Journal of Agricultural Education, 55(5), 78-92.
doi: 10.5032/jae.2014.05078

Use of Citations within Manuscripts Published by the Journal of Agricultural Education

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Abstract

Because publications serve as the institutional memory of a discipline, researchers have the responsibility of becoming familiar with and acknowledging previous literature. The use of citations in manuscripts is considered ethical best practice, and is a method of manuscript evaluation. In agricultural education, researchers have recommended that an evaluation of manuscript citations be conducted every ten years in order to ensure the integrity of the profession's research repository. This study served as a descriptive evaluation of the use of citations in the Journal of Agricultural Education *from 2003 to 2012. Findings indicated that the average number of citations used, the number of citations to support the conceptual framework, the number of citations from within and outside the profession, and the number of citations used to support findings increased over the 10-year time span.*

Keywords: citations; Journal of Agricultural Education; manuscript

Because publications serve as the institutional memory of a discipline, researchers have the responsibility of becoming familiar with previous literature in order to ensure that studies avoid repetition, build on existing work, and address gaps in knowledge (American Psychological Association, 2010). It is the responsibility of the profession to ensure that its "repository of accumulated knowledge" (American Psychological Association, 2010, p. 9) is of quality, which is typically achieved through the use of a peer-review process (Seglen, 1997). Reviewers consider, among other aspects, the study's validity, relevance, and impact to the profession, which the author is expected to establish through the use of supporting literature. Technological developments in the past several decades have caused "substantial changes" in researchers' access to technical and scholarly literature (Kurtz, et al., 2005, p. 1395). As access to previously published works has increased, so has the researcher's ability to reference the progression of research published within a particular field. However, while citation evaluation methods such as the *Science Citation Index* assume that researchers select citations based on quality (Garfield, 1961), practicing researchers have stated numerous other aspects that are considered during citation selection. Seglen (1997) noted numerous problems within researchers' selection of references that can compromise research quality, including: 1) poor knowledge of primary literature; 2) reference copying; 3) established

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knowledge is not cited; 4) self-citation; and 5) in-house citation (friends and close colleagues) (p. 1051).

The agricultural education profession has identified a need to share with others "sound research conducted within and across the human dimensions of the food and agricultural systems" (Doerfert, 2011, p. 6). In order to ensure that the profession's research is creating a valid repository of information to be used by future researchers in the justification of their research endeavors, the members of Agricultural Education should engage in an evaluation of the recorded use of citations in its library of manuscripts. Citations have been considered a frequently-used indicator of the behavior of researchers when conducting research because they "reflect on authors' debt to earlier works, constitute a statement as to which of these works are important, and are a means by which authors anchor their work and relate it to earlier research" (Goldman, 1979, 485). By examining authors' use of citations to establish a study's need, reference previous research, support the study's validity and reliability, and link the current study with the profession's repository of knowledge, researchers in Agricultural Education can identify areas of citation use improvement and both establish and further enhance the recognized quality of its institutional library.

Conceptual Framework

While there is no format for writing research papers that is universally accepted (McMillan & Schumacher, 2010), publishing authors within a profession format their works similarly based on trends and expectations within that profession. Typically, the introduction provides a historical background, establishing the need for the study that is being done, and for putting the study into context for the reader (McMillan & Schumacher, 2010). Webster and Watson (2002) stated,

> A review of prior, relevant literature is an essential feature of any academic project. An effective review creates a firm foundation for advancing knowledge. It facilitates theory development, closes areas where a plethora of research exists, and where research is needed. (xiii)

The conceptual and theoretical frameworks are then used to build a foundation of knowledge through history and to explain the phenomenon being investigated, respectively (Dyer, Haase-Wittler, & Washburn, 2003). Camp (2001) defined theory as "a set of interrelated constructs, definitions, and propositions that present a rational view of phenomena by explaining or predicting relationships" (p. 6). Ary, Jacobs, and Razavieh (1990) and Borg and Gall (1983), authors of two popular educational research textbooks, noted that research in education often takes an empirical as opposed to a theoretical orientation. Langley, Thieman, Martin, Kovar, and Kitchel (2011) indicated that agricultural educators typically use theory to "rationalize their line of inquiry" (p. 56) instead of using it to develop hypotheses for testing.

