

## **The Scientific Influence of the Journal of Engineering Technology**

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## The Scientific Influence of the *Journal of Engineering Technology*

First published in 1984 [1], the *Journal of Engineering Technology (JET)* publishes papers on current subjects in engineering technology and considers papers that relate to industrial technique, rather than analysis, and engineering education papers that focus on content, rather than methodology [2]. It is suggested too that the following subjects meet the aforementioned criteria: accreditation, active learning, applied research, assessment, capstone projects, classroom activities, curriculum design, distance learning, industry partners, innovative pedagogy, laboratories, non-technical skills, and other topics related to engineering technology practice and education.

Using data contained in the Scopus database (Elsevier B.V.) and analyzed by SCImago (aka Scimago), selected metrics were examined that characterize the *Journal of Engineering Technology*. A research group from the Consejo Superior de Investigaciones Científicas (CSIC), University of Granada, Extremadura, Carlos III (Madrid) and Alcalá de Henares, SCImago uses the Google PageRank algorithm [3] to analyze journal data, among its other purposes.

The intent of this examination was to provide researchers, authors, and the *Journal's* staff with a sense for what could be done to improve the performance of the *Journal* and thus its scientific influence. Because the data are normalized to account for differences between the disciplines, the data can be used to make comparisons among peer journals. The metrics used to characterize the *Journal* included the following:

- its standing with respect to peer journals—prestige;
- its average prestige per article;
- the relationship between the total number of citations and journal's self-citations;
- the relationship between the number of total citations per document and external citations per document less self-citations;
- the ratio of a journal's articles including substantial research in three-year windows verses those documents other than research articles, reviews and conference papers;
- the relationship between 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;
- the ratio of the journal's documents authored by researchers from more than one country; and
- the ratio of a journal's items, grouped in three years windows, that have been cited at least once verses those not cited during the following year [4].

The Scimago Journal Rank (SJR)<sup>1</sup> indicator, is a size-independent prestige indicator that ranks journals by their 'average prestige per article'. It is based on the idea that 'all citations are not created equal'.

Prestige ranks are a result of an iterative process based on the transfer of prestige from a journal to another using current year citations to the source items published in that journal during the previous three years. This contrasts with Clarivate Analytics' oft-cited Journal Impact Factor (IF), which is a measure of average citations per document.

## Method

While Scimago analyzes data on over 34,000 journals, attempts to explain and to make comparisons should at least be limited to peer journals. Narrowing the population was accomplished through the Scimago Journal & Country Rank portal. At the portal, Journal Rankings was selected, and for *JET*, a search is conducted using the following descriptors: Journal of Engineering Technology American Society for Engineering Education. The search yielded a specific product: a link to Scimago's *Journal of Engineering Technology* landing page, which when clicked, takes the user to *JET* landing page—see Figure 1. Data in the landing page helps to broaden the search to peer journals. For this examination, Engineering was selected for the subject area and Engineering (miscellaneous), for the Category. For All regions/countries, United States; types, Journals; and for the year 2017. This narrowed the population to 115 engineering > engineering (miscellaneous) > United States > journals published through 2017. An excerpt of the result, which includes *JET* appears in Figure 2. An examination of results for other years is achieved by selecting the respective years.



Figure 1. *JET* landing page contained in the Scimago Journal Rankings site [4].

On Jan. 12, 2019, historical data that characterize *JET* were downloaded from the *Journal's* landing page [4] and spreadsheets populated.

## Results

While the *Journal* was first published in 1984, coverage by Scimago's Journal Rankings was limited to issues of *JET* published in 1985, 1989-1991, 1996-2012, 2016-ongoing—see Figure 1. Moreover, users are cautioned that Scimago analysis of all journal data is limited to issues

published in 1999 and later. This was not always apparent; frequently, and depending on what was being analyzed, analysis was conducted using several years of data and the findings were reported in a given year, even though there may not be data available that year. As an example, with citations per document, or 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 are reported, while there may not have been coverage in a given year, results will still be reported in years in which there may not have been coverage. Conversely, the proportion (%) of international collaboration is reported on an annual basis. If there are no data, it will be reflected in any graphical product as zero.

