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Identification and Validation of Agricultural Hazardous Occupations Order Certification Program Instructor Criteria and Competencies

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The USDA/NIFA has awarded funding to Land Grant Institutions to conduct and enhance the Hazardous Occupations Safety Training in Agriculture (HOSTA) program.# The HOSTA program is designed to provide relevant educational opportunities in an effort to reduce the frequency and severity of farm-related injuries to all youth who work in agricultural production and to meet the current training requirements of the Agricultural Hazardous Occupations Order (AgHOs) for non-exempt youth. The Cooperative Extension Service and secondary school agricultural science and business programs are designated by the AgHOs as the only entities eligible to conduct and affirm completion of certification training. However, the law does not identify the minimum core competencies necessary for instructors and there are currently no evidence-based criteria to assess the preparedness of individuals who provide instruction to youth seeking AgHOs certification. One of the objectives of the current HOSTA project at Purdue University is to identify and validate prescribed criteria and desired core competencies for instructors who conduct certification training. This paper summarizes the findings of the validation process and reports on the core criteria and competencies identified.

Keywords: Agricultural safety, Agricultural Hazardous Occupations Safety Training, AgHOs, Hazardous Occupations Safety Training in Agriculture, HOSTA, Instructor training, Farm safety for youth.

The United States Department of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA) has provided funding under the provisions of the Employment of Youth in Agriculture Program to develop and support the current Hazardous Occupations Safety Training in Agriculture (HOSTA) initiative (Employment of Youth in Agriculture, 2005). The HOSTA program provides relevant safety and health educational opportunities for youth engaged in agricultural production activities in an effort to reduce the rate of farm-related injuries to youth, especially youth less than 16 years of age. HOSTA program funds have been allocated on a competitive basis to Land Grant Institutions to enhance agricultural safety and health programming nationwide. One goal of the HOSTA project at Purdue University has been to identify and validate minimum criteria and desired core competencies for agricultural safety instructors participating in the certification training required by the current Agricultural Hazardous Occupations Order (AgHOs) of 1968 as listed in Subpart E-1 of Part 1500 of Title 29 of the Code of Federal Regulations, an amendment to the Fair Labor Standards Act of 1938 (United States Department of Agriculture, 2010). This effort was designed to build upon the currently identified criteria specified in the law and attempt to validate an expanded set of

evidence-based criteria and competencies that reflect changes in the training and experience of eligible instructional personnel, agricultural practices, and technology over the past 40 years. The effort would also contribute to enhancing the capacity of other agricultural and youth educators to provide effective agricultural safety and health instruction.

Recent, however, unsuccessful, proposed changes to the AgHOs held the potential to further limit youth participation in agricultural tasks on a for hire basis. Several AgHOs task areas would have been expanded to further clarify and restrict participation by both youth under 16 and those enrolled in supervised agricultural work experiences (United States Department of Labor, 2011a). The proposed changes would have also removed the current exemption that permits youth ages 14-15 years old to perform certain agricultural tasks for hire, provided they have completed an approved training course. These proposed changes were justified partially on the argument that current AgHOs training lacked instructional consistency (United States Department of Labor, 2011b). The necessity for instructors of these programs to possess minimum criteria and competencies was perceived as a gap in the effort to provide effective outcome based education and training to youth exposed to agricultural hazards.

Based on a review of literature, no evidence-based criteria were identified that could be used to assess the preparedness of individuals to provide instruction to youth seeking AgHOs certification. The only general criterion identified in the language of the AgHOs is that certification be authorized by a "Cooperative Extension Service agent" or conducted and signed by a "vocational agriculture teacher" (Part 570—Child labor regulations, orders, and statements of interpretation, 2010). The roles and preparation of these professionals have evolved substantially since the AgHOs originally identified these two groups of educators in 1968. These changes have resulted in individuals who are eligible to teach by position, but who possibly lack the necessary experience, criteria, skill sets, and knowledge to provide the desired levels of instruction.