Camp (2001) further noted:

> A review of related literature does not provide an adequate theoretical framework for a study. To provide an adequate theoretical framework . . . , the literature must first establish at least one supportable premise and then generate one or more propositions that the researcher can postulate in the form of theoretical assumptions regarding the phenomena under study. Simply adding the heading 'Theoretical Framework' to a review of related literature does not actually make it a theoretical framework. Moreover, labeling an inadequate 'theoretical framework' as a 'conceptual framework' does not make it adequate. (p. 18)

The methods section of a manuscript informs the reader of the various procedures used to gather and interpret data and identifies the subjects or participants under study. The procedures identified in this section many times are included so that the study can be replicated by other researchers (McMillan & Schumacher, 2010). The results and conclusions portion of a research paper provides a summation of the data that were collected and then later explains how the results are related to the problem under study (McMillan & Schumacher, 2010). Based on the components

of research manuscripts, citations should be used throughout a manuscript to acknowledge the words, work, and ideas of others (American Psychological Association, 2010).

Researchers within the agricultural education profession routinely publish works in the *Journal of Agricultural Education,* "one of the primary outlets for disseminating agricultural education research" (Radhakrishna & Jackson, 1995). In the past, research in agricultural education has been lacking in direction and focus, as well as in its breadth and consistency, causing it to be considered inferior research in comparison to other research (Dyer et al., 2003; Edgar, Briers, & Rutherford, 2008). While research within agricultural education has rarely been a focal area of improvement (Edgar et al., 2008), members of the profession have expressed that research publication is valued in the tenure and promotion process at their institutions (Kotrlik, Bartlett, Higgins, & Williams, 2001).

Radhakrishna, Eaton, Conroy, and Jackson (1994) found that the number of citations per article in the *Journal of Agricultural Education* increased between 1981 and 1990, "indicating a greater breadth of knowledge and reading among agricultural educators" (p. 62). Also resulting from this study was the discovery that the majority of citations were from articles published in the *Journal of Agricultural Education,* which indicated a strong self-identity within the agricultural education profession. However, the variety of journals cited led the researchers to note that authors display diversity in their research and reading characteristics. Finally, the researchers recommended that an investigation into the profession's use of citations be replicated at least every ten years.

Lindner, Murphy, and Briers (2001) investigated *Journal of Agricultural Education* authors' use of citations to support decisions regarding the handling of nonresponse error, a foundational component that enables readers to gauge the validity of a study's results. They noted that from 1990-1999, almost 70% of articles failed to provide a citation, leaving nonresponse error procedures largely unaddressed.

The evaluation of manuscript citations can enable researchers to improve the quality of citations within their future manuscript submissions, thereby increasing the quality of the profession's research chronology. This study sought to describe citation trends within the *Journal of Agricultural Education* over a ten-year span in order to draw attention to a specific aspect of manuscript quality.

Purpose and Objectives

The purpose of this study was to describe trends in the citation of literature by authors in the *Journal of Agricultural Education* from 2003-2012. In order to achieve this purpose, the following objectives were developed:

1. Describe authors' number of unique citations used per article.
2. Describe authors' usage of citations to support theoretical and conceptual frameworks.
3. Describe the frequency with which authors cited literature from within the profession and from outside of the profession.
4. Describe the frequency with which authors cited literature to support the need for the study, methodological procedures, and to support findings.

Methods

This descriptive study examined a stratified random sample (n = 124 articles) of research articles published in the *Journal of Agricultural Education* from 2003 to 2012 (N = 520) in order to ensure equal representation from each of the years in question (Agresti & Finlay, 2009). This sample size was selected based on a 95% confidence interval and 10% or less precision level; while a higher level of precision is desirable, the importance of maintaining a balance between sampling error and measurement error caused by a labor-intensive data collection process led the researchers to accept a maximum sampling error of 10% rather than the more commonly used 5% (Dillman, Smyth, & Christian, 2009). Because each journal issue contains a different number of articles, a disproportional stratified random sample was conducted by first conducting a simple random sample to include one issue per year, and then including all articles from the randomly selected issues in the sample (Agresti & Finlay, 2009). Researchers accessed journal articles through the electronic publication site of the *Journal of Agricultural Education* and identified the number of unique citations per article. Researchers also identified the number of citations used to support each article's need for the study, theoretical framework, conceptual framework, methodological procedures, and findings. Finally, citations from within the profession and outside of the profession were identified. While the *Journal of Agricultural Education* currently includes "extension education, communications, leadership development, teacher education, and related areas that support the agricultural sciences" in its definition of the "agricultural education" profession, use of this broad definition began in 2009 (Radhakrishna, 2009, back cover). Journal issues published before 2009 included only extension and international agricultural education within its broader definition of "agricultural education" (Radhakrishna, 2008, back cover). Therefore, because this study included journal issues from before 2009, *within the profession* was operationally defined to include traditional areas of agricultural education but did not include agricultural leadership and communications. *Outside of the profession* was operationally defined to include agricultural communications, agricultural leadership, general communications, general education, general leadership, and miscellaneous areas. Citations were counted for the theoretical framework, conceptual framework, and methodological procedures and for classification within and outside of the profession for each occurrence. Thus, each citation of a unique reference at multiple places in the manuscript was counted.

