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NATIONAL PERCEPTIONS AND MANAGEMENT STYLES OF EXTENSION EDUCATORS AND SECONDARY AGRICULTURAL EDUCATION INSTRUCTORS ON THE U.S. DEPARTMENT OF LABOR'S TRACTOR CERTIFICATION PROGRAM

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ABSTRACT

The Hazardous Occupations Order for Agriculture was initiated in 1968 by the U.S. Department of Labor (DOL) mandating farm tractor and machinery safety training for 14 - 15 year old youth employed on farms and ranches. Under this regulation, youth were able to complete a one-time training program, commonly known as the Tractor and Machinery Certification (TMC) program. The training was dependent upon two designated entities, either the federal Extension 4-H program or the vocational agriculture school-based programs. In the 40 plus years since the legislation went into effect, deficiencies and variations have occurred in the quality of the training and the system by which agencies certify young people. Little empirical evidence was known how local instructors selected their curriculum and managed their programs. This study surveyed 330 local instructors in 33 U.S. states to determine management styles, type of curriculum, amount of administrative support, and their perceptions of the Tractor and Machinery Certification program. Overall, instructors believed the top three issues that would increase the effectiveness of the DOL program included community awareness, employer support, and access to teaching resources. In fact, the findings revealed instructors placed a higher value on standardized teaching materials than on standardized testing procedures.

BACKGROUND

The Agricultural Child Labor Hazardous Occupations Order was put into effect in 1968, as an effort to control the number of youth working in dangerous work environments. This legislation makes it unlawful for persons younger than 16 years of age to be employed in agricultural operations without a prescribed course of safety instruction. This training is popularly known as the Department of Labor (DOL) Tractor and Machinery Certification (TMC) program.

Two agencies are identified in the legislation as a source for the TMC training, the federal Extension program and the agricultural education program within secondary schools. Within each agency, legislation outlines the number of instructional hours required for certification. The legislation further specifies that all students demonstrate knowledge and performance before certification is issued. The students must pass a written safety exam as well as a skill exam where they operate a tractor two-wheeled implement.

In the 40 years since legislation was enacted, deficiencies have occurred in the quality of the TMC training and the system by which agencies properly document certification. Little oversight by the enforcement agency was given to local programs, and over time, national and state leaders lost their grasp on the training content and/or the extent to which the training was conducted within the state (Jepsen, 2006). Just as concerning, confusion often exists for local instructors who do not understand the training guidelines and cannot access up-to-date training materials. Recognizing there was great variability between and within the courses offered in the U.S., a multi-faceted study was initiated to examine the nation's TMC program. When the crux of a national training program relies upon local instructors, it is important to understand their management approaches, as well as their perceptions about the program. This information will be useful for federal stakeholders as they currently review and decide the fate of the TMC program.

To provide this baseline information, the following objectives provided a framework for the research:

Describe the type of TMC certification offered by the certifying agency;
Examine community instructors' perceptions and management of the TMC program; and
Identify teaching methods and curriculum resources used in the TMC program by community-based instructors.

METHODS

Without a national database of tractor and machinery certification instructors, a population frame was established through a linear snowball sampling approach. Knowing the two national agencies, the researcher surveyed program leaders to provide names and contact information of known TMC instructors in their state. A census of state program leaders, Federal Extension (n=50) and Department of Education (n=50), reported information about their state TMC program (Jepsen, 2006), representing a 100% response rate. From that earlier study, it was possible to construct a population directory of 467 local instructors. This population had national representation with 33 states reporting they offered the DOL TMC program.

A 43-item questionnaire was constructed around qualitative data collected in an earlier study, where eight national focus group sessions identified areas of strengths and weaknesses of tractor and machinery certification programs (Jepsen et al, 2003). The instrument collected information about the 1) Description

of Local Instructor's Certification Course and 2) Instructor's Opinions of the Programmatic Structure of the Certification Course.

The instrument was field tested with 15 Ohio course instructors to establish face validity and suitability for community instructors. Instrument reliability was established from another sample of 16 educators, half agricultural education teachers and the other half Extension educators, using the test- re-test method recommended by Garson (2006). An equivalence test was performed on responses given at Time 1 and Time 2 using the Spearman Brown statistic; reliability coefficients ranged from .962 to .660 for eight out of the nine topic areas. The Institutional Review Board at The Ohio State University reviewed the research methodologies and survey instruments to assure practices were ethical and procedures were conducted according to the standards established by the university.

