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Matt Spindler
Virginia Tech

Benjamin Ogwo
SUNY Oswego

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Abstract

Implementing high quality professional development for postsecondary Agricultural Education and Training (AET)instructors is a critical step in facilitating inclusive economic development in Nigeria. Most technical agricultural graduate programs in Nigeria do not include training in instructional methods, creating lesson plans, or assessment techniques and lecturers are usually forced into learning the craft of teaching through trial and error. Unfortunately, poor teaching and a lack of innovative strategies do little to break the status quo view that agriculture is a distasteful option for youths. It is likely that economic and social progress in Nigeria will be attenuated if AET systems cannot attract and motivate capable students to engage in addressing the critical problems surrounding food security, sustainability, and climate change. The purpose of this grounded theory study was to create a conceptual model for addressing the process oriented professional development needs of postsecondary AET instructors teaching technical subjects in Nigeria

Keywords

Agricultural Education, Nigeria, Professional Development, Process Approach

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Listening to Collaborate: Professional Development for Postsecondary Agricultural Education and Training Instructors Teaching Technical Subjects in Nigeria

Matt Spindler
Virginia Tech
Blacksburg, VA

Benjamin Ogwo
SUNY Oswego
Oswego, NY

Abstract

Implementing high quality professional development for postsecondary Agricultural Education and Training (AET) instructors is a critical step in facilitating inclusive economic development in Nigeria. Most technical agricultural graduate programs in Nigeria do not include training in instructional methods, creating lesson plans, or assessment techniques and lecturers are usually forced into learning the craft of teaching through trial and error. Unfortunately, poor teaching and a lack of innovative strategies do little to break the status quo view that agriculture is a distasteful option for youths. It is likely that economic and social progress in Nigeria will be attenuated if AET systems cannot attract and motivate capable students to engage in addressing the critical problems surrounding food security, sustainability, and climate change. The purpose of this grounded theory study was to create a conceptual model for addressing the process oriented professional development needs of postsecondary AET instructors teaching technical subjects in Nigeria.

Keywords: Agricultural Education, Nigeria, Professional Development, Process Approach

Introduction / Theoretical Framework

High quality instruction and functional Agricultural Education and Training (AET) systems are pivotal to the growth and development of any nation. In many parts of the developing world, high quality learning and training experiences for agricultural producers, processors, and entrepreneurs through AET systems have been elusive (Oladele, 2008). However, in recent years a resurgence in the drive to use AET has been fueled by a recognition of its potential impact on economic and human capital development (Akryod & Smith, 2007). Globally effective AET instructors are needed for the implementation of authentic learning opportunities which assist pupils in mastering the foundations they will need as productive adults (Wu, Ho, Nah, & Chau, 2014).

The current study was undertaken during an intensive four week institute for postsecondary Career and Technical Education (CTE) instructors in Nigeria. The study focused on agricultural educator institute participants in order to create a deeper understanding of their process oriented professional development needs and serve as one output of the institute which can inform future Agricultural Education and Training (AET) programing. The research project was designed to create a conceptual model for professional development for postsecondary AET instructors in Nigeria. The project was also implemented to foster the development and dissemination of customized professional development workshops and resource materials for postsecondary AET instructors in Nigeria which could be enacted using a train the trainer model.

Contextual learning theory postulates learning occurs only when learners process and connect novel information or knowledge to their own established frames of reference (Owens & Smith, 2000). Contextual

learning theory emphasizes learning is nested within interactions with the environment and the mind of the learner seeks meaning through the interpretation of those interactions (Perkins, 1999). Therefore, knowledge and experiences are contextualized and the connection between what is learned and how it fits into reality is explicit (Gredler, 2001).

Contextual learning theory provides a foundational guide for the creation of learning experiences that foster deep connections between the concepts that are being learned and how the knowledge will actually be utilized. It follows then, based on contextual learning theory, that knowledge and the process of learning are viewed as outcomes of the interactions between specific activities, contexts, and cultures (Brown, Collins, & Duguid, 1989). When learning is contextualized, learning activities and the actual physical environment provide scaffolding structures which promote knowledge construction, facilitate long term memory encoding, and promote organization for memory recall (Clifford & Wilson, 2000).

In order to operationalize contextual learning theory as a part of the institute planning process researchers designed the current research study to coincide with opportunities for reflection and assessment. It was critical, from the perspective of the researchers, to use the data gathering activities and interactions with participants as a model which they could transform for their own purposes. In this way, participants were the authors of their own contextualized conceptual model for facilitating the creation of information regarding professional development needs and methods for facilitating programing.

