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A Quantitative Content Analysis of Survey Research Methods Over a 40-Year Time Period in the *Journal of Agricultural Education*

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Abstract

To provide a benchmark of survey methods used in agricultural education research, a content analysis of Journal of Agricultural Education (JAE) research articles was conducted to determine populations studied, survey contact and response mode use, the use of incentives, and response and participation rates reported. Findings revealed survey research is still the most commonly used research methodology for articles published in the JAE. School-based agricultural education (SBAE) teachers are the population most frequently surveyed with contact and response modes shifting from mailed paper surveys to online surveys. Incentives were rarely used in the sampled articles. Response and participation rates have declined 20 – 30% from 1979 to 2019, increasing the possibility for nonresponse error. Recommendations for practice include providing more specific information in manuscripts related to tailoring survey methods for a particular population and reporting participation and response rates more accurately. Further research was recommended for determining which survey modes are most successful for populations commonly studied in agricultural education research, conducting a cost analysis of using incentives, and exploring new technologies to reach populations via research.

Keywords: response rate; participation rate; survey research

Introduction

The *Journal of Agricultural Education* (*JAE*) has the philosophy of promoting "the profession of agricultural education by facilitating and expediting communication among members of the profession to the end that results of research, trends, developments, and innovations in agricultural education are widely shared" (American Association for Agricultural Education [AAAE], 2018, para. 1). The *JAE* is considered the premier journal for agricultural education researchers and serves as the outlet most frequently used for publication of studies related to agricultural education broadly defined (Harder et al., 2014; Radhakrishna, 1995; Settle et al., 2020; Swafford & Anderson, 2007). The journal was established in 1961 as the *Journal of the American Association of Teacher Educators in Agriculture* and underwent a name change to the *Journal of Agricultural Education* in 1989 (Radhakrishna et al., 1994). Currently, 61 complete volumes of the journal have been published since 1961.

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According to the *JAE* philosophy, articles are published under several different subjects related to agricultural education broadly defined. One of those subjects is articles related to theoretical considerations pertaining to research methods (AAAE, 2018). During the 1980s and 1990s, journal articles published related to quantitative agricultural education research included topics such as identifying research missions, initiatives, and obstacles for agricultural education research (Buriak & Shinn, 1989), expanding modes of inquiry used for agricultural education research (Wardlow, 1989), future research priorities and directions (Buriak & Shinn, 1993), literature cited in the *JAE* (Radhakrishna et al., 1994), author prolificacy of published research (Radhakrishna & Jackson, 1995), and appropriate analysis procedures for agricultural education research (Miller, 1998). In the last 20 years there has continued to be more articles published in the *JAE* on agricultural education research. Subjects have included handling nonresponse in research (Lindner et al., 2001; Johnson & Shoulders, 2017), the use of conceptual and theoretical frameworks (Dyer et al., 2003; Kitchel & Ball, 2014), philosophies framing agricultural education research (Miller, 2006), analysis of literature cited in the *JAE* (Swafford & Anderson, 2007), research productivity in the *JAE* (Harder et al., 2008), reporting effect size (Kotrlick et al., 2011), reporting and interpreting reliability (Warmbrod, 2014), improving common practices in agricultural education research (Johnson & Shoulders, 2019), coauthor network analysis (Settle et al., 2020), and improving journal impact factors (Lindner et al., 2020).

The agricultural education research topic of interest for this study is survey research procedures with an emphasis on response rates. According to Dillman et al. (2014), response rates in survey research have declined significantly over the last two decades for a multitude of reasons including evolving technology making survey requests easier to ignore, survey messages being filtered out by technology as junk, and the over surveying of the general public leading to survey fatigue. A decline in response rates has the potential to increase the likelihood of having greater nonresponse error (Bordens & Abbott, 2018). Nonresponse error is a problem addressed through two approaches: (1) obtain acceptable response to surveys and (2) using methods to control for bias after the survey has been conducted (Rogelberg & Stanton, 2007).

Several scholars in agricultural education and extension research have recommended ways to deal with nonresponse error (Johnson & Shoulders, 2017; Lindner et al., 2001; Miller & Smith, 1983). However, sparse research has been conducted on how to decrease nonresponse when conducting research in our field. While higher response rates do not eliminate nonresponse error, Dillman et al. (2014) stated, "it is important to recognize that higher response rates do reduce the likelihood of nonresponse error and thus provide greater credibility to surveys' results than do lower response rates" (p. 6). With over half of all articles published in the *JAE* from 1990 through 1999 using survey research methods, this is an area worthy of investigation (Dyer et al., 2003). From a review of recently published articles, it can be inferred survey methods are still quite prevalent and response rates are less than perfect.

In several other fields where survey research is used, studies have been published addressing declining response rates within their specific contexts. Varying recommendations have been made in fields of research ranging from the medical field to librarian research and higher education research to educational psychology (Fosnacht, et al., 2017; Kooy, 2020; Neal et al., 2020; Sataloff & Vontela, 2021). Recommendations in these fields included increasing response efforts when working with small sample frames, considering acceptability of reported response rates based on possible impact of the study findings, and striving to improve response rates where practical (Fosnacht, et al., 2017; Neal et al., 2020; Sataloff & Vontela, 2021). Park and Tsuchiya (2021) suggested experimental results from general public opinion research recommending specific procedures to increase response can have varying results in different contexts and settings. They went on to recommend exploring response rates

and trends within specific research contexts or populations. This was also echoed by Neal et al. (2020) for specific educational settings such as with school administrators or teachers.

Agricultural education researchers frequently cite Dillman's tailored design method as the procedure used to encourage response. However, the tailored design method is complex with many variables. This leads to the question of how exactly are agricultural education researchers tailoring their survey methodology? What effects have their efforts had on response rates? Given the popularity of survey methods in agricultural education research and the need to continually improve the quality of our research, the need for this study arises. Like other research disciplines that use survey methodology have already done with varying results, the discipline of agricultural education research must examine survey response rates within our specific contexts and populations to determine where we have been and where we are going. Without a better understanding of our current practices and trends related to survey response, further recommendations for how to address the issue of nonresponse error from this viewpoint within our discipline will not be possible.