The goal of the Purdue University instructor training component of the HOSTA program was to build upon the criteria that were specifically identified or implied by the current AgHOs and enhance them through an evidence-based process to more closely match the current curriculum needs and changing characteristics of available instructors. This work is situated at the intersection of validity theory and curriculum development theory. The authors relied on the practical approach of building a validity argument (e.g., Kane, 2006) based on evidence to support the content that is essential to this domain (Porter, 2002; 2006) with the forethought of how this information will be assessed and interpreted in practice while relying on the practical approaches to developing curriculum (e.g., Ornstein & Hunkins, 2004; Tanner & Tanner, 2006) that is useful without engaging in the debate on which approach is most appropriate. That debate is beyond the scope of the paper. However, the systematic approach used follows standard practice. What can be seen within the framework, for instance, in interviews with agricultural teacher educators as well as currently employed agricultural educators, was an indication that meeting the current criteria, especially with the changing roles and educational experience of most extension educators and agricultural education teachers, no longer indicates that an individual was in possession of the desired competencies to effectively teach youth how to safely work in agricultural production. Consequently, the need to develop minimum criteria and core competencies for instructors was identified.

These criteria and competencies could then serve as a guide to develop, pilot test, and implement resources and training strategies that would improve the quality of both AgHOs certification specifically and agricultural safety and health instruction in general nationwide. Findings would also be helpful in providing evidence-based guidance for revisions to the current AgHOs in order to more closely reflect changing public expectations as well as current farm-related injury data involving youth.

Statement of the Problem

The current requirements for instructors of certification programs, as prescribed by the

AgHOs of 1968, are no longer adequate due to changing demographics, backgrounds, training and experience levels, along with changes in agricultural technology and practices. There is a need for evidence based and documentable selection criteria and minimum core competencies for these instructors to ensure youth receive training that is consistent with the AgHOs requirements and that adequately addresses the most significant hazards associated with current agricultural production processes and practices. Unlike most youth directed instruction in agriculture, this training is designed specifically to reduce the frequency of injuries and fatalities to this population. The consequences of ineffective instruction can be much more critical than outcomes in other areas due to poor instruction.

Research Questions

This research addressed the question of identifying the general criteria, including cognitive and behavioral competencies, and prerequisites desired and required of instructors of AgHOs certification programs to ensure that the instruction prepares youth to perform tasks especially hazardous in agriculture. In addition, the strategies that can be used to reliably assess these competencies and/or prerequisites were validated through the review process involving multiple data points and persons with expertise in the appropriate areas.

Materials and Methods

The authors reviewed past and currently available instructional resources used in AgHOs certification programs and general agricultural safety and health curricula used across the country to develop an initial framework of the minimum criteria and desired core competencies. Nearly all of these materials were based upon the original directives found in the language of the AgHOs (Part 570—Child labor regulations, orders, and statements of interpretation, 2010) that specified content from the original 4-H tractor and machinery manuals 1-4 that predated the AgHOs. These curricula have matured over time and the most recent include the National Safe Tractor and Machinery Operator Program (NSTMOP, 2006) and Gearing Up for Safety: Agricultural Production Safety Training for Youth (Gearing Up for Safety, 2003). Using the Gearing Up for Safety list of minimum desired core competencies for youth validated by Ortega (2011) as a guide, a list of corresponding instructor competencies was composed. This list was reviewed internally by a panel of experts comprised of the National HOSTA Advisory Committee.

The Questionnaire

An electronic questionnaire was developed from the list of identified instructor competencies that was again reviewed by the National HOSTA Advisory Committee, and pilot tested with a convenience sample of current instructors of AgHOs certification courses. The revised questionnaire was imported into the Qualtrics web-based survey software to facilitate electronic distribution. The questionnaire was password-protected with the password sent to potential respondents via email. Responses to the questionnaire would remain anonymous; however, it was necessary to isolate non-respondents in order to send reminders per the Tailored Design Method (Dillman, 2000; Dillman, 2007). Thus, potential respondents were assigned a randomly generated personal identification number. The questionnaire protocol required this number following the password request. The electronic questionnaire was divided into two sections: content-related items and demographic information. Included in the content-related section were 51 criteria or competency items. Respondents ranked each item on a five-point Likert scale according to their perception of importance of the criteria or competency for qualified instructors. The demographic section included 24 questions pertaining to respondents' teaching experience, occupation, education, and curriculum use.

Data Collection Method

The procedure for gathering data followed Dillman's Tailored Design Method (2000, 2007). The questionnaire was distributed via a

link included in an email message, as was respondents' passwords and personal identification numbers (PIN). Data was summarized using mean, median, mode, range, and standard deviation for each criterion or competency. Calculations were performed using Microsoft Excel.

