Emerald Insight

Collection Building

Comparing usage between dynamic and static e-reference collections
Alain R Lamothe

Article information:

Users who downloaded this article also downloaded:

For Authors

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com

Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

Comparing usage between dynamic and static e-reference collections

Alain R. Lamothe
J.N. Desmarais Library, Laurentian University, Sudbury, Canada

Abstract

Purpose – The purpose of this article was to present the results of a quantitative analysis that compared usage levels between an e-reference collection that has experienced continual updated content and growth and an e-reference collection that has not experienced any recent changes. The aim of the study was to determine quantitatively if e-reference collections with dynamic content experience greater levels of usage compared to e-reference collections that are static in both size and content.

Design/methodology/approach – E-reference data were separated into a dynamic collection and a static collection. Usage for e-reference belonging to the dynamic collection was compared to usage of e-reference belonging to the static collection. The number of e-reference was obtained by simple count. Additional statistics tracked include the number of viewings. A linear regression analysis was used to determine the strength of the linear relationship between collection size and usage.

Findings – Results indicate that e-reference collections that continue to grow in both size and content also continue to experience year-to-year increases in usage. E-reference collections that remain static in size and content experienced a decline in usage. A linear regression analysis indicates the existence of an extremely strong linear relationship between dynamic content and usage. A weaker linear relationship was calculated for static content.

Originality/value – To this author's knowledge, this research is the first to systematically and quantitatively compare usage levels between e-reference titles from growing collections to collections that have not had any new titles added recently.

Keywords Collection development, Collection size, Usage statistics, E-Books, E-Reference, Subscriptions

Paper type Research paper

Introduction

This article reports the results of a quantitative analysis that compared usage levels between dynamic and static e-reference collections. The dynamic e-reference collection has had new content added annually in the form of either additional e-reference titles or updated content. The static e-reference collection had not experienced any change to its content since purchased.

The purpose of this study was to determine if a dynamic e-reference collection experiences different levels of usage compared to a static e-reference collection. In a 2015 study, Lamothe compared usage levels between dynamic and static e-monograph collections. The benefits of continuous e-monograph collection growth were well-illustrated. Dynamic e-monograph collections not only experienced greater level of usage than static collections but their usage continued to increase annually (Lamothe, 2015). Static e-monograph collections even recorded decreased levels of usage over time (Lamothe, 2015). That study, however, did not address e-reference usage.

Previous studies have reported clear differences in e-reference and e-monographs use by patrons (Corlett-Rivera and Hackman, 2014; Lamothe, 2013c; Lamothe, 2012). Performing a quantitative comparison on e-reference usage would answer several questions. Would the subscription to an e-reference title with dynamic content be accompanied by continuously increasing usage levels? Would it be preferable to simply purchase one-time the e-reference content and have it remain static? Would it also be preferable for the library to expand its e-reference collection rather than purchase a static selection of e-reference titles?

E-reference have been demonstrated to record higher levels of usage compared to their e-monograph counterparts, mostly because library patrons seem to feel more comfortable using them rather than their print equivalent (Husted and Czechowski, 2012; King, 2012; Lamothe, 2012; Reid *et al.*, 2006). Corlett-Rivera and Hackman (2014) found that students and faculty at the University of Maryland heavily favored e-reference. Large unwieldy multivolume print reference sources become increasingly usable and user-friendly in electronic form (Culp, 2002). With e-reference, researchers are provided with a simple and quick access to the information they need from their computer or mobile devices (Van Epps, 2005).

The literature further suggests that collection development for printed reference material is quite different than that for printed monographs (Little, 2011; Fernandes, 2008; Engeldinger, 1990). Will this also apply for e-reference collection development?

The J.N. Desmarais Library[1] of Laurentian University[2] has purchased e-reference titles in large consortia negotiated bundles and title-by-title models. The J.N. Desmarais Library also subscribes to individual e-reference titles, with these being continuously expanded or updated by their corresponding vendors. The overall e-reference collection has been sustaining continuous growth since the acquisition of the first title in 2002. The rate of expansion has varied from year to year, but the J.N. Desmarais Library currently holds nearly 1,000 individual e-reference titles, 10 of which are subscription-based, while the rest having been purchased.

Methods

The term e-reference will be used to refer to any online reference title. These include all online almanacs, dictionaries, encyclopedias, handbooks, manuals, treatises and any other title that would normally be held in the library's reference collection.

Metrics collected included the number of e-reference titles and the number of viewings these titles recorded. The number of e-reference was obtained by simple count and included data from 2002 to 2014, inclusively. The number of viewings was also tracked and included data from 2002 to 2013, inclusively. Lamothe (2013b) previously defined a viewing as the act of opening, downloading or printing a page or chapter from an e-book.

The analysis was conducted in two parts. The first consisted of comparing individually subscribed e-reference titles that have content regularly added or updated to individually purchased e-reference titles whose content remains static after the initial acquisition.

The second part consisted of comparing e-reference titles purchased as large consortia negotiated packages. Dynamic e-reference collections continue to have new titles added to them annually, while static e-reference collections did not experience any growth beyond their initial acquisition. For the purpose of this study, collections that continued to experience growth were aggregated into a single Dynamic E-Reference Collection, while collections that did not experience any growth were aggregated into a single Static E-Reference Collection.

The Dynamic E-Reference Collection is comprised of aggregated data from two collections: Oxford Handbooks Online and Sage Knowledge eReference. Each of these individual collections has sustained continuous growth since they were first acquired. The Static E-Reference Collection is composed of aggregated data from another two collections: Gale Virtual Reference Library and Oxford Reference Online. It was decided to limit the Static E-Reference Collection to three or more years of fixed growth, as it can take up to three years for patrons to realize that a new e-resource has been added to a library's collection (Luther, 2001; Townley and Murray, 1999).

A simple linear regression analysis estimated the strength of the relationship between the size of the e-reference collection and its usage. Because a simple linear regression analysis can quantitatively estimate the strength of the linear relationship between two variables, it can therefore be used to predict the value of one variable in terms of the other (Sokal and Rohlf,

2011; Zar, 2010; McCain, 1992). In a very strong linear relationship, the magnitude of the dependent variable is a function of the magnitude of the independent variable, whereas this cannot be the case with a weak linear relationship (Zar, 2010). Furthermore, the relationship between library resource counts and usage-based variables has previously been demonstrated to exhibit direction and predictability rather than being a simple association (McCain, 1992; Wallace and Boyce, 1989).

It is assumed that the number of e-reference titles can be considered to be the independent variables. It is also assumed that the number of viewings can be considered to be the dependent variable.

The coefficient of determination (R^2) was calculated from the simple linear regression analysis. The coefficient of determination is the actual measure of strength of the linear relationship and is expressed as a numerical value between 0 and 1 (Sokal and Rohlf, 2011; Zar, 2010). A coefficient of 1 indicates that the regression line fits the data perfectly. In other words, when the value of R^2 is calculated to be 0.95, it will mean that 95 per cent of the variation in the dependent variable (e.g. the number of viewings) can be explained by the regression (Kotz *et al.*, 2006). In other words, 95 per cent of the variation in usage can be attributed to the value of the number of e-reference titles.