Purpose and Objectives

Given the need to minimize nonresponse error in agricultural education research and a lack of agricultural education research literature related to reducing nonresponse, the need to address this topic becomes clear. The purpose of this study was to analyze survey research methods used in the *Journal of Agricultural Education* over a 40-year time period. In an effort to funnel down information gathered from reviewed research articles to more precisely address response rates, the following objectives were established to guide this study:

1. Determine the research approach of studies published in the *JAE*.
2. Determine the types of research methodologies used in studies published in the *JAE*.
3. Identify populations frequently surveyed in studies published in the *JAE*.
4. Determine survey modes and use of incentives for studies published in the *JAE* using survey questionnaires.
5. Determine response rates, participation rates, and trends over 40 years for studies published in the *JAE* using survey questionnaires.
6. Determine response rates, participation rates, and trends over 40 years for specific populations studied in articles published in the *JAE* using survey questionnaires.

Conceptual Framework

To provide a framework for the concept of reducing nonresponse, we will first define nonresponse, summarize how nonresponse has been handled after it occurs, and review ways to reduce nonresponse through findings from previous research. When a survey is conducted using probabilistic sampling, that is using a small group or sample to represent the population of interest, there are four types of error a surveyor must attempt to minimize to make population estimates: (1) coverage error, (2) sampling error, (3) nonresponse error, and (4) measurement error (Dillman et al., 2014). This study focuses on response rates in regard to nonresponse error.

The failure of a completed survey instrument to be returned to a researcher is known as nonresponse (Ary et al., 2014). According to Dillman et al. (2014), nonresponse error occurs if responses from those who complete the instrument differ from those who did not. Miller and Smith (1983) recommended getting back as many responses as possible but focused on what to do about nonresponse since many studies at the time ignored this issue. They recommended comparing respondents to the population, comparing respondents to nonrespondents, comparing early to late respondents, and follow up with nonrespondents through telephone or personal interviews (Miller & Smith, 1983). Lindner et al. (2001) later recommended three methods for dealing with nonresponse:

(1) comparing early to late respondents, (2) using days to respond as a regression variable, and (3) comparing respondents to nonrespondents. Finally, Johnson and Shoulders (2017) made the case for considering statistical power when comparing early to late respondents. In summary, the recommendations from scholars in the field of agricultural education and extension research sought to determine if there was nonresponse error after a study was conducted to determine if findings could then be generalized to the population.

Few studies have been conducted within the field of agricultural education research to improve response beforehand. Miller and Smith (1983) reported carefully executed procedures should produce survey return rates of 70% to 90%. Lindner et al. (2001) concluded procedures to control for nonresponse should be employed if a response rate of at least 85% was not achieved. Roberts et al. (2011) claimed survey nonresponse is usually a threat to the validity of studies published in the *JAE*. In *JAE* articles published from 1990 through 1999, response rates ranged from 28% to 100% with an average of 81.6% (Lindner et al., 2001). Johnson and Shoulders (2017) later found *JAE* manuscripts published between 2006 and 2015 had an average response rate of 56.3%. With a trend of decreasing response, there lies room for improvements.

To maximize survey response, Dillman et al. (2014) recommended using the tailored design method. The tailored design method is "customizing survey procedures for each survey situation based upon knowledge about the topic and sponsor of the survey, the types of people who will be asked to complete the survey, the resources available, and the time frame for reporting results" (Dillman et al., 2014, p. 16). Tailored design aims to reduce total survey error, develop survey procedures to encourage all sample members to respond, and develop survey procedures that build positive social exchange (Dillman et al., 2014). Areas for adjustment that can be made to survey design and procedures to increase response include how questions are written, order of questions, visual appeal of the questionnaire, the use of incentives, mode of data collection, mode of contact, and frequency of reminders to participate to name a few (Ary et al., 2014; Dillman et al., 2014; Fraenkel et al., 2019; Mertler & Charles, 2011).

While all the aforementioned areas for tailoring a survey contribute to survey response, most are not commonly discussed in methods published in *JAE* articles. From a review of articles, it becomes apparent it is more common for researchers to discuss the number of contacts made, survey modes used, and sometimes the use of incentives. These areas will be the focus of this study. The best way to increase survey response is through the use of multiple contacts (Ary et al., 2014; Fraenkel et al., 2019; James & Bolstein, 1990; Mertler & Charles, 2011). Multiple contacts can come in the form of a prenotice, reminders, and a thank you (Dillman et al., 2014).

The second most effect way to increase survey response is to provide an incentive and has been recommended by many social scientists as a way to increase response (Ary et al., 2014; James & Bolstein, 1990; Mertler & Charles, 2011; Messar & Dillman, 2011; Millar & Dillman, 2011; Miller & Smith, 1983). Incentives can either be promised or provided upfront and can vary from cash and gift cards to small tokens of appreciation such as a pen (Dillman et al., 2014; James & Bolstein, 1990). Cash incentives provided upfront rather than promised afterward with a maximum value of $2.00 have been tested and determined to be the most effective and economical form of incentive to increase response (Dillman et al., 2014; James & Bolstein, 1990). Incentives greater than $2.00 do not result in response rates greater than those achieved with incentives of $2.00 or less and are not cost effective (Dillman et al., 2014).

In today's world with an extensive array of communication mediums, the mode selected for a survey study can have an impact on survey response (Dillman et al., 2014). Options include mail, telephone, in person interviews, web, social media, and mixed modes (Dillman et al., 2014; Fraenkel

et al., 2019). When considering survey mode, there are two different modes to consider: contact mode and data collection or response mode (Dillman et al., 2014). Dillman et al. (2014) reported mail surveys result in the best response rates; however, better response may be achieved by combining more than one contact or response mode in what is known as mixed-mode studies.