The survey was administered electronically through Zoomerang®, a Web-based survey program following Dilllman's methods (2000). This approach had time- and cost-saving benefits. Descriptive statistics were computed and contingency tables were created for comparisons.

RESULTS

After data collection, 330 surveys were included in the analysis, (70.7% response rate). The occupational experience and tenure within an agricultural profession was evident among survey participants. Demographics of the sample indicate 197 worked as an agricultural teacher during their career, with an average of 12.14 years. Another 188 reported their occupation as an Extension educator, with an average of 12.97 years. Experience as a farm worker or owner was reported with 176 respondents, and the average number of years in this profession was 20.76. Other occupations included agri-business (*n*=78), equipment dealers (*n*=19), sales (*n*=8), and non-agricultural business (*n*=7).

Of the 330 respondents, 55.2% taught a qualifying DOL program; a qualifying DOL program is one that met the legislated hours of instruction and examination criteria. Of these programs, the certification was most often administered through an Extension or 4-H program (68.7%) or through a secondary agricultural education program (24.7%). Eleven instructors offered a DOL program as a combination of Extension and secondary agricultural education programs, and one reported their DOL program was organized through their local Farm Bureau organization.

A qualifying DOL program can vary by type (Table 1). The course most often taught was the full Tractor and Machinery Certification Program (59.9%), as opposed to the Tractor (only) Certification Program (40.1%). Distinction between these program types involves the hours of instruction and subject matter taught to the youth.

Type of DOL Certification Program	*N*	%
Tractor and Machinery Certification	109	59.9
Tractor (Only) Certification	73	40.1
Total	182	100.0

Table 1: Type of DOL Certification Course Offered Most Often.

Legislation prescribes the number of hours required of a DOL program with no distinction between classroom, driving, or out-of-classroom study. According to the criteria, the full TMC program is designed for 24 hours of Extension instruction, and 25 hours when offered through the secondary schools; the Tractor only program is based on 10 instructional hours from Extension, and 15 hours for school-based programs. It is unclear why the agencies' hours differ in the code of federal regulations, however management of instructional time was an area of interest and reported in Table 2. Classroom instruction averaged 15.15 hours, time spent operating equipment averaged 6.96 hours, and homework or self-study beyond the classroom consumed an average of 6.94 hours.

	N	Min. Hours	Max. Hours	Mean Hours	Std. Deviation
Hours for classroom instruction	169	0	36	15.15	6.708
Hours driving/doing hands-on activities	153	1	45	6.96	6.092
Hours assigned to homework or self-study	130	0	24	6.94	5.437

Table 2: Amount of Instructional Hours Teaching DOL Certification Programs.

The researcher calculated a weighted mean score to include the varying hours of instruction between classroom, driving, and homework hours. By doing so, a class-hour average was calculated at 30.05 instructional hours. This average exceeds the prescribed 24- or 25-hour program indicated in the legislation. Local instructors who offer the DOL programs were asked about their testing parameters. The average passing grade for the written exam was 72.74%, with a range of 40 - 100% (*SD* = 6.747). The skill and driving exam had a wider range of 0 - 100%, with the average, passing grade of 77.24% (*SD* = 13.966).

Table 3 reports the type of fees assessed for DOL training programs. When fees are assessed, they are primarily used for student workbooks (34.1%), supplemental teaching materials (18.0%), and student refreshments and activities (14.8%). Other uses for program fees, as written in by survey responders, included costs associated with insurance coverage, fuel, or transportation expenses.

Fee Type	*N*	%
Students pay a participation fee	131	59.0
Course is sponsored all or in part by a club, organization or business	26	11.7
Course is provided as part of my organization's operating budget	39	17.6
There are no costs associated with my program.	13	5.9
Other	13	5.9
Total	222	100.0

Table 3: DOL Instructors' Report for Assessing Course Fees.

All instructors participating in the survey were asked about their teaching resources and methods. The primary course book used for course instruction was the manual published by HOBAR, *Safe Operation of Agricultural Equipment*, used by 66% of instructors. Forty-six instructors (14.6%) reported they use state- or locally-developed curriculum as their primary teaching resource, and 10instructors (3.2%) primarily used dealer publications.