Finally, ratios were calculated as a tool to provide information on average use per title. Ratios were also calculated as a quantitative measure comparing relative usage between the Dynamic and Static E-Reference Collections. Ratios have proven themselves significant in nullifying the effect that the size of two or more collections can have when comparing one to the other (Lamothe, 2013b; Scanlan, 2008; Pendleton, 2005).

Access to all e-reference titles are provided from both the library's online catalogue and from the library's Web site. Microsoft Excel for Mac 2011 (version 14.3.2) was used to perform all calculations and to generate all tables and figures.

Results and discussion

Analysis of subscription and purchased E-Reference usage

The J.N. Desmarais Library subscribes to a total of ten individual e-reference titles: *AccessScience*, Encyclopedia Britannica Online, *Encyclopedia of Life Sciences*, *Encyclopédie Universaelis*, *International Encyclopedia of the Social and Behavioral Sciences*, *Johns Hopkins Guide to Literature Theory and Criticism*, *Mental Measurement Yearbooks*, *Oxford English Dictionary Online*, Oxford Music Online and the *Routledge Encyclopedia of Philosophy*. The content of each subscription is revised, updated or increased on a regular basis. For instance, the content of *AccessScience*, Encyclopedia Britannica Online and the *Routledge Encyclopedia of Philosophy* are updated regularly (Encyclopedia Britannica Online, 2015; REP, 2014; Peterson, 2006). "Oxford Music Online is updated three times per year, with new and updated articles, new tools for navigating content, and improved functionality" (Oxford Music Online, 2014). The *Mental Measurement Yearbook* is updated less often but has new volumes added every two years (Buros Center for Testing, 2014). *The Oxford English Dictionary Online releases four updates per year. In fact, "more*

than 600 new words, and phrases have entered the *Oxford English Dictionary Online* in our latest update" (OED, 2013). Similarly, the *Encyclopedia of Life Sciences* has "close to 400 articles added every year" (Wiley Online Library, 2014). The content of each subscription is therefore considered to be dynamic in nature.

Table I compares the number of e-reference subscriptions with dynamic content to number of viewings recorded for each subscription between 2002 and 2014. The first of these subscriptions began in 2002 with the Encyclopedia Britannica Online, followed by the subscription to the *Routledge Encyclopedia of Philosophy* in 2003. The *Oxford English Dictionary Online* and Oxford Music Online were added in 2004, bringing the total number of subscribed e-reference titles to four. The subscription to the *Mental Measurements Yearbooks* began in 2005 and that of the *Johns Hopkins Guide to Literature Theory and Criticism* in 2006. Both *AccessScience* and the *Encyclopedia of Life Sciences* were added in 2007. Although the French language *Encyclopédie Universaelis* was added to the collection earlier in 2004, usage statistics only became available to subscribers in 2010.

It is clear that as the number of subscriptions increased, so did the number of viewings (Table I). The greatest year-to-year increases in the number of viewings occurred during the initial growth of the collection. In fact, as the number of titles doubled from one to two in 2003 and then to four in 2004, the number of viewings also doubled in value, from 2,246 to 4,512 in 2003, and then to 11,536 in 2004 (Table I). The number of viewings further increased by 96 per cent in 2005 after the number of subscriptions grew from four to five titles. Between 2006 and 2008, usage remained relatively stable with the number of viewings varying from between 21,886 and 22,844 (Table I). However, even when the actual number of subscribed titles became fixed at nine between 2007 and 2009, the number of viewings continued to increase, albeit, not as greatly as they did during the initial phase of subscriptions. Between 2002 and 2005, annual increases in the number of viewings averaged 117 per cent. Between 2006 and 2010, it averaged a 23 per cent increase in year-to-year usage values. When a new subscription was

Table I The number of e-reference subscriptions with dynamic content and the corresponding number of viewings recorded for these subscriptions, over a 13-year period

Year	No. of subscriptions	No. of viewings
2002	1	2,246
2003	2	4,512
2004	4	11,536
2005	5	22,632
2006	7	21,886
2007	9	22,284
2008	9	22,844
2009	9	27,101
2010	10	34,016
2011	10	44,853
2012	10	46,348
2013	10	45,972
2014	10	45,794

added in 2010 to bring the total number of subscribed titles to ten, the number of viewings jumped to 34,016. The number of viewings reached a plateau in 2011 and has been relatively consistent since (Table I).

The addition of data from the French language *Encyclopédie Universaelis* in 2010 increased the number of viewings from 27,107 to 34,016, representing a 25 per cent increase in usage. Apart from the initial growth of the collection, this is the greatest year-to-year increase in the number of viewings following the addition of a single title. Laurentian University is a bilingual university and offers both English and French language programs. *Encyclopédie Universaelis* was the only French language e-reference title available to French-speaking students and faculty who had no other recourse but to use it. The *Encyclopédie Universaelis* contributed over 2,000 viewings to the 2010 total and an additional 7,000 viewings in 2011.

The two periods of rapid increase in usage are easily observed in Figure 1. The first occurring between 2002 and 2005 and corresponds to the time when the number of subscriptions doubled (Table I). The second occurred between 2009 and 2011. Following this, usage remained relatively consistent between 2011 and 2014, with a negligible decrease of −0.8 per cent recorded in 2013 and another of −0.3 per cent recorded in 2014 (Table I).

The purchased e-reference titles exhibited a different pattern of use. Purchased e-reference included the *Corsini Encyclopedia of Psychology*, the *Kirk-Othmer Encyclopedia of Chemical Technology*, the *Treatise in Geochemistry* and the *Wiley Encyclopedia of Forensic Science*. The *Treatise in Geochemistry* is found on ScienceDirect, whereas the other three titles are part of the Wiley Online Library. No new content has been added to these titles since their initial purchase.

Table II compares the number of purchased e-reference titles to the number of viewings recorded for these titles between 2005 and 2014. As can be observed, the annual change in the number of viewings does not seem to be setting any definite trend. Year-to-year changes in the number of viewings recorded several increases and decreases (Table II). This is quite different from that observed with the subscriptions where a definite trend of increasing usage over time was identified (Table I; Figure 1).

The number of purchased e-reference titles increased between 2005 and 2010, inclusively. The library purchased the *Kirk-Othmer Encyclopedia of Chemical Technology* in 2005 and then the *Treatise in Geochemistry* in 2006. It was not until 2010 that the next titles, the *Corsini Encyclopedia of Psychology* and the *Wiley Encyclopedia of Forensic Science* were acquired. As of 2010, the number of titles has remained fixed at four (Table II). Whereas the number of subscribed titles increased slowly over time (Table I), the number of purchased titles increased to its maximum much more quickly (Table II). It doubled in size in 2006 and then it doubled again in 2010. For both of these cases, the increase in the size of the collection was always accompanied by a notable increase in the number of viewings. Usage increased by 104 per cent in 2006 when the number of viewings rose from 55 in 2005 to 112 in 2006 (Table II). Then, when the number of titles increased by another 100 per cent in 2010, the number of viewings increased by 55 per cent. The greatest increase in the usage, however, occurred in 2008 when the number of viewings rose