Population Surveyed

The population surveyed was identified from the NSTMOP Community Lead Instructors list and the Gearing Up for Safety Instructor Database. This population of 791 individuals, who had participated in AgHOs instructor training and self identified as AgHOs instructors, was selected as a source for potential respondents due to the belief they had the best knowledge of what it takes to be an effective instructor. Administrators of each database granted approval to use the contact information, and Information Technology (IT) personnel generated and assigned random numbers to each entry. The numbers would be used by IT personnel to determine non-response.

The NSTMOP database contained a total of 524 entries. Removal of entries due to duplications and absent email addresses resulted in a total of 426 potential respondents. The Gearing Up for Safety Instructors database contained a total of 267 entries. Removal of entries for the same reasons resulted in 257 total potential respondents. This resulted in 683 total potential respondents with email addresses prior to the sending of any data collection materials. The final useable sample was 507, representing 46 states, after controlling for invalid email addresses.

By the culmination of the study, four email messages requesting data had been sent to each potential respondent. The resulting response rate was 49% (N = 249).

Non-response error was controlled by randomly selecting ten percent of non-respondents using their identification number. An attempt to contact each of these instructors was made by phone. If contact was made, the instructor was asked to complete the questionnaire orally with the response recorded in a separate electronic database. Through repeated contacts over 8 weeks, only five responses were achieved. This was an insufficient amount to conduct statistical tests with adequate statistical power to determine the extent of non-response bias.

Validation

A panel of 11 experts in occupational and educational fields pertaining to agricultural safety was assembled to validate data gathered. The perspectives presented by panel members were directed toward the development of an agricultural safety instructor curriculum. This was consistent with prior work of Kingman, Yoder, Hodge, Ortega, & Field (2005) as an approach to developing a curriculum. The panel was presented with the criterion and competency data collected from the 249 respondents in summary form. Competency-related feedback generated by the panel was gathered as written perspectives of time and emphasis ranking for each competency. Criterion-related feedback was collected in the form of yes/no responses to the question of whether each criterion should be included as a component of an AgHOs instructor curriculum.

Limitations

The population referred to in this study was limited to instructors of agricultural safety programs who had received training by Pennsylvania State University or Purdue University as a part of the HOSTA program. Perspectives from agricultural safety instructors not included in these two groups hold the potential to influence the results reported here.

Data collection for the study was electronic-based only, which limited the results to those respondents who are users of electronic-based media including email. Responses from instructors who do not use electronic-based media were not determined.

Results and Discussion

Criteria Ranking by Survey Respondents

Criteria were defined as the minimal qualifications for persons seeking to provide

instruction to youth participating in agricultural safety programs designed to meet or exceed AgHOs requirements. There were 15 criteria identified in the review process that were in the questionnaire. One open ended question sought input from participants as to the minimum age believed necessary for AgHOs instructors. Descriptive statistics for the perceived level of importance of criteria as ranked by respondents are shown in descending order in Table 1. Responses were ranked on a five-point Likert scale with 5 representing most important.

Table 1
Distribution of Current AgHOs Safety Instructors' Perception of Importance of Instructor Criteria (n = 249)

Instructors of agricultural tractor and machinery safety programs should:	*M*	SD	Range	Mode	Median
1. Be at least 18 years old	4.64	0.64	3-5	5	5
2. Demonstrate mastery of the primary language necessary for instruction	4.47	0.76	1-5	5	5
3. Possess a valid driver's license	4.35	0.97	1-5	5	5
4. Have received formal safety training through classes, seminars, or training opportunities	4.22	0.90	1-5	5	4
5. Have passed (minimum 70 percent correct) a written test that addresses the basic requirements of the AgHOs (Agricultural Hazardous Occupations Order)	4.05	0.99	1-5	5	4
6. Submit to a criminal background check	3.97	1.22	1-5	5	4
7. Possess at least 3 years of agricultural equipment operation experience	3.78	1.12	1-5	4	4
8. Have first aid training	3.43	1.10	1-5	3	3
9. Have a minimum of 3 years agricultural production experience	3.41	1.18	1-5	4	4
10. Carry professional liability insurance	3.30	1.33	1-5	5	3
11. Be a secondary school agricultural education instructor	2.81	1.26	1-5	3	3
12. Have at least 3 years teaching experience at any level	2.76	1.25	1-5	3	3
13. Possess a secondary school teaching certificate	2.74	1.38	1-5	1	3
14. Be an extension educator/agent	2.71	1.18	1-5	3	3
15. Possess FEMA (Federal Emergency Management Agency) emergency preparedness certification	1.99	1.03	1-5	1	2
16. What should be the minimum age for instructors of agricultural safety programs?	21.32	2.36	14-30	21	21

Note. Scale: *M* = 1.00-1.50 = Low Importance, *M* = 1.51-2.50 = Moderately Low Importance, *M* = 2.51-3.50 = Moderate Importance, *M* = 3.51-4.50 = Moderately High Importance, *M* = 4.51-5.00 = High Importance.

