10.2
Asked other students for help	32	213	13.1
Used books and/or articles I already had	56	190	22.8

Table 12 note: This question was only answered by the 246 students who answered that they were affected by the loss of access.

As might be expected, the students' use of library resources before the loss of off-campus access has a significant relationship (omitting the masters students because there are too few of them, chi square, df=16, $p<.01$) with the students' reported effect on assignments caused by the loss. We chose the term "library resources" even though it

is a vague term because we wanted the students to define in their minds what library use was for this question. As a rule, the more the student used library resources, the more the student was affected by the loss (see table 13).

Table 13

Frequency of Library Resource Use Cross Tabulated with Effect of Problem

Frequency	Hasn't affected ability to do assignments	Has affected ability to do assignments a little	Has affected ability to do assignments noticeably	Has affected ability to do assignments a lot	Total
Daily	7 (11.7%)	16 (26.7%)	22 (36.7%)	15 (25.0%)	60
More than 2 times per week	17 (17.9%)	44 (46.3%)	19 (20.0%)	15 (15.8%)	95
Once a Week	10 (17.0%)	29 (49.2%)	11 (18.6%)	9 (15.3%)	59
Less than once a week	18 (35.3%)	22 (43.1%)	7 (13.7%)	4 (7.8%)	51
Once per month	26 (55.3%)	17 (36.2%)	3 (6.4%)	1 (2.1%)	47
Never	33 (75.0%)	5 (11.4%)	2 (4.6%)	4 (9.1%)	44
Total	111 (31.1%)	133 (37.4%)	64 (18.0%)	48 (13.5%)	356

Table 13 note: one student did not answer if it had affected the student's ability to do his or her assignments.

Not surprisingly, there was a significant relationship between how affected the student felt by the loss of off-campus access to library resources and whether the student asked for an extension or change to an assignment (chi-square, df=8, $p<.01$). The greater the student was affected by the loss, the more likely the student was to ask for an extension or a change (see Table 14). Students who reported not being affected by the loss of off-campus access did not answer this question.

Table 14

Effect of the Problem Cross Tabulated with Students Asking for an Extension or Change to an Assignment

Effect	Asked for an extension or change	Didn't ask for an extension or change	Total
It has affected my ability to do my assignments a little	18 (13.5%)	115 (86.5%)	133
It has affected my ability to do my assignments noticeably	18 (28.1%)	46 (71.9%)	64
It has affected my ability to do my assignments a lot	24 (50.0%)	24 (50.0%)	48
Total	62 (17.4%)	294 (82.6%)	356

One of the options given students to help with the problem was a username and password to EBSCOhost, which could be used off-campus and allow the student to use all the EBSCOhost resources. Of the students who reported being affected by the loss of off-campus resources, there was a significant relationship between how affected the student was and whether the student asked for the EBSCOhost username and password (chi-square, df=6, $p<.01$). The greater the student was affected by the loss, the more likely the student asked for the EBSCOhost username and password (see Table 15).

Table 15

Effect of the Problem Cross Tabulated with Students Asking for an EBSCOhost Username and Password

Effect	Student asked for EBSCOhost credentials	Student did not ask for EBSCOhost credentials	Total
It has affected my ability to do my assignments a little	11 (8.6%)	117 (91.4%)	128
It has affected my ability to do my assignments noticeably	11 (18.0%)	50 (82.0%)	61
It has affected my ability to do my assignments a lot	15 (31.9%)	32 (68.1%)	47
Total	37 (16.1%)	199 (83.9%)	236

Table 15 note: nine students did not fill out the question.

Summary of Faculty Interviews

Nine professors agreed to be interviewed about the events. The professors were from the Departments of History and Political Science in the Faculty of Arts, the Departments of Applied Disaster and Emergency Studies, Biology (2 professors), and Geology from the Faculty of Science, the Department of Music Education in the School of Music, the Department of Graduate Studies in the Faculty of Education, and the Department of Nursing in the Faculty of Heath Studies.

All of the faculty interviewed had assignments that fell during the affected period. In some cases, the assignments were due during the affected period; in other cases, the assignments were due a short time after. The assignments were primarily research papers for upper-year classes, although other kinds of assignments included class presentations, research posters, and participation in a mock debate. The research papers usually contained stipulations about including a certain number of references to peer-reviewed research articles.

