Journal of Agricultural Education, 63(4), 151-167
https://doi.org/10.5032/jae.2022.04151

Determining the Effects of Response Mode and Incentives on Survey Response Rates of School-based Agricultural Education Teachers: An Experimental Study

Will Doss, John Rayfield, David Lawver, Scott Burris

Abstract

A decline in response rates was found for agricultural education research studies using survey research methods. The use of incentives and various response modes can affect survey response rates and were the focus of this experiment. The purpose of this study was to determine the effects of survey response mode and incentives on response rates when surveying SBAE teachers. Findings revealed a significant increase in response rates for groups receiving an incentive. No significant differences were found between groups using different survey response modes. When examining summated scale scores for each construct in the questionnaire, participants answering on paper scored more positively in four of the six constructs compared to web responses. Recommendations for practice included using mixed response modes when financially feasible and oversampling to achieve the desired sample size to represent a population. Further research on the effects of communication mode on response rates is needed. An examination of why differences in scale scores occur with different response modes is recommended.

Keywords: response rate; incentives; survey mode

Introduction

Agricultural education is by nature an applied, social science discipline where scholars use survey research methodologies most frequently when studying populations (Doss et al., 2021; Dyer et al., 2003). However, survey response rates are declining in agricultural education research, possibly affecting the strength of the most frequently used methodology in the discipline. Lindner et al. (2001) reported an average response rate of 81.6% for articles published using survey research in the *Journal of Agricultural Education (JAE)* from 1990 through 1999. Later, Johnson and Shoulders (2017) reported an average response rate of 56.3% for articles published from 2006 through 2015.

Declining survey response rates in the field of agricultural education inversely lead to increased nonresponse and therefore the possibility of nonresponse error. When a portion of the sample fails to respond to a survey by not returning a questionnaire, it can result in a biased sample (Bordens & Abbott,

Will Doss is an Assistant Professor of Agricultural Education in the Department of Agricultural Education, Communications, and Technology at the University of Arkansas, 1120 West Maple, AFLS E-108, Fayetteville, AR 72701, wd009@uark.edu, https://orcid.org/0000-0002-3163-7528

John Rayfield is a Professor of Agricultural Education in the Department of Agricultural Education and Communications at Texas Tech University, Box 42131, Lubbock, TX 79409-2131, John.Rayfield@ttu.edu

David Lawver is a Professor of Agricultural Education in the Department of Agricultural Education and Communications at Texas Tech University, Box 42131, Lubbock, TX 79409-2131, David.Lawver@ttu.edu

Scott Burris is a Department Chair and Professor of Agricultural Education in the Department of Agricultural Education and Communications at Texas Tech University, Box 42131, Lubbock, TX 79409-2131, Scott.Burris@ttu.edu

2018). Results of a sample not representative of the population from which it was drawn can be a threat to the external validity of the study when attempting to generalize beyond those who were surveyed (Fraenkel et al., 2019).

While studies have recommended ways to handle nonresponse once it occurs in agricultural education research, little work has been done to address increasing response from the start (Johnson & Shoulders, 2017; Lindner et al., 2001; Miller & Smith, 1983). Higher response rates do not necessarily eliminate nonresponse error; however, "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" (Dillman et al., 2014, p. 6). Increasing the number of contacts with participants, providing incentives, and survey mode selected can have the greatest effect on survey response rates (Ary et al., 2014; Dillman et al., 2014; Fraenkel et al., 2019). In agricultural education survey research, it is common to contact participants multiple times; however, few studies use an incentive nor use a survey mode other than web-based (Doss et al., 2021). This raises the question: do these current practices achieve the best possible response rate? In addition, what affects do incentives, and the use of different response modes have on the data collected?

The mission of the American Association for Agricultural Education (n.d.) is "to foster excellence in the discovery and exchange of evidence-based solutions for social science challenges in agriculture and related sciences." For discovery and evidence-based solutions to occur at a level of high quality, methodologies in agricultural education research must continue to improve. Many recommendations for improving survey response rates come from the discipline of general public opinion research but can have varying results in different contexts and settings (Park & Tsuchiya, 2021). Researchers outside of agricultural education recommended testing recommendations for improving survey response within specific contexts and populations, providing a need for this study (Neal et al., 2020; Park & Tsuchiya, 2021).

Purpose and Objectives

The purpose of this study was to determine the effects of survey response mode and incentives on response rates when surveying school-based agricultural education (SBAE) teachers. The research objectives that guided this study were:

1. Determine the main effect of providing an incentive, the main effect of survey mode, and the interaction effects of incentive and survey mode on response rates.
2. Compare respondent questionnaire completion rates by receipt of incentive and final response mode used.
3. Compare respondent summated scale scores by receipt of incentive and final response mode used.
4. Conduct a cost analysis comparing survey modes, incentives, and response rates.

Review of Literature

From a review of literature, it quickly becomes apparent there are many variables influencing the decision to respond to a survey. Attitude toward surveys, questionnaire appearance and content, number of contacts made, providing incentives, and data collection mode used are all major categories influencing response rates and within each of these categories there are multiple variables at work (Ary et al., 2014; Fraenkel et al., 2019; James & Bolstein, 1990; Leeper, 2019; Mertler & Charles, 2011; Rogelberg et al., 2001; Ye, 2007). To narrow down the variables of interest, we chose to study the use of incentives and survey response modes because of their ability to have larger impacts on survey response rates and because of how they are currently used in agricultural education research (Dillman et al., 2014; Doss et al., 2021).

The use of incentives is the second-best way to increase response rates behind making multiple contacts (Dillman et al., 2014). Including a cash or material incentive encourages reciprocity and increases trust in the survey (Ary et al., 2014; Dillman et al., 2014). To obtain the greatest response rate and return on investment, researchers have determined the best time to provide an incentive in the survey process is with the initial invitation to participate, rather than promising an incentive after the study is completed (Ary et al., 2014; Dillman et al., 2014; James & Bolstein, 1990; Mercer et al., 2015). Studies have found $1.00 - $2.00 is adequate to increase response rates substantially with $2.00 providing the best results (Dillman et al., 2014; James & Bolstein, 1990). Incentives can be used with most survey modes, but prepaid incentives can be difficult to provide in web surveys (Dillman et al., 2014). However, in an experiment conducted by Millar and Dillman (2011), providing an incentive increased web response rates by 17%.