Figure 1 Graph comparing the number of e-reference subscriptions with dynamic content to the number of viewings recorded by these subscriptions, over a 13-year period
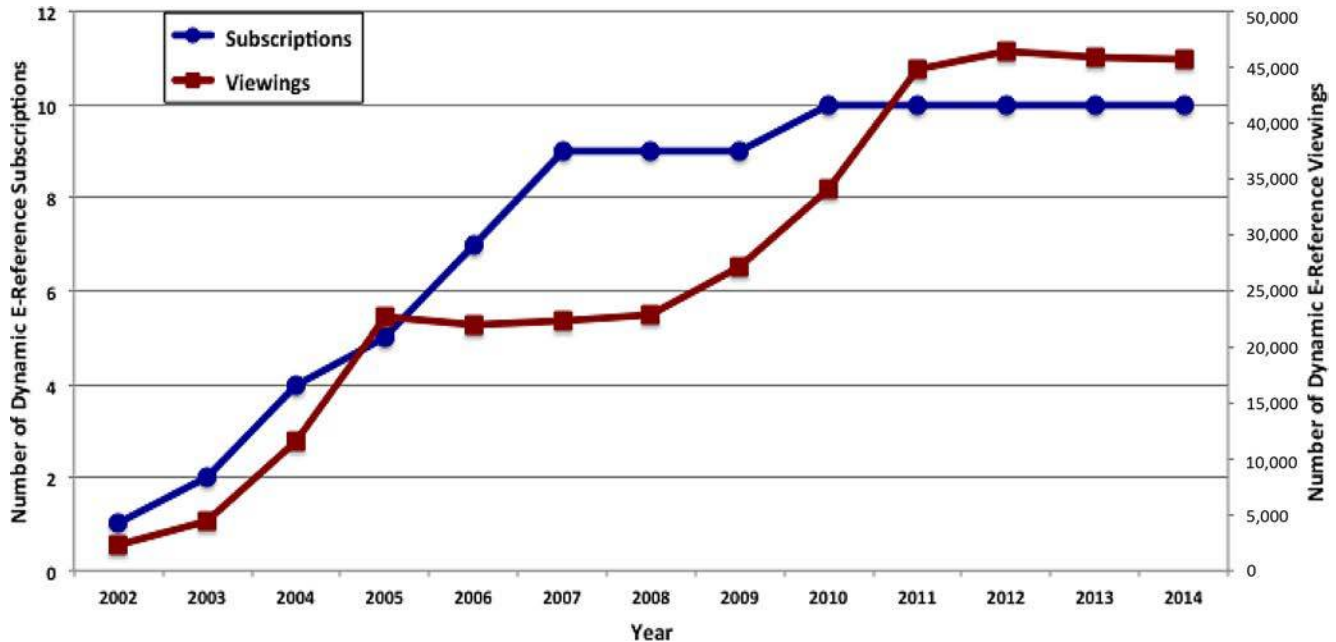
Table II The number of e-reference purchases with static content and the corresponding number of viewings recorded for these purchases, over a 10-year period

Year	No. of titles purchased	No. of viewings
2005	1	55
2006	2	112
2007	2	16
2008	2	143
2009	2	245
2010	4	380
2011	4	172
2012	4	298
2013	4	87
2014	4	71

from 16 in 2007 to 143 recorded in 2008, a 794 per cent increase (Table II). In fact, the majority of the viewings recorded in 2008 belonged to the *Treatise in Geochemistry*, 121 of the 143 of the viewings (83 per cent).

Figure 2 plots the annual changes in both the number of purchased titles and the number of viewings recorded for these titles. Figure 2 also clearly illustrates the erratic changes in the number of viewings over time. Also, clearly visible is the downward trend in the number of viewings once the number of purchased title remained constant at four in 2010 (Figure 2). This was not observed for the subscribed e-reference titles (Figure 1).

Figure 3 plots the comparative results of regression analyses performed on the data representing the subscribed titled and the purchased titles. The analyses revealed a much stronger linear relationship between the number of subscriptions and their number of viewings. The coefficient of determination was calculated to be $R^2 = 0.79$ and is indicative of a very

strong relationship between variables. It is much larger then that calculated for the purchased titles ($R^2 = 0.18$), which is considered to be extremely weak. If the relationship between purchased e-reference titles and their usage had been strong, it would have been expected that usage would remain relatively consistent as the number of purchased titles became fixed at four. Rather, usage began to decrease as soon as the collection ceased to grow.

Table III compares the "viewings per subscription" ratios to the "viewings per purchase" ratios. First, the "viewings per subscription" ratios are much greater in value than those calculated for the purchased titles, ranging between 25 and 310 times greater. In fact, the ratio for the subscribed titles ranges between 2,246 and 4,635 (Table III). For the purchased titles, the ratios range from 8 to 123 (Table III). This means that the average use per subscription is by far greater than for the purchased titles.

The greater "viewings per subscription" ratios may in part be the result of the nature of the some of the subscribed titles rather than being entirely the result of their dynamic content. *AccessScience*, the Encyclopedia Britannica Online, the *Encyclopédie Universaelis* and the *Oxford English Dictionary Online* contain a broad range of subject area and are typically used as general sources of information.

The "viewings per subscription" ratios calculated also demonstrated a steady increase in relative use starting in 2007 until reaching a plateau in 2011 (Table III; Figure 4). Between 2011 and 2014, the "viewings per subscription" ratios remained fairly constant with an average change of 1.4 per cent. On the other hand, the "viewings per purchase" ratios have been declining since 2009 (Table III; Figure 4).

The main advantage of subscribing to an e-reference title is the assurance that its content will be regularly refreshed and kept current (Korah *et al.*, 2009). Keeping up-to-date with

