An Analysis of Engineering Design Graphics Journal Articles - Volumes 67-78

Cole Berglind
Genesis Systems Group

Kevin Devine
Department of Technology
Illinois State University

Abstract

An analysis of articles published in the Engineering Design Graphics Journal (EDGJ) from 2003 - 2014 was conducted following the methodology used by Robert Chin in his 2003 study of articles published in the EDGJ from 1987 - 2002. Both studies look at feature-articles published in the EDGJ that were later indexed by ERIC (Educational Resources Information Center). ERIC provided abstract data that was compiled into a spreadsheet, which was then sorted and analyzed. The data collected from ERIC was also verified using the archives on the EDGJ website. The similar nature and analysis of the data gathered in the two studies allows direct comparisons to be made between the results of the studies.

Overview

The Engineering Design Graphics Journal (EDGJ) is a publication of the Engineering Design Graphics Division (EDGD) of the American Society for Engineering Education (ASEE). A core objective of the EDGD is to promote teaching, research, discussion, and communication of engineering design graphics (EDGD, 2015). The purpose of this study was to document the nature of the work published in the EDGJ to help identify publication patterns in the EDGJ. Data from this study can help guide authors who contribute to the EDGJ because trends in publication topics is a reflection of the evolving research interests of the EDGD membership.

The methodology used in this study was chosen to closely match that of Robert Chin's (2003) analysis of the EDGJ. Chin's study investigated articles that were indexed in the Educational Resources Information Center (ERIC) database and were published in EDGJ volumes 51-66 (1987-2002), a 15 year timespan. The current study focused on articles published in EDGJ volumes 67-78 (2003-2014), an 11 year timespan.

ERIC is an online database that catalogs over one million education related articles. They collect from thousands of journals and other sources. Articles submitted to ERIC must fulfill many requirements in order to be indexed. "All documents under consideration are evaluated by ERIC's

subject experts for their quality. That is, they are evaluated for their contribution to knowledge, significance, relevance, newness, innovativeness, effectiveness of presentation, thoroughness of reporting, relation to current priorities, timeliness, authority of source, intended audience, and comprehensiveness. Thus, feature articles published in the EDGJ and indexed later by ERIC are scrutinized twice" (Chin, 2003, p. 7). One of the original goals of ERIC was to provide pertinent information to the field of education research through accessibility (ERIC, 2014). An assessment of the EDGJ through ERIC is a metric to illustrate the journal's direction.

Methodology

On April, 1st 2015, a search was conducted on ERIC for EDGJ articles that have been indexed in volumes 67-78. Information about each ERIC-indexed article was entered into a spreadsheet making note of the author, title and subject headings. Additional information was then obtained from the EDGJ website. The Data were then organized and counted in such a way that summary tables could be compared, and in some cases combined, with the data published in Chin's 2003 study. This methodology was chosen because it will provide consistent measuring of the EDGJ from 1987 to 2014. The authors and subject headings were measured by frequency. The volumes and issues were used to compare how many articles were indexed in each EDGJ issue and volume.

A key difference between Dr. Chin's study and this one is caused by a change in ERIC's use of clearinghouses. Prior to January, 2004, ERIC used sixteen different clearinghouses to assist with indexing articles. In 2004, ERIC consolidated into a single clearinghouse entity. Expiration in contract with the individual clearinghouses and a slow bureaucratic system resulted in no submissions to ERIC entirely in 2004, and no submission from the EDGJ occurred in both 2004 and 2005 (Corby, 2009). Despite the absence of ERIC indexed articles in 2004 and 2005, the available ERIC data still gives a representation of key ideas discussed among contributors of the EDGJ.

Another key difference is ERIC's current use of the Subject Heading, which is a combination of ERIC's Major Descriptors and Minor Descriptors used in Dr. Chin's study. In this study a direct comparison was made between for the former Major Descriptors and the current Subject Heading used by ERIC.

Results

From 2003 to 2014, 98 articles were published by the EDGJ. The number of articles published per issue ranged from 8 (V76 n3 – a special edition of 67th midyear papers) to 1 (in 9 issues). The average number of articles published per issue was 2.7; the standard deviation was 1.4. In comparison, the average number of articles published in each issue between 1987 and 2002 was 4.2 and the standard deviation was 1.2. Table 1 presents a comparison of the statistics between the

current study and Chin's 2003 study. Figure 1 illustrates graphically the number of articles published in each volume of the EDGJ from 1988 (Volume 52) to 2014 (Volume 78). Each volume typically contains three issues. Although several volumes are omitted from Figure 1 (several issues were unavailable to the researchers or were special issues that skewed the data), the downward trend in articles published in the EDGJ is readily apparent.