A potential benefit of providing an incentive is that it may reduce nonresponse bias by pulling in respondents who normally would not answer (Dillman et al., 2014). James and Bolstein (1990) recommended exercising caution on this same point because providing an incentive can also cause respondents to provide more favorable responses because they feel rewarded, resulting in bias. On the other hand, James and Bolstein (1990) suggested the extra respondent effort produced by monetary incentives may be needed, especially if open-ended questions are asked or when respondents are asked to check their records to respond.

Concerning survey mode, or the platform or media in which a survey is conducted (Dillman et al., 2014), it is important to recognize this can refer to both the communication between the researcher and the participant and the response media used by the participant to answer the questionnaire. The nature of the population being studied, expected response rate, resources available to the researcher, and research questions to be answered all influence the decision of which survey mode to use (Couper, 2011). Modes of data collection include personal interviews, direct administration, mail, telephone, email, and web-based surveys (Dillman et al., 2014; Fraenkel et al., 2019; Gay et al., 2012; Mertler & Charles, 2011). Historically, the face-to-face mode was used most in the 1970s, then telephone and mail became popular, leading to email and web modes as the most common data collection method today (Roberts, 2007).

When examining response rates by survey mode, mail surveys result in the highest response rates when compared experimentally (Dillman et al, 2014; Messer & Dillman, 2011; Olson et al., 2012). Dillman et al. (2014) suggested mail surveys can achieve 50% response rates or more if implemented correctly. However, compared to web and mixed-mode surveys, mail is more expensive to implement (Mertler & Charles, 2011). For web surveys response rates are generally the lowest of any mode (Dillman et al., 2014; Messer & Dillman, 2011; Olson et al., 2012; Ye, 2007). Ye (2007) claimed 20-35% response rates were common in web surveys.

Advantages of web surveys often outweigh the disadvantages, leading to its continued popularity as a survey mode. The main benefit of using web surveys is the relatively low cost when compared to other modes, making them more feasible for researchers with a low budget (Dillman et al., 2014; Fraenkel et al., 2019; Gay et al., 2012; Greenlaw, 2006; Mertler & Charles, 2011; Roberts, 2007; Sedwick, 2003). Convenience to the participant, ability to use multimedia within the questionnaire, mobile administration, ease of targeting respondents, potential for increased statistical power, possibility of immediate feedback to participant, and a higher level of perceived anonymity are all other advantages of using the web survey mode (Evans & Rooney, 2008; Fraenkel et al., 2019; Gay et al., 2012; Roberts, 2007). On the other hand, there is also the possibility of differences in scale measurements with web surveys when compared to a paper mode survey (Roberts, 2007; Sedwick, 2003).

Mixed-mode surveys increase the complexity of designing, deploying, and managing a survey. According to Dillman et al. (2014), the following are three ways modes can be mixed for surveys:

1. Use of multiple contact modes to encourage response by a single response mode.
2. Use of multiple response modes to collect respondent answers with only one contact mode.
3. Use of multiple contact and response modes for the same study.

However, research has shown mixed-mode surveys can achieve higher response rates than web only surveys and can be as high as mail only surveys for a fraction of the cost (Dillman et al., 2014; Greenlaw, 2006; Millar & Dillman, 2011). In a mixed-mode experiment conducted by Messer and Dillman (2011), 44-52% response rates were achieved. Mixed-mode surveys can also reduce coverage error and nonresponse error (Dillman et al., 2014). When a mixed-mode study is conducted, there is opportunity to check for differences in response quality when comparing the different modes (Dixon & Turner, 2007). Messer and Dillman (2011) found mail only and web only surveys produce different demographic respondents, however web and mail mixed-mode surveys produce respondents with similar demographics as the mail only study.

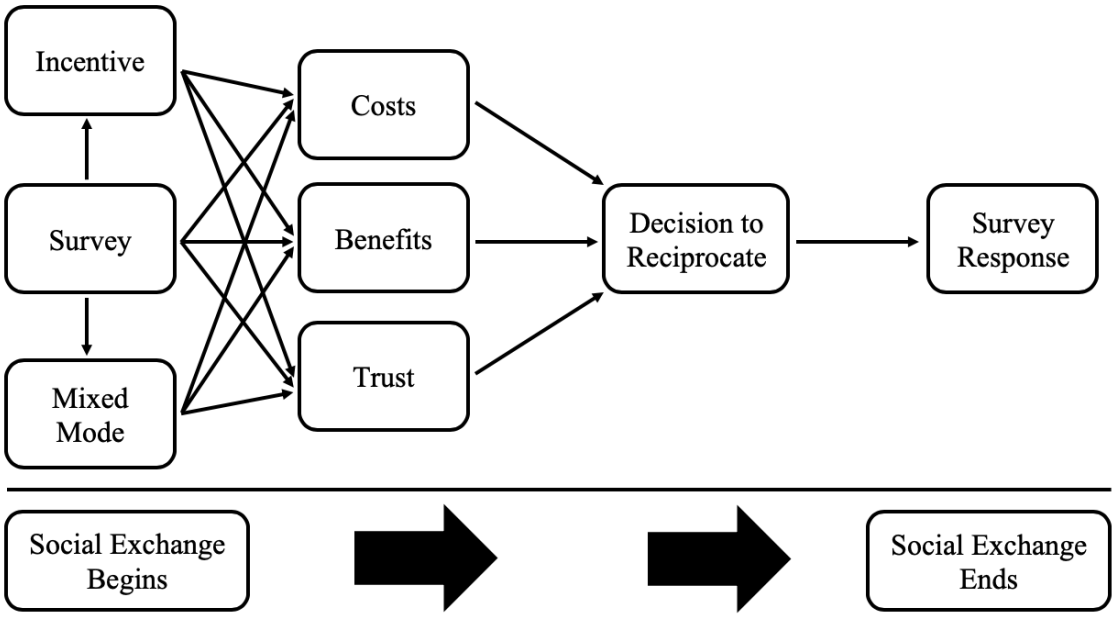
There are also several considerations to make when deciding how to mix response modes for a study. One major choice is whether to use simultaneous or sequential response options. Several studies have provided evidence that giving participants the option to choose which mode they want to respond with (simultaneous) does not increase their likelihood of responding (Dillman et al., 2014; Millar & Dillman, 2011). However, offering response modes in sequence can increase response rates significantly (Millar & Dillman, 2011). Dillman et al. (2014) recommended offering a mail response option after a web response option in a sequential-mixed mode design to increase response rate and improve quality of the data. Studies have found little change in response rates when web follows mail first (Dillman et al., 2014). However, significant increases in response were reported in studies where the web survey mode was first, followed by mail (Dillman et al., 2014; Lang, 2007; Messer & Dillman, 2011; Millar & Dillman, 2011). Concerning timing of mode switch, Wagner et al. (2017) found no significant difference in response rates when switching modes after the first, second, third, and fourth contact leading to the recommendation of switching at the final contact to the more expensive mode.