Respondents provided a mean ranking of all criteria between *moderately low importance (M* = 1.51-2.50*)* and *high importance* (*M* = 4.51-5.00). According to respondents' perceptions, being at least 18 years old was the only *high importance* (*M* = 4.51-5.00) criteria (*M* = 4.64; *SD* = 0.64).

Those criteria that received a mean ranking by respondents as *moderately high importance* (*M* = 3.51-4.50) included: "demonstrate a mastery of the primary language necessary for instruction," "possess a valid driver's license," "have received formal safety training through classes, seminars, or training opportunities," "have passed (minimum 70 percent correct) a written test that addresses the basic requirements of the AgHOs," "submit to a criminal background check," and "possess at least 3 years of agricultural equipment operation experience."

Seven criteria received a mean ranking by respondents as *moderate importance* (*M* = 2.51-3.50) including: "have first aid training," "have a

minimum of 3 years agricultural production experience," "carry professional liability insurance," "be a secondary school agricultural education instructor," "have at least 3 years teaching experience at any level," "possess a secondary school teaching certificate," and "be an extension educator/agent."

Although no criteria received a mean ranking of *low importance* (*M* = 1.00-1.50), one criterion, "possess FEMA (Federal Emergency Management Agency) emergency preparedness certification," received a mean ranking of *moderately low importance* (*M* = 1.51-2.5).

Data gathered by the electronic questionnaire also indicated that instructors should be at least 18 years old (*M* = 4.64, *SD* = 0.64). When respondents were asked to specifically identify the minimum age necessary for effective instruction of agricultural safety, the mean response was 21 years (*M* = 21.21, *SD* = 2.73). Under the current provisions of the AgHOs, it is unlikely to have an individual under the age of 21 meet the criteria of being either an Extension educator or a vocational agriculture teacher. However, findings suggest that respondents may see a role for those 18-21 to assist in program delivery, assisting a lead instructor.

Criteria ranked of higher importance tended to also have a lower standard deviation, indicating less variability in responses and more agreement on high importance. The lowest ranked criterion, "possess FEMA (Federal Emergency Management Agency) emergency preparedness certification," had a lower standard deviation than did other criteria ranked with a lower importance.

Criteria Validation

The assessment of the results from the expert panel members is included as Table 2. These findings were based upon preliminary written rankings and led discussions.

Table 2
Ranking of Criteria to be Included in an AgHOs Safety Certification Instructor Curriculum by an Expert Panel (N = 11)

Instructors of agricultural tractor and machinery safety programs should:	*M*
1. Demonstrate mastery of the primary language necessary for instruction	1.00
2. Submit to a criminal background check	1.00
3. Possess a valid Driver's License	0.91
4. Have received formal safety training through classes, seminars, or training opportunities	0.82
5. Possess at least 3 years of agricultural equipment operation experience	0.82
6. Have first aid training	0.73
7. Be at least 18 years old	0.64
8. Have a minimum of 3 years agricultural production experience	0.27
9. Have passed (minimum 70 percent correct) a written test that addresses the basic requirements of the AgHOs (Agricultural Hazardous Occupations Order)	0.18
10. Carry professional liability insurance	0.09
11. Be a secondary school agricultural education instructor	0.09
12. Have at least 3 years teaching experience at any level	0.00
13. Possess a secondary school teaching certificate	0.00
14. Be an extension educator/agent	0.00
15. Possess FEMA (Federal Emergency Management Agency) emergency preparedness certification	0.00

Note. Scale: 1 = Yes, 0 = No

Data gathered from the panel indicated strong agreement (*M* > 0.75) in terms of which criteria an instructor should meet. Those criteria included: "demonstrate mastery of the primary language necessary for instruction," "possess a valid driver's license," "have received formal safety training through classes, seminars, or training opportunities," "submit to a criminal

background check," and "possess at least three years of agricultural equipment operation experience."