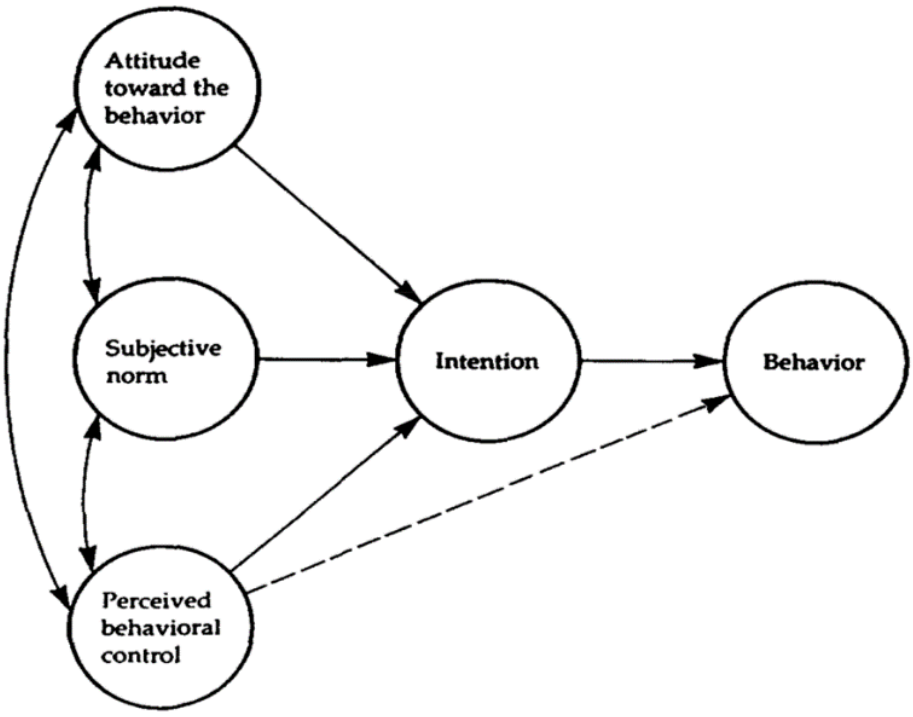
Theoretical Framework

By understanding the concept of nonresponse error, agricultural education researchers can begin to make better informed decisions on how to design studies with minimizing nonresponse error in mind. Actions can then be made in conjunction with the findings of this study by researchers which can be explained by Ajzen's (1991) Theory of Planned Behavior (TPB). This theory was "designed to predict and explain human behavior in specific contexts" (Ajzen, 1991, p. 181). The context of this study is research behaviors within agricultural education. According to the TPB, three concepts can influence intention to perform a behavior: (1) attitude toward the behavior, (2) subjective norms, and (3) perceived behavior control (Ajzen, 1991). Intention to perform a behavior leads to the actual performance of the behavior. Ajzen's model depicting this behavioral process is presented in Figure 1.

Attitude toward a behavior is the extent to which a person positively or negatively views a behavior (Ajzen, 1991). Subjective norms are a social predictive factor that takes into consideration of an individual's perceived social pressure to perform or not perform a particular activity (Ajzen, 1991). Perceived behavior control is how easily an individual perceives they will be able to perform a behavior after reflecting on previous experiences (Ajzen, 1991).

Figure 1

Ajzen's (1991) Model for the Theory of Planned Behavior



In the context of this study, the desired behavioral change is for agricultural education researchers to more closely examine survey research methodologies described in previously published studies when designing future surveys to better tailor their survey procedures for their studied

population. Findings from this article have the opportunity to influence attitude toward this behavior, shed light on subjective norms, and influence perceived behavior control. This would then have the ability to influence intention to improve future survey methodologies leading to our desired change in behavior.

Methods

To accomplish the purpose and objectives of this study, all articles published during a 40-year period from 1979 to 2019 (Volumes 20 – 60) in the *JAE* were considered for review. During this time frame, 1,675 articles were published. Due to the large volume of articles published over this time period and the laborious task of reviewing them all, a sampling procedure was employed. According to Krejcie and Morgan (1970), a sample size of $n = 159$ articles was needed to represent the full set of articles. The research team determined systematic sampling rather than random sampling was necessary to be able to depict trends over time. In order to obtain a large enough sample with equal time intervals, a systematic sampling procedure was used where starting with volume 20 through volume 60, every fifth volume was selected for the content analysis. All articles from volumes 20, 25, 30, 35, 40, 45, 50, 55, and 60 ($N = 365$) were used for analysis, yielding an adequate sample size. Distinguished lectures, research notes, special debate articles, and opinion pieces were omitted from the review. The methods section from each article was independently read by the principal researcher. Research approach, research methodology, population surveyed, response rate, survey mode, and use of incentives were recorded in a Microsoft Excel spreadsheet for each of the selected articles.

According to Mertler and Charles (2011), educational research approaches include quantitative, qualitative, and mixed-methods. The following definitions were used for research approach categorization (Mertler & Charles, 2011):

1. Quantitative research – research that explores traits and situations from which numerical data are obtained.
2. Qualitative research – research that yields extensive narrative data, which are analyzed verbally.
3. Mixed-methods research – research designs that combine both qualitative and quantitative methods.

After determining the research approach of each article, methodologies for each quantitative article were classified. Definitions presented in Table 1 were used for classification by the researchers. For analysis in this study, if conducting a survey was the main method of collecting data, the article was classified as survey research. We acknowledge ex post facto and correlational research are not necessarily mutually exclusive from survey research. However, for the objectives of this study, ex post facto and correlational research were classified as such if they met the definitions described in Table 1 and a survey was not used as the primary data collection method. Readers of this study may find more clarity in interpreting research methodology as data collection technique. The authors chose research methodology as the classification criteria due to its prevalence in research methodology textbooks used for instruction in agricultural education research methods. Additionally, Delphi studies were considered a mixed-method approach and were not further analyzed for their survey methods.