Theoretical Framework

Social exchange theory was used to guide this study. Blau (1964) described social exchange as "voluntary actions of individuals that are motivated by the returns that are expected to bring and typically do in fact bring from others" (pp. 91-92). Within the context of survey response, social exchange theory is applied in that "people are more likely to comply with a request from someone else if they believe and trust that the rewards for complying with that request will eventually exceed the costs of complying" (Dillman et al., 2014, p. 24). "Social exchange involves the principle that one person does another a favor, and while there is a general expectation of some future return, its exact nature is definitely not stipulated in advance" (Blau, 1964, p. 93). Social exchange theory considers many different influences on a decision to respond. According to Dillman et al. (2014), the decision to participate in a survey is assumed to involve multiple considerations taking into account perceived benefits, perceived costs, and trust.

Figure 1

Application of Social Exchange Theory to Survey Response for this Study



The application of social exchange theory to this study is simple. Providing the participant with a survey creates a feeling of obligation in the participant to reciprocate. The presence of mixed-modes or incentives can increase the feeling of obligation. As can be observed in Figure 1, the survey itself, presence of an incentive, and providing mixed modes can all influence costs to the participant, benefits to the participant, and establishment of trust. The overall balance of costs, benefits, and trust influence the decision to reciprocate leading to completion of the survey and returning it to the researcher.

Methods

The research design for this study was an experimental, two-way, between-subjects, factorial design with eight treatment groups (Maxwell et al., 2018). The two independent variables were survey response mode and incentive. For survey response mode, there were four types: mail only, web only, mail + web, and web + mail. For the incentive variable there were two levels: received a $2 incentive and did not receive a $2 incentive. The levels of each independent variable make this a 2 X 4 design. Subjects were randomly assigned to one of eight treatment groups shown in Table 1.

Table 1

Treatment Groups Used in this Study for Comparison

	$2 Incentive (A)	
Response Mode (B)	Yes (A_1)	No (A_2)
Mail Only (B_1)	Group 1 (A_1B_1)	Group 5 (A_2B_1)
Web Only (B_2)	Group 2 (A_1B_2)	Group 6 (A_2 B_2)
Mail + Web (B_3)	Group 3 (A_1B_3)	Group 7 (A_2 B_3)
Web + Mail (B_4)	Group 4 (A_1B_4)	Group 8 (A_2 B_4)

The target population of this study was all SBAE teachers in the United States. According to the National Association of Agricultural Educators (2020), there are approximately 12,000 SBAE teachers in the nation. The sampling procedure used for this study was stratified random sampling. Participants were stratified proportionate to the number of FFA chapters in the state compared to the nation. Lists of active FFA chapters were available online for each state and the needed number of chapters were randomly selected from each list. After the chapters were identified, specific agricultural education teachers were identified for each chapter through published online state SBAE teacher directories or by viewing individual school websites. G*Power was used to estimate the desired sample size to accomplish the level of power needed based on expected effect size as recommended by Johnson and Shoulders (2019). A sample size of 1,095 was determined in G*Power (Faul et al., 2007). Each of the eight treatment groups needed 137 participants for a total sample size of 1,096.

The instrument used in this study was a researcher designed questionnaire measuring challenges faced by SBAE teachers. There were 131 items on the questionnaire including scale items for the six constructs, one open-ended question, and demographic questions. Consistency of appearance was maintained across both paper and online modes. The instrument was an eight-page questionnaire on the paper format and one continuous page for the online format. The instrument was pilot tested with 60 SBAE teachers in Texas who were not included in the main study. Fifteen surveys from each response mode were sent to the pilot test group to make sure communication and response modes were conducted properly and to address any logistical concerns before conducting the main study. A total of 40 SBAE teachers responded to the pilot test for a 66.67% response rate. Data received from the pilot test were used to calculate a Cronbach's alpha for instrument reliability for each of the six constructs. Table 2 lists the alpha levels for each construct. All were acceptable according to Field (2018).

Table 2

Calculated Construct Reliability for Questionnaire from Pilot Test (N = 40)

Construct	Cronbach's α
1. Relationships with school and community personnel	0.86
2. Classroom factors, activities, and responsibilities	0.94
3. Program factors, activities, and responsibilities	0.94
4. Miscellaneous factors, activities, and responsibilities	0.91
5. Professionalism factors, activities, and responsibilities	0.89
6. Personal factors, activities, and responsibilities	0.96

Timing for all contacts was consistent across all response modes. A prenotice email was sent to participants two days after the initial invitation to participate was mailed allowing time for mail delivery to teachers' physical addresses. The first reminder email was sent two weeks following the mailing of the invitation to respond with a copy of the questionnaire/online instructions to allow for returned completed surveys and the opportunity to correct undeliverable addresses. All additional reminders and contacts were made at one-week intervals. Table 3 summarizes the contact procedures used.

