The Engineering Design Graphics Journal and Its Selected Metrics of Effect

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Robert A. ”Bob” Chin is a faculty member, Department of Technology Systems, College of Engineering and Technology, East Carolina University, where he has taught since 1986. He is the Engineering Design Graphics Division’s chair and in 2015, he completed his second term as the director of publications for the Engineering Design Graphics Division and the Engineering Design Graphics Journal editor. Chin has also served as the Engineering Design Graphics Division’s annual and mid-year conference program chair, and he has served as a review board member for several journals including the EDGJ. He has been a program chair for the Southeastern Section and has served as the Engineering Design Graphics Division’s vice chair and chair and as the Instructional Unit’s secretary, vice chair, and chair. His ongoing involvement with ASEE has focused on annual conference paper presentation themes associated with the Engineering Design Graphics, Engineering Libraries, Engineering Technology, New Engineering Educators, and the Two-Year College Divisions and their education and instructional agendas.

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Like the various sports ranking systems, with RPI (rating percentage index) being one of the better known, systems and a vocabulary for ranking journals have proliferated. More recently with the maturity of computer-assisted analytics and in response to the need for data to prop up claims of excellence and to promulgate entity prestige, JCR, SJR, SNIP, IF, Eigen, Scopus, Google Scholar, Altmetric, and a plethora of others have found their way into the vocabulary of researchers, authors, administrators, and the like. They continue to be bandied about as their merits are debated and careers are turned on the various approaches to journal ranking.

JCR and SJR and SNIP, oh my.

The *Engineering Design Graphics Journal* (*EDGJ*) was examined on selected metrics with respect to its effect: what it brings about, what it produces, and what it accomplishes. The purpose of this examination was to provide the *Journal's* stakeholders—researchers, authors, administrators, and the *Journal* staff—with a sense for the *Journal's* standing among its peers. This examination was limited to the data collected and analyzed by Scimago Lab [1], a company whose mission is to improve scientific visibility and online reputation. Specifically, the examination focused on statistics available through Scimago Lab's Journal Rankings [2], which is a component of their Journal & Country Rank [3].

Journal & Country Rank was used because it is accessible at no cost to users. Just as important, it was used because their products are a result of a collaboration with Elsevier [4], a major provider of scientific, technical, and medical information. This contrasts with Clarivate Analytics' Web of Science [5], which isn't quite as accessible and imposes fees to gain access [6].

Clarivate Analytics is the publisher of Journal Impact Factor (IF), which is frequently cited as the benchmark or gold standard for characterizing journal impact. While it is not an equivalent, Scimago's journal rank indicator, SJR, employs a weighted citation score, which means the citations from a prestigious journal are scored more highly than those from ones that have a smaller citation network. It measures the scientific influence of the average journal article and expresses how central it is to the global scientific discussion. In contrast, IF employs absolute counts; that is, one equals one. Fazel and Wolf [7] concluded that SJR had the strongest correlation with IF when compared to the other ($r = 0.437$) measures of impact they examined.

The results of the work done by Scimago are based on data provided by Scopus [8], Elsevier's abstract and citation database. Because the data are normalized by Scimago to account for differences between the disciplines, the data can be used to make comparisons among peer journals. For the *EDGJ*, its research spans two disciplines according to Scimago: the social sciences, specifically education, and engineering, specifically engineering/miscellaneous. This is comparable to those cited by Elsevier: social sciences and physical sciences/engineering.

The metrics used by Scimago to characterize journals include but is not limited to the following: its standing with respect to peer journals—prestige; its average prestige per article (referred to as the Scimago Journal Rank or SJR); the evolution of the total number of citations and journal's

self-citations; the evolution of the number of total citation per document and external citation per document less self-citations; the evolution of the average number of times documents published in a journal in the past two, three and four years have been cited in the current year with the journal's impact factor embedded; the ratio of the journal's documents authored by researchers from more than one country; the ratio of a journal's articles including substantial research in three year windows vs. those documents other than research articles, reviews and conference papers; and the ratio of a journal's items, grouped in three years windows, that have been cited at least once vs. those not cited during the following year.

Method

On January 23, 2018, data that characterize the *EDGJ* were downloaded from Scimago's Journal & Country Rank > Journal Rankings [9]. A spreadsheet was populated with the data and charts produced to help characterize the *Journal*.

While Scimago analyzes data on almost 23,000 journals, attempts to explain and to make comparisons should at least be limited to peer journals. For the *EDGJ*, this narrows the population to 954 education journals or 333 US published education journals and 331 engineering (miscellaneous) journals or 69 US published engineering (miscellaneous) journals.

