Agricultural Safety And Health Education Analysis of Texas' First Year Agriculture Teachers

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ABSTRACT

First year agriculture education teachers in Texas were surveyed during the 1998–1999 school year. The number of first year teachers surveyed was 118 and 74 (63%) participated. Of the 74 respondents, 57 were males and 17 were females with the mean age being 27.3 years. Fifty-seven percent of the teachers taught safety and health as separate independent units of instruction while the most common type of technology used was TV/VCR's and overhead projectors. It was determined that the most useful formats for new educational materials were videotapes with study guides. Over half of the teachers (51.4%) had received CPR training and 52.8% had received first-aid training. Only 22.2% held current CPR certifications while 21.1% had current first-aid certifications. Generally teachers have a solid understanding of safety and health issues but fail to "practice what they preach."

This study recommends that teacher education programs place a much higher emphasis on safety and health issues during teacher preparation. Furthermore, professional development workshops and seminars need to be implemented to help teachers develop necessary skills and educational materials that are easily useable in modern classrooms. A compilation of easy-to-use, interactive agricultural education safety education media materials needs to be developed and disseminated.

KEYWORDS: Agricultural Safety, Agricultural Education, Safety

Within our nation's public schools, concerns for the health and safety of student populations have recently grown in importance. Unfortunately, this attention has grown out of increasing instances of premeditated violent acts. One outcome of these tragedies has been revision of school and campus safety policies by administrators and has created a sense of urgency to improve general student safety. Commonly overlooked in these policies however are non-violent, unintentional injuries and personnel safety training. This is notably consequential, as the cause of greatest concern for the health of children and adolescents has become unintentional injuries (U.S. Department of Health and Human Services [DHHS] 1990).

In 1995, the National Safety Council reported there were 24 deaths per 100,000 agricultural workers and 140,000 disabling farm-related injuries (National Safety Council, 1996). This situation presents a special challenge for vocational education programs that are linked with dangerous occupations, such as agricultural education is to agriculture. Considering teachers and administrators stand to a limited degree *in loco parentis* to students under their supervision, it is a necessity for agriculture teachers to model safe practices and behaviors, and to create a positive safety climate. This is important for reducing preventable injuries, not only while the student is in school but also as they prepare to enter the workforce.

School administrators must be encouraging while diligently developing a positive school safety climate. Ullrich (1997) recommended that to promote a sense of urgency for safety, education administrators should develop a written safety plan and a detailed documentation system. Additionally, Lawver and Fraze (1996) recommended Texas agriscience teachers receive more preservice and inservice education in the areas promoting positive safety attitudes. These two efforts may yield dividends in eliminating preventable injury in agricultural education programs.

Safety and health education for agricultural education teachers has received increased consideration (Ford and Walson, 1997). In 1989, Johnson found that eleven of the top 18 agricultural mechanics laboratory competencies were safety-based. Swan (1993) recommended designating local and federal funds for use in improving safety and emergency equipment and instruction available to instructors and students. The importance of safety topics in preservice and inservice educational programs (Swan, 1993; Hubert, 1996) along with basic first aid and cardiopulmonary resuscitation (CPR) training / certification for agriculture teachers (Bear and Hoerner, 1978; Laird and Kahler, 1995 and Ullrich 1997) has been suggested and offered periodically. However, in most cases it is left to individual school districts to require faculty to obtain and/or keep certifications current.

Healthy People 2000 (DHSS, 1990) recommended education aim at both reducing injury risk and in preparing students to be knowledgeable members of the adult community. This recommendation corresponds with goals of youth leadership organizations such as FFA. If agricultural education students are promoted as future leaders, then training and modeling of proper agricultural safety measures is desirable. This is important, especially for Texas with secondary agricultural education enrollments of almost 90,000 including 58,000 FFA members (Texas Education Agency, 1999).