Table 3

Contact Procedures Used

Contact	Procedure
1st	Prenotice Email
2nd	Mailed Invitation Letter, Paper Copy or Link to Questionnaire, ($2, If Applicable)
3rd	Emailed Reminder to Complete Questionnaire
4th	Emailed Reminder to Complete Questionnaire

5th	Mailed Reminder w/Another Copy/Link to Questionnaire (Mode Switch)
6th	Emailed Final Reminder to Complete Questionnaire

Note. Refer to Table 1 for determining receipt of incentive and mode.

The prenotice email was a short description of the study and asked participants to check their physical mailbox in the coming days. The initial invitation letter was printed on an 8 ½ X 11 sheet of paper and enclosed in an envelope with a paper copy of the questionnaire, stamped #9 return envelope, printed web link to the questionnaire, and a $2 bill when appropriate for the treatment group. The first reminder email was a message shorter than the initial contact. For the fourth contact, a second reminder email was sent to all participants who had not responded. For the fifth contact, a mailed reminder letter was sent on an 8 ½ X 11 sheet of paper. For the appropriate treatment groups, response mode was switched. A paper copy of the questionnaire was included with this contact where appropriate and a stamped #9 return envelope. For those selected for web response, a separate card directing participants to the web link was included in the mailing. The final contact was an email reminder to participate. A final due date was provided in the email.

Since this study involved research with human subjects, institutional review board (IRB) approval was required. The proposal was submitted to the Texas Tech University Human Research Protection Program for review under the expedited category. With four of the experimental groups not receiving a $2 incentive while the other four groups received an incentive, beneficence was an ethical consideration for this study. Deception was also used in the study because participants were under the perception they were taking a survey to help with research on challenges faced by secondary school agricultural education teachers. Participants had no way of knowing the purpose of the research was actually to study response rates under varying conditions. To disclose deception to participants and ensure beneficence was equal for all participants, IRB required a debriefing email be delivered after the study was completed explaining how deception was used as well as compensation for participants that were not in experimental groups that received the $2 incentive.

Data were compiled in Qualtrics for web surveys and manually entered into a Microsoft Excel spreadsheet for mail/paper surveys. All data for this study were analyzed in IBM SPSS version 26. Basic descriptive statistics for demographic information and response rates across and within treatment groups were calculated including frequencies, percentages, means, and standard deviations. To test the hypotheses in objective one, a two way, between-subjects, factorial ANOVA was calculated. For objectives two and three, independent samples *t*-tests were calculated. Significance was established *a priori* at $p \leq 0.05$. To conduct a cost analysis comparing the use of survey incentives, survey response mode, and response rates, expenses such as postage, stationary, and printing were recorded for each treatment group. The total cost of conducting the study for each treatment was divided by the total number of responses in each treatment group to get an overall cost per response for each treatment.

Results

With all eight experimental groups combined, there were 444 responses received for an overall response rate of 40.85%. Experimental group response rates ranged from 31.85% (n = 43) for Group 8 to 51.85% (n = 70) for Group 2. A total of 227 (51.13%) paper responses were received with the combined eight groups, while 217 (48.87%) online responses were received. Response rates achieved for each experimental group are presented in Table 4. Responses were received from 49 out of 50 states. No surveys were completed and returned from the state of Maine.

Table 4

Achieved Response Rates for Experimental Groups by Response Mode (N = 444)

	Paper		Web		Total	
Group	*n*	*%*	*n*	*%*	*n*	*%*
1 (*n = 137)*	66	48.18	0	0.00	66	48.18
2 (*n = 135)*	0	0.00	70	51.85	70	51.85
3 (*n = 135)*	52	38.52	12	8.89	64	47.41
4 (*n = 137)*	10	7.30	51	37.23	61	44.53
5 (*n = 135)*	45	33.33	0	0.00	45	33.33
6 (*n = 137)*	0	0.00	47	34.31	47	34.31
7 (*n = 136)*	43	31.62	5	3.68	48	35.29
8 (*n = 135)*	11	8.15	32	23.70	43	31.85
Total (*N = 1, 087)*	227	20.88	217	19.96	444	40.85

Demographic information collected from participants revealed near equal participation from male (*n* = 227, 51.13%) and female (*n* = 215 48.42%) SBAE teachers. The majority of participants indicated they were White or Caucasian (*n* = 415, 93.47%) while 14 (3.15%) were Hispanic or Latino, two (0.45%) were Black or African American, one (0.23%) was Asian or Pacific Islander, seven (1.58%) were Native American or Alaskan Native, two (0.45%) were multiracial or biracial, and three (0.68%) did not respond. Participants had an overall average age of 38.69 years (*SD* = 11.31) and average teaching experience of 13.05 years (*SD* = 10.17). Overall, 219 (49.44%) participants reported having a bachelor's degree as their highest level of education and 216 (48.76%) had a master's degree with 82.43% (*n* = 366) reporting earning teaching certification through a traditional university setting. The final demographic variable examined in this study was survey mode preference. Participants were asked to indicate how they prefer to respond to a survey. The majority of participants preferred to answer online (*n* = 354, 79.73%), 73 (16.44%) preferred to answer on paper, five (1.13%) preferred telephone, four (0.90%) indicated other, and eight (1.80%) did not respond.

The first hypothesis tested for objective one was the main effect on response of providing an incentive. The results indicated there was a significant difference on the main effect among groups depending on receipt of an incentive with $F(1, 1{,}079) = 22.75$, $p < .001$, and $\eta^2 = .01$. Given this information, the null hypothesis was rejected. The second hypothesis tested was the main effect on response for different response modes. According to the ANOVA summary table, there is no significant difference between groups based on response mode ($F(3, 1{,}079) = 0.46$, $p = 0.711$, $\eta^2 < .01$). We fail to reject the null hypothesis. The final hypothesis tested was the interaction effect of mode and incentive on response. The results indicated there was no significant difference between groups based on the interaction effect with $F(3, 1{,}079) = 0.24$, $p = 0.208$, and $\eta^2 < .01$. Since the null hypothesis was not rejected, *post hoc* comparisons were not needed. The complete ANOVA summary table for objective one is presented in Table 5.