The faculty certainly perceived that the students were affected by the loss of off-campus access to library resources, although, since this loss also encompassed the loss of access to electronic learning tools such as Moodle, the effect on the students was amplified. In some cases, professors had to adjust their syllabi because the students could not prepare for a given day's class. Some professors emailed material directly to the students. While professors did not change their assignments, most of them did grant extensions to individual students or an entire class.

Some professors reported seeing the impact of loss of off-campus access to library resources in the quality of the assignments submitted by the students. More than one professor noticed a more pronounced use of freely available non-academic sources such as Wikipedia and blogs. Another professor noted that many assignments came in late and the number of students that dropped the class was larger than usual, although that may not be directly related to library access. Some students complained to a professor about the high cost of articles that they found and felt they had to buy. The professors also noted that the whole situation was a source of stress and frustration for the students and that the first-year students felt the stress more keenly than the upper-year students. Professors also noted that students who lived outside the city limits of Brandon or Winnipeg were at a greater disadvantage because it was harder for those students to physically use the library. Some professors noted that there were students who did not know that the library resources were available to students when the students were on campus.

Professors noted that students expect seamless 24/7 access to library resources and electronic learning tools. Professors also told us that students cannot always reschedule their other activities, such as work or family. They rely on resources being accessible when they need them to be and it adds to their stress when they are not.

The professors' own research was not greatly affected, except for one, who usually does research from home. Since the professor could only access research from on

campus, the professor would work from their campus office, where students would often interrupt. Many of the professors told us that it was very inconvenient for them not to be able to access, change, or post class materials to Moodle from home.

All professors emphasized that in situations like these, timely and complete communication from the university is vital. The professors are often the first people to whom the students will ask questions. The professors want to give clear answers, not just to questions about assignments and course readings, but also about the situation in general.

Conclusion

In an ideal world, we would not have been able to do this study. We hope never to be able to gather the same kind of data. Although it has been five years since the event took place, we believe that this is a unique event that is not described in library scholarship. It can provide insights into off-campus student library use and how to provide library service in an extreme situation.

Now that we have examined the data, we can make some conclusions. Only 31% of the students surveyed reported that it had not affected their ability to complete their assignments, and of those 31%, only 37% said they only needed Google and freely related resources. Put another way, only 41 out of 287 (14%) surveyed students reported that they only needed Google and freely available resources on the internet. Therefore, we can confidently write that the convenience hypothesis, that the general use of Google and freely available resources on the internet is sufficient for library resources, has been rejected. Students needed more than just Google and freely available resources. Off-campus access to library resources is vitally important to some of our students, and any loss of that access is hardship to those students.

There is a large percentage of students who were not affected or barely affected by the loss of off-campus access. 31% of surveyed students were not affected, and 37% of surveyed students were only affected a little. One explanation is that these students were very reliant on their course instructors for access to the material they needed for their courses. Of the 31% of surveyed students who were not affected, 69% reported that they did not need library resources at all. Another explanation is that they were not aware of any off-campus library resources or even what library resources exist. These explanations are consistent with other surveys of off-campus library resource use when there has not been a concomitant marketing effort to off-campus students (Bonella, Pitts, & Coleman, 2017; Brahme, Bryant, & Luscinski, 2018). It is possible that the increasing use of open access resources could reduce off-campus students' need to use licensed library resources. It is also possible that students who are not as sensitive to the ethical sourcing of their resources could use Sci-Hub, which would obviate the need for licensed library resources. This last possibility should be a focus of student education, so that they use ethical resources.

Because we were taken by surprise by the situation, our measurements were cruder and more limited than if we had had time to prepare. An interesting longer-term question

would be tracking the off-campus students to see if the loss of access had any effect on their subsequent university career, but that was beyond our scope.

The inverse relationship between the year of the student and the effect of the loss of the off-campus access is interesting. It could be that first-year students at Brandon University are less likely to be given assignments that require library resources, or that first-year students chose to use Google as their primary search tool and were confident in their ability to achieve acceptable results from that. More investigation seems to be warranted.

We have also learned what we must do if we are faced with a similar situation. Some of our library resources have changed so that they would not be impacted in the same way. Our library catalogue is now a cloud-based service, so it would still be accessible if the university's servers were isolated. However, our proxy server and our Moodle server are still hosted by the university. More robust solutions for these key infrastructure services are needed, so that they are not dependent on access to one server in one location.