Inter-rater consistency of the identification of citation areas was calculated based on ten articles, and found to be .974 using Pearson's correlation coefficient (Huck, 2008). Scatterplots, frequencies, percentages, means, standard deviations, and linear regression were used to describe the findings (Agresti & Finlay, 2009).

Findings

The 124 articles selected from 2003 - 2012 volumes of the *Journal of Agricultural Education* cited a mean of 30.25 (*SD* = 10.30) unique references (Table 1). Articles in the selected issue of 2012 had the greatest number of unique references (*M* = 37.07, *SD* = 10.88), while articles in the selected issue of 2003 contained the fewest unique references (*M* = 23.88, *SD* = 5.57).

Table 1

Total Mean Number of Unique References in the Journal of Agricultural Education *from 2003-2012*

Year	Number of Citations	
	M	*SD*
2003	23.88	5.57
2004	25.44	15.30
2005	28.40	13.43
2006	32.75	9.10
2007	25.73	6.66
2008	35.73	10.53
2009	30.18	10.09
2010	27.36	6.59
2011	31.71	6.39
2012	37.07	10.88
Total	30.25	10.30

Figure 1 displays the trend in the mean number of unique citations per article by year. Bivariate regression analysis indicated a significant regression coefficient, $b = 0.97$, $t(8) = 2.47$, $p = .0389$, indicating an increase of almost one additional unique citation per article per year. Year explained over 40% of the variance ($R^2 = .432$) in the number of unique citations per article over the 10 year period.

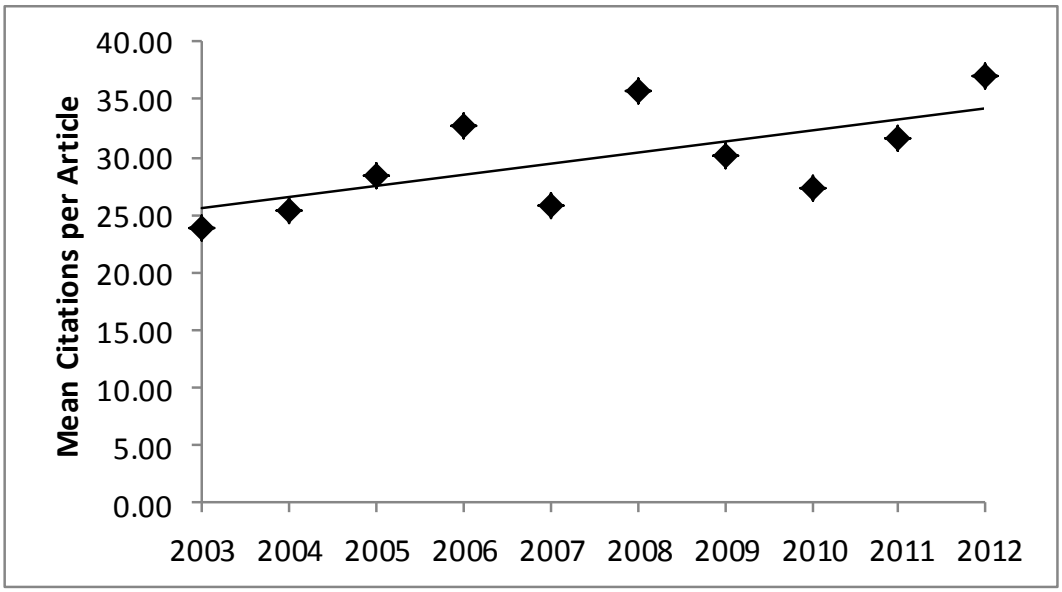

Figure 1. Trends in Mean Number of Unique Citations per Article from 2003-2012.

Objective 2 sought to describe authors' usage of citations to support theoretical frameworks and conceptual frameworks (Table 2). All issues' articles contained the greatest mean number of citations supporting the conceptual framework and the fewest mean number of citations supporting the theoretical frameworks. Overall, articles contained a mean number of 31.34 conceptual citations, and 8.31 theoretical citations.