Figure 2 Graph comparing the number of individual e-reference purchases with static content to the number of viewings recorded by these purchases, over a nine-year period
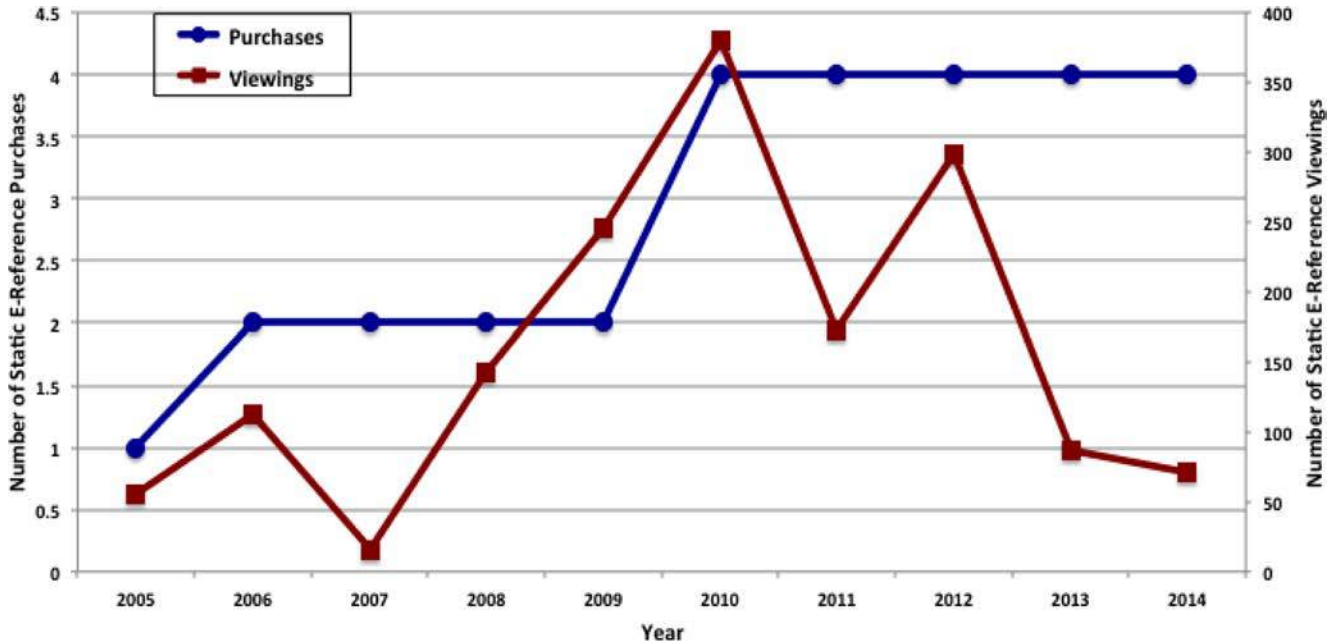
Figure 3 Results from linear regression analyses comparing the strength of the relationship (R^2) between the number of dynamic e-reference subscriptions and static e-reference purchases to their corresponding number of viewings
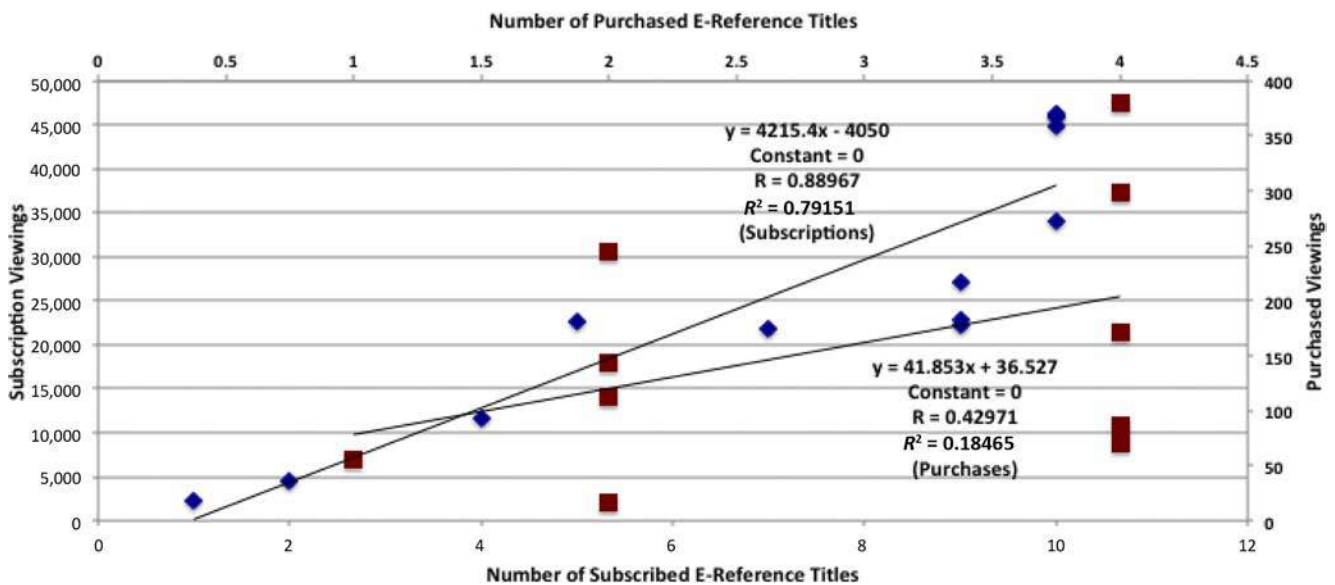
current developments is an obligation for any profession, but more so for academic fields where a very large portion of faculty surveyed considered it vital to their research (Rupp-Serrano and Robbins, 2013). Korah *et al.* (2009) reported that 93 per cent of students believe that up-to-date reference material would meet their academic needs. Singer also reported in 2009 that more than 80 per cent of libraries have replaced at least one print ready reference source with an electronic version because it contained more current information. With today's student being less dependent on the traditional library and rarely using its physical resources of

their studies, providing access to current and up-to-date online reference material has become an expectation (Tella and Oyedokun, 2014).

A less apparent advantage may also be the actual cost of a subscription versus that of an outright purchase. In some cases, publishers will charge far more for a one-time purchase of one of their titles as opposed to an annual subscription. For example, purchasing a title from Wiley Online Library will cost on average four times more than a subscription to the same title (John Wiley and Sons, Inc., 2015). This may become problematic if patrons ceased to consult them

Table III Comparison of the "Viewings per subscription" and the "Viewings per purchase" ratios

Year	Viewings/subscription	Viewings/purchase
2002	2,246	N/A
2003	2,256	N/A
2004	2,884	N/A
2005	4,526	55
2006	3,127	56
2007	2,476	8
2008	2,538	72
2009	3,011	123
2010	3,402	95
2011	4,485	43
2012	4,635	75
2013	4,597	22
2014	4,579	18

Table IV The number of dynamic collection titles and their corresponding number of viewings, recorded over a five-year period

Year	Dynamic collections numbers	Dynamic collections viewings
2010	24	77
2011	149	546
2012	155	488
2013	253	755
2014	783	3,297

repeatedly. The cost per use may actually be greater for purchased titles compared to subscribed one.

Analysis of dynamic and static collection usage

Table IV presents the number of titles in the Dynamic E-Reference Collection and the number of viewings recorded by these titles. The Dynamic E-Reference Collection is composed of an aggregation of titles from the Oxford Handbook Online and Sage Knowledge eReference.

The first 24 e-reference titles were purchased in 2010 from Sage Knowledge eReference. These were the only Sage e-reference titles purchased until 2013. In 2011, the library purchased its first 98 titles from the Oxford Handbooks Online, which increased the total number of titles from 24 to 149. This represents an increase of 520 per cent in collection size, by far the greatest increase in collection size experienced. The following year saw the addition of another 104 Oxford

Handbooks Online titles, another 104 titles in 2012 and a further 202 titles in 2013. The Dynamic E-Reference Collection therefore grew to include 155 titles in 2012 and 253 titles in 2013, representing increases of 4 and 63 per cent, respectively. The second greatest increase in collection size occurred in 2014 when 293 Oxford Handbooks Online titles were added along with 490 new titles from Sage Knowledge eReference. This increased the number of titles from 253 in 2013 to 783 in 2014, a 209 per cent increase.

The number of viewings increased from 77 to 546 in 2011 after the addition of Oxford Handbook Online titles, a 609 per cent increase in usage. The following year recorded a slight decrease in the number of viewings, falling from 546 to 488 viewings. This was an 11 per cent decrease in usage and the only recorded decrease in the number of viewings through this study. The number of viewings rebounded to 755 in 2013 and an even greater increase to 3,297 viewings in 2014. This represents a 55 per cent increase in usage from 2012 to 2013 and a 336 per cent increase in 2014.

It should be noted that the largest recorded increase in collection size in 2011 was also accompanied by the greatest year-to-year increase in the number of viewings. The second largest increase in collection size, recorded in 2014, was also accompanied by the second greatest year-to-year increase in the number of viewings (Table IV).

