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An Evaluation of Successful Collaboration Among Agricultural Science Teachers and Extension Agents in Texas

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The purpose of this research was to investigate collaboration between agricultural science teachers and Extension agents in Texas from the perspective of successful collaboration. Programs, leaders, and participants in both agricultural education and Extension can be impacted positively through collaboration. However, successful collaboration ultimately rests upon the commitment of individuals and the willingness of these individuals to work together and "collaborate" with one another. This study examined factors indicated in the literature as enablers of collaboration in the context of collaboration among agricultural science teachers and Extension agents in an effort to document best practices. Specific objectives included: (a) documentation of the environment in which successful collaboration was taking place, (b) description of areas of collaboration, (c) description of the impact of Internet–based technologies, and (d) identification of the major factors influencing collaboration. Findings provided insight into factors that can facilitate collaboration.

Keywords: collaboration, agricultural education, extension, agricultural science

Introduction

The goal of this research was to investigate collaboration among agricultural science teachers and Extension agents in Texas from the perspective of successful collaboration. Why are some agents and teachers able to collaborate effectively? Are there characteristics of the individuals or the settings that can help or hinder cooperation between these two groups? This multi–phase study was conducted to document promising practices that encourage collaboration among Extension agents and agricultural science teachers in Texas.

The desire to encourage collaboration among Extension agents and agricultural science teachers has been documented as being important. Graham (1994) stated, "I am not advocating joining clubs at the school or community level, but rather a joining of resources for the elimination of unnecessary competition" (p. 9). Gamon (1995) stated, "A willingness to network and collaborate with Extension educators will return very positive dividends for agricultural education teachers" (p. 20). In a study conducted by Ricketts and Place (2005), it was found that interdisciplinary cooperation was perceived as important by both Extension agents and agricultural education teachers. The need to encourage collaboration is especially critical at a time when budgets and time are short, yet the need for programming is high. Ultimately, the implementation of collaboration efforts rests on the willingness of the individual.

Theoretical Framework

Defining Collaboration

The terms cooperation, coordination, and collaboration are often used interchangeably. Mattessich and Monsey (1992) defined these three terms on a continuum of durability. Cooperation was described as informal without structure, while coordination was defined as more formal relationships, and collaboration

suggested "a more durable and pervasive relationship" (p. 39). When looking specifically at collaboration, it is important to note that various authors have defined collaboration in different ways. Mattessich and Monsey (1992) defined collaboration as "a mutually beneficial and well–defined relationship entered into by two or more organizations to achieve common goals" (p. 7). Wood and Gray (1991) shared that in the process of seeking a definition of collaboration, the authors found a "welter of definitions" (p. 144). These authors defined collaboration as, "… when a group of autonomous stakeholders of a problem domain engage in an interactive process, using shared rules, norms, and structures, to act or decide on issues related to that domain" (p. 145). For the purpose of this study, collaboration was defined as agricultural science teachers and Extension agents engaging in sustained cooperation and group effort over time, with a common purpose for the benefit of both agencies, key stakeholders, and the community.

Importance of Collaboration

The importance of collaboration within agriculture has been studied in different contexts. Dormody (1992) explored the concept of "resource sharing," an element of collaboration, between secondary agricultural science teachers and their respective science departments. This study found that agricultural science teachers did in fact share resources with their respective science departments; however, the amount of sharing could be improved. The study also indicated the importance of improved communication and awareness as factors that impact the sharing of resources. Osborne and Dyer (1998) looked at attitudes of high school science teachers toward agricultural science programs and found that "one–half of the science teachers reported some collaboration with agricultural teachers" (p. 8). "These attitudes also influence their tendencies to collaborate with agriculture teachers in offering new agriscience courses" (Osborne & Dyer, 1998, p. 9). Whent (1994) built upon the concept of studying factors that influence the sharing of resources by measuring the impact of participation in an *Agriscience Institute and Outreach Program*. Whent found that participation in the program had indeed increased the sharing of resources between departments.