Table 1 Articles per EDGJ Issue

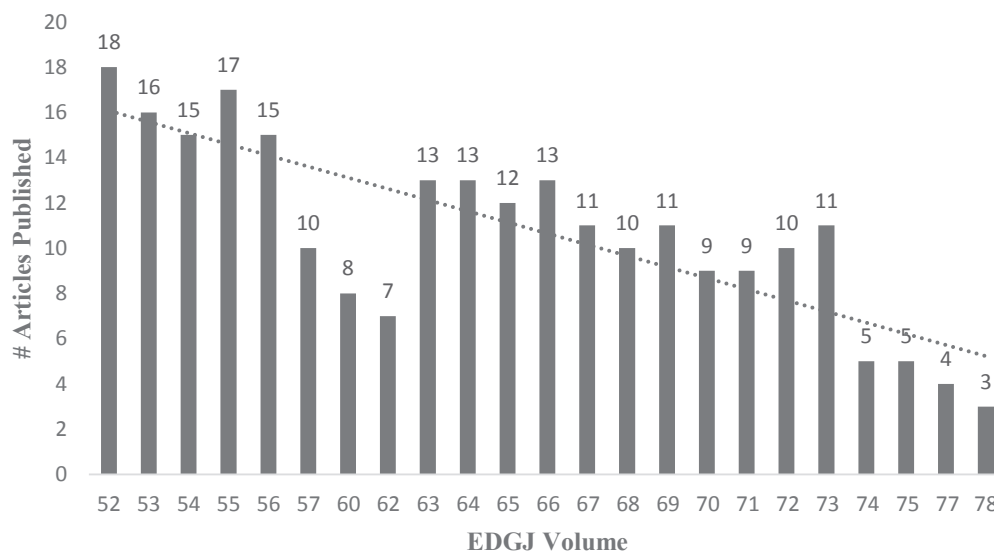|	Average # Articles per Issue	Standard Deviation
Current Study Vols. 67-78 (2003-2014)	2.7	1.4
Chin Study Vols. 51-66 (1987-2002)	4.2	1.2

Figure 1 Articles per EDGJ Volume from 1988-2014

Of the 98 articles published by the EDGJ between 2003 and 2014, 68% (N-67) were indexed by ERIC. By EDGJ volume, the proportion of articles indexed ranged from 0% (during the aforementioned ERIC clearinghouse changeover) to 100%. Table 2 summarizes the distribution of ERIC-indexed articles by volume. Between 2003 and 2014, the EDGJ published 296 articles, of which 147 (50%) were indexed by ERIC.

Table 2 Percent of EDGJ Articles Indexed by ERIC

Current Study	Vol.	67	68	69	70	71	72	73	74	75	76	77	78				Total
	% Indexed	45	0	0	100	100	70	100	100	100	100	75	100				68%
Chin Study	Vol.	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	Total
	% Indexed	80	27	0	80	76	70	0	0	30	25	13	86	62	38	75	31	40%

When ERIC indexes articles a variety of fields are populated in their database including items such as author, journal citation, and subject headings. As previously discussed, when Dr. Chin completed his study in 2003, ERIC listed Major Descriptors and Minor Descriptors for the articles they indexed. Today ERIC lists a single Subject Heading. Table 3 presents a direct comparison between the most frequently used Major Descriptors from Chin's study and the most frequently used Subject Headings found in the current study. While the list has changed modestly over the years, many of the key topics discussed among the EDGJ authors are consistent. Engineering Education, Computer Aided Design, Spatial Ability, Visualization, Computer Graphics, and Computer Software are the most frequently used subject descriptors for the EDGJ ERIC-indexed articles in both studies. Engineering Education remains the most frequently used descriptor among the indexed articles. This is not surprising since ERIC is a database for educators, and the EDGD is a community of educators.