Table 2

Number of Citations Used to Support Theoretical and Conceptual Frameworks in the Journal of Agricultural Education *from 2003-2012*

Year	Issue	Number of Articles	Number of Theoretical Citations		Number of Conceptual Citations	
			M	*SD*	*M*	*SD*
2003	2	8	10.38	6.28	23.13	11.72
2004	1	9	2.67	2.29	29.00	17.61
2005	3	11	5.60	5.04	36.10	19.94
2006	4	13	3.92	5.85	30.83	7.30
2007	3	12	4.27	4.10	32.27	15.56
2008	4	14	12.91	5.80	33.73	15.48
2009	1	12	8.09	7.25	26.45	11.95
2010	1	11	9.09	7.44	30.27	11.23
2011	1	17	10.29	16.77	36.00	10.96
2012	4	17	13.57	8.99	32.00	8.62
Total		124	8.31	8.89	31.34	13.18

Figure 2 displays the trend in the mean number of citations per article used to support conceptual and the theoretical frameworks over the 10 year period. Bivariate regression analysis resulted in a non-significant regression coefficients for the mean number of citations used to support conceptual frameworks, $b = 0.5337$, $t(8) = 1.23$, $p = 0.2546$. Likewise, the regression coefficient for the mean number of articles used to support theoretical frameworks was not significant, $b = 0.7316$, $t(8) = 2.01$, $p = 0.0797$. Thus, despite the appearance of a modest increase in both the mean number of conceptual and theoretical citations over the 10 year period, the slope of the regression line is not significantly different from zero. Further analyses of the data on the mean number of conceptual citations per article and the mean number of theoretical citations per article does confirm the visual impression that *JAE* authors use significantly more conceptual citations than theoretical citations per article, $t(18) = 12.98$, $p < .0001$.

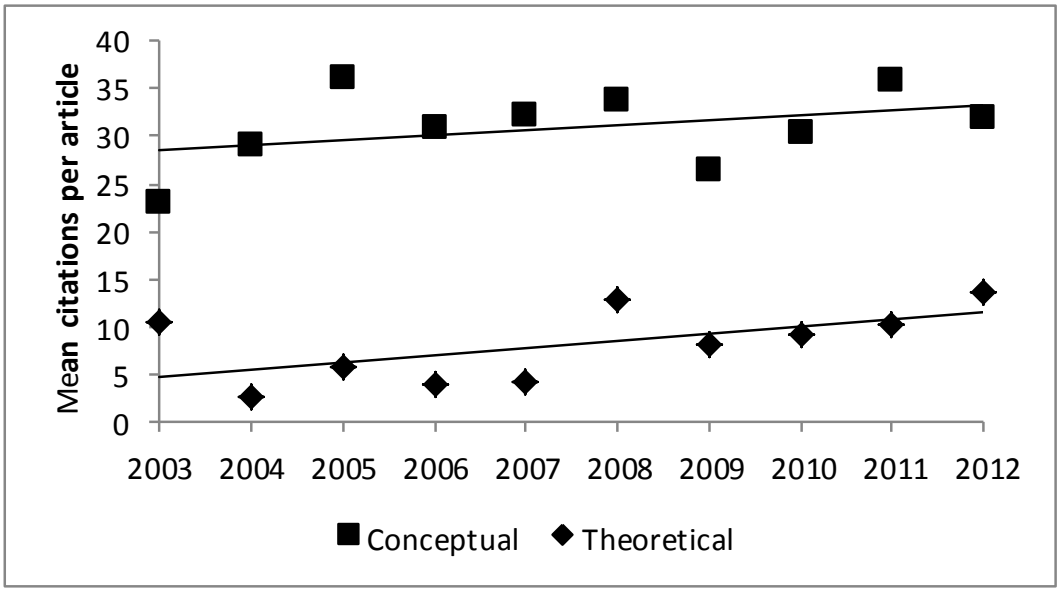

Figure 2. Trends in Mean Number of Citations per Article used to Support Theoretical and Conceptual Frameworks from Articles in JAE between 2003-2012.

Objective 3 sought to describe the frequency with which authors cited literature from within the profession and from outside of the profession (Table 3). Each issue's articles had a higher mean number of citations from outside of the profession than from inside the profession. Overall, there were significantly more articles from sources outside the profession than from sources within the profession, $t(18) = 5.96$, $p < .0001$.