Panel members drew from their personal and professional experience to set the cut score for inclusion of criteria in an instructor curriculum at 0.5. The criterion ranked above the cut score, but not strongly agreed upon by the panel members was: "be at least 18 years old." The rationale that influenced this ranking was that many panel members believed 21 years old to be a more appropriate minimum age for instructors of agricultural safety programs.

Panel members unanimously ranked four criteria to not be included (M = 0.00). The criteria not considered relevant were: "have at least three years teaching experience at any level," "possess a secondary school teaching certificate," "be an extension educator/agent" (which is inconsistent with the current provisions of the AgHOs), and "possess FEMA (Federal Emergency Management Agency) emergency preparedness certification."

Eight criteria that had been ranked of *Moderately High Importance* (M = 3.51-4.50) to *Moderately Low Importance* (M = 1.51-2.50) by respondents to the questionnaire were determined to be of low importance for two primary reasons. 1. Some criteria, for example: "instructors of agricultural tractor and machinery safety programs should have passed (minimum 70 percent correct) a written test that addresses the basic requirements of the AgHOs," would not facilitate sustainability of the program since oversight to periodically monitor, maintain, update, administer, and/or grade the tests would be necessary. 2. Other criteria, such as: "instructors of agricultural tractor and machinery safety programs should possess a secondary school teaching certificate," were determined by the panel to present undue occupation-related restrictions to otherwise qualified instructors. Criteria that met this rationale were found, in many cases, to be addressed by cooperating agencies such as 4-H or school systems that sponsor agricultural safety training for youth.

Indications based upon verbal feedback from the panel determined that AgHOs safety certification instructor programs should be designed as self-sustaining to prepare potential instructors with at least the minimum required knowledge and skills necessary to teach agricultural safety to youth. As such, it was the panel's position that only those criteria that were not addressed by other related, sponsoring, or cooperating entities should be included.

Competency Ranking by Survey Respondents

Competencies were defined as knowledge and skills acquired as a result of training, experience, or education. Included in the electronic questionnaire were 36 competencies that current instructors were asked to rank in terms of importance for mastery by instructors. The perceived levels of importance of competencies are shown in descending order in Table 3, ranked on a five-point Likert scale.

Table 3
Distribution of Current AgHOs Safety Instructors' Perception of Importance of Selected Competencies (n = 249) with Ranking of Instructional Time Allocation to Competencies by Expert Panel (N = 11) in parentheses

Rank	Instructors should possess knowledge in the following areas:	*M*	*SD*	Range	Mode	Median
1. (34)	Effective communication with the intended audience	4.57 (1.73)	0.63 (1.27)	2-5 (1-5)	5 (1)	5 (1)
2. (1)	Identification and explanation of the function and location of safety features and devices found on tractors	4.52 (4.55)	0.67 (0.69)	2-5 (3-5)	5 (5)	5 (5)
3. (3)	Basic operating principles of PTO powered agricultural machinery	4.51 (4.27)	0.76 (1.01)	1-5 (2-5)	5 (5)	5 (5)
4. (2)	Safe operation procedures relative to tractor component basics	4.50 (4.55)	0.75 (0.82)	1-5 (3-5)	5 (5)	5 (5)
5. (5)	Identification of basic tractor components	4.45 (4.09)	0.74 (0.94)	2-5 (3-5)	5 (5)	5 (4)
6.(6)	General awareness of agricultur-al hazards	4.44 (3.91)	0.77 (0.93)	1-5 (3-5)	5 (4)	5 (4)
7. (7)	Proper use of personal protective equipment	4.37 (3.82)	0.87 (0.97)	1-5 (3-5)	5 (3)	5 (4)
8. (8)	Identification and explanation of the function and location of basic integral components found on powered agricultural machines	4.34 (3.64)	0.77 (0.81)	2-5 (3-5)	5 (3)	5 (3)
9. (4)	Safe operation of powered agricultural machinery	4.32 (4.18)	0.86 (0.87)	1-5 (3-5)	5 (5)	5 (4)
10. (30)	Demonstrated ability to access materials and facilities required for successful safety training programs	4.32 (2.09)	0.70 (1.04)	1-5 (1-4)	4 (1)	4 (2)
11. (9)	Safe operation of a tractor through a structured course	4.31 (3.55)	0.88 (1.21)	1-5 (2-5)	5 (5)	5 (4)
12. (11)	Safe practices when working with hydraulics	4.25 (3.45)	0.81 (1.36)	1-5 (1-5)	5 (5)	4 (3)
13. (17)	Laws and regulations that apply to youth working in agricultural workplaces	4.18 (2.91)	0.83 (1.51)	1-5 (1-5)	4 (3)	4 (3)
14. (20)	Meanings associated with standard safety colors	4.17 (2.73)	0.86 (1.01)	1-5 (1-4)	5 (3)	4 (3)
15. (31)	Access to knowledgeable individuals within the local community	4.15 (2.09)	0.73 (0.94)	1-5 (1-4)	4 (2)	4 (2)
16. (14)	Safe practices for operating ATVs	4.10 (3.09)	0.97 (1.22)	1-5 (1-5)	5 (3)	4 (3)