It was important to nest the institute within the broader context of the AET system in Nigeria. As part of the contextualization process it was important to

focus on system factors that would play a part in shaping the results of the institute and current research study. Institute planners recognized the need to frame the AET system in Nigeria as a context in which researchers have found: (a) AET instructional practices were not in line with the principles of modern learning theory which stresses the active role of learners, the need for reflective feedback loops, and the need to account for individual differences; (b) valid information for producers and processors was available, however, the construction and implementation of high quality instruction to help learners understand and apply that information was constrained; and (c) producers and processors recognized the potential impact that improved AET instruction and robust outreach opportunities could have on reducing knowledge gaps related to crop and animal performance (Chukwuone, Agwu, & Ozor, 2006; Okoedo-Okojie & Edozor, 2013; Oladele, 2008; Olugenga, 2004). It was within the aforementioned nested context that the researchers undertook the current study and set about creating a conceptualization of the process oriented professional development needs of postsecondary AET instructors teaching technical subjects in Nigeria.

Purpose / Objectives

The purpose of this study was to generate a grounded theory which serves as a conceptual model for designing postsecondary AET instructor professional development in Nigeria. The research question that was used to guide the current study was: What are the process oriented professional development needs of postsecondary AET instructors teaching technical subjects in Nigeria? In addition to the guiding question, the following questions were utilized with the postsecondary AET instructor participants to

provide a common point of entry into the research interview episodes.

- 1) What is important about AET and the AET system in Nigeria?
- 2) What kinds of AET teaching and training experiences have you had?
- 3) What is important to know about postsecondary AET instructors in Nigeria?
- 4) What information is critical for understanding AET professional development for postsecondary instructors in Nigeria?
- 5) How should AET professional development be organized?
- 6) What are the opportunities for change AET professional development?

Methods / Procedures

Participants for the current grounded theory research study were purposefully selected from a population of 40 individuals participating in a World Bank sponsored institute designed to provide upskilling experiences for postsecondary CTE educators in Nigeria. The potential sample of research participants consisted of 17 agricultural education faculty teaching technical subjects at universities or polytechnic colleges. The remaining 23 institute participants were either business, trade and industrial, or family and consumer science instructors teaching technical subjects at universities or polytechnics across Nigeria. The study included eight participants, three of whom were female. Participants were purposefully selected for the study based on: (a) recommendations from institute collaborators from Nigeria with system wide expertise regarding AET technical content areas; (b) the location of their institution of employment; and (c) their number of years of AET teaching and training experience. The participants ranged in age from 32 to 58 years. Three of the

participants had a doctoral degree as their highest degree attained and the other five had a Master's degree as their highest degree attained. Two of the participants had obtained their doctoral degree outside of Nigeria, while the remaining doctoral degree holder had attained his/her doctoral degree from an institution in Nigeria. All of the Master's degree holders had attained their degree from an institution in Nigeria. All participants had at least five years of teaching or training experience within the AET system and at least three years of experience training producers or processors. The Approval for carrying out the study was granted by the Human Subjects Committee at the State University of New York at Oswego and the Vice Chancellor of the University of Nigeria at Nsukka.

The guiding question for the study emerged from a needs assessment and a review of literature that were carried out in preparation for conducting the institute for postsecondary CTE educators in Nigeria. The questions utilized to provide a common point of entry into the interview episodes arose from preliminary institute planning conversations with AET professionals regarding their perceptions of professional development within the AET system in Nigeria.

A grounded theory methodological context and data analysis procedures were utilized in this study as a means to better understand the professional experiences and future needs of the participants at a conceptual level. While quantitative research stresses the importance of generalizability, the goal of the qualitative approach is "to understand the particular in depth, rather than finding out what is generally true of many" (Merriam, 1995, p. 57). As defined by Denzin and Lincoln (1994), qualitative research is a multi-faceted method, involving an interpretive and naturalistic approach to carrying out

inquiry. Within qualitative methods of research, the perceptions and experiences of participants are meticulously enumerated through the employment of thick description. In defining thick description, Schwandt (2007) state that:

to thickly describe perceptions and experiences is actually to begin to interpret them by recording the circumstances, meanings, intentions, strategies, motivations, and so on that characterize particular episodes. It is this interpretive characteristic of description rather than detail per se that makes it thick. (p. 296)