In general, the conclusion is that the greater need the student had of library resources, the more the student was affected by the loss of off-campus access. This conclusion is not surprising, and, in some ways, is reassuring. When the systems fail, these students could not fall back on Google and get the same results. We just have to make sure the systems do not fail.

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Appendix A – The Research Questions

This survey is to understand if you changed your research habits, due to the loss of off-campus library access. This survey is only interested in your research and not in your use of Moodle, the S-drive or any other BU online system that was down.

1. What year are you in?

    a. First
    b. Second
    c. Third
    d. Fourth or more
    e. Master's Student

2. What faculty or school are you in?

    a. Arts
    b. Science
    c. Health Studies in Brandon
    d. Health Studies in Winnipeg
    e. Education
    f. Music
    g. I haven't chosen one yet

3. Before the loss of off-campus access, how often did you come into the BU library?

    a. Daily
    b. more than 2 times a week
    c. once a week
    d. less than once a week
    e. once per month
    f. never

4. Before the loss of off-campus access, how often did you access the library resources though the library website?

    a. Daily
    b. more than 2 times a week
    c. once a week
    d. less than once a week
    e. once per month
    f. never

5. Which databases do you regularly use for your research? (Check all that you use)

    a. Ebscohost
    b. JSTOR
    c. Web of Science
    d. Google
    e. Google Scholar
    f. Library Catalog
    g. None of the above

6. How much has not being able to access library resources like Ebscohost or JSTOR from off campus affected your ability to do your assignments?

    a. It hasn't affected my ability to do my assignments
    b. It has affected my ability to do my assignments a little
    c. It has affected my ability to do my assignments noticeably
    d. It has affected my ability to do my assignments a lot

If the student answers (a) above they are directed to question 7 otherwise they are directed to question 8

7. Why weren't you affected by the problems with off-campus access? (Check all that apply)

    a. I live in residence
    b. I didn't have any assignments that needed library resources
    c. I could do all my research in the library or the computer labs on campus
    d. I could do my research through Google and didn't need the library resources
    e. I could do my assignments with the Ebscohost username and password that I got
    f. I could do my assignments with books and articles I already had
    g. I could do my assignments with books and articles on reserve at the library
    h. I could do my assignments with books and articles I got from other students
    i. I could do my assignments with books and articles I got from my professors

The student is finished if he or she answers question 7.

8. What weren't you able to do because of the lack of off-campus access to library resources? (Check all that apply)

    a. Find journal articles for my assignments
    b. Use the library catalogue to search for library books for my assignments
    c. Use RefWorks to create bibliographies for my assignments
    d. Place Interlibrary loan requests
    e. Use Moodle
    f. Use Naxos to listen to music

9. Did you have to spend more time in the library than you usually do?

    a. Yes, a lot more time
    b. Yes, a little more time
    c. No, I spent the same amount of time
    d. I'm never on campus so I'm in the library

10. Indicate if you did any of the following, due to the lack of off-campus access to library resources?

    a. Came to library to do my research
    b. Came on campus to access wireless
    c. Used only what I could access from home
    d. Asked my professor for help
    e. Asked other students for help
    f. Used books and/or articles I already had

11. Did you ask for an Ebscohost username and password?

    a. Yes
    b. No

12. Did you ask your professor for an extension or a change to an assignment? (Check all that apply)

    a. I asked for an extension
    b. I asked for a change to an assignment
    c. I didn't ask for an extension or a change

13. Do you have any further comments?

Appendix B – Semi-Structured Interview Questions for Faculty Members

1. Did you have an assignment requiring library type research due during the time when off-campus access to the library was lost?
    a. Follow up question if is answer is no: Did you have an assignment due after the outage ended that students might have worked on during the outage?
2. Did students contact you about the effects of loss of off-campus library access?
3. What did they tell you?
4. Do you think students were affected by the loss of off-campus library access?
    a. How?
5. How did you handle the assignment during the time?
6. Did you change any of your assignments due to the outage?
7. In your opinion, what did students do to cope with the situation?
8. Do you think the quality of student assignments was affected?
9. Was your research affected by the outage?