Instructors identified the types of teaching aids they believed to be most effective for student learning. From a list of 11 possible choices, instructors selected their top five aids to be hands-on activities (21.4%), video tapes (18.5%), student workbooks (14.7%), guest lecturers (13.5%), and DVDs (10.4%). Other aids ranked by instructors are included in Figure 2. Other teaching aids written into the comment section of this survey question included demonstrations, toy equipment, games, worksheets, newspaper clippings of actual accidents, working with an adult mentor, group discussion, driving actual equipment, and students teaching safety to elementary audiences.

Teaching Aids	*N*	%	Rank
Hands-on activities	296	21.4	1
Video tapes	255	18.5	2
Student workbooks	203	14.7	3
Guest lecturers	186	13.5	4
DVDs	143	10.4	5
Computer assisted instruction or activities	89	6.4	6
Slide presentations	70	5.1	7
Overhead transparencies	47	3.4	8
On-line computer instruction or activities	44	3.2	9
Textbooks	36	2.6	10
Flip charts	8	.6	11
Not applicable	4	.3	
Total	1381	100.0	

Table 4: Teaching Aids Identified as Most Effective for Student Learning.

Course instructors were asked their opinions on 19 topics – identified through earlier focus group discussions (Jepsen, 2003). Using a Likert-type scale, the instructors rated each item as: (1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly Agree. For purposes of analysis, the researcher combined values 4 and 5 to indicate levels of agreement. As reported in Table 5, instructors believed the course was beneficial to students (86.3%) and that the students took the course seriously (77.3%). Course instructors also agreed additional teaching aids were needed for the TMC program (73.7%), that the TMC course had potential to attract additional students (69.6%), as well as new audiences in landscaping and horticultural services (80.0%). Instructors also believed written tests (72.3%) and skills/driving tests (69.9%) for the TMC program should meet nationally identified standards.

Two topics from Table 5 received low agreement from survey respondents. In essence, course instructors strongly disagreed with offering the course in its entirety as a self-study program (80.1%). Likewise 90% of instructors did not agree with the statement, "This program should no longer be offered." Strong support for continuing the DOL program was interpreted through this group of questions.

	N	% No Opinion	% Agree and Strongly Agree	Rank
The course is beneficial for students.	313	10.9	86.3	1
This program could attract new youth audiences, like those in landscaping and horticultural services.	310	7.1	80.0	2
Students take the course seriously.	312	11.5	77.3	3
Additional teaching aids should be developed for this course.	312	10.9	73.7	4
The written test should meet nationally identified standards.	310	7.7	72.3	5
The skill/driving test should meet nationally identified standards.	312	7.7	69.9	6
This program has potential to attract many more students than what it currently reaches.	309	8.1	69.6	7
The required course hours identified by law for 4-H/Extension programs (10 hours for tractor, and 24 hours for tractor & machinery) are sufficient to adequately teach a safety program.	313	9.3	67.4	8
The required course hours identified by law for school-based programs (15 hours for tractor, and 25 hours for tractor & machinery) are sufficient to adequately teach a safety program.	308	12.0	66.9	9
Homework is appropriate for this course.	311	10.3	63.3	10
The course is only beneficial to students when led by an instructor.	310	7.7	55.2	11
Instructors should be expected to complete a formal train-the-trainer program in order to teach the certification course to youth.	311	7.4	51.1	12
Portions of this course could be offered as a self-study program.	311	7.7	50.5	13
Students should be assessed a fee for receiving safety training.	313	8.0	44.1	14
Students should be assessed a fee for receiving certification credentials.	312	7.7	38.8	15
Instructor's experience of tractor and machinery operation should be enough to teach the certification course to youth.	310	7.7	38.7	16
Up-to-date teaching aids are available to instruct this course.	310	11.0	37.1	17
This course could be offered in its entirety as a self-study program.	307	8.5	11.4	18
This program should no longer be offered.	310	7.7	2.3	19

Table 5: Community Instructor Perceptions of the DOL TMC Certification Program.

Instructors were asked to rate their ability to offer a DOL program based on 11 external factors (Table 6). The majority of instructors (59.9%) indicated they did not lack support from their administration in order to offer a training program. The highest reported factors affecting their ability to offer a TMC program were lack of time to teach the course in the prescribed number of hours required by legislation (24.3%), lack of support or awareness from employers or labor groups to encourage students to receive certification (23.6%), and lack of enforcement on employers to comply with the certification requirement (22.5%). Interestingly, the items commonly thought to influence community leaders' abilities to offer the program were accounted for as "somewhat of an influence."

These external factors included lack of teaching resources (42.4%), not enough students interested in the course (40.85), and lack of enforcement on employers to comply with the certification requirement (40.1%).