Agriculture has had the dubious distinction of being ranked first or second in industry work death rate [each year] since 1981 (Pierson and Murphy, 1996). Since a premise of agricultural education programs is to prepare students for careers in agriculture, the issue of reducing injuries, illnesses, and fatalities is essential to their training. The development of a positive and continuous safety climate within an agricultural education program is directly influenced by the personal attitudes and beliefs of the teachers managing that program. As such, a need has been established to determine the scope of health and safety education preparation for agriculture teachers including teaching resources used in secondary agricultural education programs.

PURPOSE AND OBJECTIVES

The purpose of this descriptive study was to provide benchmark data for the assessment of the knowledge, attitudes, and perceptions regarding agricultural safety issues and curricula held by Texas agriculture teachers with less than two full years of teaching experience. The study was supported by CDC/NIOSH funds from Cooperative Agreement # U07/CCU612017. Four objectives were developed to guide this study of Texas agricultural science teachers with less than two full years of teaching experience.

1. Identify selected demographic characteristics.

2. Determine curricula and teaching materials used to address agricultural safety and health.
3. Ascertain most preferred and usable types of curricula as perceived by the surveyed group.
4. Describe the emergency care preparedness of the surveyed group.
5. Determine personal beliefs, practices, and attitudes regarding common agricultural safety and health issues.

MATERIALS AND METHODS

The target population was Texas agriculture teachers with less than two years of agriculture teaching experience and was selected from a database of over 1400 Texas Agricultural Science teachers. The Vocational Agricultural Teachers Association of Texas (VATAT) database of first year teachers served as the frame with 98 teachers identified. Duplicates and foreign elements were removed. Missing elements were identified from university entry-year teacher lists and added which adjusted the frame to 118 identified teachers.

Descriptive research methodology was used to collect data. The instrument design was a booklet style questionnaire. The instrument contained six sections: (I) demographics, (II) agricultural curricula and teaching materials, (III) classes taught 1998-99, (IV) personal health and safety training, (V) personal beliefs, and (VI) personal practices. This manuscript will only address the responses for Sections I-II and IV-VI. Six teacher educators, and seven state agricultural education staff from Texas and Oklahoma served as a panel of experts to review the instrument for face and content validity. Appropriate revisions were completed based on comments. To insure reliability, the instrument was administered to twelve agricultural science teachers in southeast Texas. They were selected because of their location, accessibility, and concern for safety issues. Following review and revision, the instrument was distributed. To ascertain internal consistency, Cronbach's alphas for Sections IV (personal health and safety training), V (personal beliefs) and VI (personal practices) were calculated with results being .71, .62 and .57, respectively. The relatively low internal consistency for the personal practices may be because the items included statements that, while individually important as safety practices, may be unrelated to each other (e.g "I was ___ when I first operated a tractor equipment alone") or due to small numbers of response items in this section.

Data were collected over an eight-week period during the spring of 1999. The instrument, cover letter, self-addressed, postage-paid envelopes and detailed instructions were mailed during first week of April 1999. After approximately two weeks, reminder postcards were sent to those failing to respond. Two weeks later a second survey was mailed. All non-respondents from both mailings were phoned. A final attempt to secure data on the target population was conducted via recruitment and curricula distribution booths at the 1999 Texas FFA convention and VATAT Professional Improvement Conference.

Completed instruments were collected from 74 of the identified 118 agriculture teachers, or a 63% response rate. Descriptive statistics, means, standard deviations and percentages were used to analyze all data. Results were analyzed at the .05 level of significance.

RESULTS AND DISCUSSION

Of the 74 teachers meeting the entry year qualification, there were 57 males (77.0 %) and 17 females (23.0%). This was a larger percentage of females than the current female percentage of 9.0 percent for Texas agricultural education teachers (TEA, 1999). The mean age was 27.3 years. For data analyses teachers were placed in two groups by age: a traditional age group "20-25 years old" (n=40) and a non-traditional age group of "26 years or greater" (n=32) and two were non respondents. Males were evenly distributed between

the two groups (29 and 28 respectively) while almost twice the numbers of females were in the younger grouping (11 and 6 respectively).