The concept of collaboration among Extension agents and agricultural science teachers is not new. Diatta and Luft (1986) conducted a study to determine the level of cooperation between vocational agriculture teachers and county agents in North Dakota. The authors specifically looked at the influence of sixteen factors of cooperation. These factors included: short distance between school and office, initiative in making contact, informal relationships, clients being served, age similarity, discussing factors affecting educational programs, recognition of credit, tenure in position, formal education, client recognition, relationship between school and Extension office, years of experience, difference of age, time conflicts, lack of clarity, and long distance between school and office. Of these factors, only four had a neutral or negative impact on cooperation: "difference in age, long distance (greater than 20 miles) between school and county Extension office, time conflicts in getting together for cooperative efforts, and lack of clarity of functions" (p. 9). Hillison (1996) stated: "Today's agricultural educator and cooperative Extension leaders need to look at the historical memoranda of understanding to find precedent–setting points of agreement and points of controversy in order to best facilitate collaboration" (p. 9).

Lacy (1996) addressed collaboration in a broad sense when he stated the importance of collaboration across research, Extension, and user partnerships. While collaboration among agricultural science teachers and Extension agents are merely one small part of the collaboration described, it is important to recognize the significance of collaboration. Lacy stated, "Finally, agendas of the research/extension/user system will need to arise out of negotiation, persuasion, and coercion involving the full range of clients, Extension educators, and researchers, if it is to more effectively meet the future needs of our food system both domestically and globally" (p. 40). While this statement is beyond the scope of this study, it is important to recognize that collaboration ultimately takes place at the individual level and that all collaboration efforts will contribute to the goal stated by Lacy.

Factors Impacting Collaboration

Deutsch (1949) explored the concept of cooperation and competition in his article entitled *A Theory of Co–operation and Competition.* Given that agricultural Extension and agricultural education are seen as both competitors and colleagues, it is important to consider these elements in the context of improving collaboration. Deutsch identified the following group aspects as ones that need to be considered: "organization, motivation, communication, orientation, productivity, interpersonal relations, and individual behavior" (p. 141). The author shared that each of these aspects can impact how groups function.

Grage, Ricketts, and Place (2002) conducted a qualitative study to explore "cooperation and collaboration perceptions among agricultural educators and Extension faculty" (Abstract, para. 2). This study revealed that relationships, awareness, understandings, and perceptions were critical in the positive influence of cooperation. The study further revealed a "lack of strong collaboration between [the] disciplines" (Abstract, para. 3). An awareness of job function was revealed as one factor that impacted the success of collaboration. In 1986, Diatta and Luft reported that agricultural science teachers and Extension agents "need to be made more aware of the functions of each other's job" (p. 12).

Mattessich and Monsey (1992) conducted an extensive review of literature focused on factors that influence successful collaboration. One of the goals of the report generated was to "review and summarize the existing research literature on factors that influence the success of collaboration" (p. 2). This report provided a strong theoretical base for understanding collaboration and the factors that can impact the success of collaboration. Mattessich and Monsey (1992) identified 19 factors that can influence collaboration and grouped the factors into six categories: environment, membership characteristics, process/structure, communication, purpose, and resources. The *environmental factor* was related to cooperation in the community from the perspective of political climate and overall history within the community. *Membership characteristics* were related to "mutual respect, understanding, & trust" (p. 12), representation by all community segments, self–interest, and the "ability to compromise" (p.12). *Process/Structure* was related to the feeling of *ownership* of both the process and the results, looking at how open and flexible members are. *Communication* was related to frequency and openness in both informal and formal channels. *Purpose* was related to the extent to which there are shared goals and vision that yield a unique purpose. Finally, *resources* were related to both financial and human resources.

Grage, Place, and Ricketts (2004) confirmed many of these factors as being important in encouraging collaboration. The authors reported "a good working relationship" (Relationship Between, para. 1), "mutual respect and essential communication" (Relationship Between, para. 1), "history of cooperation" (Relationship Between, para. 3), and "former relationships" (Relationship Between, para. 4). One specific barrier reported was the "lack of awareness of the other profession" ("Awareness," para. 1). It was noted by the authors that educators' and agents' "perceptions regarding cooperation and competition" ("Understanding," para. 1) impacted their collaboration. The authors recommended activities such as joint preparation activities and educational activities for agents and teachers to learn about each other's professions. Additionally, the authors stated that "future research should continue to focus on the perceptions, attitudes, and motivations behind both groups as it pertains to developing cooperative relationships" (Conclusions, para. 5).

When considering the concept of collaboration, it is important to recognize the role that the organization plays in facilitating or hindering collaboration at the individual level. van de Ven (1976) provided a theoretical foundation for studying "inter–organizational relationships" (p. 25). He shared that similarity in goals, where finances are obtained, professional skills of members, services, and customers will impact the extent to which agencies will take part in inter–organizational relationships. This concept ties directly to the concept of collaboration.