Figure 4 Graph comparing the "viewings per subscription" ratios to the "viewings per purchase" ratios
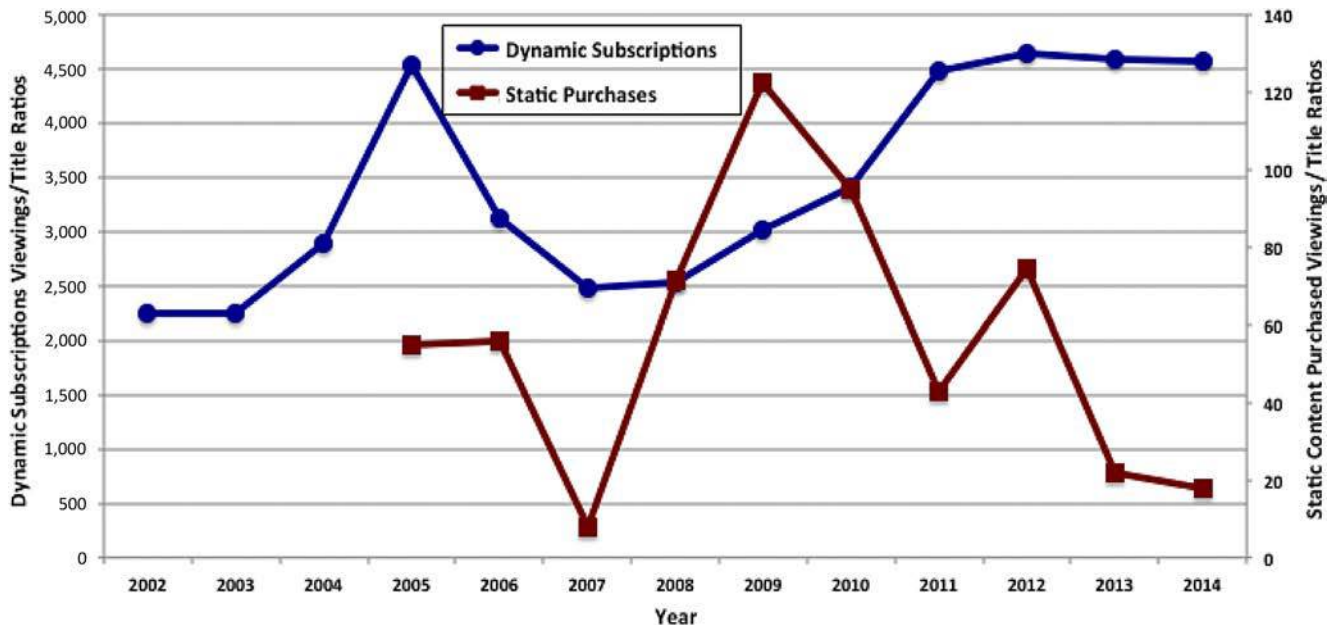
Figure 5 illustrates graphically the change in Dynamic E-Reference Collection size to the change in the number of viewings recorded. As can be observed, the near linear growth in collection size was also accompanied by a near linear growth in the number of viewings (Figure 5). The lines representing each variable follow a nearly identical path. It is therefore not surprising to find that a linear regression analysis yielded an extremely strong linear relationship between the number of titles in that collection and the number of viewings. The coefficient of determination was calculated to be $R^2 = 0.99$ (Figure 6). For each change in the value of the number of e-reference titles, there will be a proportional increase in the number of viewings. The results of this regression analysis showed that the number of viewings (dependent variable) is tightly linked to the number of titles (independent variable).

Figure 5 Graph comparing the number of titles in the dynamic e-reference collection to their corresponding number of viewings, recorded over a three-year period
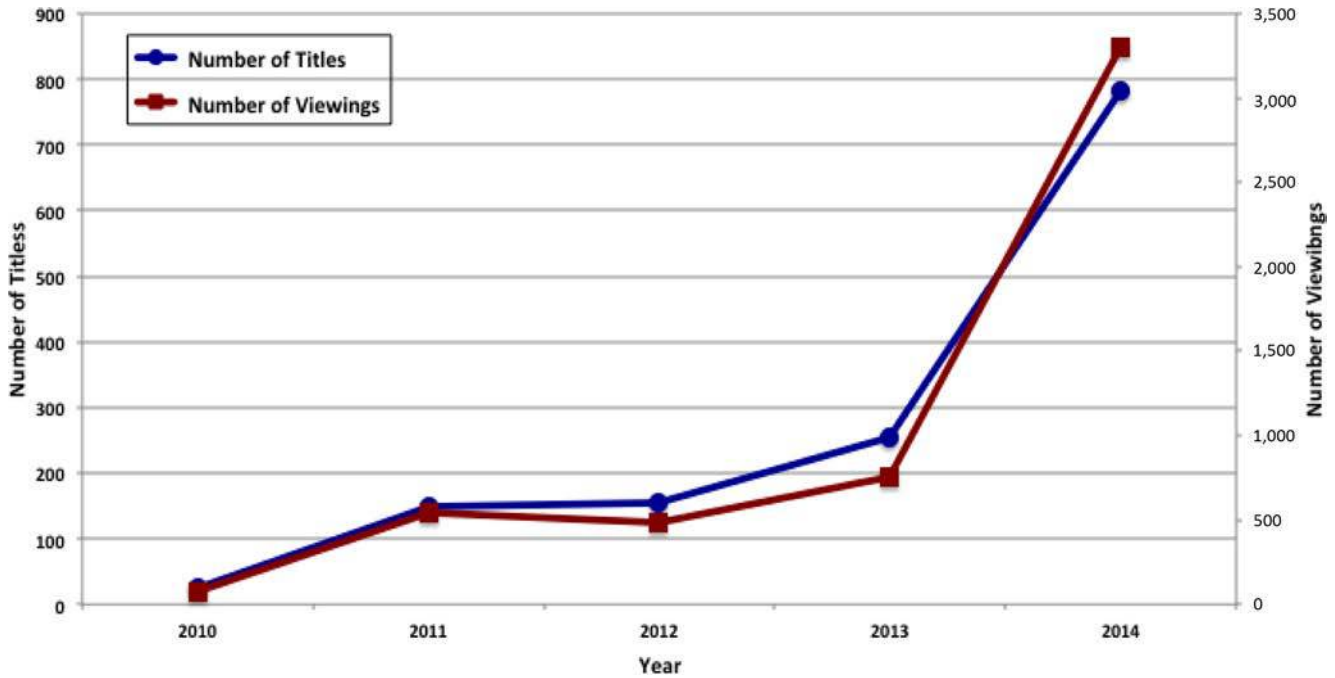