Teachers were well distributed throughout the VATAT areas that follow the area structure established by the Texas FFA Association. The ten Texas Areas are illustrated in Figure 1.

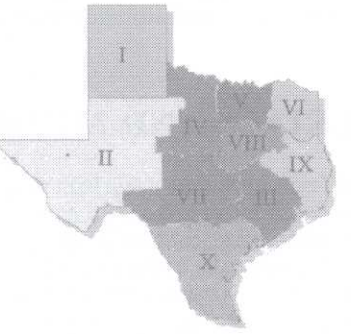

Figure 1. Vocational Agriculture Teachers Assoc.of Texas (VATAT) Areas.

The highest frequency of respondents was in Areas III (14, 18.9%), IX (10, 13.5%), and X (8, 10.8%). The remaining seven Areas had between four (5.4%) and seven (9.5%) respondents per area (Table I).

Table 1. Texas entry-year teacher distribution by FFA Area (1998-99).

	FFA Area										
	I	II	III	IV	V	VI	VII	VIII	IX	X	N
Number of teachers	4	7	14	7	5	6	6	7	10	8	74

To determine distribution by school size, respondents were asked to identify the enrollment size of their school by University Interscholastic League (UIL) conference. The division levels for Texas high school competitions are based on enrollments and are divided as follows: 5A (1,780 students or greater), 4A (780-1,779 students), 3A (345-779 students), 2A (160-344 students), and 1A (159 students or fewer) (UIL, 1999). Data indicated a mean of 146.2 students enrolled in these agricultural education programs (range 16-625) of which 91.2 were FFA members (range 5 to 350). The distribution of teachers by UIL conference / school enrollment are presented in Table 2. The numbers of respondents based on conference classification are as follows: 1A and 2A, 15 respondents each; 3A, 19 respondents; 4A, 13 respondents; 5A, 10 respondents; and two did not complete the classification section of the survey.

Table 2. Entry-year teacher distribution by UIL conference (1998-99).

	Conference Classification						
	1A	2A	3A	4A	5A	N/A	N
Number of teachers	15	15	19	13	10	2	74

Teachers were asked to identify if they addressed agricultural safety and health topics as separate, individual units of instruction or as subjects within instructional units. Thirty-two teachers (43.2%) indicated that they taught safety as a separate unit with the remaining 42 teachers (56.7%) addressing safety and health as specific subjects within larger units such as "cattle handling safety" while covering cattle production.

Teachers indicated from a provided list which technologies they had available at their respective schools. The most common technology identified by all teachers was televisions with videotape players and overhead projectors. Sixty-six (90.4%) had slide projectors, while 63 (85.1%) confirmed that a computer with Internet accessibility was available. Over 60 percent (62.2) checked CD-ROM availability. The least available equipment were laserdisc players (17.6%) and one teacher declared having a laptop computer for presentations. No statistical significant differences were found based on any demographic.

As shown in Table 3, teachers ranked the types of new teaching resources according to greatest value and use (1=most useful— 6=least useful). It was determined that the most useful formats for new materials were videotapes with study guides (X=1.90, SD=1.00). Secondary preference was indicated for demonstrations/simulations (X=2.51, SD=1.36). Within the two age groupings, the preferred resource type was videotape and study guide but there was a significant difference in the perceived usefulness of transparencies. The non-traditional group ranked transparencies as more useful (X=3.59, SD=1.39), a significantly different value from the age 20-25 group (X=4.25, SD=1.10).

Emergency care preparedness of new teachers was also a health topic of this study and is presented in Table 4. Over half of the respondents (37/72, 51.4%) had received cardiopulmonary resuscitation (CPR) training. Twenty of those teachers (54.1%) were in the age 20-25 grouping. However, only 16 of the 72 teachers (22.2%) kept certifications current.

Seventy-two teachers responded to inquiries of first aid training. Similar to CPR training, 38 (52.8%) teachers revealed having had first-aid training, with 20 (52.6%) responses coming from the younger group. Only eight (21.1%) of these 38 teachers had current certification in first-aid.