External Factors	*N*	% No Opinion	% Never	% Somewhat	% Definitely
Lack of support from administration to offer a course.	309	8.4	59.9	20.4	11.3
Lack of community support or awareness of course benefits	311	7.1	49.5	32.5	10.9
Lack of people to assist with teaching the course.	311	5.8	46.9	33.8	13.5
Lack of equipment to conduct the skills or driving portion of the course.	309	6.8	40.1	32.7	20.4
Lack of funding to offer the course.	311	7.1	39.9	34.7	18.3
Lack of teaching resources.	309	5.5	38.5	42.4	13.6
Not enough students to justify my time offering a course.	311	9.0	37.0	36.7	17.3
Lack of time to teach the course in the prescribed number of hours required by Dept. of Labor.	305	8.5	33.8	33.4	24.3
Not enough students interested in the course.	311	10.0	30.5	40.8	18.7
Lack of support/awareness from employers or labor groups to encourage students to receive certification.	305	8.9	29.8	37.7	23.6
Lack of enforcement on employers to comply with this certification requirement.	307	12.0	25.4	40.1	22.5

Table 6: External Factors that Affect Local Course Instructors' Abilities to Offer a DOL TMC Program.

Instructors were asked to select the top three issues that would increase the effectiveness of the DOL certification program. Of the 12 available options, three issues rose to the top of importance; these included community awareness of the program (14.7%), employer support for the program (14.6%), and access to teaching resources (14.6%). Instructors identified in-service trainings (10.0%) and additional student learning activities (9.7%) as considerable issues to increase program effectiveness, while standardizing the testing requirements (4.2%) and decreasing the required number of course hours (3.7%) were not thought to be issues that would enhance the TMC program's effectiveness.

CONCLUSIONS

With little empirical evidence published on the Department of Labor Tractor and Machinery Certification programs, and the extent such programs are available in the rural areas, this study sought information from national instructors. These instructors are a recognized, critical link for the programs being offered to youth in the local communities. Understanding the perceptions and management styles of Extension educators and secondary agricultural education teachers allowed greater insight to the federal program. Their responses can be discussed in two broad concepts: respect for public policy and need for curriculum. Respect for pubic policy. Course instructors believed the TMC program was a beneficial course for young employees. As a public policy, it is important for the program to maintain its credibility and presence in the community. However, this study did not find the DOL program available in all U.S. states; yet when available, it was primarily offered as the full Tractor and Machinery Certification program (59.9%), and primarily offered through the federal Extension program (The hours of course instruction were heeded by local instructors, and often exceeded the prescribed criteria with a time-weighted average of 30.05 hours. Likewise, minimum passing grades on student examinations were reportedly slightly higher than the universal average of 70%, with 72.74% reported on the written, and 77.24% reported on the driving/skill exam.

Need for curriculum. It is not surprising for educators to feel strongly about updated teaching curriculum. Students are unmotivated in subject content if they believe content is not relevant to their environment. The 1976 Hobar publication, *Safe Operation of Agricultural Equipment,* is currently identified as the primary curriculum. Findings suggest additional teaching aids are needed for effective instruction to this curriculum, and instructors identified hands-on activities, videotapes, student workbooks, and DVDs as the most popular choices.

Also not surprising, instructors placed a higher value on standardized teaching materials than on standardized testing procedures. However, within the TMC program, it may be possible to develop a standardized testing system, once nationally accepted curriculum is developed. Recently new materials have been developed through USDA-National Institute for Food and Agriculture grants. These curricula, *Gearing Up for Safety* and the *National Safe Tractor and Machinery Operation Program*, have expanded and updated the course content available in the older Hobar publication.

While sound educational materials are a major component of the DOL program, other programmatic factors play a role in the successful delivery of the educational training. Such factors include instructors' awareness of the federal certification program requirements, their amount of administrative support, their available time and flexibility to address subject matter outside of their state performance standards, their ability to fund training courses, their personal experience and understanding of agriculture equipment, and their need for in-service training.

Baseline information collected through these participants will assist program leaders in the development and implementation of any new resources supporting tractor safety and TMC programs nationwide. The ultimate value of this study is to understand the local instructors' perspectives, management, and structure of training courses. As policy makers consider changes to the current child labor legislation, they will have a better understanding for the program structure and how it is implemented in the United States. This knowledge will ultimately improve the occupational training for youth in an overall effort to reduce youth agricultural injuries in the U.S.

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