Figure 6 Results from linear regression analyses comparing the strength of the relationship (R^2) between the number of titles in the dynamic and static e-reference collections to their corresponding number of viewings
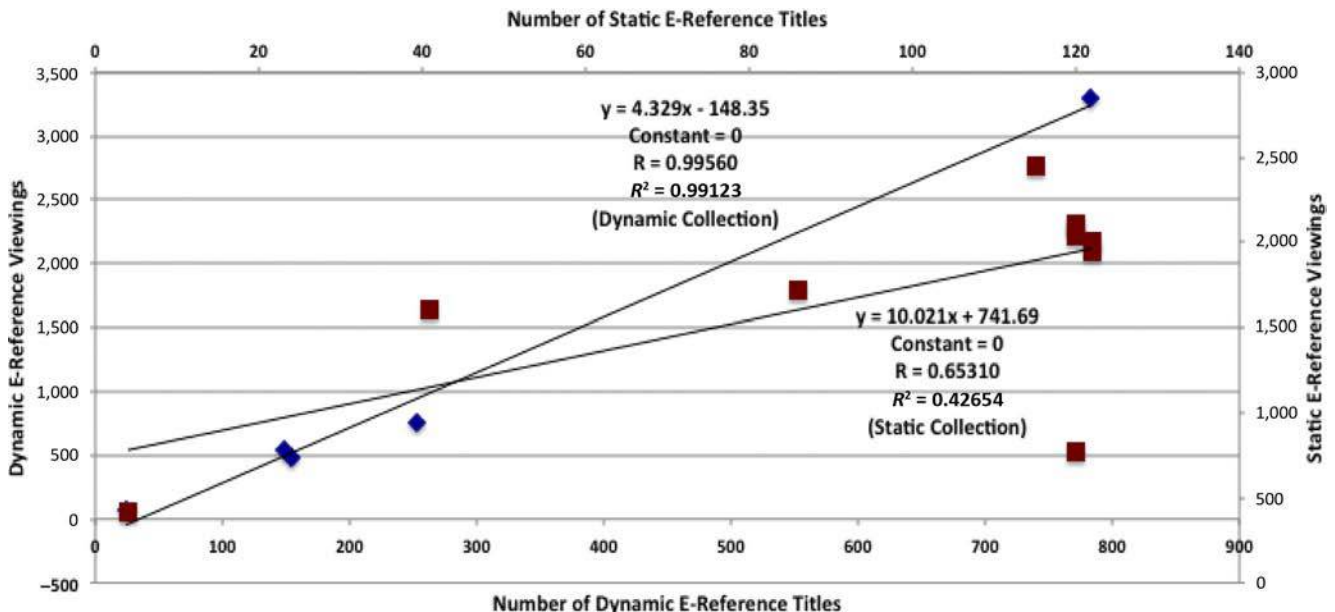
Table V presents the number of titles comprising the Static E-Reference Collection as well as their corresponding number of viewings. The Static E-Reference Collection is composed of titles from the Gale Virtual Reference Online and Oxford Reference Online.

The first four Gale Virtual Reference Library titles were purchased in 2005. The number of Gale Virtual Reference Library further increased to included 28 titles in 2006, 58 in 2007, 86 in 2008 and finally 91 in 2009. This total persisted until 2011 when two titles were removed from the collection, bringing the total number of e-reference on Gale Virtual Reference Library down to 89. No further changes were made since. The Oxford Reference Online collection experienced similar growth after the first 13 titles were initially acquired in 2006. This was followed by an increase to 28 titles in 2007, and to 29 in 2008 and finally to 31 titles in 2009. Oxford Reference Online titles remained fixed at 31.

Table V The number of static sub-collections titles and their corresponding number of viewings, recorded over an eight-year period

Year	Static collections numbers	Static collections viewings
2005	4	416
2006	42	1,606
2007	86	1,717
2008	115	2,450
2009	122	1,944
2010	122	2,001
2011	120	2,102
2012	120	2,039
2013	120	2,095
2014	120	767

Consequently, the Static E-Reference Collection grew from 4 in 2005 to 42 in 2006, a 950 per cent increase in collection size. The collection continued to grow in size from 42 to 86 in 2007 (106 per cent), and then to 115 titles in 2008 (34 per cent) and then finally to 122 titles in 2009 (5 per cent). With the removal of 2 Gale Virtual Reference Library titles in 2011, the collection decreased in size from 122 to 120 and remained at that number (−3 per cent).

As the Static E-Reference Collection grew in size, usage levels increased as well. Between 2005 and 2008, when the collection grew from 4 titles to 115, the number of viewings rose from 416 to 2,450. This nearly linear increase in both collection size and usage can be observed in Figure 7. After 2008, even as the collection was continuing to grow in size, but at a much-reduced rate, the number of viewings decreased to 1,944 (Table V). From this point onward, the number of viewings has been recording minor increases and decreases until 2014 when the number of viewings plummeted from 2,095 to 767 (Table V; Figure 7). This was a 63 per cent decrease in usage that can be clearly visible in Figure 7. As the number of titles increased and reached a peak, the number of viewings also increased proportionally (Table V; Figure 7). But as the number of titles remained static over time, the number of viewings began to decrease, slowly at first but then sharply in 2014 (Table V; Figure 7).

A linear regression analysis yielded a much weaker linear relationship between the number of titles and the number of viewings (Figure 6). In fact, the coefficient of determination was calculated to be $R^2 = 0.43$. This means that the number of viewings recorded for the Static E-Reference Collection is not as tightly linked to the number of titles compared to the Dynamic E-Reference Collection. A linear relationship equal in strength to that observed for the Dynamic E-Reference Collection would have seen the number of viewings reach a

Figure 7 Graph comparing the number of titles in the static e-reference collection to their corresponding number of viewings, recorded over an eight-year period
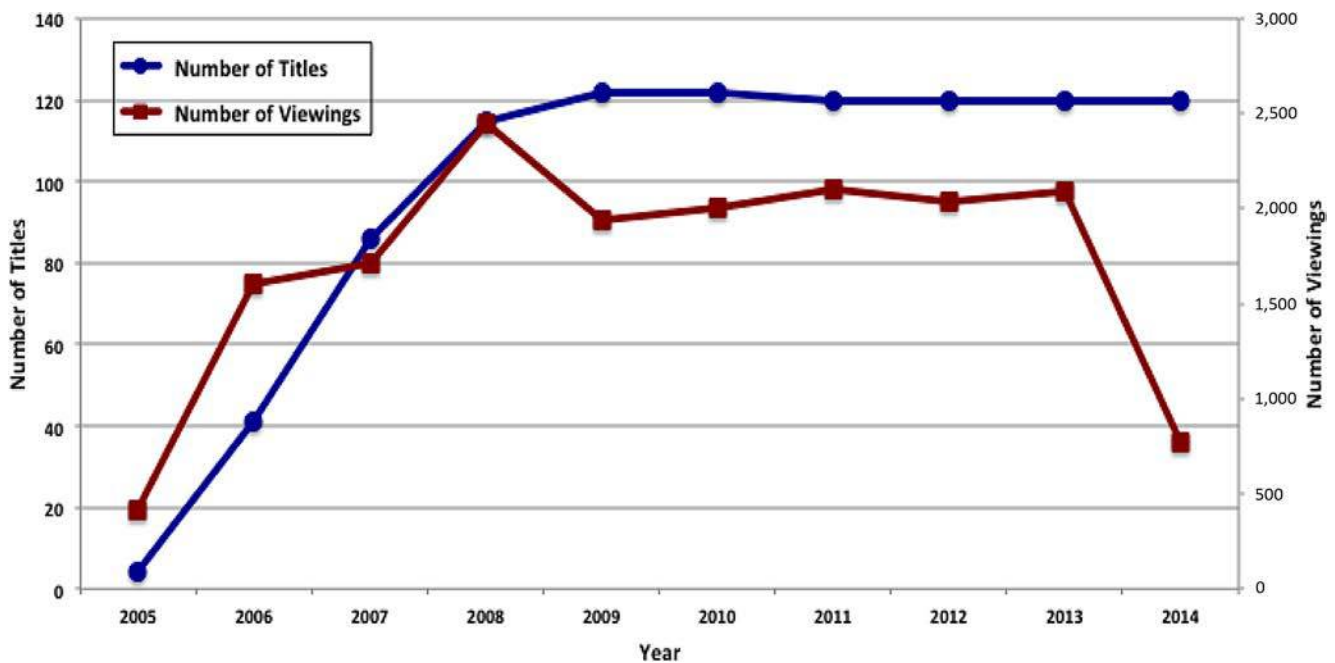
plateau along with the number of titles in 2009 and remain consistent from that point onward. Instead, the number of viewings began to decrease once the number of titles remained static (Table V: Figure 7).