Table 3. Entry-year teacher age group comparison of teaching resources.

	Age 20-25		Age 26 +		Aggregate			
	Mean	SD	Mean	SD	Mean	SD	F	P
Videotape and study guide	1.83	0.93	2.00	1.08	1.90	1.00	0.55	0.4623
Class demonstration / Simulation activities	2.32	1.38	2.75	1.32	2.51	1.36	1.75	0.1907
Individual student booklets	3.75	1.48	3.38	1.58	3.58	1.53	1.07	0.3037
Transparencies	4.25	1.10	3.59	1.39	3.96	1.27	5.00	0.0286*
Interactive media	4.33	1.87	3.84	2.00	4.11	1.93	1.10	0.2969
Slides	4.20	1.49	4.19	1.62	4.19	1.53	0.00	0.9729

Note: 1=most useful — 6=least useful
* significant at P = .05

Lastly, information was sought as to identify completion of a general health and/or safety related course. Forty-three (58.9%) of the 73 teachers recorded that they had taken and completed a health class prior to teaching. Twenty-six (60.5%) of the 43 represented the age 20-25 group with the remaining 39.5 percent from the age 26 or greater group. The health and/or safety course was a requirement of graduation for just less than one third of all respondents.

Teachers were asked to give their opinions to a series of questions concerning their personal beliefs and attitudes regarding common agricultural safety and health issues. On a forced response four point Likert-type scale (1 = highly agree, 2 = agree, 3 = disagree and 4 = highly disagree) respondents were highly agreeable that all shops should have a properly working fire extinguisher (X=1.22), and that a clean well-organized shop reflects a safe working environment (X=1.25). Teachers also perceived that wearing proper protective equipment was very important (X=1.30), having emergency numbers posted by the phone were slightly less important (X=1.40), and that seatbelts should be worn and that

Table 4. Emergency care preparedness and safety training of new teachers.

	Age 20-25			Age 26 or greater			Aggregate		
	Yes	No	Certified Currently Required	Yes	No	Certified Currently Required	Yes	No	Certified Currently
Cardio Pulmonary Resuscitation Trained (n=72)	20	19	8	17	16	8	37	35	16
First Aid Trained (n=72)	20	19	5	18	15	3	38	34	8
Private Industry - Safety Training (n=70)	11	27	NA	16	16	NA	27	43	NA
Health Class (n=73)	26	13	16	17	17	8	43	30	24

safety devices in place when operating tractors and farm machinery (X=1.48). Respondents agreed that fences around farm ponds and stock tanks and lagoons are effective safety precautions (X=1.9). To a lesser degree teachers agreed (X=2.06) that mandatory age requirements should be established to operate tractors and / or equipment (Table 5).

The answers to questions concerning personal safety practices of entry-year teachers are reported in Table 6 and are indicators of teacher attitudes about a positive safety climate. Considering the teachers that responded to the question asking if they wear a seatbelt when driving a tractor, 22 or 34.9% indicated that they did while 65.10% did not. Eleven of the respondents indicated that the question was not applicable. An overwhelming majority (82.3%) indicated that they made sure that when they operated a tractor that the PTO shields were in place; 17.74% did not follow this basic safety precaution, while eight teachers identified that this question was not applicable. When asked if their home shop had a properly working and accessible fire extinguisher 69.40% stated that they did, 30.60% did not and twenty-four of the teachers did not have a home shop.

Two additional questions were asked to identify if the teachers were prepared for emergencies at their homes. Fifty-one (69.8%) of the 74 respondents stated that they did not have emergency phone numbers posted by all phones while 22 (30.1%) had phone numbers posted. Only ten (13.5%) of the teachers had directions to their home / property posted by phones for emergency use.

Table 5. Texas agriculture teachers' personal beliefs and attitudes.