Table 3

Mean Number of Citations Used from Within the Agricultural Education Profession and Outside the Profession per issue of the Journal of Agricultural Education *from 2003 to 2012*

Year	Issue	Number of Articles	Average # of citations inside of profession		Average # of citations outside of profession	
			M	SD	M	SD
2003	2	8	10.63	7.46	13.25	5.70
2004	1	9	9.11	5.75	16.57	14.08
2005	3	11	7.90	4.36	18.50	12.81
2006	4	13	8.83	6.51	21.25	7.46
2007	3	12	8.00	4.98	17.25	6.97
2008	4	14	10.73	6.71	23.50	11.65
2009	1	12	12.18	7.00	17.88	6.81
2010	1	11	11.27	7.68	16.50	7.13
2011	1	17	5.86	3.32	23.50	5.37
2012	4	17	12.29	9.38	30.75	11.60
Total		124	9.68	6.32	19.89	5.00

Figure 3 shows the mean number of citations from within and outside of the profession over the 10-year period. The regression coefficient for mean number of citations per article from within the profession was not significant, $b = 0.2393$, $t(8) = 0.55$, $p = 0.5956$. However, the regression coefficient for mean number of citations per article from outside the profession was significant, $b = 1.1646$, $p = .0229$. Year explained nearly half of the variance ($R^2 = .4964$) in the mean number of citations per article from outside the profession.

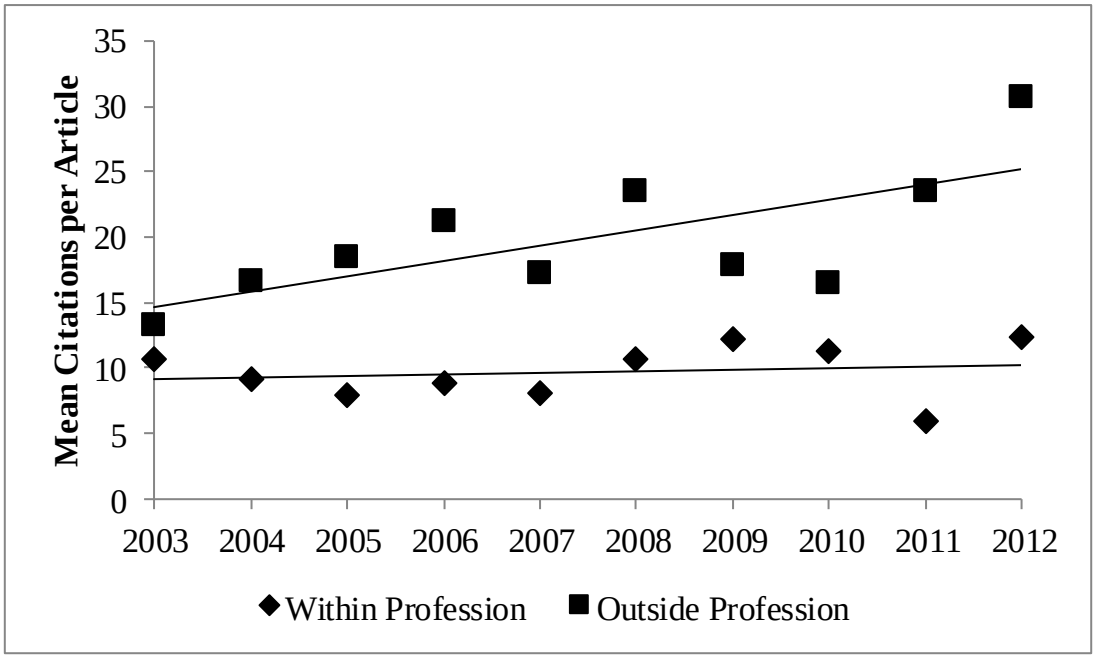

Figure 3. Trends in Mean Number of Citations from Within the Profession and Outside the Profession from 2003-2012.

Table 4 displays the mean number of citations per article from outside of the agricultural education profession, disaggregated by subject area. The majority of external citations were from education each year, with the exception of 2010, when articles had a higher mean number of other external sources. A one-way ANOVA indicated there was a significant difference between subject areas in mean numbers of citations per article, $F(3, 36) = 73.67$, $p < .0001$, $R^2 = 8599$. A *Tukey* post-hoc test indicated education sources were cited significantly more often than the other three areas; other sources were cited significantly less often than education sources but significantly more often than communication or agricultural communication sources; there was no significant difference between how often communication and agricultural communication sources were cited.