Results

As of January 23, 2018, the SJR (average prestige per article measure) for the *EDGJ* was 0.102 ranking it 320th among the 333 US published education journals and 68th among the 69 US published engineering (miscellaneous) journals based on impact factors (not to be confused with IF)—see Figure 1. Added to the graph are the 2016 thresholds for the respective third quartiles for purposes of comparison.

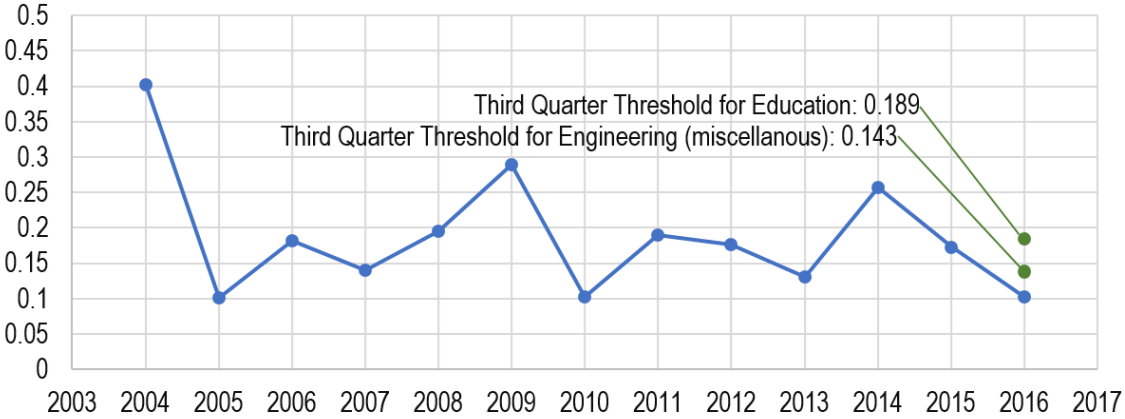

Figure 1. Annual size-independent prestige indicator—SJR.

Sets of journals are ranked according to their SJR and divided into four equal groups: four quartiles. In 2016, the *EDGJ* was in the 4th quartile among its peers—see Figures 2 and 3. These two Figures also provide a sense for where the *EDGJ* has been ranked relative to its peers in the past. Notably, while the *Journal* is ranked 68th among its 69 peer engineering (miscellaneous)

journals, it appears its performance among its engineering (miscellaneous) journals has been what has elevated its overall SJR.

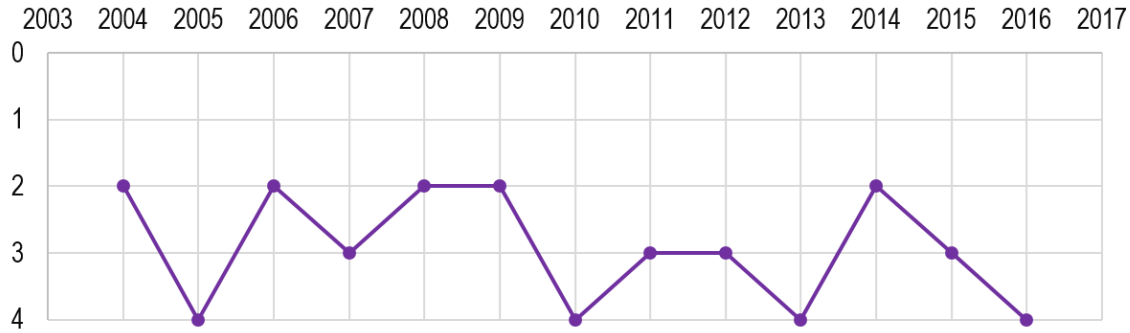

Figure 2. Quartiles in which the *EDGJ* were ranked as an Engineering (miscellaneous) journal.

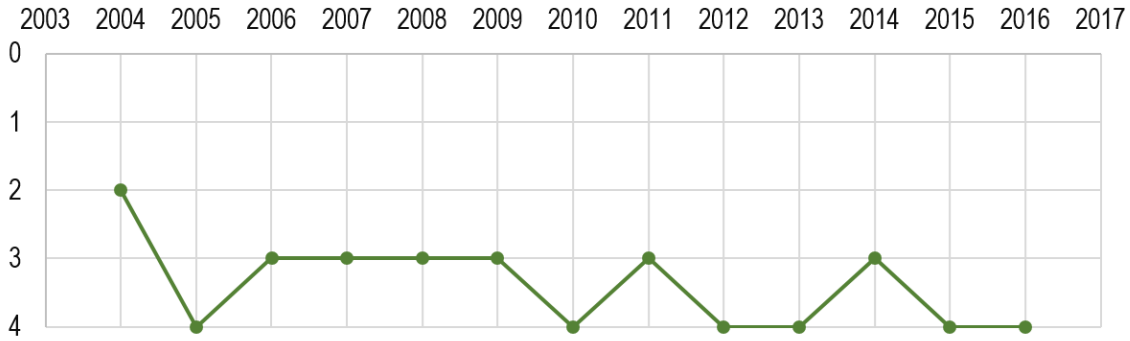

Figure 3. Quartiles in which the *EDGJ* were ranked as an Education journal.