Table 5

Factorial ANOVA Summary Table Comparing Experimental Groups (N = 1,087)

Source	*SS*	*df*	*MS*	*F*	*p*	η^2
Incentive	5.41	1	5.41	22.75	<.001	.01
Mode	0.33	3	0.11	0.46	.711	<.01
Mode*Incentive	0.15	3	0.05	0.24	.208	<.01
Error	256.59	1,079	.24			

The second objective was to compare respondent questionnaire completion rates by receipt of incentive and final response mode used. An overall average of 98.84% (*SD* = 2.74) of questions were answered on the 131-item questionnaire. Table 6 presents a complete breakdown of the percentage of items completed by experimental group.

Table 6

Average Completion Percentage of 131-Item Questionnaire by Experimental Group (N = 444)

Group	*n*	*M*	*SD*
1	66	98.06	4.95
2	70	98.56	4.06
3	64	98.91	1.03
4	61	99.46	0.60
5	45	99.00	1.22
6	47	99.19	0.92
7	48	99.01	1.21
8	43	98.72	2.47
Overall	444	98.84	2.74

To compare questionnaire completion rates of those receiving an incentive and those not receiving an incentive, an independent samples *t*-test was conducted. The null hypothesis stated there is no difference in questionnaire completion rates when comparing respondents receiving an incentive to those who did not. The difference between completion rates of those receiving an incentive (*M* = 98.73%, *SD* = 3.33) and those not receiving an incentive (*M* = 98.99%, *SD* = 1.55) resulted in a *t*-score (t_{442} = -0.97, *p* = 0.33) indicating no difference between groups. The null hypothesis for this test was not rejected. These findings are summarized in Table 7.

Table 7

Comparison of Questionnaire Completion Rates by Receipt of Incentive (N = 444)

Variable	*n*	*M*	*SD*	t_{442}	*p*
Incentive	261	98.73	3.33	-.97	.33
No Incentive	183	98.99	1.55		

To compare questionnaire completion rates of those answering on paper to those answering online, an independent samples *t*-test was conducted. The null hypothesis stated there was no difference in questionnaire completion rates when comparing those responding on paper to those responding online. The difference between completion rates of those responding on paper (*M* = 98.62%, *SD* = 3.00) and those responding online (*M* = 99.06%, *SD* = 2.42) resulted in a *t*-score (t_{442} = -1.72, *p* = 0.09) indicating no significant difference between groups. The null hypothesis for this test was not rejected. These findings are presented in Table 8.

Table 8

Comparison of Questionnaire Completion Rates by Response Mode (N = 444)

Response Mode	*n*	*M*	*SD*	t_{442}	*p*
Paper	227	98.62	3.00	-1.72	.09
Online	217	99.06	2.42		

The third objective of this study was to compare respondent summated scale scores by receipt of incentive and final response mode used. Average summated scale scores were calculated for each

respondent for each of the six constructs from the questionnaire used in this study. The scale ranged from *1 = very negative influence* to *6 = very positive influence*. Independent samples *t*-tests were used to compare responses for those receiving an incentive to those not receiving an incentive for each construct. There were no significant differences between scores for those receiving an incentive compared to those not receiving an incentive for any of the six constructs. This information is summarized in Table 9.

Table 9

Comparison of Construct Scores by Receipt of Incentive (N = 444)

	Incentive (n = 261)		No Incentive (n = 183)			
Construct	M	SD	M	SD	t_{442}	p
1. Relationships	4.78	0.46	4.77	0.44	-0.25	.80
2. Classroom	4.50	0.58	4.52	0.53	0.38	.71
3. Program	4.64	0.63	4.63	0.64	-0.06	.95
4. Miscellaneous	4.03	0.68	3.92	0.71	-1.57	.12
5. Professionalism	4.56	0.73	4.57	0.71	0.10	.92
6. Personal	4.08	0.93	3.96	0.97	-1.31	.19

Independent samples *t*-tests were used to compare responses on paper to responses online for each construct. The results of these tests are presented in Table 10. For all constructs, the mean summated score was higher for paper responses compared to online responses. Responses for constructs one, two, five, and six were all significantly higher for those answering on paper compared to those answering online. Responses for constructs three and four were not significantly different depending on final response mode.

Table 10

Comparison of Construct Scores by Final Response Mode (N = 444)

	Paper (n = 227)		Online (n = 217)			
Construct	M	SD	M	SD	t_{442}	p
1. Relationships	4.82	0.45	4.73	0.46	1.99	.05
2. Classroom	4.57	0.51	4.45	0.60	2.26	.02
3. Program	4.68	0.65	4.58	0.63	1.63	.10
4. Miscellaneous	4.04	0.67	3.92	0.73	1.85	.06
5. Professionalism	4.65	0.70	4.48	0.73	2.59	.01
6. Personal	4.13	0.94	3.93	0.95	2.28	.02

The final objective was to conduct a cost analysis comparing survey modes, incentives, and response rates. Receipts were kept from the purchase of materials for all steps in the process. For the purpose of this study, labor costs were not factored into final costs. Email contacts were considered to be no cost. Expenses incurred with this experiment included envelopes, stamps, copies of the questionnaire, cover letters, online instruction sheets, metered postage, and incentives. These costs varied across experimental groups depending on what was required for the assigned response mode or use of incentive. Postage and incentives were the greatest costs for this study. Table 11 has a breakdown of material costs per individual for mail contact supplies.