Successful collaboration ultimately rests upon the commitment of individuals and the willingness for these individuals to work together and *collaborate* with one another. There is a need to understand collaboration better and develop strategies to encourage

collaboration efforts between and among agricultural science teachers and Extension agents in order to develop youth effectively and efficiently across both programs. The National Research Agenda for Agricultural Education and Communications called for research that "enhance[s] program delivery models for agricultural education" (Osborne, 2007, p. 5). This study sought to address that call by studying collaboration between agricultural science teachers and Extension agents.

Purpose and Objectives

The purpose of this study was to examine factors of collaboration between agricultural science teachers and Extension agents. Successful collaboration was defined as sustained cooperation and group effort over time, with a common purpose for the benefit of both agencies, key stakeholders, and the community as perceived by state leaders in both Texas AgriLife Extension and the Vocational Agriculture Teachers Association of Texas. Specific objectives included: (a) document the environment in which successful collaboration was taking place, (b) describe areas of collaboration, (c) describe the use of Internet–based technologies, and (d) identify major factors influencing collaboration.

Methods / Procedures

Population and Sample

Participants were purposefully selected through a nomination process. Leaders in Texas AgriLife Extension and the Vocational Agriculture Teachers Association of Texas were asked to identify teachers and agents who collaborate well with their counterparts. The purposive sampling method was also utilized because there are approximately 1600 agricultural science teachers (Instructional Materials Service, 2009) and approximately 600 Extension agents (Texas AgriLife Extension Service, 2009) across the state of Texas. A first round list of potential participants was generated based on those responses. Potential participants were then asked to confirm that they collaborate well with their teacher/agent counterpart and provide names of counterparts they collaborate with. Names not already on the list were added. State agricultural science and Extension leaders nominated a total 45 individuals (21 agents; 24 teachers) as collaborating well with their counterparts. An additional 12 individuals (3 agents; 9 teachers) were identified by the participants in the study, creating a sample of 57 individuals (24 agents; 33 teachers). A total of 33 respondents (15 agents; 18 teachers) completed the online survey, yielding a response rate of 58%. Early and late responders were compared as suggested by Miller and Smith (1983) and Lindner, Murphy, and Briers (2001) and no statistically significant differences were found.

Instrumentation

The instrument consisted of an online survey that was created by the researchers based on the literature and input from experts in Extension and agricultural science education. The survey included the following categories: background/demographics, collaboration description, number of years of collaboration, areas of collaboration, use of Internet–based technologies to collaborate, identification of factors that influenced collaboration, and open–ended questions. The section focused on the identification of factors that influenced collaboration consisted of both a multiple choice question and a series of Likert Scale questions using a four–point scale (Strongly Disagree, Disagree, Agree, Strongly Agree). Likert Scale questions were constructed based on the article entitled *Collaboration: What Makes It Work* (Mattessich & Monsey, 1992). A total of 32 statements relating to each of the following constructs were included: environmental factors (4), membership characteristics (6), process and structure (4), communication (6), purpose (5), and resources (5). Two statements were independent of a construct. Statements were constructed in a way to document whether or not these factors were perceived by respondents as influencing collaboration. The instrument was analyzed by university faculty, state agricultural science leaders, and state Extension leaders for content validity. After minor revisions, a pilot test was conducted with a group of agricultural science teachers and Extension agents who were not selected to participate in the study. Instrument reliability was determined to be $\alpha = .87$.

Procedures and Analysis

The study reported here shares one part of a two–part study focused on collaboration between Extension agents and agricultural science teachers conducted in Fall 2009. The two parts included a survey with closed and open–ended questions (administered in September 2009) and a follow–up focus group session (administered in December 2009). Responses to the open–ended questions and focus group are not reported in this paper. Participants that elected to participate in this study were asked to: (a) identify agents/teachers that they collaborate effectively with in their county, and (b) complete a brief online survey that included questions related to demographics and collaboration. Responses were coded to ensure confidentiality using a coding system to track data collected from each participant. Institutional Review Board approval was received. Data were collected and e–mail reminders were sent to participants to encourage their participation in the study following Dillman's Tailored Design Method (2000). Data were entered into SPSS 17.0 and analyzed according to Gall, Gall, and Borg (2003). Descriptive statistics were used to describe the respondents and identify areas of collaboration, use of Internet–based technologies, and influences on collaboration. Independent sample t–tests were used to determine if differences existed between agents and teachers.