	Mean	SD	N
All shops should have a properly working fire extinguisher.	1.22	.71	73
A clean and well-organized shop reflects a safe environment.	1.25	.59	73
Proper protective equipment should always be worn when doing agricultural work.	1.30	.73	73
Emergency numbers posted by the phone are a good idea.	1.40	.79	73
Seatbelts should be worn and safety devices in place when operating tractors and farm machinery.	1.48	.66	73
Fences around farm ponds / stock tanks and lagoons are an effective safety precaution.	1.90	.80	72
Mandatory age requirements should be established to operate tractors and / or equipment.	2.06	.73	73

Note: 1= highly agree, 2=agree, 3=disagree, 4=highly disagree

Table 6. Personal safety practices of entry-year Texas agriculture teachers.

	Yes (%)	No (%)	N	N/A	N
When operating a tractor I wear a seatbelt.	22 (34.9%)	41 (65.1%)	63	11	74
When operating a tractor I make sure PTO shields are in place.	51 (82.3%)	11 (17.7%)	62	8	70
My shop at home has properly working and accessible fire extinguishers.	34 (69.4%)	15 (30.6%)	49	24	73
I have emergency phone numbers posted by all phones.	22 (30.1%)	51 (69.9%)	73	-	73
I have directions to our house/property posted by all phones for use in an emergency.	10 (13.5)%	64 (86.5%)	74	-	74

In Table 7, data on entry-year teachers' age and opinions on age requirements are noted. The researchers were interested in determining the age of responding teachers when they first operated a tractor or piece of agricultural equipment alone. The average age was found to be 11.8 years, the range was from 21 years old to 47 years old with a standard deviation of 6.63. These teachers allow trained drivers with a mean age of 14.9 while they began driving tractors and farm machinery when they were 11.8 years old. Furthermore, teachers felt children should be 11.0 years old to assist when working with livestock.

Table 7. Teacher safety information and opinions on age.

	Mean	SD	N
How old were you when you first operated a tractor or equipment alone?	11.80	6.63	73
I allow trained drivers age _____ and older to drive tractors and farm equipment alone.	14.87	2.15	73
Children must be _____ years old to assist when working with livestock.	11.02	3.30	73

*Mean is calculated as years of age.

Table 8. Personal safety practices of teachers.

	Always	Almost Always	Rarely	Never	Mean	SD	N
While doing agricultural work, I _____ wear the appropriate protective equipment. **	17 22.4%	52 68.4%	7 9.21%	1 1.31%	1.90	.60	70
I _____ follow recommended directions when mixing chemicals for application. **	60 77.9%	14 18.9%	0 0%	0 0%	1.22	.42	74

**Note: 1=Always, 2=Almost Always, 3=Rarely and 4=Never

Additional personal safety practices were evaluated. Respondents always wear appropriate protective equipment while working, at a rate of 22.4% and almost always 68.4% of the time. Few teachers rarely (9.2%) and never (1.3%) wear protective equipment. Similarly, these teachers always or almost always followed recommended directions when mixing chemicals. This data is illustrated in Table 8.

SUMMARY

There are several areas of concern and interest documented by the findings of this study of Texas' entry year teachers. The demographic data indicated that increasing numbers of females have entered this traditionally male-dominated career field. Females made up almost one quarter of the new teachers during the 1998-99 academic year in the agricultural education classrooms across Texas. This was a substantially higher percentage as compared to the percentage of female agriculture teachers in Texas overall (nine percent). The average age of these new teachers was just over 27 years old and although considerably higher than expected, it may reflect the current practice of recruiting preservice teachers from the ranks of college graduates in other disciplines or others returning to school following a few years of work experience in other fields.

A large portion of teachers that did not teach safety and health topics within larger educational curriculum units may substantiate a lack of continuous safety education integration in a program and a weakness in the establishment of an overall safe climate. This study also reveals an element of weakness in curricula utilized by the teacher, and in the teacher preparation programs failing to prepare these individuals for the challenge of integrating safety and health concepts throughout the curriculum.

