

# Assessing Return on Investment in Licensed E-Resources Through Citation Analysis

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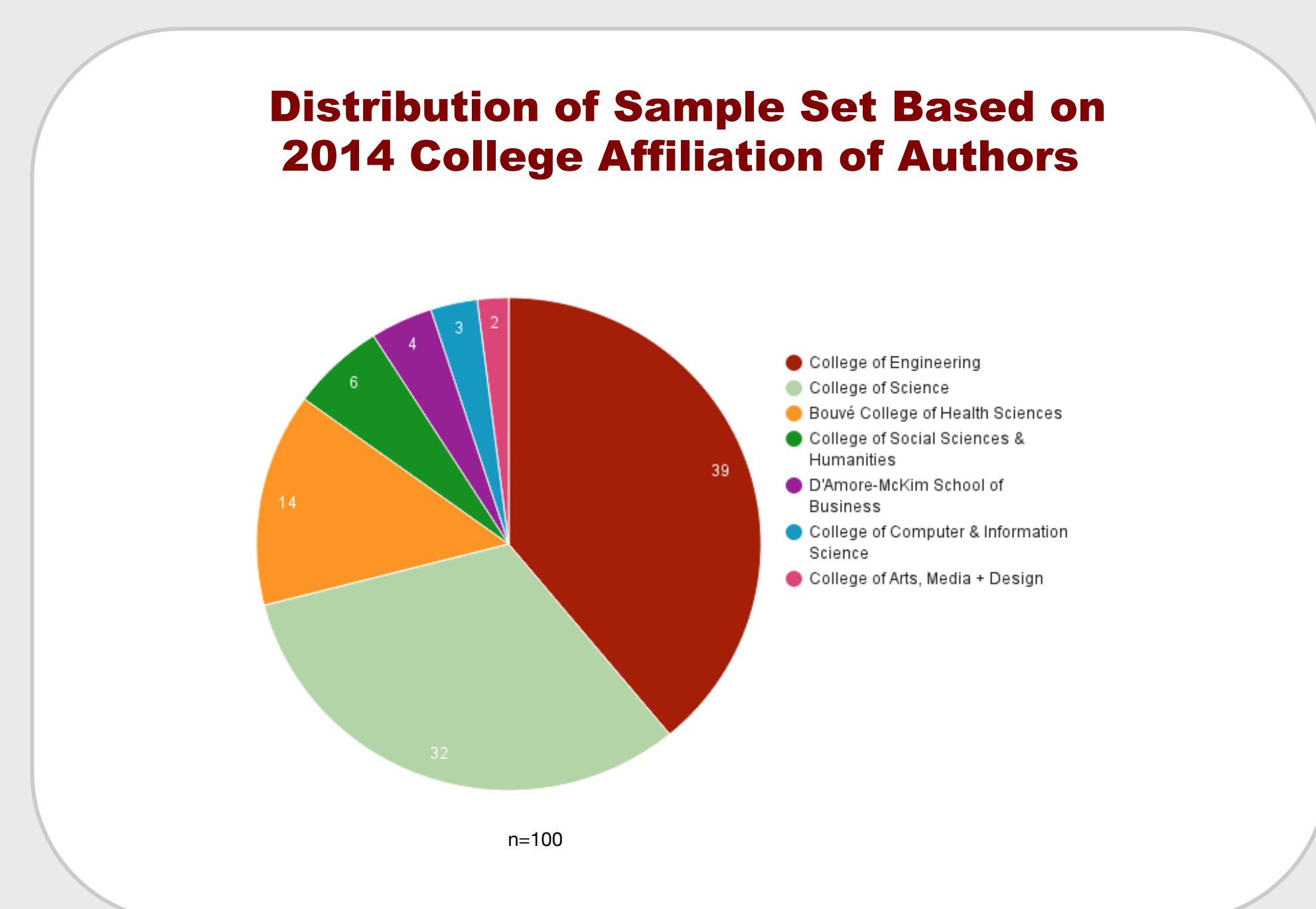
## Background