Limitation of the Study

Given that participants were not randomly selected, a limitation of the study exists because leaders in Texas AgriLife Extension and the Vocational Agriculture Teachers Association of Texas identified potential respondents, thus, those agents or teachers who are collaborating in ways not seen by leadership were not provided an opportunity to respond.

Results/Findings

Objective 1: Description of the Environment of Successful Collaboration

The study revealed that 84% of the participants were male and nearly 67% were between the ages of 31–50. Sixty–nine percent reported being employed in their current position more than six years. In fact, 48 percent reported being employed in their current position more than 10 years. Almost half (48.5%) reported working in a town of 5000 people or less and the majority (75.8%) reported that their program has between 101–500 participants. Seventy–eight percent of the subjects categorized themselves as working in a rural setting and 72% reported collaborating with their Extension or agricultural science counterpart for more than five years. In comparing agents to teachers, both groups were represented by similar numbers based on gender, age, years in position, location, and years of collaboration. More teachers (72%) than agents (20%) reported working in a community of 5000 people or less. In fact, 73% of agents reported working in communities larger than 10,000 people. Twenty–six percent of agents and no teachers reported working with over 500 students. Table 1 shares detailed demographic information.

Table 1
Agricultural Science Teachers' and Extension Agents' Demographic Information

	Agricultural Science Teachers $n = 18$		Extension Agents $n = 15$		Cumulative $N = 33$	
Demographic Characteristics	*f*	Percent	*f*	Percent	*f*	Percent
Gender						
Male	15	83.3	13	86.7	28	84.8
Female	3	16.7	2	13.3	5	15.2
Age						
21–30 years old	3	1.7	2	13.3	5	15.2
31–40 years old	7	38.9	6	40.0	13	39.4
41–50 years old	5	27.8	4	26.7	9	27.3
51 years old and over	3	16.7	3	20.0	6	18.2
Number of years in position						
Less than 1 year	0	0.0	0	0.0	0	0.0
1–5 years	5	27.8	5	33.3	10	30.3
6–10 years	3	16.7	4	26.7	7	21.2
More than 10 years	10	55.5	6	40.0	16	48.5
Size of Community						
5000 people or less	13	72.2	3	20.0	16	48.5
5001–10,000 people	2	11.1	1	6.7	3	9.1
10,001–20,000 people	1	5.5	3	20.0	4	12.1
20,0001–50,000 people	2	11.1	4	26.7	6	18.2
Greater than 50,000 people	0	0.0	4	26.7	4	12.1
Number of Students/Participants in program						
0–100	3	16.7	1	6.7	4	12.1
101–500	15	83.3	10	66.7	25	75.8
501–800	0	0.0	2	13.3	2	6.1
801–1000	0	0.0	0	0.0	0	0.0
Over 1000	0	0.0	2	13.3	2	6.1
Rural or Urban Location						
Rural	16	88.9	10	66.7	26	78.8
Urban	2	11.1	5	33.3	7	21.2
Years of Collaboration						
Less than 1 year	0	0.0	1	6.7	1	3.0
More than 1, less than 5 years	4	22.2	4	26.7	8	24.2
More than 5, less than 8 years	2	11.1	1	6.7	3	9.1
More than 8 years	12	66.7	9	60.0	21	63.6

Objective 2: Areas of Collaboration

Participants were asked which areas they collaborated in: livestock shows/fairs, equipment/facility sharing, guest speaker/content area expert, volunteer and/or other. Table 2 reveals the percentage of participants, as reported by both teachers and agents, who collaborate in these areas. Almost all (97%) of the respondents indicated that they collaborated in livestock shows/fairs and a majority (66%) of the respondents indicated collaboration in regard to equipment/facility sharing. A comparison between teachers and agents revealed that both groups collaborated equally on all areas listed with teachers (61%) indicating slightly more collaboration in regard to guest speaker/content area expertise than agents (46%). A total of 7 respondents indicated collaboration in "other" areas yielding five additional areas of collaboration.