(Table 3 continues)

(Table 3 continued)

Rank	Instructors should possess knowledge in the following areas:	*M*	*SD*	Range	Mode	Median
17. (16)	Required procedures for entering agricultural confined spaces such as grain bins, silos, etc.	4.08 (3.09)	1.04 (1.64)	1-5 (1-5)	5 (1)	4 (3)
18. (26)	Locating appropriate safety resources	4.07 (2.55)	0.93 (1.37)	1-5 (1-5)	4 (3)	4 (3)
19. (21)	Fire safety and suppression	4.05 (2.64)	0.96 (1.03)	1-5 (1-5)	5 (3)	4 (3)
20. (10)	Agricultural practices and structures that could yield or contain toxic gases and/or entrapment in a toxic environment	4.02 (3.55)	0.97 (0.93)	1-5 (2-5)	5 (3)	4 (3)
21. (35)	Demonstrated record keeping skills	3.98 (1.55)	0.86 (0.82)	1-5 (1-3)	4 (1)	4 (1)
22. (12)	Safe operating procedures for skid steer loaders	3.95 (3.36)	1.05 (1.36)	1-5 (1-5)	4 (5)	4 (3)
23. (13)	Electrical safety	3.95 (3.36)	1.02 (1.03)	1-5 (2-5)	4 (4)	4 (4)
24. (22)	General agricultural practices that focus on various agricultural machines, methods, practices, procedures, crops, livestock, and other related agricultural areas	3.91 (2.64)	0.89 (1.36)	1-5 (1-5)	4 (2)	4 (2)
25. (18)	Safe animal handling techniques	3.88 (2.82)	1.08 (1.47)	1-5 (1-5)	4 (3)	4 (3)
26. (23)	Animal behavior characteristics	3.85 (2.64)	1.09 (1.57)	1-5 (1-5)	4 (1)	4 (3)
27. (15)	Safe operation of farm vehicles with the primary purpose of carrying passengers	3.73 (3.09)	1.18 (1.51)	1-5 (1-5)	5 (5)	4 (3)
28. (33)	Up to date technologies (computers, DVDs, webinars, online forums, etc.) used for safety instruction	3.72 (1.91)	1.01 (0.70)	1-5 (1-3)	4 (2)	4 (2)
29. (19)	Procedures to safely handle restricted use agricultural chemicals	3.68 (2.82)	1.18 (1.66)	1-5 (1-5)	4 (1)	4 (3)
30. (24)	Procedures for safely handling anhydrous ammonia (NH_3)	3.68 (2.64)	1.15 (1.69)	1-5 (1-5)	4 (1)	4 (3)
31. (25)	Statistics that describe the frequency and severity of injuries in agricultural workplaces	3.51(2.55)	0.95 (1.29)	1-5 (1-5)	4 (1)	4 (2)
32. (27)	Safe procedures for operation of forklifts	3.42 (2.55)	1.15 (1.51)	1-5 (1-5)	4 (1)	4 (2)
33. (29)	Procedures for safely working on ladders or scaffolding at heights greater than 20 feet	3.39 (2.22)	1.28 (1.48)	1-5 (1-5)	4 (1)	4 (2)
34. (32)	Safe procedures for operation of earth moving equipment	3.38 (2.09)	1.24 (1.38)	1-5 (1-5)	4 (1)	4 (2)

(Table 3 continues)

(Table 3 continued)

Rank	Instructors should possess knowledge in the following areas:	*M*	*SD*	Range	Mode	Median
35. (28)	Basic adolescent/youth development	3.00 (2.40)	0.99 (1.26)	1-5 (1-5)	3 (2)	3 (2)
36. (36)	Safe practices used when handling blasting agents	2.65 (1.50)	1.42 (1.27)	1-5 (1-5)	1 (1)	2 (1)

Note. Scale: *M* = 1.00-1.50 = Low Importance, *M* = 1.51-2.50 = Moderately Low Importance, *M* = 2.51-3.50 = Moderate Importance, *M* = 3.51-4.50 = Moderately High Importance, *M* = 4.51-5.00 = High Importance.