Of the 115 engineering > engineering (miscellaneous) > United States > journals > 2017, 73 published a sufficient number of documents to be ranked. Figure 2 summarizes *JET*'s standing among four of its 115 peer journals in 2017. According to Scimago's Journal Rankings:

- The *Journal's* SJR, or its size independent prestige indicator, was 0.111, which places it in the 4<sup>th</sup> quartile among its 73 peers or 67<sup>th</sup> among its 115 peers.
- *JET*'s scientific productivity and the citation impact (H index) is 8, which places it 60<sup>th</sup> among its 115 peers.
- *JET* published 11 documents in 2017 (Total Docs—2017)
- *JET* published 18 documents in the most recent 3 years (Total Docs—3 years.).
- One-hundred sixty bibliographical references (Total Refs.) were found in *JET* during this period.
- *JET* was cited 3 times (Total Cites—3 years).
- Seventeen citable documents were published by *JET* in the three previous years (Citable Docs—3 years).
- An average of 0.18 citations per document appeared in a 2-year period (Cites/Doc—2 years). Cites/Doc—2 years is computed considering the number of citations received by a journal in the current year to the documents published in the two previous years.
- The average number of references per document was 14.55 (Ref/Doc).

From Scimago's landing page for *JET*, a sense for where *JET* has been ranked relative to its peers in the past and its performance on selected metrics can be examined.

Sets of journals are ranked according to their SJR and divided into four equal groups: four quartiles. From 1999 through 2017, with respect to overall prestige, *JET* was ranked between the second and fourth quartiles among their peers in engineering (miscellaneous)—the fourth, exclusively the last 7 years—see Figure 3.






Rank	Title	Type	SJR	H Index	Total Docs. (2017)	Total Docs. (3years)	Total Refs.	Total Cites (3years)	Citable Docs. (3years)	Cites / Doc. (2years)	Ref. / Doc.
65	International Journal of Science, Mathematics and Technology Learning	journal	0.113 	1	6	48	223	2	48	0.00	37.17
66	Technology Review	journal	0.112 	15	229	541	312	33	214	0.15	1.36
67	Journal of Engineering Technology	journal	0.111 	8	11	18	160	3	17	0.18	14.55
68	Johns Hopkins APL Technical Digest (Applied Physics Laboratory)	journal	0.110 	27	18	38	149	13	38	0.38	8.28
69	Resource: Engineering and Technology for Sustainable World	journal	0.105 	7	33	93	0	5	93	0.07	0.00

Figure 2. *JET's* standing relative to four other peer engineering (miscellaneous) journals [5].

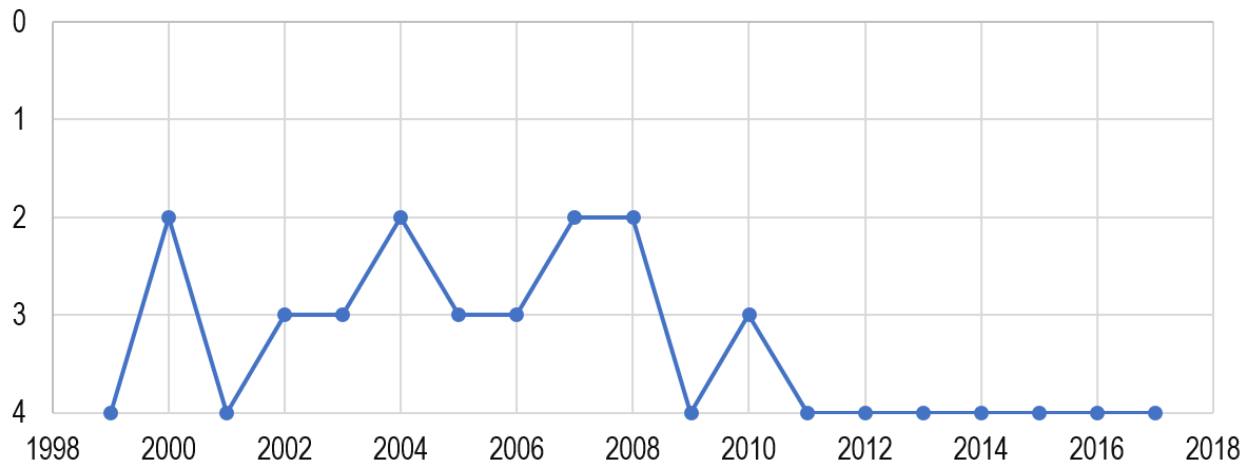


Figure 3. Quartiles in which *JET* were ranked as an Engineering (miscellaneous) journal.

