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Competencies and Experiences Needed by Pre–service Agricultural Educators to Teach Globalized Curricula: A Modified Delphi Study

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The 21st century graduate must be able to interact with people from all over the world and must also be knowledgeable about the world (Longview Foundation, 2008). In order to produce graduates that are globally competent, The National Council for the Accreditation of Teachers (NCATE, 1982) has mandated that multi–cultural education be incorporated as part of the teacher–preparation curricula. The purpose of this study was to identify competencies and experiences needed by agricultural pre–service teachers in order to teach globalized curricula. A modified Delphi method was used and the panel consisted of 13 (n = 13) experts in the field of agricultural teacher education with additional experience in international agricultural education or extension. Twenty competencies and two experiences were identified for pre–service agricultural educators to teach globalized curricula at the high school level.

Keywords: agricultural education; competencies; globalized curricula; Delphi; pre–service teachers

The agricultural industry represents a global marketplace where producers purchase inputs from around the world and sell their outputs to consumers across the globe (National Research Council, 2009). The expectations on college graduates have changed immensely due to the nature of today's agricultural industry. A 21st century graduate "will need extensive knowledge of the world and the skills and dispositions to engage with people from many cultures and countries" (Longview Foundation, 2008, p. 3). The National Research Council (2009) recognized a need to expose undergraduate agricultural students to international perspectives in preparation for their future agricultural careers and recommended the following: (a) learning–abroad programs; and (b) the infusion of international perspectives into traditional agricultural courses.

These global expectations are not limited to college graduates. Employers recognize the importance of hiring high school graduates with the skills that promote effective interaction with people on a global level (Longview Foundation, 2008). Employers prefer to hire graduates who are globally competent. According to the Longview Foundation, a globally competent student has:

- Knowledge of and curiosity about the world's history, geography, cultures, environmental and economic systems, and current international issues
- Language and cross–cultural skills to communicate effectively with people from other countries, understand multiple perspectives, and use primary sources from around the globe
- A commitment to ethical citizenship (p. 7)

In order for high schools to produce globally competent graduates, the teachers and the curricula must encourage and promote the importance of globalization and multiculturalism. If teachers are not globally competent, it is unlikely that they will be able to prepare their students to be globally competent.

The National Council for the Accreditation of Teachers (NCATE, 1982), mandated that multi–cultural education be incorporated into existing teacher–preparation programs. Multi–cultural education could be implemented in many differ-

ent ways including: coursework, readings, field experiences, and clinical experiences (NCATE, 1982), typically emphasizing multi–cultural aspects within the United States.

Although the call has been made for universities and colleges to produce teachers who are globally competent, the demand is not being met (Merryfield, 2000). In order for a teacher to effectively produce globally competent students, the teacher must possess knowledge of international issues; have appreciation of multiple points of view, possess pedagogical skills, and have commitment to teaching students to become both local and global citizens (Longview Foundation, 2008). The competencies identified by the Longview Foundation are a good starting point, but fail to address discipline–specific competencies that an agricultural education teacher would need. What competencies and experiences would a secondary agricultural education teacher need to effectively prepare their students to work in a global workforce?

Theoretical Framework/ Literature Review

Specifically, the researchers were interested in learning what pre–service teachers should know in order to teach a globalized agricultural education curricula and what experiences would help pre–service teachers construct their understanding of this knowledge. The theoretical framework for this study was based on constructivism and its central tenant that learners construct meaning from their own experiences (Fosnot, 1996; Ormrod, 2008). More precisely, this study used cognitive constructivism and experiential learning to guide the inquiry (Doolittle & Camp, 1999; Roberts, 2006).

This study was based in the context of agricultural education teacher–education programs. Cruickshank (1984) proposed a model for teacher–education that included five variables:

1. teacher educators,
2. teacher education students,
3. contexts of teacher–education,
4. content or curriculum in teacher–education, instruction, and
5. organization in teacher–education (p. 44–45).

All of the variables interact with each other and affect the outcomes of teacher–education (Cruickshank, 1984). This study will specifically examine the contexts and content for teacher–education programs in agricultural education related to globalizing the secondary curricula. What competencies and experiences do pre–service agricultural education teachers need in order to teach globalized curricula? The current literature on this topic is inadequate to answer this question.