Table 11

Individual Material Costs for Mail Contact Supplies

		Experimental Groups Receiving Item	
Supply Item	Cost	1st Mail Contact	2nd Mail Contact
#9 Envelope	$0.07	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8
#10 Envelope	$0.07	1,3,5,7	1,4,5,8
Return Envelope Stamp	$0.55	1,3,5,7	1,4,5,8
Printed Paper Questionnaire	$0.12	1,3,5,7	1,4,5,8
Printed Cover Letter	$0.05	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8
Printed Online Instruction Sheet	$0.05	2,4,6,8	2,3,6,7
Metered Postage	$0.52	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8
Incentive	$2.00	1,2,3,4	-

When examining the overall average cost per response received for each experimental group, responses from group six were the least expensive at $3.54 while responses from group one were the most expensive at $8.98 per response. Overall, mail responses were the most expensive and online responses were the least expensive. A summary of the average cost per response received is presented in Table 12.

Table 12

Average Cost Per Response Received by Experimental Groups (N = 444)

Group	Responses (*n*)	Total 1st & 2nd Mailing Cost	Cost/Response
1	66	$592.78	$8.98
2	70	$420.42	$6.01
3	64	$524.73	$8.20
4	61	$493.27	$8.09
5	45	$346.50	$7.70
6	47	$166.29	$3.54
7	48	$262.33	$5.47
8	43	$242.84	$5.65
Overall Total	444	$3,049.15	$6.87

Conclusions, Implications, and Recommendations

From the results of this experiment, it can be concluded providing an incentive significantly increases survey response rates with SBAE teachers. In this study the increase in response ranged from approximately 12% to 17% more responses. The significance of providing an incentive on response rates was to be expected since it has been recommended by many as the second most effective way to increase responses (Ary et al., 2014; Dillman et al., 2014; James & Bolstein, 1990; Mercer et al., 2015; Mertler & Charles, 2011). Incentives increased survey response with SBAE teachers at similar rates found in the literature, confirming findings of other studies with a different population (Millar & Dillman, 2011). Increases in response across all modes may indicate an incentive pulls in respondents who normally would not answer with the potential to reduce nonresponse bias, a benefit highlighted by Dillman et al. (2014).

Response mode used had little influence on SBAE teacher response rates; however, effect size was very small making this difficult to detect with our selected sample size. This conclusion was contradictory to what others have found where mail surveys resulted in the highest response rates (Dillman et al., 2014; Messer & Dillman, 2011; Olson et al., 2012). Online-only group response rates exceeded mail-only groups regardless of incentive, although these differences still were not significant. Literature indicated mail

surveys could achieve 50% or greater response rates (Dillman et al., 2014), however 50% response was not achieved in either group regardless of incentive use. Several studies indicated web response rates were the lowest of any survey mode (Dillman et al., 2014; Messer & Dillman, 2011; Olson et al., 2012; Ye, 2007). This was not the case with SBAE teachers. When an incentive was provided, online was the mode receiving the greatest response. For mixed-mode studies, Messer and Dillman (2011) found that 44-52% response rates could be achieved. Response rates for both mixed-mode groups receiving an incentive fell in this range, however those not receiving an incentive were less. SBAE teachers also did not produce significant differences in response rates with mixed modes based on the sequence of mixing the modes. Finally, there was no significant interaction effects found on response rates from incentives and response mode. This indicates that incentives had the same effect across all response modes used in this study.

Through the lens of social exchange theory, incentives appear to be an element that impacts SBAE teachers' decision to respond to a survey. Dillman et al. (2014) suggested the chances of convincing participants to respond are higher when many aspects of a survey request work together to encourage response. This was observed in this experiment when comparing differences in response rates for groups based on incentive. Mode, on the other hand, does not seem to significantly contribute to the decision to respond or have an effect on perceived costs, benefits, and trust when surveying SBAE teachers.

After examining completion rates of questionnaires returned by SBAE teachers who received an incentive compared to those who did not receive an incentive, there was no significant difference between the two groups. James and Bolstein (1990) suggested providing incentives to encourage more complete and clarifying responses on questionnaires, particularly with open-ended questions. Since this study only had one open-ended question, overall completion rates were examined instead. It does not appear an incentive helps with completion rates of closed-ended questions when studying SBAE teachers. Dixon and Turner (2007) noted there is an opportunity to check for differences in response quality when comparing different response modes. In terms of completion rate of the questionnaire as an indicator of response quality, both online and paper completion rates were near 99% with online being slightly higher. There was no significant difference found in completion rates indicating response mode did not affect how much of a questionnaire was completed by SBAE teachers. The findings from this objective are also likely an indicator that both online and paper versions of the questionnaire were viewed similarly in the decision to respond to questions, meeting the goal of keeping this variable constant.

When comparing scale scores of respondents receiving an incentive to those not receiving an incentive, there were no significant differences found. This indicates incentive did not influence how teachers responded. James and Bolstein (1990) recommended using caution when using incentives because they can cause respondents to provide more favorable responses because they feel rewarded, resulting in bias. It appears incentive did not have this effect with this study.

In this study, SBAE teachers produced significantly more positive responses on four of the six constructs measured when responding on paper. Differences in scale measurement are possible with web surveys when compared to a paper survey (Roberts, 2007; Sedwick, 2003). Design of the questionnaires across the different modes and differences in demographics of those responding are possible explanations from Roberts (2007) and Sedwick (2003) for why this could happen in their studies. In this study, the design of the questionnaire and scales were held constant across both modes. A possible explanation for why differences in scale scores occurred across modes is that those responding online felt a higher level of anonymity and were able to express more negative feelings. Higher perceived anonymity for web surveys is an advantage of using online response modes according to several scholars (Evans & Rooney, 2008; Fraenkel et al., 2019; Gay et al., 2012; Roberts, 2007). Those answering on paper may have felt like their responses were less anonymous and were more reluctant to indicate negative feelings toward different aspects of their job. However, this study did not directly collect data on this matter.

Practicality of using incentives and different response modes comes into play with the final objective. We found that incentives increase response rates but is it worth the cost? Mixing response modes can provide higher quality data but at what cost to the researcher? The average cost per response when using the $2.00 incentive was more expensive than when incentives were not used but better response rates were achieved. Since there were no differences in scores depending on incentive, the question becomes is it worth the investment? Did the increase in response from using an incentive reduce nonresponse error even if the scores between the two groups were the same? It would stand to reason that there would be differences in response scores if a greater portion of the population is reached if there were going to be differences between respondents and nonrespondents. However, addressing this issue was beyond the scope of this study. If a researcher's goal is to obtain more responses for analysis, then the additional cost of an incentive may be worth the investment. If the study has to be conducted under a limited budget, the extra expense is probably not worth the investment.