As of Jan. 12, 2019, the SJR (average prestige per article metric) for *JET* was 0.111 ranking it 67<sup>th</sup> among the 115 US published engineering (miscellaneous) journals based on impact factors (not to be confused with Clarivate Analytics' oft-cited Journal Impact Factor or IF)—see Figure 4. Added to the graph are the 2017 thresholds for the respective quartile cutoffs for purposes of making comparison among its 115 peer journals. The thresholds do change annually based on the journals' performance.

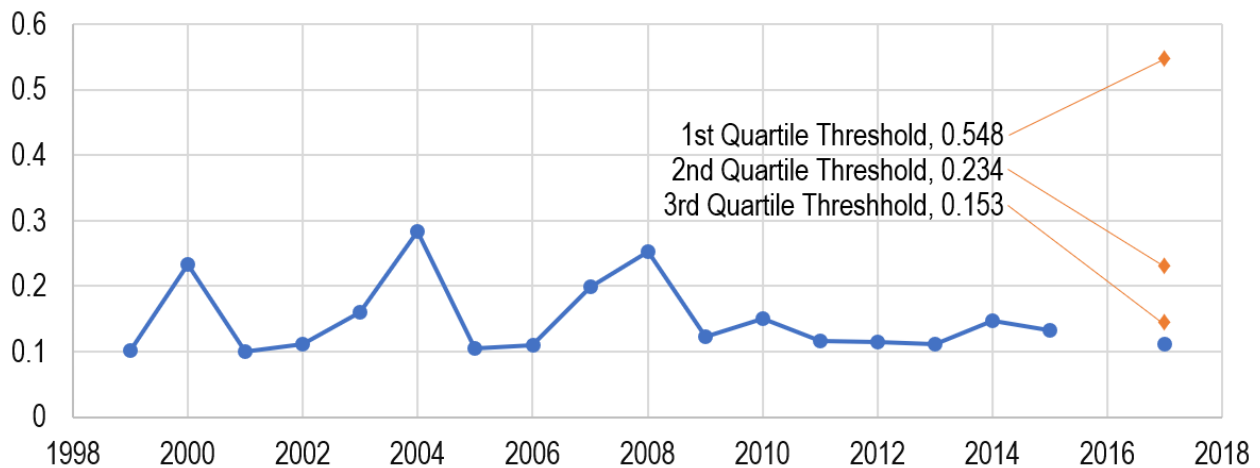


Figure 4. Annual size-independent prestige indicator—SJR.

The total number of citations and *JET* self-citations received by the *Journal's* published documents during the three previous years are presented in Figure 5. Self-citation is defined as the number of citations from *JET* citing documents to documents published by the *Journal*.

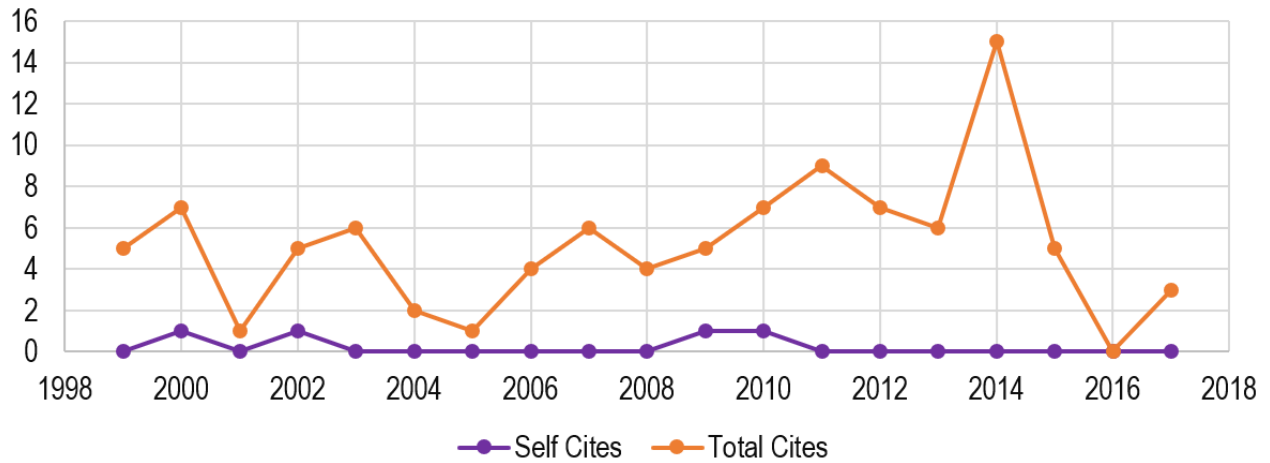


Figure 5. Total citations and self-citations received by *JET*.