Table 2
Agricultural Science Teachers' and Extension Agents' Reporting of Areas of Collaboration

Which of the following areas do you collaborate in?	Agricultural Science Teachers $n = 18$		Extension Agents $n = 15$		Cumulative $N = 33$	
	f[a]	Percent	f[a]	Percent	f[a]	Percent
Livestock shows/fairs	18	100	14	93.3	32	97.0
Equipment/facility sharing	10	55.6	12	80.0	22	66.7
Guest speaker/content area expert	11	61.1	7	46.7	18	54.5
Volunteer	13	72.2	13	86.7	26	78.8
Other[b]	3	16.7	4	26.7	7	21.2

[a]*Frequency of reporting of "Yes"*
[b]Other included: "Judging Teams," "Leadership," "Show Validations," "4–H," "Committee."
Note. The majority of respondents were male, with only 5 respondents being female.

Objective 3: Impact of Internet–based Technologies

Participants were asked if Internet–based technologies had impacted their collaboration efforts specifically in regard to Internet access, e–mail, social networks, blogs, and/or Twitter™. Tables 3 and 4 reveal the numbers and percentages of teachers and agents, respectively, who reported Internet–based technology impact on collaboration efforts. All teachers indicated that Internet (in the broad sense) and email had impacted their collaboration efforts. Seventy–three percent of agents indicated impact by the Internet and 86% indicated impact by email. Blogs and Twitter™ were reported as not having an impact on collaboration. Only one teacher indicated that Twitter™ had some impact on his/her collaboration efforts. Social networks were similarly indicated as having low impact. Sixteen percent of the teachers and 13% of the agents reported some level of impact.

Table 3
Agricultural Science Teachers' Reporting of Internet–based Technologies Impact on Collaboration Efforts

	Agricultural Science Teachers (n = 18)					
	No		*Yes – Some*		*Yes – A Lot*	
	f	Percent	*f*	Percent	*f*	Percent
Internet Access (in the broad sense)	0	0	13	72.0	5	27.8
E–mail	0	0	4	22.2	14	77.8
Social Networks (i.e., Facebook™, MySpace™)	14	77.8	1	5.6	2	11.1
Blogs	16	88.9	0	0	0	0
Twitter™	16	88.9	1	5.6	0	0

Table 4
Extension Agents' Reporting of Internet–based Technologies Impact on Collaboration Efforts

	Extension Agents (n = 15)					
	No		*Yes – Some*		*Yes – A Lot*	
	f	Percent	*f*	Percent	*f*	Percent
Internet Access (in the broad sense)	4	26.7	10	66.7	1	6.7
E–mail	2	13.3	8	53.3	5	33.3
Social Networks (i.e., Facebook™, MySpace™)	11	73.3	2	13.3	0	0
Blogs	12	80.0	0	0	0	0
Twitter™	13	86.7	0	0	0	0

Objective 4: Factors Influencing Collaboration

Participants were asked to identify whether or not the elements of necessity, convenience, incentives, relationships, and/or knowledge sharing, had influenced them to collaborate. Table 5 reveals the results of both teachers' and agents' responses. Relationships and knowledge sharing were reported by 88% of teachers and over 80% of agents as influencing collaboration. Necessity and convenience were reported by 61% of teachers and over 66% of agents as influencing their collaboration efforts. Only a limited number of respondents (11% of teachers and 33% of agents) reported incentives as an influence.

Table 5
Agricultural Science Teachers' and Extension Agents' Reporting of Elements that have Influenced Collaboration

What has influenced you to collaborate?	Agricultural Science Teachers (n = 18)		Extension Agents (n = 15)		Cumulative (N = 33[b])	
	f[a]	Percent	f[a]	Percent	f[a]	Percent
Necessity	11	61.1	11	73.3	22	66.7
Convenience	11	61.1	10	66.7	21	63.6
Incentives	2	11.1	5	33.3	7	21.2
Relationships	16	88.9	13	86.7	29	87.9
Knowledge Sharing	16	88.9	12	80.0	28	84.8

[a]*Frequency of reporting of "Yes"*
[b]*Note*: The majority of respondents were male, with only 5 respondents being female.

An analysis of the responses to each of the six constructs related to factors that influence collaboration revealed no significant difference between agents and teachers (See Table 6). In addition, no evidence was found that indicated that gender, age, number of years in position, size of community, location, or years of collaboration affected the response to each construct.