Mail surveys are known to be more expensive than web only or mixed-mode surveys, as was found with our study (Mertler & Charles, 2011). When incentives were used, mail surveys were approximately $3.00 more expensive per response than online surveys. When incentives were not used, mail surveys were approximately $4.00 more expensive per response than online surveys. However, given that differences were found in scores between these two modes, it is difficult to recommend using online surveys over mail. It should be noted the cheapest mode per response was online without an incentive at $3.54. This was approximately $2.00 cheaper per response compared to any other mode not using an incentive. The same $2.00 savings per response compared to other modes was also observed when an incentive was provided. Reduced costs of using online surveys continues to be an advantage that is difficult to ignore as was noted by several scholars (Dillman et al., 2014; Fraenkel et al., 2019; Gay et al., 2012; Greenlaw, 2006; Mertler & Charles, 2011; Roberts, 2007; Sedwick, 2003).

For mixed-mode surveys, the literature suggests using the cheaper response mode first, followed by the more expensive mode to reduce costs (Dillman et al., 2014; Wagner et al., 2017). In the case of this study, this would mean using the online response mode first and switching to mail response at the end of the study. When an incentive was used in this study, the average response was $0.11 cheaper when using web first then switching to mail, aligning with the suggestions of Dillman et al. (2014) and Wagner et al. (2017) on the subject of cost. When an incentive was not used, the web first then switching to mail response was $0.18 more expensive per response, differing from their suggestion. Overall, both mixed modes were cheaper than mail only responses by about $1.00 when incentives were used and $2.00 when incentives were not used. This was expected as it is one of the main advantages of using mixed-mode survey procedures (Dillman et al., 2014; Greenlaw, 2006; Millar & Dillman, 2011). In both cases of using an incentive and not using an incentive, the cost of mixed-mode surveys were about $2.00 more expensive per response compared to the online only mode. While collecting data both on paper and online has the advantage of providing higher quality data because of the difference of scores observed in this study, is it worth the extra $2.00? The answer to this question is likely up to each individual researcher and their available budget.

Recommendations for practice emerging from this experiment include using incentives and over sampling when studying SBAE teachers. Incentives should be used to gain better response rates from this population when budget allows. Since survey data collection mode used does not impact response rates, other factors such as completion rates, quality of data across modes, and cost should influence the mode decision. Oversampling may be used to reach a desired sample size based on results from specific conditions in this study. Oversampling could be used to strengthen power of a study. In fact, Ary et al. (2014) and Dillman et al. (2014) recommended oversampling to achieve a desired sample size. However, oversampling does not necessarily fix the problem of nonresponse error if those responding are still different from those who are not responding (Fraenkel et al., 2019). Nevertheless, it is widely accepted higher response rates are

less likely to have nonresponse bias than lower response rates (Ary et al., 2014; Dillman et al., 2014; Fraenkel et al., 2019).

Dillman et al. (2014) recommended using mixed-mode surveys to improve the quality of data collected for a study. Since differences were found in scores across response modes in this study, Dillman's recommendation should be considered when studying SBAE teachers. This study has found few advantages to conducting a mixed-mode study, however, the possibility of having a higher quality data set from multiple modes is an advantage. When quality of data is not the greatest concern in designing the survey procedures, the online-only mode seems to be the least expensive and results in the highest response rates. The decision of which survey mode to use really belongs to the researcher and where their priorities lie with budget and data quality.

Further research should be conducted on the effects of contact mode used to improve response rates rather than response mode. Mixed contact modes were used across all experimental groups; however, this is not really used often in agricultural education research (Doss et al., 2021). Communication was the largest expense in this study, even above incentives. Information from research conducted based on contact mode may help identify more efficient ways to save money when conducting surveys. This study found responses differed on scale scores between online and paper respondents. Further research should be conducted to determine why this happens and the effects this has on interpreting scores from each mode. Finally, qualitative research should be used to determine why some SBAE teachers do not respond to surveys. Efforts should be made to personally contact those who did not answer a survey and collect qualitative data as to why they did not respond. What could researchers do to better convince nonrespondents to respond? Are researchers asking questions relevant to agricultural education teachers and worthy of their time? These are questions that lend themselves to a qualitative inquiry.

Survey research procedures are constantly changing based on the available technology. Many factors influence the decision to respond to a survey. We suspect the level of influence of many factors is constantly changing for an individual. However, there are likely a few factors that make up the majority of the decision to respond. Research in survey methodology should continue to attempt to identify these factors and take advantage of them. Survey research is an evolving field and will have a continued need for study in the future if we are to continue improving the quality of research in agricultural education. We believe this is an endeavor our profession should continue to pursue into the future.

References

American Association for Agricultural Education (n.d.). *Vision, mission & core values*. http://aaaeonline.org/about

Ary, D., Jacobs, L. C., Sorensen, C. K., & Walker, D. A. (2014). *Introduction to research in education* (9th ed.). Wadsworth Cengage Learning.

Blau, P. M. (1964). *Exchange and power in social life.* John Wiley & Sons, Inc

Bordens, K. S., & Abbott, B. B. (2018). *Research design and methods: A process approach* (10th ed.). McGraw-Hill Education.

Couper, M. P. (2011). The future of modes of data collection. *Public Opinion Quarterly, 75*(5), 889-908. https://doi.org/10.1093/poq/nfr046

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method* (4th ed.). Wiley.

Dixon, R., & Turner, R. (2007). Electronic vs. conventional surveys. In R. A. Reynolds, R. Woods, & Baker, J. D. (Eds.), *Handbook of research on electronic surveys and measurements* (pp. 104-111). Idea Group Reference.