Table 1

Quantitative Research Methodology Descriptions Used for Article Classification

Method	Description
Experimental	Research in which the investigator manipulates one or more independent variables and observes the effect on one or more dependent variables.
Quasi-experimental	Research in which the investigator can control the treatment and the measurement of the dependent variable but cannot control assignment of the subjects to treatment.
Ex Post Facto	A type of research that attempts to determine the causes for, or the consequences of, differences that already exist in groups of individuals.
Survey	A type of nonexperimental research in which investigators ask questions about peoples' beliefs, opinions, and behavior.
Correlational	Research that attempts to determine the extent and the direction of the relationship between two or more variables.
Other	Any other research method not listed here.

Note. Definitions from Ary et al. (2014).

For studies classified as survey research, excluding Delphi studies, the population surveyed was entered into the Microsoft Excel spreadsheet. Survey research studies were further classified as using probabilistic or nonprobabilistic sampling procedures. Probabilistic sampling requires selecting participants from a population in such a way that is representative of the population (Vogt, 1999). Probabilistic sampling requires reporting of a response rate (Baker et al., 2016). For nonprobabilistic sampling where the population size is known, for example a census, participation rates should be reported in survey research (Baker et al., 2016). For studies using sampling procedures where response rates or participation rates could be calculated, rates achieved by the study, survey contact and response modes used, and use of incentives were recorded. Response rate was defined as the proportion (percentage) of the selected sample that returned a completed questionnaire (Ary et al., 2014). Participation rate was defined as the proportion of a known population size that completed a questionnaire (Baker et al., 2016). Recorded response rates, survey modes, and the use of incentives were determined by what was reported by researchers in the methods section. If the authors did not discuss one of these areas, it was listed as "not reported".

The spreadsheet served as the data collection instrument for this study. A panel of three agricultural education researchers at Texas Tech University with a combined experience of over 50 years in survey research methods served on the research team for this project in addition to the principal researcher to establish content validity of the instrument. Each of the three panel members have taught or currently teaches the research methods course at Texas Tech University making them uniquely qualified to evaluate research methodology and make suggestions to the approach used to collect and classify the methodology data for this study. Each professor on the panel has served as a peer reviewer for articles published in the *JAE* for the last 15 to 20 years, making them familiar with research procedures commonly used in the field. Based on the panel's input, the final data collection instrument was a spreadsheet with columns to record the following information for each article reviewed: publication year, journal volume, journal issue, article number, authors, research approach used, methodology used, sampling used, population studied, response rate achieved for each population, participation rate achieved for each population, response mode reported, contact mode reported, number of contacts made, and incentive use.

All articles sampled were read and categorized by the principal researcher. To assess reliability of the classification of published studies, 10 articles were randomly selected from the sample of articles and recategorized by two independent professors on the research team at Texas Tech University one

month after all data were initially collected (Potter & Levine-Donnerstein, 1999). There was 100% agreement between the two professors and the principal researcher on categorizing the 10 articles by research approach, research method used, identification of response rates, survey mode used, and incentive use of studies using survey research methods. Ten articles were also reclassified by the principal researcher one month after initial classification resulting in 100% agreement (Potter & Levine-Donnerstein, 1999). For data analysis, descriptive statistics used included frequencies, percentages, means, and standard deviations. All data were analyzed in Microsoft Excel.

Findings

The first objective of this study was to determine the research approach of studies published in the *JAE*. In the early years of the *JAE*, the quantitative approach was more common than it was in 2019. The review of articles revealed an increase in studies using a qualitative research approach compared to earlier years. The use of mixed methods approaches also increased during this time. Table 2 presents the frequencies and percentages for each research approach for articles reviewed between the years of 1979 and 2019.

Table 2

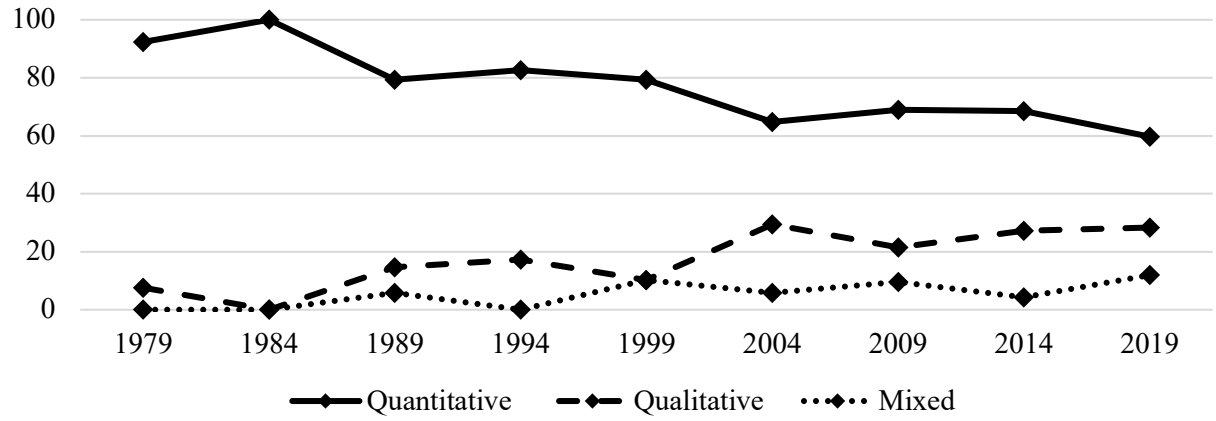
Research Approach of Articles Published by Year (N = 365)

		Quantitative		Qualitative		Mixed	
Year	*n*	*f*	*%*	*f*	*%*	*f*	*%*
1979	13	12	92.31	1	7.69	0	0.00
1984	30	30	100.00	0	0.00	0	0.00
1989	34	27	79.41	5	14.71	2	5.88
1994	46	38	82.61	8	17.39	0	0.00
1999	29	23	79.31	3	10.34	3	10.34
2004	34	22	64.71	10	29.41	2	5.88
2009	42	29	69.05	9	21.43	4	9.52
2014	70	48	68.57	19	27.14	3	4.29
2019	67	40	59.70	19	28.36	8	11.94
Total	365	269	73.70	74	20.27	22	6.03

When plotting the data over time, a general downward trend is observed in the percentage of articles using a quantitative research approach. Increases can be observed in studies using qualitative and mixed methods approaches. Trends are depicted of this information in Figure 2.