A large percentage of teachers had access to computers with Internet access and CD-ROM's, as well as the more traditional audio/video equipment in slide projectors, televisions and VCRs. It was interesting that even though these teachers largely had access to modern computer technology, they did not find interactive media whether from CD-ROM's or Internet as useful teaching tools. In comparison, they also tended to rank traditional resources such as videotapes and class demonstration / simulation activities highly. This could be indicative of not receiving adequate training on the use of newer, interactive

media as teaching tools during their pre-service training programs or, this could be an indication that teachers feel that the older teaching tools are more effective. This appears contradictory to research that indicates students enjoy and learn well when these resources are included in teaching methodologies. Another factor to be considered regarding the lower ranking of interactive media is that easy to use, inexpensive interactive media teaching resources may not be available or accessible to these teachers.

Glaring concerns exist related to maintaining emergency care preparedness certifications and health and safety education training. Improvements are needed in this area since only a relative small percentage of the teachers are currently certified in CPR and first-aid and less than one-third of these teachers having been exposed to a required a health or safety course.

In general these teachers have strong personal safety beliefs and safety attitudes. When reviewing the data, nearly all highly agreed or agreed with the safety statements indicating that they have an understanding of what is required in a well-defined safety climate.

It is also obvious that these same teachers who possess an excellent awareness of what is required to have a well-defined safety climate do not follow appropriate personal safety practices. Furthermore, it is interesting to note that not all of these teachers, always wear appropriate protective equipment when doing agricultural work or when mixing chemicals. This is indicative of an attitude of "do like I say, not like I do." As role models for students in agricultural education programs this is an ethical dilemma that cannot be ignored. The researchers' concern is that the teachers seem to understand the safety concerns but do not always follow the safety practices that will protect them from injury.

Basic safety issues such as wearing seatbelts when operating a tractor, posting emergency phone numbers and directions were largely ignored. To a lesser degree these teachers had a somewhat acceptable compliance of checking PTO shields when operating a tractor and of having fire extinguishers in their home shop facility. Yet again many of these teachers failed in their ethical and moral obligations by modeling improper safety attitudes and practices.

It is also noteworthy that these respondents recognize the dangers of allowing children to operate tractors and farm equipment. This is indicated by the differences in the age at which they first operated tractors and equipment, compared to the age at which they now allow children to be involved in the same activity.

RECOMMENDATIONS

It is imperative that all teachers, both new and veteran groups, involved with extracurricular activities receive CPR certification and it is highly recommended that CPR certification and first-aid training be incorporated into all agriculture teacher education programs to create a sense of urgency and a positive safety climate. It is further recommended that CPR certification and first aid training workshops be offered at the annual Professional Development Conference for Texas' agriculture teachers in order to help meet the recent state mandate for such training.

This study found that even though a vast majority of schools with entry-year agriculture teachers have access to computer technology, teachers do not rate the use of interactive media very highly as a teaching tool. It is recommended that teacher education programs place additional emphasis on developing these skills to use media in teacher education programs.

A compilation of easy-to-use, interactive agricultural safety education media materials need to be developed for use specifically for agriculture teachers. For best results, these multimedia materials should be available at low or no cost to agricultural education programs through the use of state or federal funds. Furthermore, safety education and injury

prevention teaching materials and resources should to be developed to specifically meet the needs of agricultural education students and teachers.

As a means of improving teachers' awareness of the importance of modeling proper safety attitudes and actions teacher preparation programs should place a much larger emphasis on instilling and enforcing these attitudes and skills on pre-service teachers. Additionally, workshops on safety education including topics concerning modeling safety attitudes and actions should be organized and offered during the annual Professional Improvement Conference.

Further research may be necessary to address unique concerns of females in agricultural education. Additional investigation into the female perspective of safety and health issues could reveal topics not previously considered as high priority. Another issue for review is the finding that these teachers' were older than those considered traditional. Similar research should be undertaken to address safety and health attitudes of all agriculture teachers and in the safety climate perceptions of agricultural education programs overall. This study should be replicated annually in Texas, as well as in other states, to provide the data necessary for the longitudinal analysis of safety education. Longitudinal analysis will enable us to accurately determine the benefits and outcomes of safety education programs.

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