Within qualitative research trustworthiness can be defined as the methodological procedures and sources used to establish a high degree of harmony between the participants' expressions and the researcher's interpretations of them (Creswell, 2005). A variety of strategies and techniques were employed to support the overall trustworthiness of the current research. Sufficient time and space were given to the data collection process to support trustworthy research outcomes. The research study employed colleagues as external agents to address issues of trustworthiness (Charmaz, 2006). The two external agents compared the theme of the research with: (a) the selection of participants; (b) the articulations between the transcript data, open codes, and axial codes; and (c) the articulations between the axial codes, selective codes, and categories that formed the grounded theory. The external agents also assisted in providing trustworthiness by reviewing the methods utilized within the study and monitoring the harmony between the AET instructors' expressions and the researcher's interpretations to ensure that the grounded theory was reflective of the participants'

experiences (Creswell, 2005). The researchers also included member checks as a way to support the trustworthiness, however, only three follow-up interview member checks were able to be conducted because of technical difficulties.

In order to construct an emic account of the perceptions and experiences of the agricultural educator participants thick descriptions were incorporated which include the cultural framework and meanings which emerged from the data (Patton, 2002). The research procedures engaged the researchers and participants in a process of constructing a detailed narrative. The narrative data was analyzed line by line utilizing the constant comparative method. From the data analysis emerged an abstraction which depicts the perceptions and understandings of a conceptual model

for the professional development needs of AET instructors in Nigeria.

Figure 1 provides a conceptual illustration of the general analytic process within the grounded theory method of research. For this project the researchers began by collecting data through the use of interviews. Simultaneous to the data collection the researchers began note taking which initiated the process of organizing the data and recording reflexive thoughts for later analysis. As data collection continued the researchers began the coding process which served to identify elements or facets of interest by organizing slices of data substantively related to the research area (Charmaz, 2006).

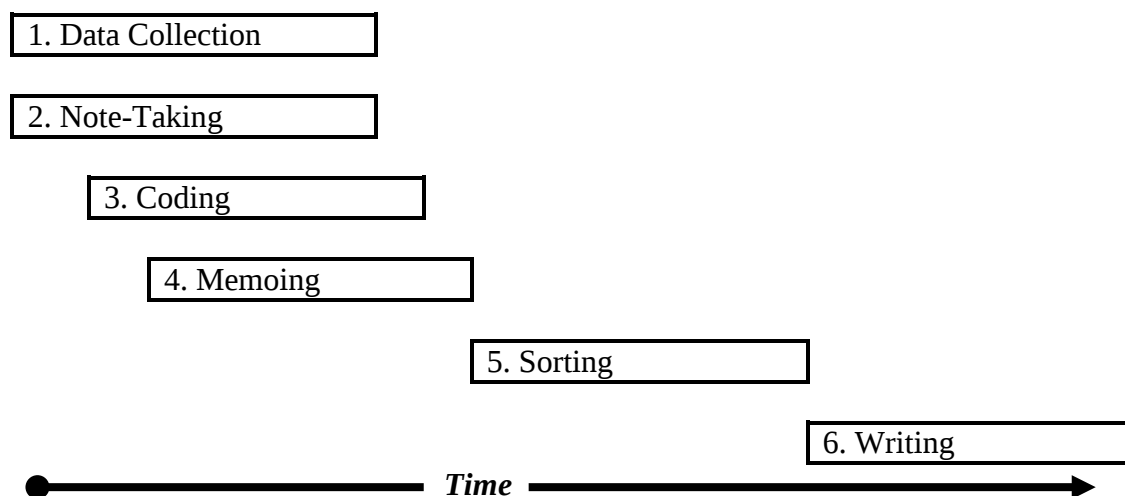


Figure 1. A conceptual illustration of the data collection, analysis, and reporting process in grounded theory research studies (Creswell, 2005)

Figure 2 represents a conceptualization of the coding process which forms an essential element of the grounded theory method. Figure 2 illustrates that the open coding process consists of gleaning words, phrases, and ideas from the

narrative data gathered from in depth interviews. Open coding consists of a close line-by-line reading of the data in order to identify as many concepts as possible without being concerned with how they are connected (Schwandt, 2007).