Figure 2

Percentage of Research Approaches Used in Articles Published from 1979 – 2019



The second research objective sought to determine the types of research methodologies used in studies published in the *JAE.* For quantitative studies, Table 3 presents frequencies and percentages of articles classified by research methodology for each year reviewed. Thirty-one (77.50%) articles from 2019 used survey research methods. Survey methods were used most frequently in 1989 (f = 24, 88.89%) while 1979 had the fewest number of articles using survey research (f = 6, 50.00%). The method used least frequently overall was "other" (f = 3, 1.12%). All studies classified as other used quantitative content analysis as the research methodology.

Table 3

Quantitative Research Methodologies used in JAE Articles by Year (N = 269)

		Exp.[a]		Q. Exp.[b]		Ex Po F[c]		Correl[d]		Survey		Other	
Year	*n*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
1979	12	3	25.00	1	8.33	1	8.33	1	8.33	6	50.00	0	0.00
1984	30	1	3.33	1	3.33	6	20.00	3	10.00	19	63.33	0	0.00
1989	27	1	3.70	0	0.00	2	7.41	0	0.00	24	88.89	0	0.00
1994	38	2	5.26	1	2.63	2	5.26	5	13.16	28	73.68	0	0.00
1999	23	0	0.00	1	4.35	3	13.04	3	13.04	16	69.57	0	0.00
2004	22	1	4.55	0	0.00	2	9.09	3	13.64	16	72.73	0	0.00
2009	29	2	6.90	3	10.34	3	10.34	4	13.79	17	58.62	0	0.00
2014	48	2	4.17	5	10.42	2	4.17	6	12.50	31	64.58	2	4.17
2019	40	2	5.00	3	7.50	2	5.00	1	2.50	31	77.50	1	2.50
Total	269	14	5.20	15	5.58	23	8.55	26	9.67	188	69.89	3	1.12

Note. a = experimental, b = quasi-experimental, c = ex post facto, d = correlational.

The third objective of this study was to identify populations surveyed in studies published in the *JAE*. Only populations from studies that were previously classified as quantitative, survey research were included. Some studies using survey research methods surveyed more than one population. Each population within the study was counted separately, resulting in a greater number of populations than number of articles using survey methods. There were 197 unique populations studied in the 188 articles using survey research methods. The population most frequently surveyed was school-based agricultural education (SBAE) teachers (f = 74, 37.56%) followed by agricultural extension personnel (f = 21,

10.66%) and college agricultural students (*f* = 21, 10.66%). Table 4 presents the top 10 populations studied in articles reviewed from 1979 – 2019 using survey research methods.

Table 4

Top 10 Populations Studied in Articles using Survey Research Methods (N = 197)

Population	*f*	%
SBAE Teachers	74	37.56
Agricultural Extension Personnel	21	10.66
College Agricultural Students	21	10.66
Secondary Agricultural Students	17	8.63
College Agricultural Instructors	9	4.57
Secondary School Administrators	6	3.05
Farmers	5	2.54
Preservice Agricultural Education Teachers	5	2.54
FFA Members	4	2.03
Agribusiness Personnel	3	1.52

The fourth objective was to determine survey modes and incentive use for studies published in the *JAE* using survey questionnaires. There were 188 articles that used survey research methods. For studies surveying multiple populations, each population received one classification for mode and incentive use for a total of 197 unique populations. Contact mode and response mode were recorded for each population. Studies using more than one mode of contact or response were classified as mixed. Table 5 presents reported contact modes for populations by year. Overall, contact through the mail was reported the most frequently (*f* = 64, 32.49%). However, in 2019, this was the contact mode used least frequently (*f* = 1, 3.13%). Online contact was the predominate mode of contact in 2014 (*f* = 13, 41.94%) and in 2019 (*f* = 17, 53.13%).

Table 5

Reported Survey Contact Modes for Studied Populations using Survey Methods (N = 197)

		Mail		In Person		Online		Mixed		No Report	
Year	*n*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
1979	7	3	42.86	1	14.29	0	0.00	0	0.00	3	42.86
1984	19	11	57.89	4	21.05	0	0.00	1	5.26	3	15.79
1989	27	17	62.96	3	11.11	0	0.00	7	25.93	0	0.00
1994	28	11	39.29	6	21.43	0	0.00	5	17.86	6	21.43
1999	18	12	66.67	2	11.11	0	0.00	3	16.67	1	5.56
2004	17	6	35.29	3	17.65	0	0.00	7	41.18	1	5.88
2009	18	3	16.67	1	5.56	3	16.67	10	55.56	1	5.56
2014	31	0	0.00	5	16.13	13	41.94	8	25.81	5	16.13
2019	32	1	3.13	6	18.75	17	53.13	2	6.25	6	18.75
Total	197	64	32.49	31	15.74	35	17.77	41	20.81	26	13.20

For survey response mode, paper was again most commonly used overall (*f* = 113, 57.36%). This was the case for all years in this sample from 1979 through 2004. In 2009, mixed response modes were reported most frequently (*f* = 8, 44.44%) while online survey response modes were most frequently reported in 2014 (*f* = 20, 64.52%) and in 2019 (*f* = 20, 62.50%). Table 6 presents a full breakdown of reported survey response modes by year.