Many libraries rely upon download or usage statistics for licensed e-resources to help make collection decisions. These data, useful as they are, do not indicate whether articles were read or if their readers found them valuable for their research purposes. **Significant usage of a journal article may be inferred by its inclusion in an author's list of references.**

In their 2014 article, "Usage Versus Citation Behaviours in Four Subject Areas," Juan Gorraiz and co-authors found that **50-140 uses of a journal's content correlated to one citation from that journal**. Arts and humanities journals showed higher numbers of uses per citation, while science/health journals showed fewer. We conducted a study to gain insight into usage and citation patterns of our faculty and researchers, and to see if our own results reflect a similar download to citation ratio. We ultimately plan to use this data to more accurately assess our library's return on investment for researchers using our licensed e-journals, with an analysis of pricing data for internal usage.

## Methods

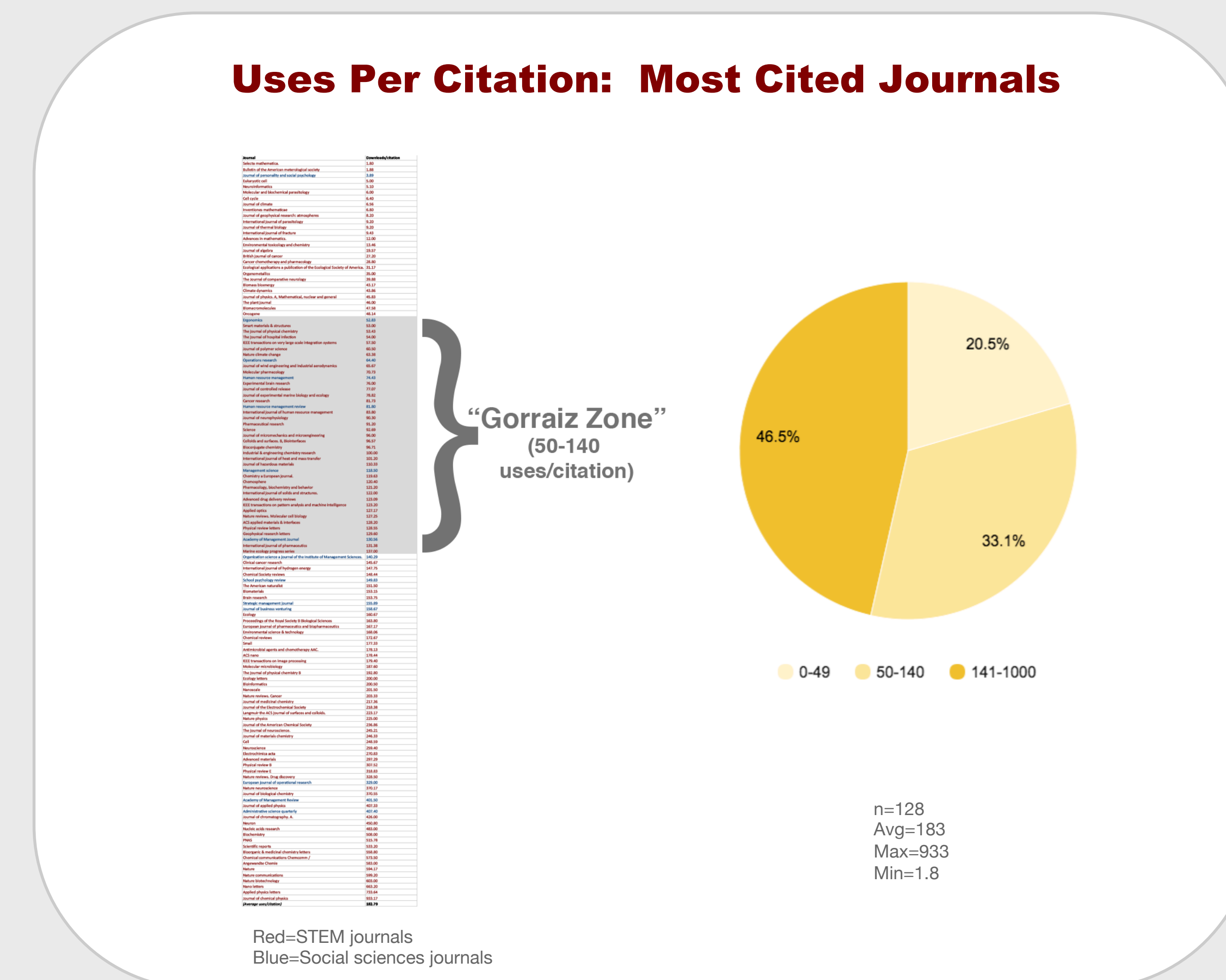
We studied 100 articles authored by Northeastern faculty members and published in 2014 to determine how frequently they cited articles found in our licensed e-journals and databases. We used Web of Science to identify articles in journals we had full-text access to, where at least 50% of authors were Northeastern faculty members ( $n=414$ ), and chose 100 of these articles to analyze in representative proportions to the overall distribution of college affiliation, as shown below.