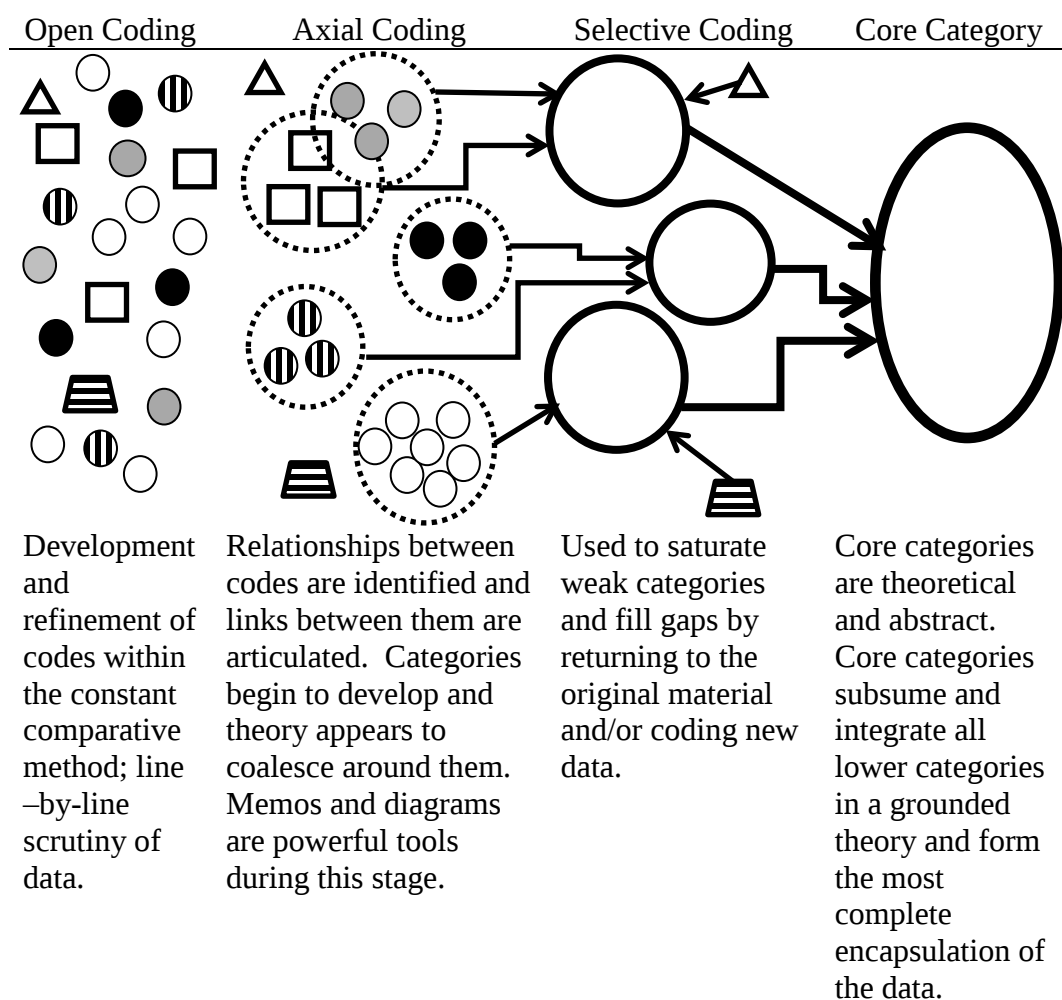


Figure 2. A conceptual illustration of the three iterative stages of coding outlined in grounded theory procedures (Charmas, 2006; Strauss & Corbin, 1997)

Figure 2 illustrates that the process of open coding forms the basis for axial coding. During the process of axial coding the data is reassembled in order to begin to identify connections between elements that were coded within the open coding process. As the axial coding process progresses coded elements coalesce to form categories. Figure 2 illustrates that following axial

coding the researchers employ the process of selective coding. The selective coding stage is utilized to refine data categories by filling gaps and reviewing coded elements in order to assess the density of the categories that have been established. The selective coding process integrates the connections between the coalescing categories and further

strengthens within category connections as well.

Figure 2 reveals the process of selective coding is followed by the formation of a core category. Formation of a core category is a key milestone within the grounded theory research process. The formation of a core category represents a point at which the properties and dimensions of the central concepts and conceptual relationships have emerged from the data. It is also the point at which the category which best captures the essence of the phenomena being investigated in all its complexity and variation emerges from the fog (Groenewald, 2008).

Data for the current study were collected utilizing eight 45 minute digitally recorded in depth interviews. In an effort to protect the confidentiality of the participants, pseudonyms were utilized to enable a more robust discussion of the findings and data was never connected to any of the participants' names, institutions, or specializations. Within the framework of the research study the researchers utilized the software program NVivo 7 for much of the grounded theory data analysis. NVivo is a software platform designed to support analytic methods used to build and test grounded theory from unstructured qualitative data. The NVivo software platform was utilized to analyze all the transcribed data generated through the digitally recorded interviews, the researchers' notes, and researchers' memos.