Doss, W., Rayfield, J., Burris, S., & Lawver, D. (2021). A quantitative content analysis of survey research methods over a 40-year time period in the *Journal of Agricultural Education*. *Journal of Agricultural Education, 62*(3), 310-328. https://doi.org/10.5032/jae.2021.03310

Dyer, J. E., Haase-Wittler, P. S., & Washburn, S. G. (2003). Structuring agricultural education research using conceptual and theoretical frameworks. *Journal of Agricultural Education, 44*(2), 61-74. https://doi.org/10.5032/jae.2003.02061

Evans, A. N., & Rooney, B. J. (2008). *Methods in psychological research*. SAGE Publications.

Faul, F., Erdfelder, E., Lang, A-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175-191. https://doi.org/10.3758/bf03193146

Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). *How to design and evaluate research in education* (10th ed.). McGraw-Hill.

Gay, L. R., Mills, G. E., & Airasian, P. (2012). *Educational research: Competencies for analysis and applications* (10th ed.). Pearson.

Greenlaw, C. P. (2006). *A comparison of web-based and paper-based survey methods: Testing assumptions of survey mode and response cost* (Publication No. 3230719) [Doctoral dissertation, California State University, Fresno & University of California, Davis]. UMI Microform.

James, J. M., & Bolstein, R. (1990). The effect of monetary incentives and follow-up mailings on the response rate and response quality in mail surveys. *Public Opinion Quarterly, 54*(3), 346-361. https://www.jstor.org/stable/2749372

Johnson, D. M., & Shoulders, C. W. (2017). Power of statistical tests used to address nonresponse error in the *Journal of Agricultural Education*. *Journal of Agricultural Education, 58*(1), 300-312. https://doi.org/10.5032/jae.2017.01300

Johnson, D. M., & Shoulders, C. W. (2019). Beyond magic words and symbols: Rethinking common practices in quantitative research. *Journal of Agricultural Education, 60*(3), 291-303. https://doi.org/10.5032/jae.2019.03291

Lang, M. (2007). Dual-mode electronic survey lessons and experiences. In R. A. Reynolds, R. Woods, & Baker, J. D. (Eds.), *Handbook of research on electronic surveys and measurements* (pp. 65-75). Idea Group Reference.

Leeper, T. J. (2019). Where have the respondents gone? Perhaps we ate them all [Special issue]. *Public Opinion Quarterly, 83*, 280-288. https://doi.org/10.1093/poq/nfz010

Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education, 42*(4), 43-53. https://doi.org/10.5032/jae.2001.04043

Maxwell, S. E., Harold, D. D., & Kelley, K. (2018). *Designing experiments and analyzing data: A model comparison perspective* (3rd ed.). Routledge.

Mercer, A., Caporaso, A., Cantor, D., & Townsend, R. (2015). How much gets you how much? Monetary incentives and response rates in household surveys. *Public Opinion Quarterly, 79*(1), 105-129. https://doi.org/10.10193/poq/nfu059

Mertler, C. A., & Charles, C. M. (2011). *Introduction to educational research* (7th ed.). Pearson.

Messer, B. L., & Dillman, D. A. (2011). Surveying the general public over the internet using address-based sampling and mail contact procedures. *Public Opinion Quarterly, 75*(3), 429-457. https://doi.org/10.1093/poq/nfr021

Millar, M. M., & Dillman, D. A. (2011). Improving response to web and mixed-mode surveys. *Public Opinion Quarterly, 75*(2), 249-269. https://doi.org/10.1093/poq/nfr003

Miller, L. E., & Smith, K. L. (1983). Handling nonresponse issues. *Journal of Extension, 21*(5), 45-50.

National Association of Agricultural Educators. (2020). *What is agricultural education?* https://www.naae.org/whatisaged/index.cfm

Neal, Z., Neal, J. W., & Piteo, A. (2020). Call me maybe: Using incentive and follow-ups to increase principals' survey response rates. *Journal of Research on Educational Effectiveness, 13*(4), 784-793. https://doi.org/10.1080/19345747.2020.1772423

Olson, K., Smyth, J. D., & Wood, H. M. (2012). Does giving people their preferred survey mode actually increase survey participation rates? An experimental examination. *Public Opinion Quarterly, 76*(4), 611-635. https://doi.org/10.1093/poq/nfs024

Park, Y., & Tsuchiya, T. (2021). Improving mail survey response rates in Japan: empirical tests for envelopes, request letters, questionnaires, and schedules. *International Journal of Social Research Methodology, 24*(1), 15-29. https://doi.org/10.1080/13645579.2020.1756618

Roberts, L. D. (2007). Opportunities and constraints of electronic research. In R. A. Reynolds, R. Woods, & Baker, J. D. (Eds.), *Handbook of research on electronic surveys and measurements* (pp. 19-27). Idea Group Reference.

Rogelberg, S. G., Fisher, G. G., Maynard, D., Hakel, M. D., & Horvath, M. (2001). Attitudes toward surveys: Development of a measure and its relationship to respondent behavior. *Organizational Research Methods, 4*(1), 3-25. https://search-proquest-com.lib-e2.lib.ttu.edu/docview/195062201?pq-origsite=summon

Sedwick, J. L. (2003). *A comparison of three data collection survey modes among Southern Baptist youth workers: Group administered, e-mail/web, and mail* (Publication No. 3108671) [Doctoral dissertation, Southwestern Baptist Theological Seminary]. UMI Microform.

Wagner, J., Schroeder, H. M., Piskorowski, A., Ursana, R. J., Stein, M. B., Heeringa, S. G., & Colpe, L. J. (2017). Timing the mode switch in a sequential mixed-mode survey: An experimental evaluation

of the impact on final response rates, key estimates, and costs. *Social Science Computer Review, 35*(2), 262-276. https://doi.org/10.1177/0894439316654611

Ye, J. (2007). Overcoming challenges to conducting online surveys. In R. A. Reynolds, R. Woods, & Baker, J. D. (Eds.), *Handbook of research on electronic surveys and measurements* (pp. 83-89). Idea Group Reference.