Respondents ranked all competencies at least moderately important. Three competencies were perceived by current instructors of AgHOs certification programs as being of *high importance (M* = 4.51-5.00): "effective communication with the intended audience," "identification and explanation of the function and location of safety features and devices found on tractors," and "basic operating principles of PTO powered agricultural machinery."

The majority of competencies (75%) presented in the questionnaire were perceived by respondents as being of *moderately high importance* (*M* = 3.51-4.50). This reflected that the competencies identified in the review of current resources continue to be important.

The remaining five competencies included in the questionnaire were perceived by respondents to be of *moderate importance* (*M* = 2.51-3.50): "safe procedures for operation of forklifts," "procedures for working on ladders or scaffolding at heights greater than 20 feet," "safe procedures for operation of earth moving equipment," "basic adolescent/youth development," and "safe practices used when handling blasting agents."

Competencies Validation

Validation of instructor competencies was accomplished by the expert panel that allocated instructional time (in parentheses in Table 3) to each competency in a hypothetical AgHOs safety certification instructor curriculum. Data gathered from responses to the electronic survey of instructors resulted in a ranked order of competencies in terms of perceived importance. This ranked list of competencies was presented to expert panel members in order to provide a reference for use when allocating instructional time to each competency. Importance data was omitted in an attempt to avoid biasing the time allocation rankings (which also used a five-point Likert scale) of panel members.

The panel identified two competencies as requiring a *large amount of time or emphasis* (*M* = 4.51 – 5.00), as noted by the data included in parentheses in Table 3. These two areas were: "identification and explanation of the function and location of safety features and devices found on tractors" (*M* = 4.55, *SD* = 0.69) and "safe operation procedures relative to tractor component basics" (*M* = 4.55, *SD* = 0.82).

The competency "safe practices used when handling blasting agents" (*M* = 1.50, *SD* = 1.27) received the lowest mean ranking in terms of time or emphasis allocated to the subject by the expert panel. The panel reported that even though this activity is considered illegal under the provisions of the AgHOs, youth should be made aware of what tasks they cannot perform.

Conclusions

Conclusions Concerning Questionnaire Response for Minimum Criteria

Criteria included in the questionnaire were isolated as a result of a review of literature related to past and current AgHOs curricula and available agricultural safety and health resources, input from a panel of experts, and results from a pilot survey of current instructors of the Gearing Up for Safety curriculum. The resulting 15 criteria were ranked in terms of level of importance by 249 current agricultural safety and health instructors via an electronic survey.

Age of the instructor, along with mastery of the primary language necessary for instruction, possession of a valid driver's license, and completion of formal safety training were perceived of greatest importance. The instructors' occupation appeared to be of lesser concern to questionnaire respondents. The criterion rated least important by respondents was that instructors obtain FEMA training and certification.

Conclusions Concerning Expert Panel Validation of Minimum Criteria

Validation of the criteria survey responses was conducted by an expert panel that determined the minimum mean "yes"/"no" score necessary to rate significance for the criteria. The minimum mean value was set at 0.50. Based on this determination, criteria numbers 1-7 listed in Table 2 were recommended for inclusion in future selection processes for AgHOs instructors.

Conclusions Concerning Questionnaire Response for Minimum Competencies

Based on a review of literature, applicable laws, related curricula, and feedback from experts in the field, a list of minimum core competencies necessary for mastery by instructors of AgHOs safety certification programs was generated and validated by a panel of experts as the recommended building blocks for instructor selection and training. The instructors' ranking of the perceived level of importance of each competency guided the expert panel in determining the amount of time that should be allocated to each core competency.

Although the majority of competencies (86%) included in the questionnaire received rankings of at least *moderately high importance*, competencies that dealt directly with tractor and machinery safety were ranked among the highest by respondents. Examples included: "identification and explanation of the function and location of safety features and devices found on tractors," "basic operating principles of PTO powered agricultural machinery," "safe operation procedures relative to tractor component basics," "identification of basic tractor components," "identification and explanation of the function and location of basic integral components found on powered agricultural machines," "safe operation of powered agricultural machinery," and "safe operation of a tractor through a structured course." This appears to reflect both the historical focus of AgHOs training and the causes of the most severe injuries to youth employed in agriculture.