Table 6

Reported Survey Response Modes for Studied Populations using Survey Methods (N = 197)

		Paper		Interview		Online		Mixed		No Report	
Year	*n*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
1979	7	4	57.14	0	0.00	0	0.00	0	0.00	3	42.86
1984	19	16	84.21	0	0.00	0	0.00	0	0.00	3	15.79
1989	27	26	96.30	0	0.00	0	0.00	1	3.70	0	0.00
1994	28	21	75.00	2	7.14	0	0.00	0	0.00	5	17.86
1999	18	17	94.44	0	0.00	0	0.00	0	0.00	1	5.56
2004	17	14	85.35	0	0.00	0	0.00	2	11.76	1	5.88
2009	18	5	27.78	0	0.00	4	22.22	8	44.44	1	5.56
2014	31	6	19.35	0	0.00	20	64.52	2	6.45	3	9.68
2019	32	4	12.50	0	0.00	20	62.50	3	9.38	5	15.63
Total	197	113	57.36	2	1.02	44	22.34	16	8.12	22	11.17

Populations were classified as having been surveyed with the use of an incentive, no use of incentive, or not reported. The majority of articles did not address this issue and were classified as not reported. Incentives were used to survey populations most frequently in 2019 ($f = 6$, 18.75%). Table 7 provides a summary for incentive use by year.

Table 7

Reported Incentive Use for Studied Populations using Survey Methods (N = 197)

		Incentive Used		No Incentive		Not Reported	
Year	*n*	*f*	%	*f*	%	*f*	%
1979	7	0	0.00	0	0.00	7	100.00
1984	19	0	0.00	0	0.00	19	100.00
1989	27	0	0.00	0	0.00	27	100.00
1994	28	4	14.29	0	0.00	24	85.71
1999	18	0	0.00	0	0.00	18	100.00
2004	17	3	17.65	0	0.00	14	82.35
2009	18	3	16.67	0	0.00	15	83.33
2014	31	2	6.45	1	3.23	28	90.32
2019	32	6	18.75	3	9.38	23	71.88
Total	197	18	9.14	4	2.03	175	88.83

The fifth objective of this study was to determine response rates, participation rates, and trends over 40 years for studies published in the *JAE* using survey questionnaires. Only studies where a participation or response rate was possible were used for this analysis. Convenience sampling or any other sampling technique where there was no known population size was excluded. All response rates were averaged by year for studies reporting response rates and using probabilistic sampling. All participation rates were also averaged by year for studies reporting participation rates and using nonprobabilistic sampling. Fifty-four response rates were reported for surveyed population samples with an overall average response rate of 65.87% ($SD = 5.95$). A total of 122 participation rates were reported with an overall average participation rate of 74.04% ($SD = 4.56$). Neither a response rate nor participation rate was reported for 21 surveyed populations. Table 8 summarizes average response and participation rates by year.

Table 8

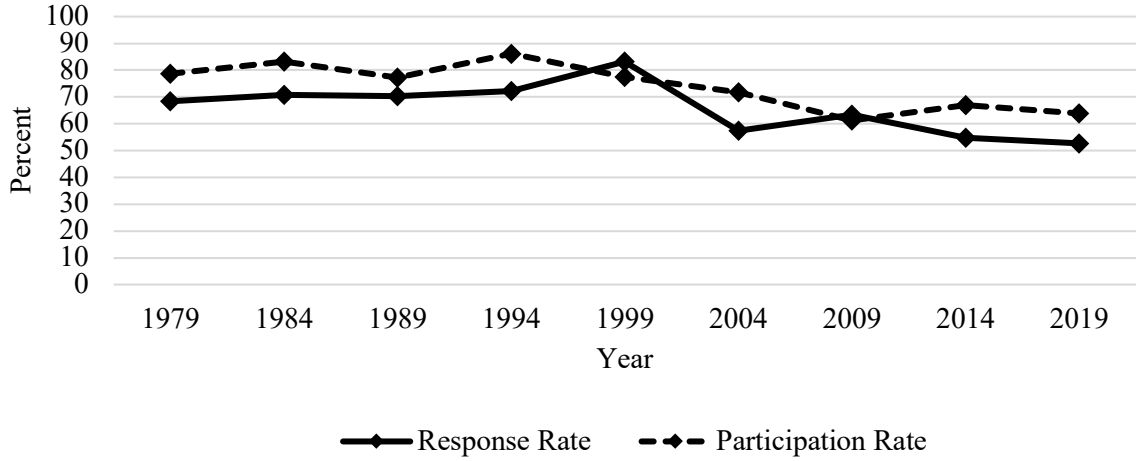
Average Percent Response and Participation Rates for Studied Populations (N = 176)

	Response Rates			Participation Rates		
Year	*n*	*M*	*SD*	*n*	*M*	*SD*
1979	3	68.30	15.73	3	78.67	21.83
1984	5	70.66	21.60	9	83.20	10.97
1989	11	70.19	12.54	14	77.28	19.62
1994	12	72.26	18.86	14	86.16	9.62
1999	3	83.17	14.51	14	77.39	14.43
2004	2	57.41	5.50	13	71.65	18.18
2009	4	63.49	7.39	12	61.24	20.24
2014	8	54.70	13.75	21	67.00	21.25
2019	5	52.68	23.30	22	63.75	20.15
Total	54	65.87	5.95	122	74.04	4.56

When plotting survey response and participation rates for populations studied in the *JAE* from 1979 to 2019, a general downward trend can be observed. Response rates were steady or slightly increasing from 1979 to 1999. After 1999, response rates saw a general decline. Participation rates were also steady to slightly increasing from 1979 to 1994. After 1994 participation rates began to decline. Figure 3 depicts trends of response and participation rates.