In his 2015 study, on e-monograph collection size and usage, Lamothe discovered a very similar relationship. He reported a very strong linear relationship between the number of e-monographs in a dynamic collection and their corresponding number of viewings ($R^2 = 0.91$) (Lamothe, 2015). In this study, e-reference collection size and usage demonstrated an equally strong relationship $R^2 = 0.99$ (Figure 6).

Lamothe (2015) also reported a similarly weak linear relationship between size and usage for a static e-monograph collection ($R^2 = 0.61$). It would therefore appear that whether or not a collection is composed of e-monographs or e-reference titles, if an e-book collection continues to grow in size, it will also continue to experience year-to-year increases in usage. E-book collections that remain static in size and content will experience a decrease in usage over time.

Table VI Comparison of the dynamic and static e-reference collections "Viewings per title" ratios

| Year	Dynamic collection viewings/title	Static collection viewings/title
2005	N/A	104
2006	N/A	39
2007	N/A	20
2008	N/A	21
2009	N/A	16
2010	3.21	16
2011	3.66	18
2012	3.15	17
2013	2.98	17
2014	4.21	6

Table VI further presents the calculated "viewings per title" ratios for both the Dynamic and Static E-Reference Collections. Whereas the "viewings per title" ratios for the Dynamic E-Reference Collection remained fairly constant between three and four, the Static E-Reference Collection "viewings per title" ratios began at 104 but sharply dropped to 39 the following year and continued to gradually decrease to 6 "viewings per title." The average use per title remained relatively constant for the Dynamic E-Reference Collection, although it did increase from 2.98 to 4.21 "viewings per title" in 2014 (Table VI; Figure 8) after the number of e-reference titles increased substantially from 258 to 783 (Table IV). This was not observed for the Static E-Reference Collection, which experienced continuous decreases in ratios from one year to the next (Table VI; Figure 7). As the number of titles remained static, the average use per title declined.

These findings support those of an earlier qualitative study by Reid *et al.* (2006). They reported that at the Loughborough University Library, UK, study participants viewed reference collections that are not refreshed or updated regularly as being inaccurate and outdated and therefore not worth their time and effort to consult, as they did not answer their academic needs.

Conclusions

Subscribed e-reference titles have new and updated content added regularly. Subscribed e-reference titles at Laurentian University experienced annual increases in usage. Purchased e-reference titles do not contain dynamic content but rather have content that remains unchanged and static in nature after their initial purchase. Purchased e-reference titles experienced a decrease in usage over time. As the number of purchased titles remained static, the number of viewings recorded annually decreased.

Figure 8 Graph comparing the "viewings per title" ratios between the dynamic and static e-reference collections
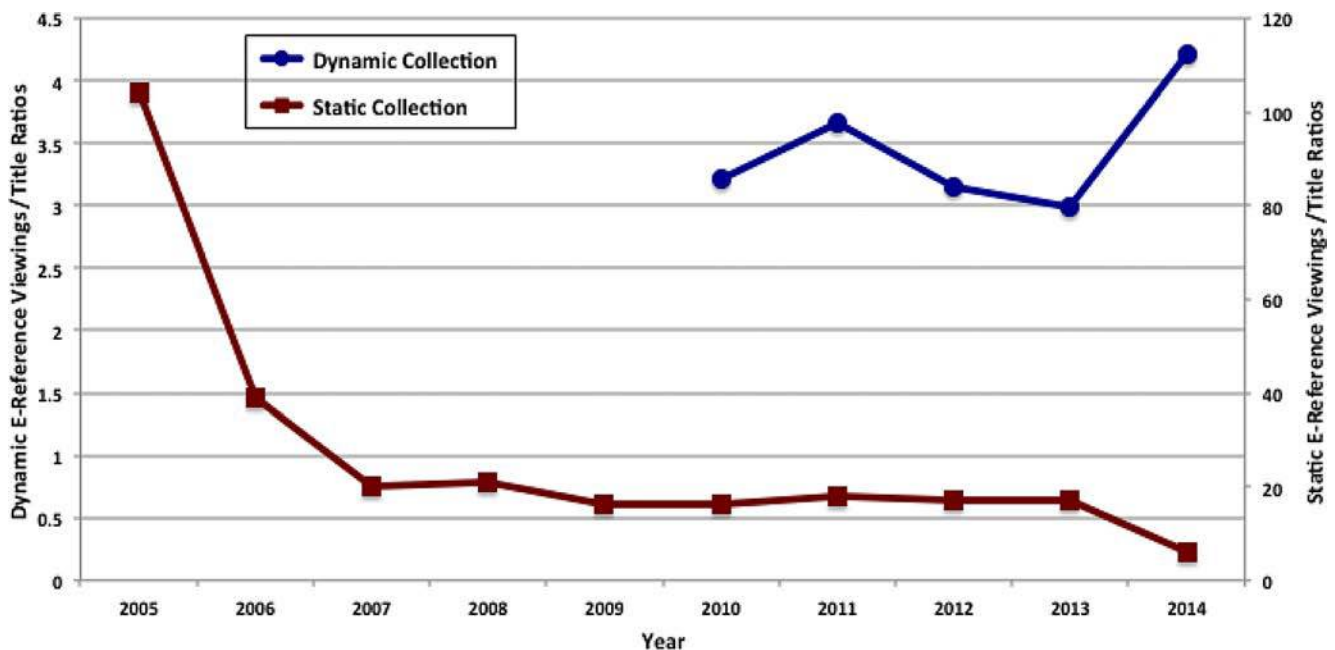
Similarly, the Dynamic E-Reference Collection at Laurentian University, in which new titles were added annually, recorded annual increases in usage. As the Dynamic E-Reference Collection continued to grow, usage levels also continued to grow. On the other hand, the Static E-Reference Collection, in which the number of titles remained fixed at four, experienced a decline in usage from one year to the next.

"Viewings per title" ratios also suggest that average use per title will decline over time for e-reference with static content as academic patrons consult them less and less.

Based on these results, it is important for the J.N. Desmarais Library to keep its e-reference content dynamic and up-to-date to answer academic patron needs and assure continued use of its e-reference collection. A subscription to an e-reference title would be more advantageous, as it keeps content refreshed and up to date. The results of this study also suggest that purchasing e-reference titles in large packages will result in an increase in usage over time as long as new titles are added to that collection annually. The content of each e-reference title may not be refreshed but adding new titles will make available new and additional information to patrons who will then return and reuse the collection.

Notes

1 The J.N. Desmarais Library is Laurentian University's main campus library.

2 Laurentian University is a multi-campus university with its main campus located in Sudbury, Ontario, Canada. Total student population in 2014 was 9,200, of which 700 were enrolled in Master's programs and 170 in doctoral programs. Also, in 2014, the university had 390 full-time teaching and research faculty members. Academic programs cover a multiple of fields in the sciences, social sciences and humanities and offers 60 undergraduate, 17 Master's and 7 doctoral degrees.