Conclusions Concerning Expert Panel Validation of Minimum Competencies

The distribution of time or emphasis for the competencies tended to resemble the importance rankings that were provided by electronic questionnaire respondents. Of the competencies included in the electronic questionnaire, "effectively communicate with the intended audience" was ranked by respondents as the most important. After discussion, the expert panel determined that this qualification was more in accordance with the definition of a criterion than a competency. In addition, experts found it to be redundant with respect to the criterion "mastery of the primary language necessary for instruction," and therefore combined the two as a single criteria.

Many of the competencies ranked as requiring the greatest time allowance pertained to safe operation of agricultural tractors and machinery. Due to the fact that one of the primary purposes of AgHOs safety certification programs is to prepare youth ages 14-15 years old to safely operate agricultural tractors and machines for hire, the ranking was no surprise. Consequently, a strong emphasis of AgHOs safety certification instructor training should be placed on preparation of these individuals in tractor and machine safety, component identification, and operation knowledge.

Noteworthy is the moderately high level of emphasis placed on making instructors aware of their own and their students' personal safety. This is supported by panel members' ranking that "general awareness of agricultural hazards" and "proper use of personal protective equipment" should be allocated *moderately large amounts of time or emphasis* in an instructor curriculum.

Some competencies were associated with tasks that were expressly prohibited for youth in

the current AgHOs. These included items such as: "safe operation of farm vehicles with the primary purpose of carrying passengers," "required procedures for entering confined spaces such as grain bins, silos, etc.," and "safe practices used when handling blasting agents." Initially, the panel of experts determined that these competencies were inappropriate for inclusion in an instructor curriculum since they are expressly identified as illegal for youth to perform under the age of 16. However, it was concluded that inclusion would result in an instructor possessing necessary knowledge of prohibited tasks. Thus, he or she could instruct youth of specific reasons why the tasks are hazardous and reiterate why youth should not perform them.

Discussion with the expert panel concluded that there would be insufficient time to address all potential ways that youth could be injured. Members recommended that the provisions of the AgHOs be revisited to initiate revisions that reflect newer curriculum material, current farm-related injury data, changes in agricultural practices and societal expectations, and findings of this study. Rather than responding to a small number of highly publicized agricultural-related injuries when proposing revisions to the current AgHOs, utilization of the criteria and competencies that have now been identified and validated would present a stronger, evidence-based framework for revisions.

Summary

The process used to identify and validate the minimum core criteria and competencies for instructors of certification programs under the provisions of the current AgHOs led to a list of specific outcomes for use in future curriculum development for instructors of AgHOs certification programs. Findings could be used to develop and pilot test targeted curricula that could be delivered via multiple formats, including face-to-face and online media. The process also provides a basis for assessing the readiness of potential instructors in an objective manner.

Most of the instructor criteria and competencies were consistent with general expectations reflected in currently used curricula, with several major exceptions. The low importance of being an Extension educator or agricultural (vocational) educator as a prerequisite indicated by respondents was surprising. This finding is inconsistent with the current requirements of the AgHOs, and may reflect expectations for persons in these positions that have changed dramatically over the past 40 years. Regardless, the findings suggest the restrictions should be re-evaluated in light of current skills and knowledge levels of these two groups.

One area of inconsistency between the surveyed AgHOs instructors and the expert panel was over the issue of testing and instructor certification. The current instructors reported that testing was of high importance; whereas the expert panel concluded that it was largely unneeded. This issue should be explored further. Regardless of current efforts to revise the AgHOs, the need to provide relevant instruction for those teaching agricultural safety and health competencies will remain. The greatest need for adequately prepared instructors will be for that population of youth who remain exempt from the current AgHOs provisions—the children of farm owners and operators. Any future consideration to the design of instructor training should include components that address reaching this underserved population.

Recommendations for Future Research

A greater understanding of the competencies and criteria most necessary for a successful agricultural safety education program could be from research efforts directed at employers of youth in agriculture. This population could provide a perspective of the jobs being assigned to youth, the dangers inherent to their operations, and the potential strategies to mitigate those risks.

An additional source of information that would better illustrate the balance between necessary competencies and criteria and those that would be best learned and utilized by students would be to seek feedback from youth who currently work in agriculture. These youth could identify the actual tasks being performed, the perceived need for instruction, and the characteristics of safety instructors that they believe to be of greatest importance in communicating safety and health information.

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