Table 6
Independent Samples t–test by Construct for Factors that Influence Collaboration for Agricultural Science Teachers (n = 18) and Extension Agents (n = 15)

Construct		*M* [a]	*SD*	*t*	*Sig.*	*α*	Effect Size
Environmental Factors	Agents	3.28	.75	-.18	.86	.79	.07
	Teachers	3.32	.36			(4 items)	
Membership Characteristics	Agents	3.36	.65	.02	.98	.84	.02
	Teachers	3.35	.32			(6 items)	
Process and Structure	Agents	3.20	.57	-.29	.77	.83	.10
	Teachers	3.25	.41			(4 items)	
Communication	Agents	3.00	.66	-1.36	.18	.86	.44
	Teachers	3.24	.33			(6 items)	
Purpose	Agents	3.29	.58	.29	.77	.85	.08
	Teachers	3.24	.37			(5 items)	
Resources	Agents	3.29	.59	.23	.82	.76	.07
	Teachers	3.26	.34			(5 items)	

[a]*Note:* Strongly Disagree = 1, Disagree = 2, Agree = 3, Strongly Agree = 4. α calculated per construct for collaboration factors.

Both teachers and agents *disagreed* with the statements, "Budget constraints have caused me to increase my collaboration efforts," (n = 33, M = 2.24) and "Time constraints have caused me to decrease my collaboration efforts" (n = 33, M = 2.24).

Conclusions

Based on the findings, there are many conclusions that can be drawn related to the environment for successful collaboration, areas of collaboration, impact of Internet–based technologies on collaboration, and factors that can influence collaboration.

Objective 1: Description of the Environment of Successful Collaboration

Based on the demographics collected from respondents, it can be concluded that teachers and agents who are identified as successful at collaboration are generally male, thirty–one years of age or older, and have been in their position for more than 10 years. In terms of demographic characteristics, similarities and differences between agents and teachers were found in several areas. One area that teachers and agents shared no difference in related to gender. Participants in this study were overwhelmingly male regardless of position as agent or teacher. Statewide data shows that both groups are predominantly male, with overall numbers typically in the range of 60–70% by profession. This study includes 83–86% males. Perhaps the higher percentage was simply a result of the nomination process that was utilized in this particular study.

In the area of number of years in position, the majority of teachers had been in their position for more than 10 years while agents were more evenly split between 1–10 years and over 10 years. This correlates to the *years of collaboration* reported where the majority of both groups reported collaborating more than eight years. However, it is interesting to note that size of community showed differences between agents and teachers. Agricultural science teachers overwhelmingly reported working in communities of 5000 people or less (72.2%) while agents were more evenly split across categories, with the majority (53.4%) working in communities greater than 20,000. While defining the term *community* may be easier for a teacher because of the location of the school, the researchers questioned if agents are typically located in places of larger populations in order to serve the greatest number of people or if it is a function of where agents feel they contribute the most. Further study is needed regarding rural and urban implications on collaboration efforts. Another interesting finding related to the self–identification of where teachers and agents worked: rural versus urban locations. Though the majority of agents reported working in communities of greater than 20,000 people, the majority also reported working in rural areas. The disconnect between size of community and working location warrants further investigation.

Based on the finding that *time* was listed as the most prominent barrier to collaboration, it can be concluded that successful collaboration requires individuals to see collaboration as a benefit rather than just an additional task. This finding matches with the findings of Diatta and Luft (1986), revealing that *time* continues to be a pressing issue.

Objective 2: Areas of Collaboration

It was not surprising that the majority of agents and teachers collaborate in the area of livestock shows and fairs. This finding lends further support to the findings by Grage et al. (2004) who reported that much cooperation between agents and teachers took place in this arena. This is a setting where agents and teachers interact with students, parents and projects simultaneously and lends itself to collaboration rather than a duplication of effort. However, it was surprising that only 55.6% of teachers reported collaborating on equipment and facility sharing. It was also surprising that only 54.5% of teachers and agents reported collaborating in the area of guest speakers/content area experts. Based on the findings, it can be concluded that livestock shows and fairs are a prominent area of collaboration. Future research should seek to determine methods to increase collaboration efforts in additional areas.

Objective 3: Impact of Internet–based Technologies

In reviewing the data related to the impact of Internet–based technologies on collaboration, surprising differences were found in comparing agents and teachers. While all teachers reported using the Internet and email (yes–some or yes–a lot), 26.7% of agents reported not using the Internet and 13.3% reported no use of email for collaboration. The question arises as to why these individuals would not be using the Internet or email for collaboration. Is it possible that the

lack of use by agents is a function of lack of quality equipment and/or slow Internet speeds? In addition, findings revealed that social networks, blogs, and Twitter™ are not currently being used to facilitate collaboration. Based on the findings, it can be concluded that Internet–based technologies are not currently impacting collaboration, except for the use of email by teachers.