Interviews were conducted in the presence of both lead researchers. Researcher one was raised in Nigeria and completed all of his university studies, including all graduate work, at institutions in Nigeria. Researcher two was raised in the United States and completed all of his university studies at institutions in the United States. It was critical to have researchers with divergent lived experiences

because when creating, providing, and assessing worthwhile international professional development activities, considerations must be made to acknowledge and address the needs of the educators within the cultural context and site based constraints of the program (Baird, McIntosh, & Özler, 2011). Further, it is critical to build understanding that addresses perspectives surrounding various issues and specific terminology to avoid confusion and the waste of valuable resources (Hospes, 2013).

The use of interviewing allowed the researchers to understand the experiences of the agricultural educators and the meaning they constructed from those experiences (Charmaz, 2006). During the interview process the researchers were careful to provide enough time to capture the perceptions and experiences of the participants as they related to the context of interest. By asking the participants probing questions from a variety of perspectives, the researchers were able to improve the likelihood that the results of the study would exhibit greater trustworthiness (Creswell, 2005; Patton, 2002).

Once initial interviews began to be conducted, the researchers were immersed in the constant comparative method of forming open, axial, and selective codes. As the coding process moved forward coded elements had begun to coalesce around a central concept. The central concept that emerged from the data is best defined as cooperative collaboration. External agents were asked to review the initial transcript data and the open, axial, and selective codes that emerged from the data. One external agent was a colleague within the Department of Agricultural Education at the University of Nigeria at Nsukka and the other was an AET practitioner working on a related, but separate USAID project. Both external agents agreed with the direction of the

research study, however, they questioned how several terms were being defined by the participating agricultural educators.

The researchers attempted to complete follow-up phone interviews after the institute had been completed and they had returned to the United States. The researchers were successful in conducting follow-up phone interviews with three of the participants. The follow-up interviews were conducted to clarify the meaning around vague definitions of terms, brought up by the external agents, and allow participants to affirm whether coding diagrams were in harmony with their intended expressions. The follow-up phone interviews were used as a form of member checking that gave participants an opportunity to add new information concerning the research context. The fact that only three of the research participants could be reached for follow-up interviews represents a limitation to the study, however, the researchers believe an adequate analysis was carried out with the available data.

In the wake of the follow-up phone interviews, the researchers continued to enact the constant comparative method which did not facilitate the emergence of any new elements from the combination of the original interview data and the follow-up phone interview data. Once the researchers determined no new elements had emerged from the follow-up interviews, they were satisfied that a sufficient level of theoretical saturation had been attained. Theoretical saturation is defined here as the point at which no new coded elements or connections between elements emerge from the data.

Theoretical saturation signals the point in grounded theory studies at which theorizing the events under investigation is considered to have come to a sufficiently comprehensive end (Creswell, 2005). The achievement of theoretical saturation is a

function of the theoretical proclivities of individual researchers which are a function of their prior research experiences, their experiences with the context, and the judgments of their colleagues (Merriam, 1995). In a very real sense theoretical saturation is a process that is particular to an individual researcher working on a particular study. When theoretical saturation is reached depends on such factors as sample variation, length of time in the field of study, and researcher experience (Groenewald, 2008). Moreover, because theories are always subject to revision, theoretical saturation represents what Glaser and Strauss (1967) described as a pause in the never-ending process of theory development (as cited in Charmaz, 2006).

Results / Findings

The purpose of this grounded theory study was to create a conceptual model for addressing the process oriented professional development needs of postsecondary AET instructors teaching technical subjects in Nigeria. The research question that was used to guide the current study was: What are the process oriented professional development needs of postsecondary AET instructors teaching technical subjects in Nigeria? The research process constructed a conceptual model which explicates the lived experiences, perceptions, and ideas of the AET instructor participants.

Figure 3 illustrates the conceptual model and contextually depicts the core category identified through the research process as cooperative collaboration. The core category that emerged through the data collection and analysis process is the main storyline of the narrative and it captures the essence of the participants' meanings. In the current study, the use of coding resulted in 54 open codes, 21 axial codes, and 8 selective codes. The core category of cooperative collaboration illustrates the

main theme within the framework for professional development and includes the following concepts: (a) lateral cooperation for collaboration; (b) sustained cooperation

for collaboration; and (c) reciprocal cooperation for collaboration.