In a study of agricultural education undergraduates at Texas A&M University, Wingenbach et al. (2003) found that a mere 5% of the participants obtained a passing score on a knowledge test that focused on international agricultural issues. Navarro and Edwards (2008) concluded that internationalization of the undergraduate agricultural curriculum is often viewed as a stand–alone effort towards curriculum reform. Internationalization should be a "multifaceted effort of curricular reform, a process embedded in all programs and a necessary ingredient in everything faculty do from an instructional perspective" (Navarro & Edwards, 2008, p. 79). One way students can experience international agriculture is through learning–abroad programs. These programs strive to improve cultural sensitivity and examine the multidisciplinary approaches used within agriculture (National Research Council, 2009).

Educational disciplines have begun to examine this issue, often through the lens of multi–cultural education. This research has looked at pre–service teachers and teacher–educators. In order to produce educators who are prepared to teach a curriculum that integrates global knowledge and competencies, students must be exposed to multi–cultural and globalized curricula throughout their educational experience (Longview Foundation, 2008). As of 2008, the University of North Carolina and the University of Maryland required students to take coursework that focuses on international topics (Longview Foundation, 2008). However, students are not the only ones who need to experience a globalized curriculum; teacher educators need to have international knowledge and experience (Longview Foundation, 2008). Merryfield (2000) found that effective teacher educators that focus on multi–cultural and global educa-

tion had "significant experiences with people different from themselves" (p. 440), awareness of discrimination and injustice, been a minority, and "most importantly, they are conscious of how human differences are used by people in power to rationalize inequities, maintain their privilege and promote their culture as superior" (p. 440). Merryfield also found that "teacher educators in the study recognize that it is the interaction of identity, power, and lived experiences that has led to their work in multi–cultural and global education" (p. 441). Teacher educators are not successfully preparing future teachers to engage and teach from a multi–cultural and global perspective (Merryfield, 2000). Merryfield concluded that teacher–education programs must hire educators that have knowledge, experiences, and awareness of multi–cultural and global education in order to prepare students for global interconnectedness. It is up to teacher educators to promote an environment that encourages multi–cultural appreciation within the pre–service teacher program (Ambe, 2006).

In summary, the existing literature addresses what teachers should know about *multi–cultural* education and just scratches the surface with regards to *international* knowledge required of teachers. The literature also barely addresses international knowledge of college–level agricultural education students. In addition, the literature examines the knowledge required of teacher–educators. Although insightful, the existing literature fails to indicate which competencies and experiences a secondary agricultural education teacher needs to effectively teach globalized curricula.

Purpose and Objectives

The purpose of this study was to determine what pre–service agricultural educators would need in order to teach globalized curricula. The specific objectives were:

1. Identify global *competencies* that pre–service agricultural educators should possess before entering the teaching profession.
2. Identify global *experiences* that pre–service agricultural educators should obtain before entering the teaching profession.

Methods

A modified Delphi method was used for this study due to its acceptance and ability to identify a consensus from a panel of experts (Dalkey, 1969; Helmer, 1966; Stufflebeam, McCormick, Binkerhoff, & Nelson, 1985). The methods for this research were approved by the Institutional Review Board from the University of Florida. Three rounds of data collection were used to solicit the opinions of an expert panel. The criterion for membership on the panel was twofold: (a) the person must be currently working as a teacher–educator in agricultural education and (b) the person must have been involved in an international agricultural education or extension project. The researchers determined that these individuals would have the expertise to know what would be necessary to teach a globalized high school agriculture curricula and the expertise to understand what would be necessary to prepare a pre–service teacher for this task. The expert panel was formed using a snowball–sampling method (Goodman, 1961). To begin forming the panel, 4 agricultural education faculty from various institutions were identified as having considerable experience in this area and meeting the criterion. They were each asked to identify 4 or 5 additional agricultural educators that met the criteria. A total of 17 potential agricultural educators were identified and invited to participate in the study. A total of 13 experts representing 12 agricultural education programs throughout the United States agreed to participate.

Data were collected via an online survey tool called Qualtrics. Notifications for each round of the study were sent to each panelist using an email with a link to the questionnaire. The timing of pre–notice, notice, and follow–up emails were developed based on Dillman, Smyth, and Christian's (2009) Tailored Design Method.

Round 1 of the study comprised of one open–ended question, "What competencies and experiences would a pre–service teacher need to effectively teach globalized agricultural curricula in the high school?" The responses to the ini-

tial question were analyzed and categorized using a constant–comparative method (Glaser & Straus, 1967). Response statements that were deemed to have the same meaning as response statements from other participants were condensed to one response statement. The response statements were categorized into competencies and experiences. Nine of the 13 members responded (69%) and identified 24 competencies and 18 experiences.