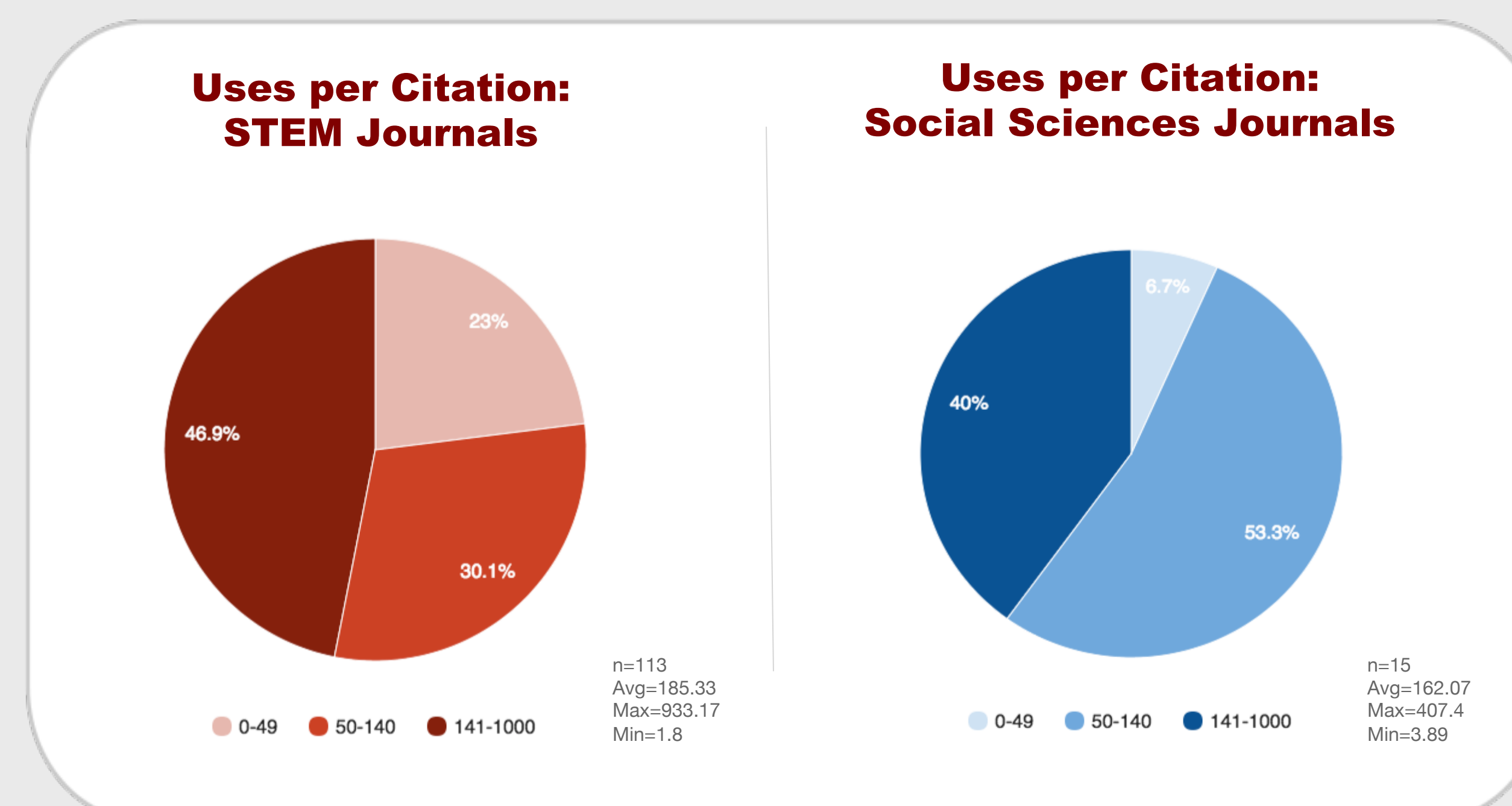
We analyzed each article's reference list to produce a list of 3,100 cited journal articles. Citations to conference proceedings, books, chapters, and other materials were excluded. **We found that articles from 1,055 of our subscribed e-journals were cited.**