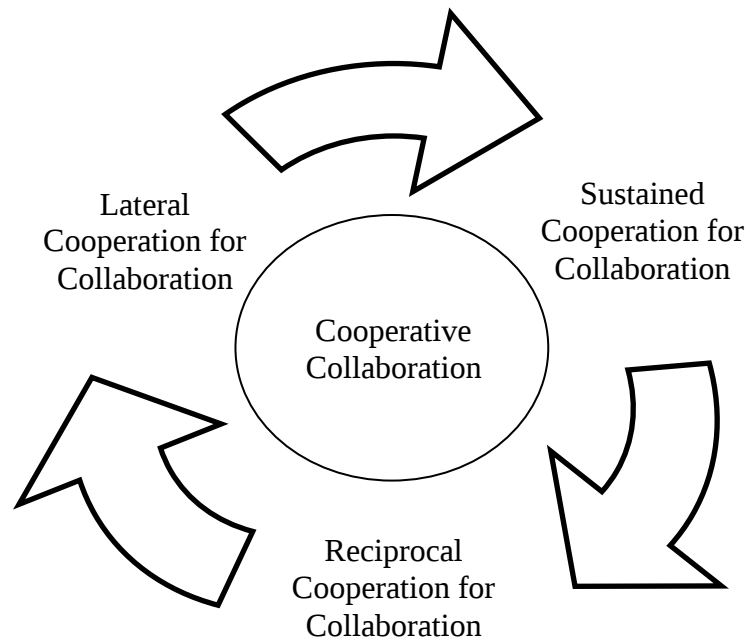


Figure 3. A graphic representation of the conceptual model for the professional development needs of postsecondary agricultural educators teaching technical subjects in Nigeria

For the participants in the study the core category of cooperative collaboration conceptually defined preferred professional development processes and outcomes. Table 1 illustrates quotes from participants that typified the core category of cooperative collaboration. The AET instructors revealed that currently little if any input from their ranks effects the creation or enactment of professional development experiences or opportunities. From the perspective of the participants there were not opportunities for instructors to work together to build professional development opportunities. Further, the participants believed that what they needed was access to opportunities for organized cooperation in order to seek potential collaborators for participatory professional development.

Specifically, the participants talked about ways to establish connections across institutions in order to utilize shared resources and utilize best practices established through pathway models of assessment. Further, the AET instructor participants began to express methods for cultivating cooperative collaboration between federal ministries (Federal Ministry of Agriculture and Rural Development; Federal Ministry of Education), postsecondary institutions, and NGOs to support the creation of instructional resources and Information Communication Technologies (ICT) access. The actions and expressions of the AET instructors are supported by previous research that found that the AET system and cooperation within the system were limited because of weak

institutional development, conflict,
corruption and a lack of overall direction

(Chukwuone, Agwu, & Ozor, 2006).

Table 1

Example Quotes that Typified the Core Category of Cooperative Collaboration

“How is it known ... how is it known what is critical for our professional development. We are not asked to contribute and there is no help to focus on what we believe is important ... that should be started, a plan for instructors to work more together” Rooney

“When there is professional development, it is most often too far away and only people with sponsorship can make the travel, more attention should be focused at different places. We should receive assistance to build our own chances (opportunities for professional development)” Robben

“We need do not have any chance to determine topics for professional practice improvement or help each other plan for instruction for professional improvement.” Wambach

“Part of what we need is to have travel money to work together and plan more effectively, without money for travel we cannot start planning in an organized way that incorporates the ideas of all of the people.” Torres

“The ministry (Federal Ministry of Agriculture and Rural Development) wants to build capacity of agriculture as an area of business, this must be led first by working with instructors to ensure what is taught is important and that the students make high achievements.” Drogba

Subsumed under the core category was the sub-category of lateral cooperation for collaboration. Table 2 illustrates quotes from participants that typified the sub-category of lateral cooperation. The participants revealed the instruction and professional development for instructors has a top down arrangement. Such an arrangement does not provide places or spaces for lateral contributions of stakeholders. In addition, the hierarchical arrangement limits participatory actions and stifles creativity in both designing

professional development and ensuring that it is well presented. The data reveal that a model of professional development should create opportunities for lateral contributions to professional development and limit the effect that hierarchical structures play determining professional development outcomes. This idea was particularly expressed by the female participants who revealed a complete lack of lateral shared power experiences with respect to creating and enacting professional development.