The total citations per *JET* document and external citations per document (self-citations subtracted from the total) for *JET* documents published during the previous three-year period is presented in Figure 6.

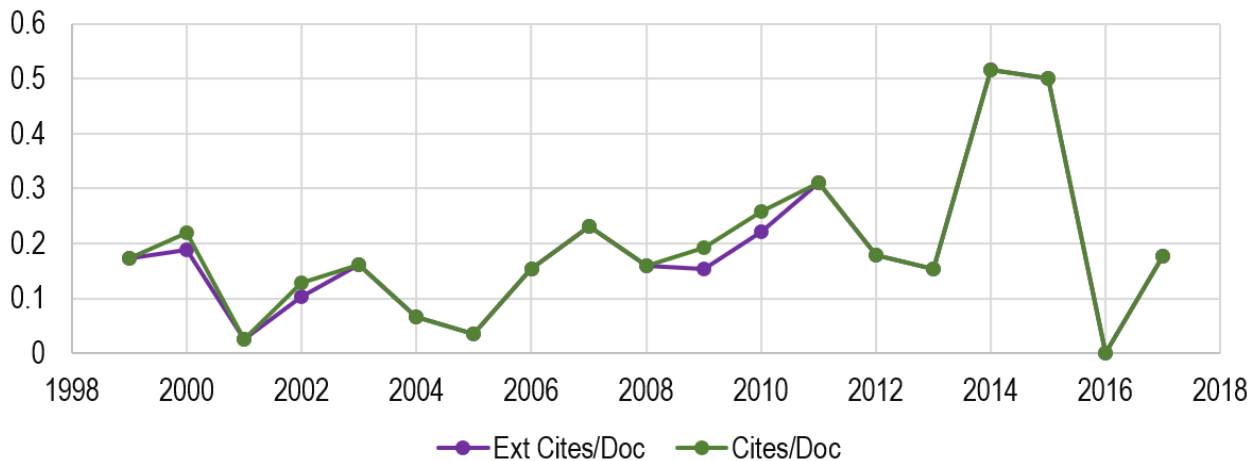


Figure 6. Total citations received per *JET* document versus external cites per document.

With the citations per document metric, the number of citations received by *JET* documents is divided by the total number of documents published. The average number of times *JET* documents published in the past two, three, and four years have been cited in the current year appear in Figure 7.

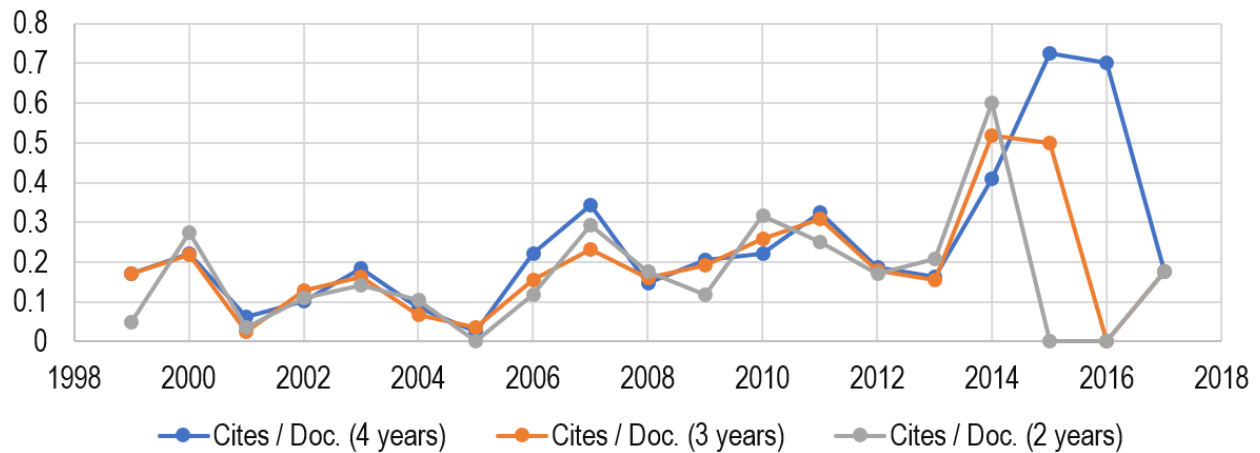


Figure 7. Citations per Document—2 years, 3 years, and 4 years.