Round 2 consisted of a 42–statement questionnaire based on the findings from Round 1. The panelists utilized a five–point rating scale to rank their level of agreement or disagreement (strongly disagree, disagree, neither disagree nor agree, agree, strongly agree). The panelists were also given the opportunity to suggest rewording of competencies and experiences and to suggest additional competencies and experiences. Thirteen members of the panel responded (100%) to the competency section of the questionnaire and 12 members of the panel responded (92%) to the experience section of the questionnaire. Upon completion of Round 2, the competencies and experiences were analyzed to determine which competencies and experiences would move on to Round 3. It was determined *a priori* that competencies and experiences with at least two–thirds of the panelists choosing agree or strongly agree would move on to round three. The panel members agreed on 24 competencies and 11 experiences. Two additional competencies were suggested in Round 2 and added for Round 3 based on the recommendations of panel members. Twelve competencies and experiences were also reworded based on suggestions from the panel.

Round 3 consisted of 24 competencies and 11 experiences in which the panelists were asked to use a dichotomous scale to indicate whether or not they agree or disagree with each competency and experience. The panelists were provided with the utilized statistics from Round 2 and also told which competencies and experiences were reworded. An 80% agreement rate was determined *a priori* to indicate that the competency or experience would be retained. Twelve participants responded to round 3.

Results

Round 1

Round 1 was designed to solicit a comprehensive list of competencies and experiences that pre–service agricultural educators might have in order to teach globalized curricula. As mentioned before, the open–ended prompt used to develop the lists was, "What competencies and experiences would a pre–service teacher need to effectively teach globalized agricultural curricula in the high school?" Panelists proposed 24 potential competencies and 18 potential experiences from the open–ended prompt. The identified competencies are presented in Table 1 and experiences are presented in Table 2.

Table 1
Descriptive Statistics of Competencies by Delphi Round 1 and 2

Competencies Identified in Round 1	Round 2 (n = 13) Agree/Strongly Agree %
1. Understand the connection between local agricultural production and the global agricultural economy	100.00[a]
2. Understand the global interconnectedness of agricultural production systems (e.g. sources of production inputs such as seed, seedstock, fertilizer, livestock breedstock, etc.	100.00
3. Understand the connection between the global economy and United States economy	100.00[a]
4. Understand international issues that affect agriculture	100.00[a]
5. Understand the role of agriculture in developing countries	100.00[a, b]
6. Understand the importance of global agriculture	92.30
7. Understand agricultural production and commodities in major world regions	84.61
8. Have knowledge of international trade related to agricultural commodities	84.61[a]
9. Have knowledge of the domestic and international agencies that impact agricultural	84.61[a]
10. Understand the relationship between food security, national security, and political/cultural stability	84.61[a]
11. Have an appreciation for cultural differences including religion, language, customs, and food	84.61
12. Have knowledge of world geography	91.66[b]
13. Understand international trade agreements	76.92
14. Have knowledge of United States policies affecting global agriculture	76.92[a]
15. Knowledge of agricultural education in international settings	76.92[a]
16. Have knowledge about the culture of at least one other country	76.92[a]
17. Have knowledge of the major subcultures in the United States	76.92[a]
18. Understand the role that religion plays in politics, production practices, customs, and cultures	76.92[a]
19. Have knowledge of global agricultural corporations	69.23[b]
20. Be aware that cultural differences does not make a person wrong, bad, an enemy, or stupid	66.66[a, b]
21. Understand agriculture from multi–cultural perspectives	66.66[a, b]
22. Understand aspects of global climate change likely to impact agricultural and food production worldwide	66.66[a, b]
23. Be open–minded	53.84
24. Understand the biological, social, and emotional similarities of people throughout the world	53.84