Table 4

Average Number of Citations Used from Outside the Profession by Category per Issue of the Journal of Agricultural Education *from 2003 to 2012*

Year	Issue	Number of Articles	Average Number of Citations							
			Education		Agricultural Communications		Communications		Other	
			M	SD	M	SD	M	SD	M	SD
2003	2	8	7.50	5.68	0.00	0.00	0.13	0.35	5.63	3.16
2004	1	9	9.89	10.89	0.00	0.00	0.33	0.50	6.11	6.25
2005	3	11	12.40	12.66	0.40	1.26	0.10	0.32	7.70	7.79
2006	4	13	14.58	10.71	0.00	0.00	0.00	0.00	9.17	4.26
2007	3	12	10.46	8.91	0.00	0.00	0.55	1.81	6.73	5.57
2008	4	14	16.73	11.08	0.00	0.00	0.00	0.00	8.27	8.16
2009	1	12	13.91	7.15	0.00	0.00	0.73	0.65	3.82	2.04
2010	1	11	5.91	5.99	0.36	0.92	0.91	2.21	8.91	4.72
2011	1	17	14.43	6.49	0.00	0.00	0.07	0.27	11.21	7.76
2012	4	17	17.57	10.40	0.07	0.27	0.21	0.80	6.64	4.83
Total		124	12.34	3.84	0.08	0.16	0.30	0.32	7.42	2.09

Figure 4 displays trends in the mean number of citations from outside the profession by category over the 10 year time span. Regression coefficients (not reported) for the four citation sources outside the agricultural education profession were not statistically significant ($p > .05$), indicating that any observed increases could be due to sampling error and did not necessarily indicate an increase in mean citations in the population of articles by year.

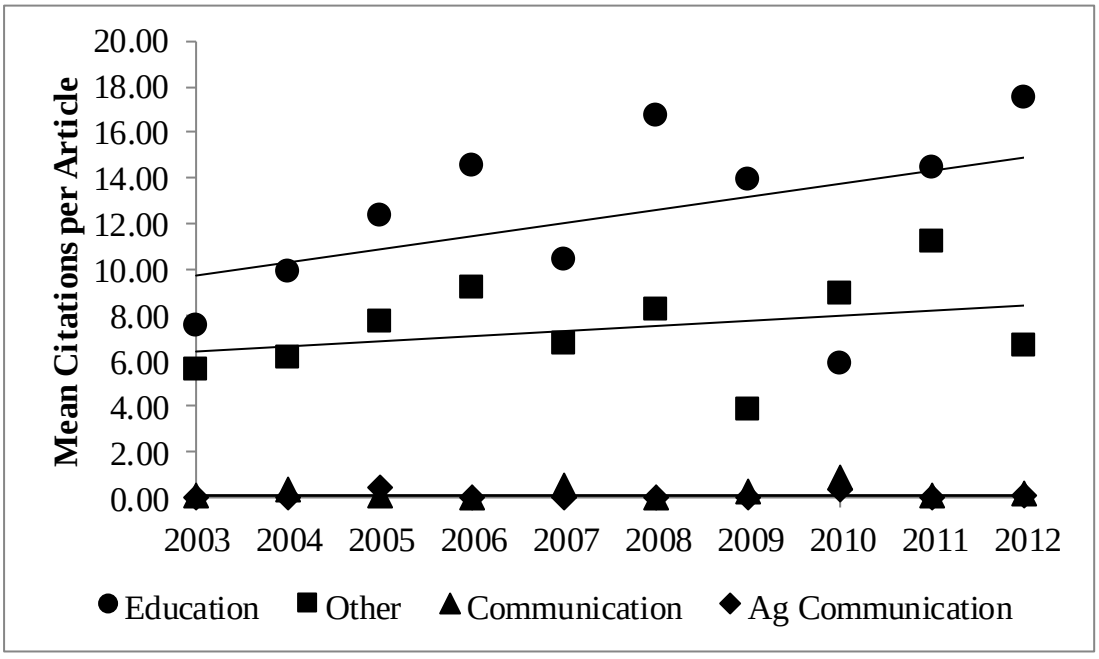

Figure 4. Trends in Mean Number of Citations from Outside the Profession by Category

Objective 4 sought to describe the frequency with which authors cited literature to support the need for the study, methodological procedures, and their findings. Table 5 displays the means and standard deviations in reference to the number of citations used in order to support articles' the need for the study, methods, and findings within each issue. A one-way ANOVA indicated there was a significant difference between the mean number of citations per article used to support these three purposes, $F(2, 27) = 109.70$, $p < .0001$, $R^2 = .8904$. The *Tukey* post hoc test showed literature supporting the need for the study was cited significantly ($p < .05$) more frequently than literature supporting either the research methods or the findings.