The total number of citations and the *EDGJ's* self-citations received by the *Journal's* published documents during the three previous years are presented in Figure 4. Self-citation is defined as the number of citations from the *EDGJ* citing documents to documents published by the *Journal*.

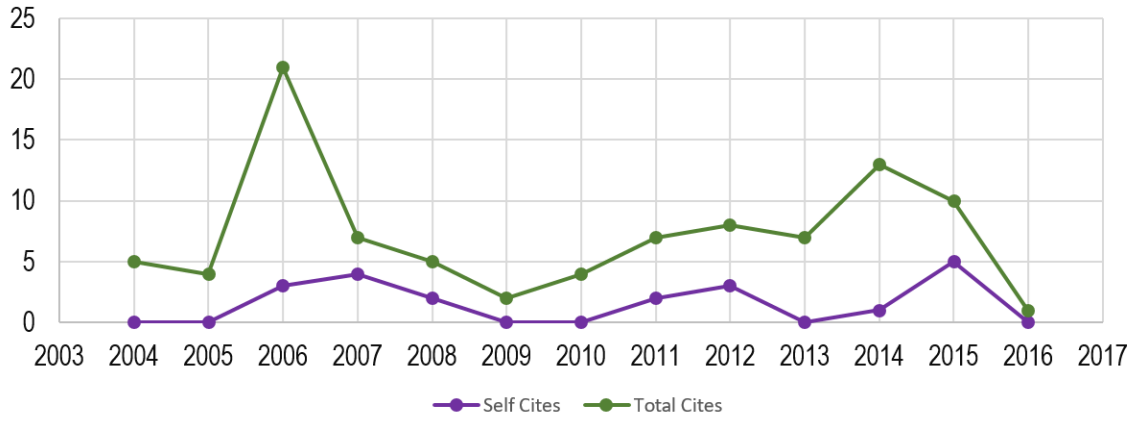

Figure 4. Total citations and self-citations received by the *EDGJ*.

The total citations per *EDGJ* document and external citations per document (self-citations subtracted from the total) for *EDGJ* documents published during the previous three-year period

is presented in Figure 6. Notably, the total number of citations per *EDGJ* document and external citations per document began to decrease in 2014 following years of having risen since 2009

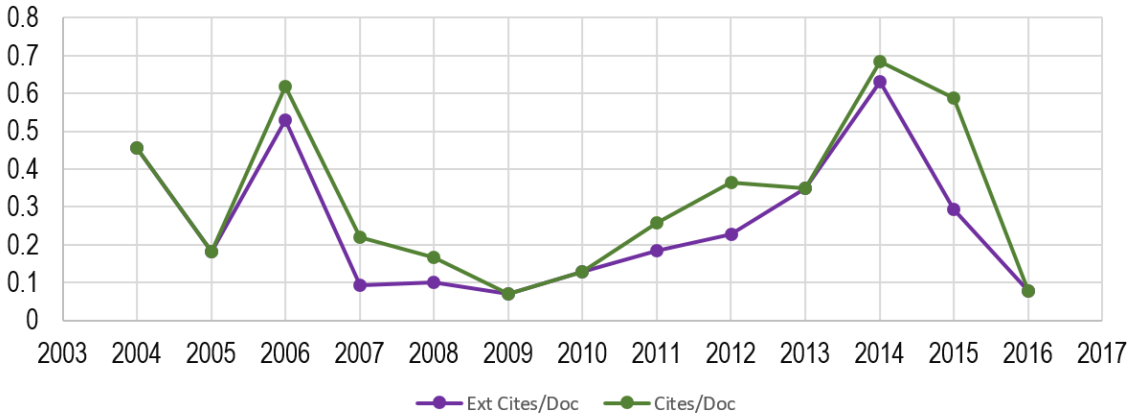

Figure 5. Total citations received per *EDGJ* document verses external cites per document.