**Of the 1,055 subscribed journals, 128 were cited 5 times or more** (indicating a classic long-tail usage pattern). These highly cited journals were all in either STEM or social sciences disciplines. We analyzed our usage statistics for these journals to determine whether usage and citation occurred in ratios similar to Gorraiz, et al.

## Results



Overall, only about one-third (32%) of 128 journals were accessed 50-140 times per citation, thus falling into what we referred to as the "Gorraiz zone." **On average, journals were accessed 183 times per citation.** When we analyzed whether journal usage to citation ratios varied by discipline, we found that while citations to the STEM journals aligned fairly closely to the overall distribution, **a larger proportion of the social sciences journals fell into the Gorraiz zone—more than 50%.** However, a larger sample size of social sciences journals would be necessary in order to confirm the significance of this finding.



Because our data set of highly cited journals did not contain any titles in the arts and humanities, we could not confirm Gorraiz, et al.'s analysis that journals in those disciplines showed a higher usage/citation ratio. But the chart above, right, shows that in the social sciences (an area not specifically called out by Gorraiz, et al.), while the average usage/citation ratio was slightly lower, representing a smaller range of variation, the percentage of journals with a high usage/citation ratio was markedly higher. **Over 93% of journals in the social sciences had >50 uses per citation, compared to 77% in the STEM category, despite having a lower average usage/citation ratio.**

## Conclusions

Like Gorraiz and colleagues, we found disciplinary differences in downloads per citation rates. A greater number of STEM journals had lower download per citation rates, and social sciences journals as a whole conformed more closely to the 50-140 downloads per citation figure.

These disciplinary differences in download figures vs. citation rates may have implications for libraries that use download statistics to help make collection decisions. **STEM resources may be at a disadvantage in collection decisions applying this type of analysis, as both the Gorraiz study and ours found that STEM journals had lower download per citation rates than other disciplines.** Conversely, while citation may indicate "significant usage" of a journal, **social science and arts/humanities journals would be disadvantaged because they are cited less frequently**, due to differences in disciplinary practice. Thus, **while citation analysis provides an additional way of assessing e-journal usage, we advise caution in giving it too much weight in collection decisions.**

## Study Limitations

This study must be viewed as an exercise in data analysis rather than a qualitative assessment of specific individuals' information-seeking behavior. It is not possible to know if NU-affiliated authors actually acquired the articles in their reference lists through our licensed and purchased e-resources or through other channels. Also, because it is not possible to know when authors acquired cited articles, we arbitrarily chose to analyze usage data from 2014, the same year in which the citing articles were published.

## Areas for Future Study

In addition to ultimately using this data to analyze the library's return on investment for researchers using our licensed e-resources, the data that we gathered hinted at several intriguing areas for further study. Potential future study areas include faculty interaction with Open Access journals; self-citation rates in different disciplines; and how faculty acquire articles they cite from non-subscribed journals.

## References

Gorraiz, J., Gumpenberger, C., & Schögl, C. (2014). Usage versus citation behaviours in four subject areas. *Scientometrics*, 101(2), 1077-1095. doi: 10.1007/s11192-041-1271-1

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