Table 5

Average Number of Citations Used to Support the Need for Study, Methodological Procedures, and Researchers' Findings from 2003-2012

Year	Issue	Number of Articles	Number of Citations used to Support the Need for Study		Number of Citations used in Methodology		Number of Citations used to Support Findings	
			M	SD	M	SD	M	SD
2003	2	8	20.13	7.97	6.88	5.28	6.50	5.26
2004	1	9	25.00	19.25	2.89	2.76	4.11	3.06
2005	3	11	24.40	11.70	6.30	5.42	11.40	17.32
2006	4	13	22.83	6.91	6.58	3.37	5.50	2.94
2007	3	12	20.91	12.38	4.91	5.05	10.64	13.96
2008	4	14	27.18	10.01	10.64	10.99	9.64	5.84
2009	1	12	24.55	13.74	5.55	5.47	5.73	3.10
2010	1	11	20.91	7.01	7.91	6.09	10.73	11.13
2011	1	17	32.43	15.72	8.21	2.69	5.86	2.80
2012	4	17	27.29	11.64	7.93	2.16	11.64	6.05
Total		124	24.95	12.06	6.94	5.52	8.27	8.58

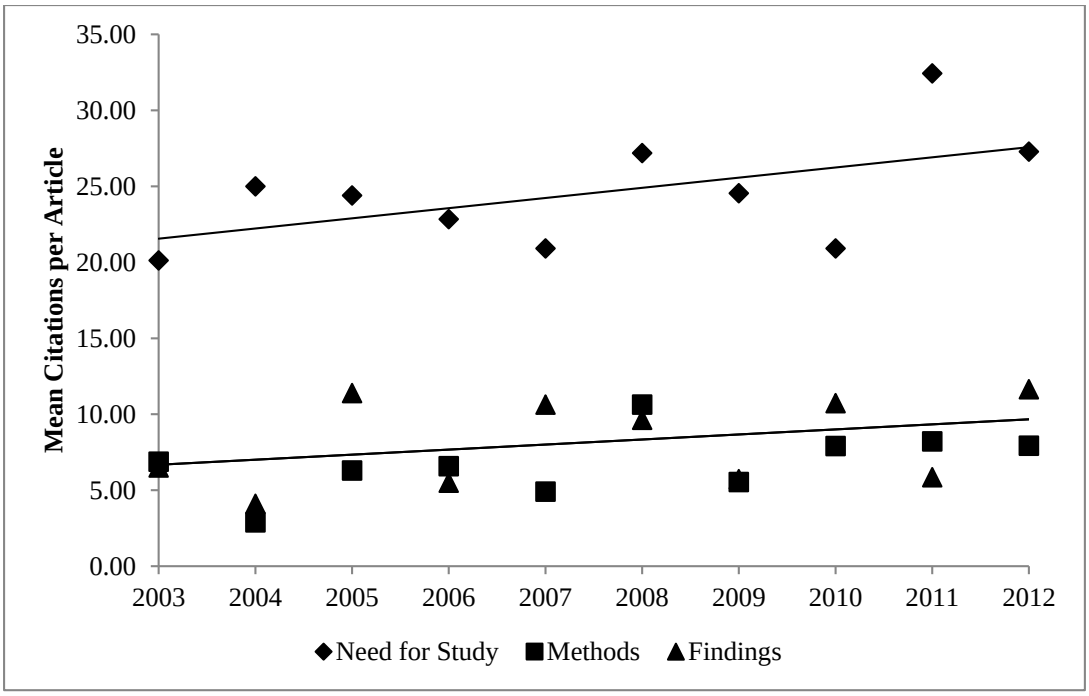

Figure 5. Trends in Mean Number of Citations Used to Support the Need for Study, Methodological Procedures, and Researchers' Findings from 2003-2012

Figure 5 displays trends in use of citations to support the need for the study, the methodological procedures, and to support findings over the 10-year period. Regression coefficients (not reported) for citations supporting the need for the study, methods, and findings were not statistically significant ($p > .05$), indicating that any observed increases could be due to sampling error and did not necessarily indicate an increase in mean citations in the population of articles by year.

Conclusions and Implications

From 2003 to 2012, the 124 randomly selected articles included in the sample contained a mean of 30.25 (SD = 10.30) unique reference citations. Year explained over 40% (R^2 = .432) the variance in the mean total number of unique articles cited in the *Journal of Agricultural Education*, with each year successive accounting for an increase of nearly one additional article. These results support Radhakrishna, et al.'s (1994) findings that researchers within the profession continue to expand their review of research, although the reasoning behind this expansion was not explored in this study.

Of these citations (including duplicated citations), authors used significantly more citations to support conceptual frameworks than they used to support theoretical frameworks. These findings imply that authors publishing in the *Journal of Agricultural Education* are using more citations to primarily build a foundation of knowledge through history and fewer to explain the theoretical underpinnings of the phenomenon being investigated (Dyer, et al., 2003), implying that authors could be using only primary authors to support theories. No significant changes in number of theoretical or conceptual citations were found, implying that while knowledge within the profession is added to each year, authors are not increasing the number of studies they use to build a foundation through history.