Table 3 Frequency of Subject Headings

Current Study (2003-2014)		Chin Study (1987-2002)	
ERIC Subject Heading	**N**	**ERIC Major Descriptors**	**N**
Engineering Education	44	Engineering Education	44
Computer Assisted Design	28	Engineering Graphics	37
Engineering	25	College Science	31
Drafting	22	Computer Graphics	27
Spatial Ability	22	Computer Aided Design	23
Models	19	Visualization	19
Visualization	19	Computer use in Education	13
Computer Graphics	17	Computer Software	13
Computer Software	16	Spatial ability	11
Teaching Methods	13	Design	10

Of the 98 articles published by the EDGJ between 2003 and 2014 that were later indexed by ERIC, 26 were written by individual authors. Table 4 lists five authors who contributed more than 1 article individually. Of the same 98 articles, 9 different authors were the first-author of 2 or

more jointly-written articles (refer to Table 5). Table 6 lists 16 second and subsequent authors who published 2 or more articles in the EDGJ that were later indexed by ERIC.

Table 4 Individual Authors

Author	# Articles
Devine, Kevin	2
Ding, Suining	2
Kellie, Andrew C	2
Mohler, James L	2
Yue, Jianping	2

Table 5 First Authors in a Group

Current Study (2003-2014)		Chin Study (1987-2002)	
First Author	**# Articles**	**First Author**	**# Articles**
Branoff, Theodore J	3	Barr, R. E.	3
Ernst, Jeremy V	3	Branoff, T. J.	3
Ault, Holly K	2	Clark, A. C.	3
Chandramouli, Magesh	2	Leach, J. A.	3
Clark, Aaron C	2	Sorby, S. A.	3
Harris, La Verne Abe	2	Weibe, E. N.	3
Kinsey, Brad L	2	Ault, H. K.	2
Lane, Diarmaid	2	Bertoline, G. R.	2
Veurink, N	2	Connolly, P. E.	2
		Khonsari, M. M.	2
		McCuiston, P, J.	2
		Rodriquez-Ramos, W. E.	2
		Ross, W. A.	2
		Wiley, S. E.	2

Table 6 Second and Subsequent Authors in a Group

Current Study (2003-2014)		Chin Study (1987-2002)	
2nd and Subsequent Author	**# Articles**	**2nd and Subsequent Author**	**# Articles**
Hartman, Nathan W	3	Scales, A. Y.	3
Bertoline, Gary R	2	Barr, R. E.	2
Birchman, Judy A	2	Horn, H.	2
Blasko, Dawn G	2	Jenison, R. D.	2
Clark, Aaron C	2	Juricic, D.	2
Harris, La Verne Abe	2	Krueger, T. J.	2
Holliday-Darr, Kathryn	2	Sadowski, M. A.	2
Miller, Craig L	2		
Mohler, James L	2		
Onyancha, Richard M	2		
Sadowski, M A	2		
Scales, Alice Y	2		
Seery, Niall	2		
Sorby, S A	2		
Towle, Erick	2		
Wiebe, Eric N	2		

Conclusion

Following the methodology used by Chin (2003), the authors conducted a literature search of the ERIC-indexed articles published by the EDGJ from 2003-2014 (volumes 67-78). A search of the EDGJ website was also conducted to gather additional information about EDGJ publication records. The gathered data were entered into a spreadsheet and analyzed. Descriptive data tables were prepared to match those presented by Dr. Chin, thus allowing direct comparisons to be made between the two studies. Several observations can be made by comparing the data from the two studies.

- EDGJ articles published between 2003 and 2014 are indexed by ERIC with greater frequency than those published between 1987 and 2002. The greater indexing frequency is likely due to changes in ERIC indexing procedures.

- The number of articles published in each volume of the EDGJ between 1987 and 2014 is trending downward.

- Based on the frequency of study headings listed by ERIC, the common topics of the articles published in the EDGJ has remained consistent between 1987 and 2002.

References

Chin, R. A. (2003). An Analysis of Engineering Design graphics Journal Articles. Engineering Design Graphics Journal, 68(2), 6-13.

Corby, K. (2009). When is ERIC Useful? A Background and Current Overview of the Education Resource Information Center. The Reference Librarian, 50, 137-149. Doi 10.1080/02763870902755890

EDGD (2015). Retrieved from http://edgd.asee.org/.

ERIC. (2014). 50 Years of ERIC. Retrieved from http://eric.ed.gov/pdf/ERIC_Retrospective.pdf