Figure 3

Response and Participation Rate Trends of Populations Studied from 1979 – 2019



The final objective of this study was to determine response rates, participation rates, and trends over 40 years for specific populations studied in articles published in the *JAE* using survey questionnaires. The only population studied in all years of articles sampled was SBAE teachers; thus, this was the only population analyzed for this objective. Participation and response rates were calculated for each year using the same parameters described for objective five. These findings are presented in Table 9.

Table 9

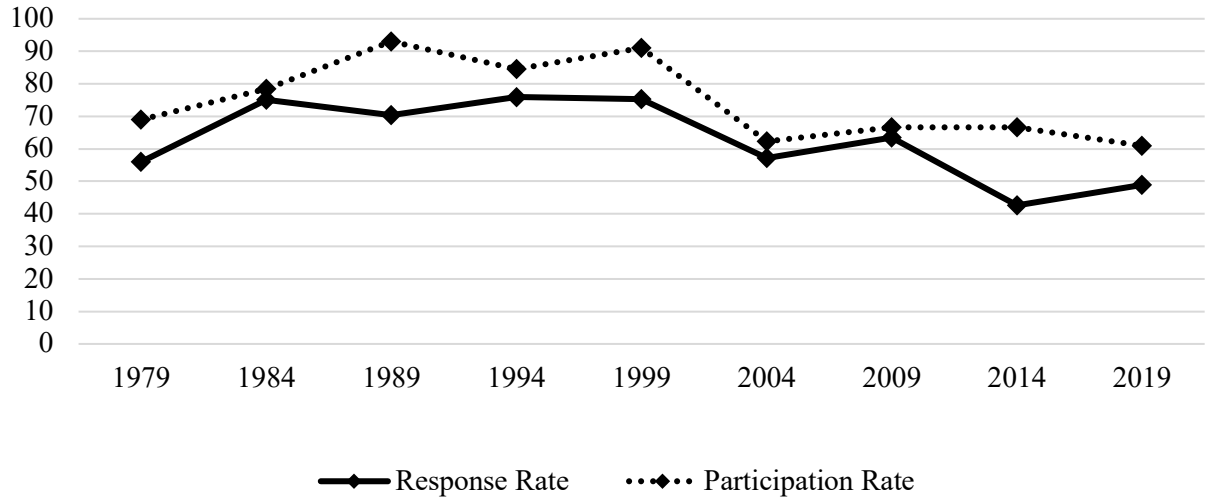
Average Response and Participation Rates for SBAE Teachers

	Response Rates			Participation Rates		
Year	*n*	*M*	*SD*	*n*	*M*	*SD*
1979	1	55.90	-	2	69.00	19.80
1984	3	75.10	4.29	3	78.33	11.24
1989	4	70.40	10.98	4	93.03	5.72
1994	2	75.95	8.41	4	84.48	4.87
1999	2	75.25	6.72	3	91.07	7.00
2004	1	57.23	-	4	62.28	22.62
2009	4	63.49	7.39	5	66.57	25.86
2014	2	42.62	10.44	13	66.69	16.27
2019	3	49.00	24.46	12	60.94	17.99
Total	22	62.77	6.61	50	74.71	7.71

When plotting response and participation rates of surveyed SBAE teachers, a general decrease can be observed beginning in the 2000s. Both response rates and participation rates of SBAE teachers are lower in 2014 and 2019 than at any other observed year. Figure 4 depicts trends for SBAE teacher response and participation rates in survey research.

Figure 4

Response and Participation Rate Trends of SBAE Teachers Studied from 1979 – 2019



Conclusions/Recommendations/Discussion/Implications

Results from this content analysis reveal the use of the quantitative research approach is declining while qualitative and mixed methods approaches are increasing. Quantitative research was used with 100% of the studies published in 1984 and has declined to about 60% in 2019. Even though a decline in the use of the quantitative approach has occurred, survey research still dominates the quantitative realm in agricultural education research. Dyer et al. (2003) reported over half of the studies published in the 1990s used survey research methods. This study is congruent with those results and finds survey research is still used for nearly half of the studies published from 2004 through 2019.

When studies are further broken down by research approach, survey research methods were at their second highest level in 2019 for the analyzed years in this study, confirming the method's prevalence.

As a portion of the quantitative research approach, experimental research methods showed the greatest change over time. In 1979 experimental research was used in 25% of the published quantitative articles, while in 2019 it was down to 5%. Ex post facto and correlational research methods have had increases and decreases over the time period but generally make up less than 10% of the studies published. The bulk of quasi-experimental research was observed in articles reviewed in 2009, 2014, and 2019, indicating this may be becoming a more popular research methodology. Studies classified in the "other" category were quantitative content analysis methods, as would be the case with this study. This may be a research method that could be used more often in the future as the literature base expands.

SBAE teachers were the subjects most often surveyed for articles reviewed in this analysis. This was to be expected given the nature of studies published in the *JAE*. Agricultural extension personnel, college agriculture students, secondary agriculture students, and college agricultural instructors were all in the top five populations surveyed. If we are to continue research by surveying these identified populations, our methods must be tailored to elicit better response and participation rates as recommended by Dillman et al. (2014).

When we examined survey contact and response modes, trends followed technology available during the time period. Studies from 1979 through 1999 predominately contacted survey participants using mail-only or in-person contact modes. It should be noted that nearly half of all studies published in 1979 did not report how participants were contacted. The failure to report contact mode has decreased since then, but most recently is still around 13%. Mixed contact modes peaked in 2009 for this study during the transition from mostly paper and in person contact to online contacts. Years following, online contact was used most frequently, aligning with mode trends reported by Dillman et al. (2014).

Naturally, survey response modes align closely with contact modes. Paper was most frequently used from 1979 through 2004 with over half of the studied populations. In 2009 mixed response modes occurred most often, followed by paper-only and online-only modes. Beginning in 2014, online response was used for the majority of studies while paper response continued to decrease. Response mode was not reported in 1979 by over 40% of published articles. In 2019, there were still 15% of the published studies that failed to report response mode. Trends in response modes used from this analysis are consistent with overall trends reported by Dillman et al. (2014).