[a] Reworded after Round 2. [b] Only 12 panelists responded to this competency

Table 2
Descriptive Statistics of Experiences by Delphi Round 1 and 2

Experiences Identified in Round 1 or 2	Round 2 (n = 12) Agree/Strongly Agree %
1. Interact with people working in the international agricultural field	91.66
2. Interact with agricultural students in another country (using a variety of technologies)	83.33
3. Complete training on how to use a globalized curriculum	83.33
4. Complete an international agricultural course	75.00
5. Interact with international students on campus	75.00
6. Complete a short term study tour abroad in agriculture	66.66
7. Complete a multi–cultural/diversity course	66.66
8. Complete a course that focuses on the global economy	66.66
9. Interact with international faculty on campus	66.66
10. Interact with people of different cultures	66.66
11. Teach others about international agriculture and globalization	66.66
12. Have an International experience of any type	58.33
13. Complete an American history course	58.33
14. Take a virtual field trip	58.33
15. Complete a world history course	41.66
16. Complete an international agricultural internship	25.00
17. Complete a semester long study abroad in agriculture	25.00
18. Complete a concentration of study in a particular region of the world	16.66

Round 2

In Round 2, the panelists were given the opportunity to identify their level of agreement for each competency and experience identified through Round 1 of the study. Panelists rated each item using a five–point rating scale. Panelists were also given the opportunity to reword items or suggest additional items to the competency and/or experience list. As previously mentioned, it was determined *a priori* that competencies and experiences with at least two–thirds of the panelists choosing agree or strongly agree would move on to round three. Round 2 results for competencies are presented in Table 1 and Round 2 results for experiences are presented in Table 2. Based on the results, the competency *be open minded* was dropped after Round 2 because less than two–thirds of the panelists agreed or strongly agreed with the competency.

Based on feedback from the panel, seven experiences were also dropped after Round 2 due to having less than two–thirds of the panelists agree or strongly agree with the experience: (a) *Have an International experience of any type*, (b) *Complete an international agricultural internship*, (c) *Complete a semester long study abroad in agriculture*, (d) *Complete a world history course*, (e) *Take a virtual field trip*, (f) *Complete a concentration of study in a particular region of the world, and* (g) *Complete a world history course*. Panelists suggested that two additional competencies be added for consideration in Round 3: (a) *Describe the nutritional needs of individuals as it relates to protein needs, vitamins/minerals, carbohydrates, etc.* and (b) *Discuss how human nutritional needs relate to the commodities raised in the various regions of the world*. Thus, 24 competencies and 11 experiences moved on to Round 3.

Round 3

In Round 3, panelists were asked to agree or disagree with each competency and experience that made it to the final round. As mentioned before, it was determined *a priori* that competencies and experiences with a minimum of 80% panelist agreement would be retained. Complete

results for competencies are presented in Table 3 and experiences are presented in Table 4. Panelists came to consensus on 20 competencies. The following four competencies were dropped after Round 3: (a) *Describe agricultural education in international settings*, (b) *Identify major subcultures in the United States*, (c) *Discuss aspects of global climate change likely to impact agricultural and food production worldwide*, and (d) *Describe the nutritional needs of individuals as it relates to protein needs, vitamins/minerals, carbohydrates, etc.* Interestingly, panelists came to consensus on only 2 out of the 11 experiences, *Interact with people working in the international agricultural field* and *Complete training on how to use a globalized curriculum*.

Table 3
Descriptive Statistics of Competencies for Delphi Round 3 (n=12)

Competencies	Agree %
1. Describe the relationships between local agricultural production and the global agricultural economy	100.00
2. Describe the global interconnectedness of agricultural production systems (e.g. sources of production inputs such as seed, seedstock, fertilizer, livestock breedstock, etc.)	100.00
3. Describe the connection between the global economy and United States economy	100.00
4. Describe the relationship between food security, national security, and political/cultural stability	100.00
5. Identify international issues that affect agriculture	100.00
6. Describe how U.S. policies affect global agriculture	100.00
7. Describe the role of agriculture in developing countries	100.00
8. Explain the importance of global agriculture	100.00
9. Explain how agricultural commodities are traded internationally	91.66
10. Describe how domestic and international agencies affect agricultural trade	91.66
11. Discuss cultural differences including religion, language, customs, and food	91.66
12. Describe the culture of at least one other country	91.66
13. Recognize that cultural differences do not make a person wrong, bad, an enemy, or stupid	91.66
14. Discuss agriculture from multi–cultural perspectives	91.66
15. Describe agricultural production and commodities in major world regions	83.33
16. Describe international trade agreements	83.33
17. Identify major global agricultural corporations	83.33
18. Describe the role that religion plays in politics, production practices, customs, and cultures	83.33
19. Discuss their knowledge of world geography	83.33
20. Discuss how human nutritional needs relate to the commodities raised in the various regions of the world	83.33[a]
21. Describe agricultural education in international settings	75.00
22. Identify major subcultures in the United States	75.00
23. Discuss aspects of global climate change likely to impact agricultural and food production worldwide	66.66
24. Describe the nutritional needs of individuals as it relates to protein needs, vitamins/minerals, carbohydrates, etc	58.33[a]