The proportion (%) of international collaborations with authors from several countries is presented in Figure 8. Specifically, it depicts the proportion of documents in which the by-line includes authors from more than one country.

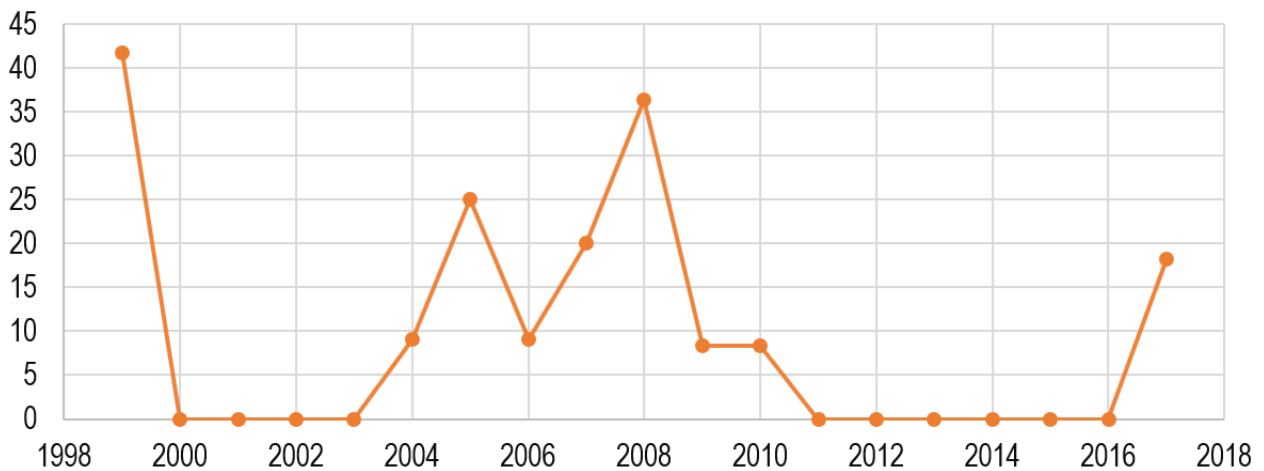


Figure 8. Proportion of international collaborations on *JET* articles.

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 9 along with the number of non-citable documents published.



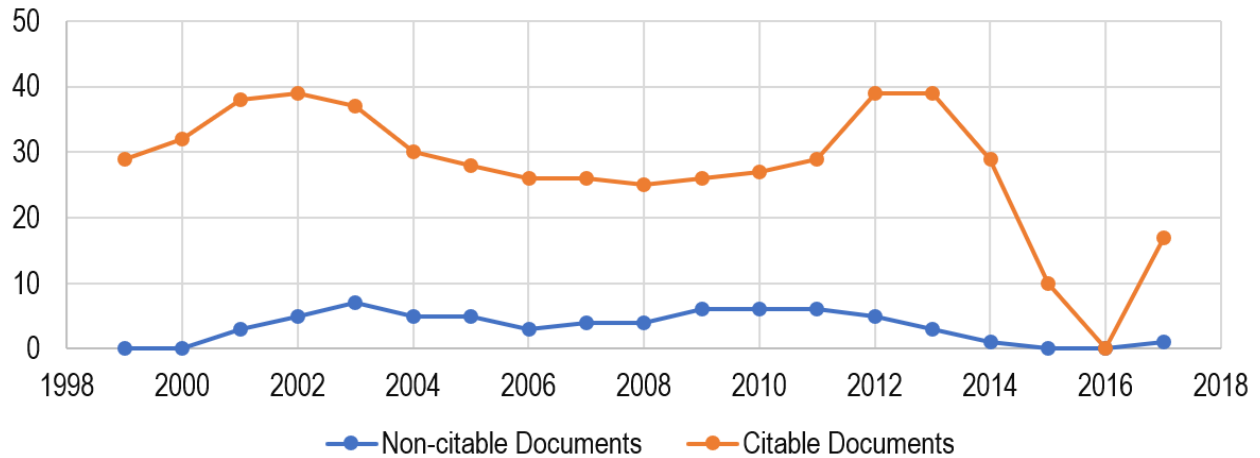


Figure 9. Citable documents and non-citable documents published in *JET*.