Authors in the *Journal of Agricultural Education* cited significantly more sources from outside the agricultural education profession, indicating a continued value for diversity among citations originally found by Radhakrishna, et al. (1994). While mean number of citations per article from within the profession did not change over time, authors used significantly more citations from outside of the profession as year increased. The increase in use of sources from outside the profession could suggest that authors took advantage of increasing page limits in the journal's manuscript requirements or that their access to online journal databases increased over time (Kurtz, et al., 2005). However, because the mean number of citations per article from within the profession did not change, the increase in citations from outside of the profession could be caused by forces external to those that would have the potential to increase all citations.

Of those outside the profession, the majority of resources were of an educational nature while few resources from agricultural communications or general communications were used. With the heavy collaboration seen between the professions of agricultural education and agricultural communications, the lack of communications citations could suggest that greater breadth is needed in this area. Alternately, the few number of communications citations could imply that researchers focusing on agricultural communications are publishing elsewhere.

Findings indicate that authors used significantly more citations to support the need for the study than they used to support research methods or findings. Reliance on citations to support the need for a study could be an outgrowth of the practical, problem-solving mindset of the profession, combined with the need to convince reviewers of the importance of the research. Essentially, the heavy usage of citations to support the need for the study could be a response to the "so what?" question asked of reviewers during their manuscript evaluation (American Association of Agricultural Education, 2011). However, while the number of sources used to support the need for study, methodology, and findings varied among issues and among articles within issues, there was no change in the number of citations used in each category over the 10-year span. Publication of these articles, despite a lack of increase in citations in these categories, may imply that the profession feels that authors are including an adequate number of citations to explain and justify methodological procedures and to provide information necessary for other researchers to better understand or replicate their studies (McMillan & Schumacher, 2010).

Recommendations

The field of agricultural education should continually seek to improve research in the discipline. In 1994, Radhakrishna et al. recommended that an analysis of the literature cited within the *Journal of Agricultural Education* be completed at least every ten years. This study attempted to evaluate the extent to which authors publishing in the *Journal of Agricultural Education* used citations within their works for the purpose of establishing a need for the study, supporting theoretical/conceptual frameworks, methodology, and for supporting their findings.

The total number of unique citations per article increased at the rate of approximately one citation per year over the course of the 10 years investigated. This trend toward an increased citation count allows for better developed lines of inquiry and may be due to maturation of the discipline as well as the increased use of on-line scholarly search tools, such as Google Scholar®. Alternately, the increase in number of citations could be attributed to the increase in page length limits for manuscripts; further study investigating the impact of page limit requirements on citation usage within each issue should be investigated. As the depth of the profession's history grows, the *Journal of Agricultural Education's* editing managing board may better enable the profession's researchers to adequately support their work with citations by further adjusting the manuscript length limits. Regardless of the exact cause, the expectation of an increased number of citations will exert a positive influence on researchers as they seek to meet the new norms of the discipline.

A majority of citations in the typical *Journal of Agricultural Education* article were used to establish the conceptual frameworks for the studies and were drawn from the literature of the

profession. These findings indicate that agricultural education research is grounded in the problems and literature of the profession. Thus, the strong self-identity noted by Radhakrishna, et al. (1994) remains a defining characteristic of agricultural education research.

Consistent with Camp's (2001) call to enhance the theoretical framework of agricultural education research, the number and percentage of citations categorized as theoretical increased between 2003 and 2012. Agricultural education research, like much research in education, has been criticized for emphasizing the discovery of discrete facts (empiricism) while failing to develop a theoretical understanding of cause and effect relationships (Ary, Jacobs, & Razavieh, 1990). The proper use of theory in agricultural education research is an important topic that is valued by many researchers; a lack of growth in the number of citations used to support theoretical underpinnings suggests that Camp's (2001) call to enhance the theoretical framework of agricultural education research be renewed. Before great changes are made by researchers, however, investigations into the quality of citations to support theories must be conducted. Use of primary authors to support theory could justify the lack of growth in this area.

As Radhakrishna, et al. (1994) recommended, the profession should continue to evaluate its use of citations periodically to ensure the integrity of the professional repository of research. Continued inquiry should investigate the extent to which Seglen's (1997) identified problems with citations are being practiced by the profession's authors in order to improve the quality of manuscripts. More in-depth evaluation into the quality of citations within sections of manuscripts should also be conducted, as Lindner, et al. (2001) noted concerns regarding the use of citations when supporting methodological procedures.

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