Table 2

Example Quotes that Typified the Sub-Category of Lateral Cooperation for Collaboration

“We (women) do not have ways to have an impact on it (professional development), the higher ups make all the decisions ... and there are not many women in (AET) technical subjects.”
Wambach

“If only the same few people make decisions and decide what is important nothing new will come about ... also they choose the same people to present topics ... to be better we need change that is led by the instructors” Lingor

Another sub-category subsumed underneath the core category of cooperative collaboration was entitled sustained cooperation for collaboration. Table 3 shows participant quotes that typified the sub-category of sustained cooperation for collaboration. Participants voiced that sustaining cooperation over time is very difficult and often opportunities to engage in professional development are not

consistently offered and have no follow-up. As part of the dialogue participants were keen to establish sustained opportunities that were organized and operationalized at consistent times. Participants also sought to utilize technology in order to maintain connections between individuals and use a method of keeping track of opportunities at different levels of scale (institution; state; nation).

Table 3

Example Quotes that Typified the Sub-Category of Sustained Cooperation for Collaboration

“After an institute there is nothing else and no one is aware of what happens ... cooperation needs to be built and then people in leadership need to help sustain the peoples’ cooperation”
Ronaldo

“Travel is very difficult and is expensive for projects and institutions....It should be considered to have regularly scheduled institutes and use centers; maybe to partner with ITF (Industrial Training Fund)” Torres

“Using technology to maintain contact and learn more about results is critical” Drogba

The sub-category of reciprocal cooperation for collaboration was also included in the findings from the data. Table 4 illustrates participant quotes that typified the sub-category of reciprocal cooperation for collaboration. The participants indicated that there are times people take advantage of opportunities for personal gain, but they

would not carry-out the necessary exercises or activities to truly benefit from the experiences. Participants also revealed that many times people in charge of planning or carrying out professional development would not contribute effort and this would cause the event or opportunities to fall apart. The participants voiced that methods for

incentivizing reciprocal participation would be an important component of ongoing professional development that had an impact on the practice of AET faculty at the postsecondary level.

Within the scope of the study there were no significant deviations from the main themes which emerged from the data. However, two of the female participants talked about aspects of their personal lives

which were described, by the participants, as being separate from the realm of their professional development. Essentially, the scope of the deviations centered on work life balance challenges. While these findings did not fit well within the overall data and represented outlier information, the content of the outlier data may prove to be important for some readers.

Table 4

Example Quotes that Typified the Sub-Category of Reciprocal Cooperation for Collaboration

“We rely on professional dispositions and that is not always reliable ... putting rewards in place for actions would lead to greater impacts” Robben

“People doing work for institutes should receive credit ... leaders that are only in name have a way of making things fall apart” Wambach

Conclusions

The purpose of this study was to generate a grounded theory which can serve as a conceptual model for designing postsecondary AET instructor professional development in Nigeria. AET has potential to create living wage and improved food security opportunities for people across Nigeria and it can also be a powerful tool for national level sustainable economic growth. However, improvements within the Nigerian AET system must be made. Improvements in pedagogy and updated curriculum through postsecondary AET instructor professional development could have a large impact on the development of agricultural employment and entrepreneurial opportunities across Nigeria. However, because of a variety of constraints work must be undertaken to improve postsecondary AET instructor professional development.

Perhaps it would be helpful here to synthesize the descriptions of the categories

identified through the research process and depicted in Figure 3: lateral cooperation for collaboration; reciprocal cooperation for collaboration; and sustained cooperation for collaboration. In a lateral context ownership and control are shared across a greater number of people. Sharing ownership and control raises the sense of buy in from stakeholders and enhances the overall meaning of their experiences (Johnson & Johnson, 2009). Those effects in turn are likely to increase feelings of growth and development on the part of the active stakeholders (DeJaeghere & Baxter, 2013; Deutsch, 1949). Further the coordination of efforts is likely to raise the diversity of ideas and novel strategies for addressing challenges. It follows then that ownership and increased feelings of growth and development fostered by lateral interactions will likely lead to more sustained cooperation for collaboration. And sustaining cooperation for collaboration is part of a process of identifying and focusing

on shared goals with respect to skills, experiences, and connections (Nwankwo, Olukotu, & Abah, 2013).