The number of *JET* 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 10. Notably, the trend in the Journal’s documents that have been cited at least once the following year began to decrease uniformly after 2012, after having remain constant the preceding years.

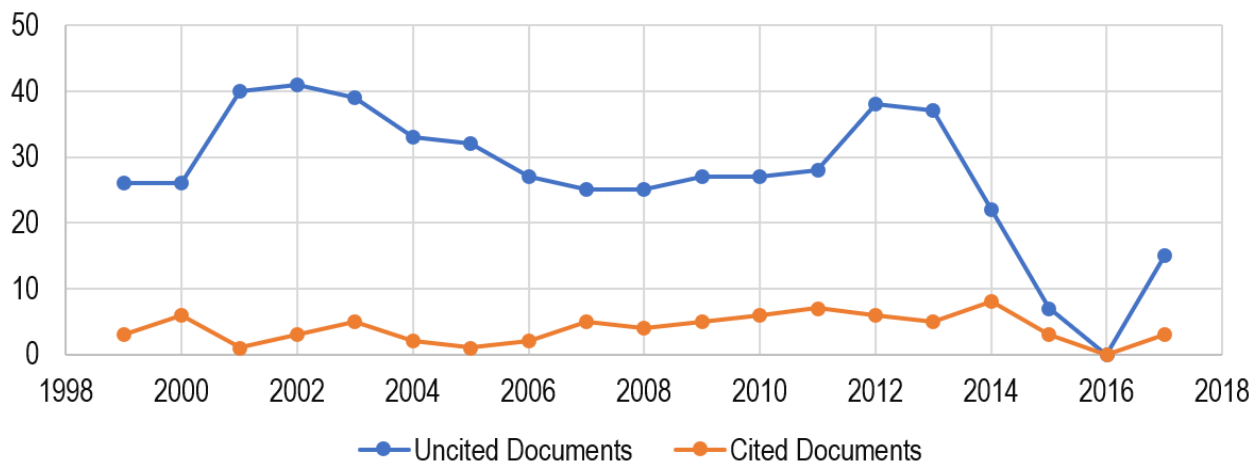


Figure 10. Cited and uncited *JET* documents published grouped in three-year windows.

## Discussion

Scimago’s prestige ranking (SJR)—its measure of scientific influence—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 1999 through 2017, with respect to prestige, *JET* has been ranked between the second and fourth quartiles among their peer engineering (miscellaneous) journals. Moreover, its prestige ranking has place it in the fourth quartile among peer engineering (miscellaneous) journals since 2011. However, we are cautioned too that first quartile journals do not always have the highest impact [7].

As well, it should be noted that it appears six issues of *JET* data (2013-2015) may not have been included in the analysis of *JET* (see Figure 1). And while there is a total of 18 documents attributed to *JET* in 2016, much of the remaining data characterizing the *Journal* are missing because of missing data on issues published in 2013 through 2015.

Nevertheless, 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 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 *JET* continues to disseminate new findings. Figure 5 might suggest that *JET* authors and researcher are not publishing results that build on previous findings. The *Journal's* staff should encourage greater international collaboration, thus perhaps broadening interest in engineering technology.

The statistics produced for presentation by Scimago, once validated by the *Journal's* staff, can be used to make improvements in the performance of the *Journal* and thus elevating its measures of prestige: statistics such as those associated with citable versus non-citable documents published by the *Journal*—see Figure 7, or the numbers of cited and uncited *JET* documents published—see Figure 8. Scimago's statistics need to be validated. The *Journal's* staff should consider ensuring data for what seem to be missing issues of *JET* are included in Scimago's analysis.

Authors should ensure they build on the work disseminated by *JET* as they disseminate their research findings in other publications. While the number of non-citable documents published by the *Journal* remains constant—see Figure 9, the number of primary research documents published by the *Journal* after 2013 began to decrease. *JET* should be asking why.

With respect to 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 [8] and Penn State University [9] 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 *JET*. 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.

## References

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## Footnotes

<sup>1</sup>A description of the Scimago Journal Rank (SJR) and the calculations of a journal’s final prestige, which is based on the transfer of prestige from a journal to another, can be found at <https://www.scimagojr.com/SCImagoJournalRank.pdf>.