With the citations per document metric, the number of citations received by *EDGJ* documents is divided by the total number of documents published. The average number of times *EDGJ* documents published in the past two, three, and four years have been cited in the current year appear in Figure 6. Notably, the number of citations received by *EDGJ* documents began to decrease in 2014 following years of having risen since 2008/9.

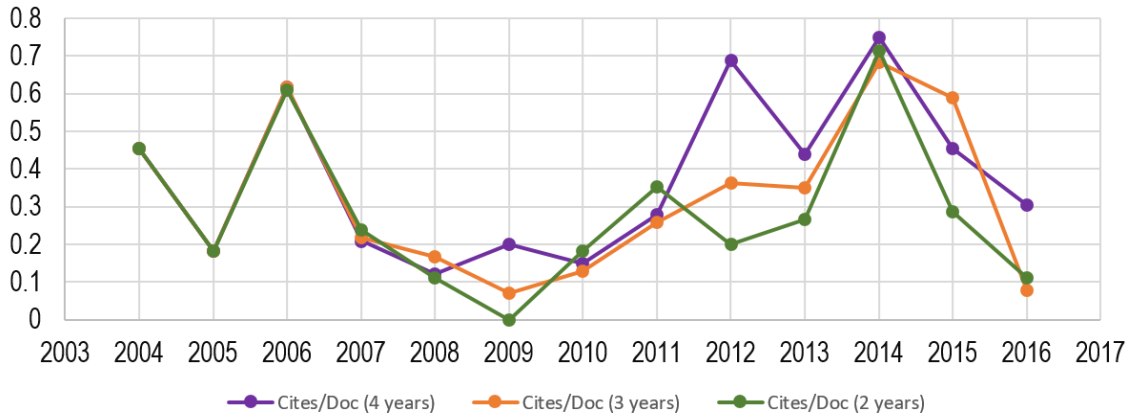

Figure 6. Citations per Document—2 years, 3 years, and 4 years.

The proportion (%) of international collaborations with authors from several countries is presented in Figure 7. Specifically, it depicts the proportion of documents in which the by-line includes authors from more than one country.

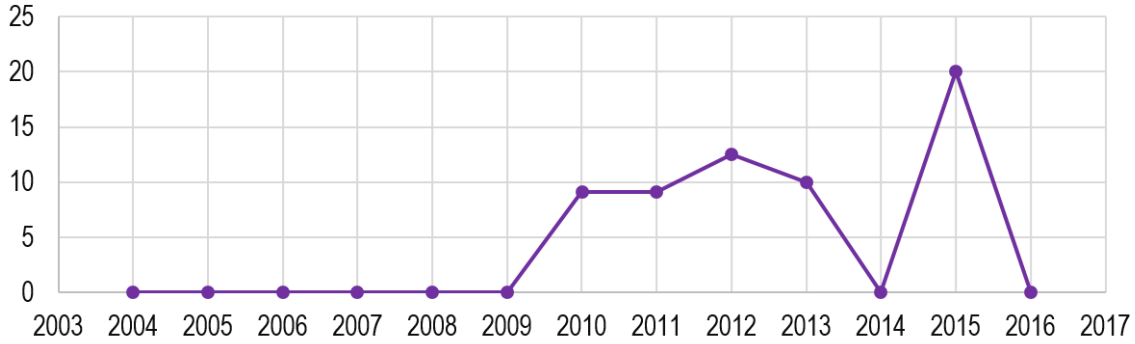

Figure 7. Proportion of international collaborations on *EDGJ* articles.

The number of primary research documents, therefore citable (ie research articles, conference papers, and reviews) published by the *Journal* in a three-year period is depicted in Figure 8 along with the number of non-citable documents published. Notably, the number of primary research documents published by the *Journal* after 2010 began to decrease and the number of non-citable documents published by the *Journal* began to creep up. By 2014 the citable and non-citable lines converged.