[a] New competency added after Round 2

Table 4
Descriptive Statistics of Experiences for Delphi Round 3 (n=12)

Experiences	Agree %
1. Complete training on how to use a globalized curriculum	100.00 [a]
2. Interact with people working in the international agricultural field	81.81 [a]
3. Interact with international faculty on campus	75.00
4. Interact with people of different cultures	72.72 [a]
5. Interact with agricultural students in another country (using a variety of technologies)	72.72 [a]
6. Teach others about international agriculture and globalization	72.72 [a]
7. Complete a short term study tour abroad in agriculture	66.66
8. Complete an international agricultural course	66.66
9. Complete a course that examines working in a multi–cultural environment	66.66
10. Complete a course that focuses on the global economy	66.66
11. Interact with international students on campus	66.66

[a] Only 11 panelists responded to this experience

Conclusions, Discussion, and Implications

Agricultural teacher educators who participated on the expert panel came to a consensus that pre–service agricultural educators need 20 competencies and 2 experiences in order to teach a globalized curriculum at the high school level. The data collected from this study indicated that the number of competencies by pre–service agricultural educators to teach globalized curricula in the high school exceeded the number of experiences needed. The 20 competencies (see Table 3) could be categorized as competencies related to agricultural production, economics, political/policy, and social/cultural. One experience (*Complete training on how to use a globalized curriculum*) focused on pedagogical development, the other (*Interact with people working in the international agricultural field*) focused on developing knowledge based on the experiences of others.

The competencies identified support and expand the Longview Foundation's characteristics of a globally competent student (2008). A globally competent student is able to "describe a body of knowledge about world regions, cultures, and global issues, and skills and dispositions to engage responsibly and effectively in a global environment" (Longview Foundation, 2008, p. 7). The findings in the current study add an agricultural context to the previously identified characteristics of a globally competent student. However, the panelist rejected the experiences that required the pre–service agricultural educators to interact with people of different cultures. It is interesting to think about why the panelists disregarded the experience. Merryfield (2000) found that cultural interaction for teacher educators was an important experience to have. Why are cultural interactions an important experience for teacher educators and not pre–service agricultural educators? Another experience not deemed necessary was a study–abroad experience for pre–service agricultural educators. This finding was inconsistent with the National Research Council (2009), which advocated international experiences for all agricultural students.

To allow pre–service agricultural educators to construct (Doolittle & Camp, 1999; Fosnot, 1996; Ormrod, 2008; Roberts, 2006; Steffe & Gale, 1995) their understanding of teaching globalized agriculture curricula, the context and content (Cruickshank, 1984) of agricultural education programs should be adjusted to include the competencies and experiences identified in this study. This may include changing degree requirements, redesigning courses, and/or developing curricula training sessions. Exposing the pre–service teachers to the globalized competencies and experience will allow students' to organize the competencies and experiences in a way that allows them to construct knowledge (Ormrod, 2008).

Given the espoused emphasis on experiential learning in agricultural education (Roberts & Harlin, 2007), it is interesting to speculate why the panel failed to agree on so many of the pro-

posed experiences. One panelist offered some insight into his rationale. He suggested that each of the proposed experiences is valuable, but all of them are not realistic and are not needed to effectively teach globalized curricula (R. Terry, personal communication, July 26, 2011). Although it cannot be certain if all the panelists thought the same way, it would appear that the pragmatic nature of agricultural teacher educators trumped the desire to include more experiential activities.

This study is just beginning to fill this gap in the knowledge base. Further research in this area is needed in order to continue the development of a theoretical base for the competencies and experiences needed by pre–service agricultural educators in order to teach globalized curricula. Additionally, further research is necessary to address the following questions:

1. To what extent are pre–service agricultural educators across the nation developing the identified global competencies and having the identified experiences during their teacher preparation program?
2. What method or methods can be implemented to effectively and efficiently develop these competencies and provide these experiences?
3. What is the student perception regarding the identified global competencies and experiences?
4. Are some of the identified global competencies and experiences more important than others for pre–service agricultural educators?
5. Do the identified global competencies and experiences make pre–service agricultural educators more effective at teaching a globalized curriculum than their peers that do not possess the same competencies and experiences?

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