Dillman et al. (2014) stated that using incentives to encourage response is the second most effective way to increase survey response rates. Out of the 197 populations studied in this analysis, only 18 used an incentive as reported by authors in the methods section of the articles. Authors directly acknowledged that four studied populations did not receive an incentive while the remaining 175 articles did not mention incentives. We cannot safely assume that no incentives were used in studies that did not report information on this topic; however, it is still likely that most did not.

Concerning survey response and participation rates, a general decline from 1979 to 2019 was observed. A decline in survey response rates has been well documented by Dillman et al. (2014) when surveying the general public and is reflected in surveys conducted within agricultural education research. It is clear why methods were developed to handle nonresponse during this time period within agricultural education research. With average response rates around 50% and participation rates around 65% in 2019, it could be concluded researchers would have to try to control for nonresponse error. How could we decrease nonresponse from the start? Are some survey method designs more successful than others in modern research? Participation rates were generally higher than response rates with the exception of two years, 1999 and 2009. This likely is due to the nature of how data is collected for

nonprobabilistic studies where this often occurs in-person at an event or with a smaller group of people with a closer relationship to the researcher compared to probabilistic sampling. After all, one of the reasons sampling is used is to reduce the number of responses needed to generalize to a population (Ary et al., 2014).

When we examine response and participation rates from SBAE teachers, the same decline is taking place as with all populations studied in agricultural education research. However, the decline is at a steeper rate, particularly with response rates. Why is this occurring? Possible reasons could include over surveying the population of interest, difficulty contacting the population, need for improved survey methods, or time available for the population to respond. Information gained on this topic could help with methods used in future research when surveying SBAE teachers. Survey fatigue may be a problem with SBAE teachers and could alter the way sampling is conducted with this population.

So, what do the conclusions and implications from this study mean for the agricultural education profession? We know response rates are continuing to decline. As reported in the introduction to this article, other context specific disciplines have begun to tackle this issue. As a professional organization, we (AAAE) must decide what is acceptable in regard to response rate. This has implications for the review and acceptance of survey research. Many in the profession have proposed dealing with nonresponse after it occurs, we propose a few ways to lower nonresponse *a priori*. Findings revealed several studies did not report items such as contact mode, response mode, incentive use, response rate, or participation rate. In the spirit of Ajzen's theory of planned behavior, this is a behavior we can change by adding it to the methods section of a manuscript. Well documented methods in research manuscripts can be helpful to others trying to study a similar population. With response rates declining, it is important to note which methods lead to better response and in turn reduce the likelihood of nonresponse error. Authors should strive to be specific when describing how survey methods are tailored for a specific population by addressing contact modes used, response modes used, whether or not an incentive was used, contact time intervals, how many responded for each contact round, and other techniques used to solicit response such as design, appearance, and wording of contacts.

When describing survey response rates or participation rates, accuracy in describing rates for probabilistic and nonprobabilistic sampling should be employed. For example, when nonprobabilistic surveys are conducted such as a census, a participation rate should be reported rather than a response rate (Baker et al., 2016). Two of the main ways Dillman et al. (2014) recommended increasing response was through the use of incentives and mixing modes. Researchers should use an incentive when possible to see if it would help declining response rates in our field. Mixed-mode data collection should be considered when conducting survey research. According to Dillman et al. (2014), this has the potential to increase response and can reach different sectors of the population who may have differing preferences.

Another recommendation we have based on the declining response rate data is to oversample to reach a desired sample size as recommended by Ary et al. (2014) and Dillman et al. (2014). Researchers can refer to previously published studies where similar conditions exist in survey procedures and the population to estimate oversampling needed. We recognize oversampling does not necessarily fix the problem of nonresponse error (Fraenkel et al., 2019) but it likely would not negatively impact this problem either. This technique could be used to strengthen the statistical power of a study. Johnson and Shoulders (2019) reported determining sample size was a problem in agricultural education research. Oversampling can help with this problem, particularly when inferential statistics are calculated with survey data. The additional statistical power from oversampling can help with having enough statistical power to make the *post hoc* comparisons necessary to determine if nonresponse error exists (Johnson & Shoulders, 2017).

The authors acknowledge this study only analyzed a sample of articles from one journal which is a limitation. Consumers of findings from this study should use caution when attempting to generalize findings beyond the analyzed sample of articles. Another limitation of this study was it identified trends and common practices but did not identify cause of declining response. These limitations leave room for further research. Methods from other journals commonly used to publish agricultural education research could be analyzed as well as a larger sample from the *JAE*. Further research should also be conducted to determine how specific populations respond within our field of research. Further experimental studies could also be conducted to explore survey contact and response mode use for populations specific to agricultural education research. Consideration of the use of incentives and their cost-benefit ratio should be analyzed. Data should be collected to help explain why response rates are declining in our research. A qualitative approach may be more appropriate for addressing this issue. Finally, an exploration of emerging survey technologies should be conducted to determine if there are better ways to reach our populations in modern research.

In final discussion, the pursuit of the best response rates possible is a worthy cause. If we are to continue producing quality research, it only makes sense that we do our best to achieve the best response possible. This issue affects the credibility of our studies, particularly when outside readers reference our work. It may be time to develop guidelines as a professional organization for evaluating research submitted for peer review in regard to survey procedures used. A discussion related to the worth of survey studies submitted that do not have "acceptable" response rates is worth having. We believe these studies still have utility and are not advocating against their publication. Authors should thoroughly acknowledge the limitations of nonresponse error and consumers of that information should consider the impact of this error on the application of the study findings. In many cases, the impact may not practically have much effect. We hope the findings from this study can help drive some of these discussions as the profession continues to adjust to decreasing response rates.

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