Objective 4: Major Factors Influencing Collaboration

Based on findings, it can be concluded that gender and years in position did not impact respondents' reaction to statements related to factors that impact collaboration. When asked the question, "What has influenced you to collaborate?" it was noteworthy that only a few (21.2%) of the respondents indicated that incentives had influenced their collaboration efforts. It can be concluded that incentives are not a primary influence on collaboration. Based on the finding that the prominent influences on collaboration efforts were *relationships* and *knowledge sharing*, it can be concluded that interpersonal relations (Deutsch, 1949) and individual behavior are critical factors in the collaboration between teachers and agents.

Findings from this study indicated that both agents and teachers agree with factors outlined by Mattessich and Monsey (1992) which included the constructs of environmental factors, membership characteristics, process and structure, communication, purpose, and resources. Given that no significant difference was found between the two groups, it can be concluded that agents and teachers who are successful in collaborating agree on factors related to the environment, member characteristics, process and structure, and communication. In fact, findings revealed that both teachers and agents strongly agree that these factors influence collaboration. Thus, it is possible that leadership of both groups could increase collaboration by addressing these factors. Based on responses to statements related to budget and time constraints, it can be concluded that while *time* is perceived to be a barrier to collaboration (as shared earlier), these constraints have not caused respondents to change their behavior regarding collaboration.

Implications & Recommendations

How do we foster collaboration between Extension agents and agricultural science teachers? Can we utilize the individuals who have been identified as successful collaborators and have them serve as mentors to beginning agents and teachers? The researchers believe it may be possible for expert collaborators to present workshops at new agent training programs and at agricultural science education professional development and teacher conferences to emphasize both the importance and advantages of collaborating. Current practices in preparing teachers and agents should also be examined to determine pre–service activities that could positively impact collaboration. Given that agents and teachers who are successful in collaborating agreed on factors shared by Mattessich and Monsey (1992), leadership could use the factors listed as a resource for material to be presented at training sessions and also as a resource in determining strategies to encourage collaboration. Based on this study, training that included the importance of mutual respect, strategies to compromise, importance of flexibility, and shared vision (among other topics) would be beneficial.

Based on the conclusion that Internet–based technologies are not currently impacting collaboration (except for the use of email by teachers), an implication exists related to possible training or exposure as to how Internet–based tools can be used to enhance collaboration efforts. Communication was one of the factors shared by Mattessich and Monsey (1992) that could influence collaboration. This study revealed possible issues with equipment and Internet speed for both teachers and agents. Further investigation is needed to determine if the lack of use of Internet–based technologies is by choice or a function of poor equipment and/or access. Regardless, it is recommended that leadership consider the importance that communication has on collaboration and find ways to address potential technology issues revealed in this study. Current news media sings the praises of how social media and Internet technologies can encourage collaboration; however, this study does not support that viewpoint.

Does collaboration benefit both Extension agents and agricultural science teachers equally, or is there more benefit for one group over the other to collaborate? The concept of reciprocity and equal benefit should be considered in future research. In addition, it is not known as to whether being in a rural versus an urban setting influences collaboration. Seventy–eight percent of the respondents indicated that they were in a rural setting. Does this mean that there is more opportunity for collaboration in rural areas? Or, is it possible that leaders see collaboration more visibly in rural areas? Or, is there merely a greater need for collaboration in rural areas? More research is needed to understand how setting impacts collaboration between the two groups studied.

Based on the conclusion that incentives were not found to be a primary influence on collaboration, future research should investigate the types of incentives that appeal to both groups as well as determine other elements that could positively influence collaboration.

It is important to recognize that this study was conducted at the individual level. A follow–up study is recommended that would look at collaboration as perceived at the administrative level of Extension and agricultural education. In addition, given that the respondents were predominately male it is recommended that future research be conducted that includes a higher percentage of female participants. Finally, the research reported here studied only those individuals that were nominated as individuals who were successful in collaborating with their counterparts in agricultural education or Extension. A study of teachers and agents that self–report not collaborating would be valuable in identifying barriers and incentives to collaboration especially in relation to the factors outlined by Mattessich and Monsey (1992). Finally, a broad–based study of teachers and agents across Texas would allow the collection of additional best practices from agents and teachers that might not be in a position to be observed collaborating.

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