References

Buros Center for Testing (2014), *Mental Measurements Yearbook*, University of Nebraska Press, Lincoln, NE, available at: http://buros.org/mental-measurements-yearbook (accessed 15 April 2015).

Corlett-Rivera, K. and Hackman, T. (2014), "E-book use and attitudes in the humanities, social sciences, and education", *Portal: Libraries and the Academy*, Vol. 14 No. 2, pp. 255-286.

Culp, B. (2002), "The handbook: glorious past, parlous present, no future?", *Proceedings of the 2002 Chemical Information Conference, Nimes*, 20-23 October, pp. 49-53.

Encyclopedia Britannica Online (2015), *Frequently Asked Questions: Why Should I Become a Member?*, Encyclopedia Britannica, London, available at: http://help.eb.com/premium2/index.htm (accessed 17 April 2015).

Engeldinger, E.A. (1990), "'Use' as a criterion for the weeding of reference collections: a review and case study", *Reference Librarian*, Vol. 13 No. 29, pp. 119-128.

Fernandes, M.I. (2008), "Ready reference collections: thoughts on trends", *Community and Junior College Libraries*, Vol. 14 No. 3, pp. 201-210.

Husted, J.T. and Czechowski, L.J. (2012), "Rethinking the reference collection: exploring benchmarks and e-book availability", *Medical Reference Services Quarterly*, Vol. 31 No. 3, pp. 267-279.

John Wiley and Sons, Inc. (2015), *Pricing and Flexible Purchase Options*, John Wiley and Sons, New York, NY, available at: http://olabout.wiley.com/WileyCDA/Section/id-406092.html#pricing (access 23 February 2015).

King, N. (2012), "Nice vs necessary: reference collections in ARL member libraries", *Reference Librarian*, Vol. 53 No. 2, pp. 138-155.

Korah, A., Cassidy, E., Elmore, E. and Jerabek, A. (2009), "Off the shelf: trends in the purchase and use of electronic reference books", *Journal of Electronic Resources Librarianship*, Vol. 21 Nos 3/4, pp. 263-278.

Kotz, S., Balakrishnan, N., Read, C.B. and Vidakovic, B. (2006), "Coefficient of determination", *Encyclopedia of Statistical Sciences. Calcutta Statistical Association Bulletin to Cyclic Sampling*, Wiley Interscience, Hoboken, NJ, Vol. 2, p. 1029.

Lamothe, A.R. (2012), "Comparing usage recorded between an electronic reference and an electronic monograph collection: the difference in searches and full-text content viewings", *Journal of Electronic Resources Librarianship*, Vol. 24 No. 3, pp. 101-118.

Lamothe, A.R. (2013b), "Factors influencing the usage of an electronic book collection: size of the e-book collection, the student population, and the faculty population", *College and Research Libraries*, Vol. 74 No. 1, pp. 39-59.

Lamothe, A.R. (2013c), "Comparing linear relationships between e-book usage and university student and faculty populations: the difference between e-reference and e-monograph collections", *Journal of Electronic Resources Librarianship*, Vol. 25 No. 1, pp. 1-15.

Lamothe, A.R. (2015), "Comparing usage between a dynamic and a static e-monograph collection", *Collection Building*, Vol. 34 No. 1, pp. 17-26.

Little, G. (2011), "Collection development in library and information science at ARL libraries", *Collection Building*, Vol. 30 No. 3, pp. 135-139.

Luther, J. (2001), "White paper on electronic journal usage statistics", *Serials Librarian*, Vol. 41 No. 2, pp. 119-147.

McCain, K.W. (1992), "Some determinants of journal holding patterns in academic libraries", *Library and Information Science Research*, Vol. 14 No. 3, pp. 223-243.

OED (2013), *Recent Updates to the OED*, Oxford University Press, New York, NY, available at: http://public.oed.com/the-oed-today/recent-updates-to-the-oed/ (accessed 15 April 2015).

Oxford Music Online (2014), *What's New*, Oxford University Press, New York, NY, available at: www.oxfordmusiconline.com/subscriber/page/whats_new (accessed 15 April 2015).

Pendleton, B.F. (2005), "Ratio correlation", in Kotz, S., Balakrishnan, N., Read, C.B. and Vidakovic, B. (Eds), *Encyclopedia of Statistical Sciences. Preference Mapping to Recovery Interblock Information*, Wiley Interscience, Hoboken, NJ, Vol. 10, pp. 6967-6971.

Peterson, K. (2006), "Database reviews and reports: accessscience", *Issues in Science and Technology Librarianship*,

Vol. 45, available at: www.istl.org/06-winter/databases3.html (accessed 15 April 2015).

Reid, S., Walton, G. and Lund, P. (2006), "Strategic development of library reference collections in higher education: a case study at Loughborough University Library (UK)", *Library and Information Research*, Vol. 30 No. 95, pp. 10-24.

REP, (2014) *REP Online Updates*, Routledge, New York, NY, available at: www.rep.routledge.com/updates (accessed 15 April 2015).

Rupp-Serrano, K. and Robbins, S. (2013), "Information-seeking habits of education faculty", *College and Research Libraries*, Vol. 74 No. 2, pp. 131-141.

Scanlan, C.R. (2008), "Ratio measure", in Lavrakas, P.J. (Ed.), *Encyclopedia of Survey Research Methods*, Sage Publication, London, Vol. 2, pp. 692-693.

Singer, C.A. (2009), "Why do reference librarians purchase print or online reference sources?", *Against the Grain*, Vol. 21 No. 4, p. 46.

Sokal, R.R. and Rohlf, F.J. (2011), *Biometry*, W.H. Freeman and Company, New York, NY.

Tella, A. and Oyedokun, T.T. (2014), "An evaluation of online reference services through social networking sites in selected Nigerian university libraries", *Reference Librarian*, Vol. 55 No. 4, pp. 343-367.

Townley, C.T. and Murray, L. (1999), "Use-based criteria for selecting and retaining electronic information: a case study", *Information Technology and Libraries*, Vol. 18 No. 1, p. 32.

Van Epps, A.S. (2005), "The evolution of electronic reference sources", *Library Hi Tech*, Vol. 23 No. 2, pp. 287-298.

Wallace, D.P. and Boyce, B.R. (1989), "Holdings as a measure of journal value", *Library and Information Science Research*, Vol. 11 No. 1, pp. 59-71.

Wiley Online Library (2014), *About eLS*, John Wiley and Sons, New York, NY, available at: www.els.net/WileyCDA/Section/id-610173.html (accessed 15 April 2015).

Zar, J. (2010), *Biostatistical Analysis*, Prentice Hall, Upper Saddle River, NJ.

Further reading

Jackson, M. (2007), "One by one or bundle by bundle: evaluating the landscape of ebooks", *Against the Grain*, Vol. 19 No. 2, pp. 48-52.

Lamothe, A.R. (2013a), "Comparing usage between selective and bundled e-monograph purchases", *Collection Building*, Vol. 32 No. 3, pp. 116-121.

Corresponding author

Alain R. Lamothe can be contacted at: alamothe@laurentian.ca

This article has been cited by:

1. References 135–146. [CrossRef]