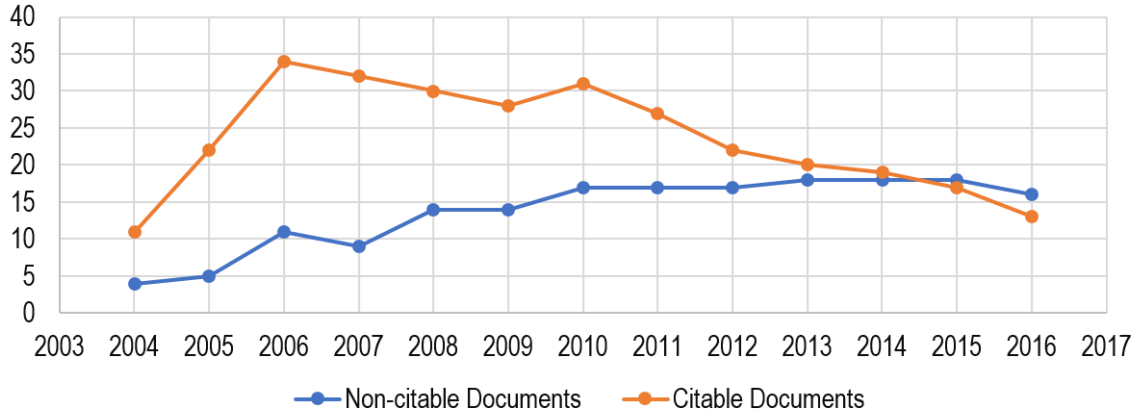

Figure 8. Citable documents and non-citable documents published in the *EDGJ*.

The number of *EDGJ* documents, grouped in three-year windows, that have been cited at least once in the following year and those not cited is depicted in Figure 9. Notably, the trend in the Journal's documents that have been cited at least once the following year began to decrease uniformly after 2010, after having risen annual in the preceding years.

Discussion

Scimago's prestige ranking (SJR) is a result of an iterative process based on the transfer of prestige from one journal to another, using current year citations to the source documents published in that journal during the previous years. From 2004 through 2016, with respect to prestige, the *EDGJ* languished between the third and fourth quartiles among their peer education journals. During the same period, the *Journal* bounced between the second and fourth quartiles among their engineering (miscellaneous) journals. Moreover, its prestige ranking has dropped

since 2014. However, we are cautioned too that first quartile journals do not always have the highest impact [10].

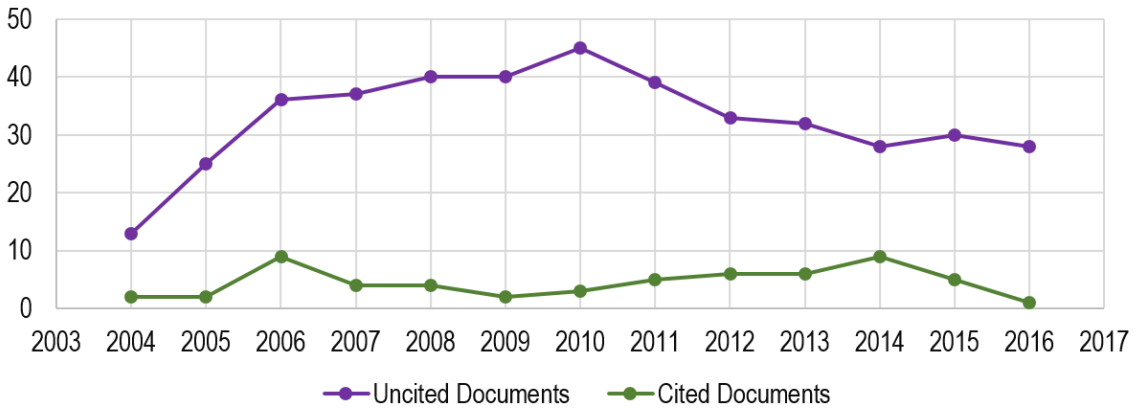

Figure 9. Cited and uncited *EDGJ* documents published grouped in three-year windows.

Data exists: mined and analyzed, the results can serve as a catalyst to help improve the *Journal's* effect: what it brings about, what it produces, and what it accomplishes. Yes, selected Scimago Lab metrics can be 'gamed', and many are at the mercy of other researchers and authors. Nevertheless, the *Journal's* staff, researchers, and authors can exercise greater due diligence to ensure their research and other creative activities can be used to extrapolate broader implications. As an example, the *Journal's* staff should ensure researchers and authors are building on the works published by the *Journal* as the *Journal* continues to disseminate new findings. The statistics produced for presentation by Scimago Lab, once validated by the *Journal's* staff, can be used to make improvements in the performance of the *Journal* and thus elevate its measures of prestige: statistics such as those associated with citable verses non-citable documents published by the *Journal*—see Figure 8, or the numbers of cited and uncited *EDGJ* documents published—see Figure 9.

With respect to Web of Science's Journal Impact Factor, frequently referred to as JIF or IF, researchers, authors, and administrators need to become more literate with the vocabulary and the various measures of journal effect. Like most academic libraries, the University of Michigan [11] and Penn State University [12] publish guides that put into lay terms the various measures of journal effect.

This examination was limited to data collected, analyzed, and presented by Scimago Lab. Consequently, it offers a limited perspective on the effect of the *EDGJ*. Future studies should include an examination of results produced by other like service providers and comparative analyses of the results from other like services providers.

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