Within the sustainment of cooperation for collaboration peers serve as guides for goal attainment and data is created and utilized continuously to support individuals and teams in making progress down specified pathways. Data will create more opportunities for transparency which will reduce conflicts of interest highlighted in the category of reciprocal cooperation for collaboration. Further increased data collection and sharing across a lateral context will support higher levels of positive interdependence and will incentivize mutual helping behaviors (Johnson & Johnson, 2009) thereby supporting further reciprocal cooperation for collaboration.

Recommendations

Based on the findings this study there are four central recommendations for practice. It is recommended that ideas for the content and delivery of professional development should emerge from the ranks of the participants in ways that eliminate a top down expression of preconceived concepts. This idea is echoed by Olugenga (2004), who found the input of effective and experienced faculty was critical to the creation of novel opportunities which were beneficial to the vocational development of students. As much as possible beliefs about what is needed should be suspended until faculty participants have explored possibilities cooperatively with potential external partners. Creating information about professional development needs arising from the ranks of participants could take several forms. One method could include the use of instructor, ministry, and employer focus groups to determine areas of competency that are most in need of improvement. Another method would be to utilize peer instructor observations so that it

is possible to quickly employ instructors utilizing high quality content and instruction as exemplars. Utilizing peer observations as models for driving change is supported within the literature and could be also be a way to foster peer collaboration (Johnson & Ridley, 2004). Observations and reflections about those observations would help AET postsecondary instructors to quickly adapt their own content and methods using what they learned vicariously.

The second recommendation for practice is that designs for AET instructor professional development should consist of sustained efforts that: (a) have short and long term goals; and (b) should leverage technology to maximize the impact of the experiences and help instructors to become more familiar with useful emerging technologies. This recommendation is supported by Okoedo-Okojie and Edobor (2013), who found sustained seminar opportunities should be organized for AET technical instructors. Further, it is likely seminars would be particularly useful for promoting professional development centering on content and technologies which AET instructors do not perceive can have an influence on their interactions with students, producers, or processors (Okoedo-Okojie & Edobor, 2013).

Sustaining professional development efforts may take the form of cohorts or teams that work together over an extended period of time to develop content and improve their teaching methods (Richter, Kunter, Klusmann, Ludkte, & Baumert, 2010). Such cohorts could also be sources of collaboration and if members are located at dispersed institutions social media or other communication technology could be incorporated as a tool. In a way this echoes the recommendation of Oladele (2008), who indicated repeated contacts within the AET system would be helpful for increasing the adoption of best practices and as a

mechanism for strengthening professional networks through consistent communication.

The third recommendation for practice is that opportunities to incentivize cooperative collaboration should be designed within postsecondary AET instructor professional development plans and activities. Further, one of the focus points of the incentive should be to support sustained commitment. One method of infusing incentives may be to create opportunities for professional development cohorts to lead AET professional development institutes and allow cohort members to utilize and keep selected planning and instructional resources. Under this scenario cohort planners may be able to keep some of the text resources, software, or iPads that were purchased to plan or operationalize the professional development experiences.

The fourth recommendation for practice is that professional development for postsecondary AET instructors in Nigeria should empower instructors to create lateral structures for designing, implementing, and assessing professional development as egalitarian opportunities for all stakeholders, particularly women. Again the cohort model of professional development would be well suited to address this recommendation. Instructor professional development cohorts tend to build lateral connections and a more level playing field for the participants (Richter et al., 2010). One way to actuate the empowerment of women to guide professional development for postsecondary AET instructors in Nigeria would be to create female cohorts. In addition to designing and implementing professional development to address the needs of women, the method would put participants in close connection with valuable colleagues that could support them in many ways (Groves & Hinton, 2013).

Building opportunities for women may be considered even more critical when one recognizes that the total number of applied agricultural scientists being trained is insufficient to support the needs of AET systems in developing countries across the world (Mohamedbhai, 2012; Okoedo-Okojie & Edobor, 2013; Olugenga, 2004; Urama, Chika, Ozor, Kane, & Hassan, 2010; Vergot & Momol, 2007). Creating more opportunities around advancing the instructional capacity of female AET instructors may have value added benefits related to educating and training more women to become applied scientists (Ayonmike, Okwelle, & Okeke, 2013). In addition, creating more stable lateral structures for professional development of female AET instructors may indirectly support the improvement of applied science applications which directly impact agricultural systems in developing countries. At the very least, targeting the improvement of professional development opportunities for female instructors within AET systems is likely to create a more equitable system for all people. It is recommended that projects and research explore the implementation of a female cohort model for AET instructor professional development and more work be carried out to explore how women in the AET sector deal with the interface between professional and personal lives.

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