

A Correlational Study on the Relationship Between Curricula and Indiana Agricultural Educators' Curriculum Use and Pedagogical Design Capacity Enactment

Mathew Smith¹
Hui-Hui Wang²

Abstract

When educators utilize curriculum-related resources, they must interpret a variety of curriculum components and determine the value, meaning, and proper sequencing of the curriculum-related resource and the planned instructional episode. This descriptive study aimed to describe the relationship between Indiana agricultural educators' pedagogical design capacity (PDC) enactment and self-efficacy in relation to third-party curricula, as well as the characteristics of the professional development (PD) provided by curriculum designers. Five third-party curricula, AgEdNet, CASE, ICEV, MyCAERT, and OLT, were selected. Seventy-three agricultural educators (21.1% participation rate) participated in the study. The results showed that Indiana agricultural educators employ various PDC enactments (i.e., adapting and improvising) in response to different curricula. Overall, educators' PDC enactment varied by curriculum, including their PDC enactment, perceptions of the curriculum, and the frequency with which they used the curriculum. A relationship was found between self-efficacy and curriculum use on AgEdNet.com. Additionally, relationships were found between PD and the educators' PDC enactment and their perceptions of the CASE and ICEV curricula. This study provides commentary on factors influencing curriculum enactment, but cannot distinguish between these factors. The study was limited by questionnaire issues, including the relevance of the TSES instrument and the fact that it cannot discriminate between enactment patterns. Future research will focus on validating the conceptual model and further developing the PDC instrument. Further research is also necessary to understand the relationship between PDC enactment and teachers' knowledge and beliefs.

Introduction

An educator's ability to plan and design lessons may be restricted by curricula that are designed with varying affordances and constraints (Brown, 2003; Brown et al., 2009). Some features allow or restrict educators in possible curriculum enactment options (affordances). Some features limit possible curriculum enactment options (constraints). Agriculture educators incorporate standards for national and state agriculture, food, and natural resources (AFNR) in eight career pathways (The Council, 2015). Given a large amount of content and the various responsibilities of providing a complete program of agricultural education (FFA, SAE, and classroom/laboratory instruction), agricultural educators often rely on third-party curricula to develop lessons, refine their pedagogy, expose them to various subject-matter, and to provide additional resources in developing their curricula (The National FFA Organization, 2022; The Council, 2015).

In applying curricula to their classrooms, educators draw upon their subject-matter knowledge, pedagogical content knowledge, and their personal beliefs (Brown et al., 2009; Easterly & Simpson, 2020;

¹ Mathew Smith is a doctoral student of Agricultural Education in the Department of Agricultural Sciences Education and Communication at Purdue University, 47907, smit4488@purdue.edu, <https://orcid.org/0009-0008-6925-3176>

² Hui-Hui Wang is an associate professor of Agricultural Sciences Education and Communication at Purdue University, 47907, huiwang@purdue.edu, <https://orcid.org/0000-0002-6244-8252>

Knights-Bardsley & McNeill, 2016; Remillard, 2018; Shulman, 1986; Thornton et al., 2020). However, the features of these third-party curricula will present affordances and constraints for educators, which may alter the possibilities of how educators choose to offload, adapt, or improvise the curricula.

The affordances and constraints can be related to the design and features of the curriculum, as well as the resources provided to educators. Variances include the content selection within the curriculum, the design of the content within the lesson, the resources to support educators in teaching and assessing students using the curriculum, and the availability of professional development (PD) or training for educators to learn how to effectively implement the curriculum in their classrooms.

When educators utilize curriculum-related resources, they actively interpret a range of curriculum components and must determine the value, meaning, and proper sequencing of both the curriculum resource and the planned instructional episode (Remillard, 2018).

Curricula for Agricultural Education

This study defined third-party curriculum as overt or written curriculum, or “that which is written as part of formal instruction in schooling experiences” (Wilson, 2013, p. 2). Curriculum-related materials may include all planned and written lessons, unit plans aligned to a course outline, textbooks, films, assessments, scope and sequence documents, and teacher notes.

Educators are exposed to multiple commercial curriculum products that vary in the quality of instruction and planning, price, time dedication, and alignment to state standards (Mercier, 2015). In the United States, agriculture educators can access multiple third-party curricula options: AgEdNet.com, CAERT, The Curriculum for Agricultural Science Education (CASE), ICEV, and One Less Thing (OLT).

Several factors may influence an educator's decision to select a third-party curriculum. However, there is a lack of research on how agriculture educators select curricula, identify curriculum-related materials, make choices about adapting or implementing the curricula, or on the quality and effectiveness of current third-party curricula in agriculture education.

Self-Efficacy Impacts Curriculum Implementation and Adaptation

Self-efficacy in teaching is a context- and subject-matter-specific field of research, which means that an educator may feel more or less efficacious when teaching specific curricula or topics, and in certain contexts (e.g., groups of students, schools, and available resources) (Bandura, 1986; Tschannen-Moran & Woolfolk-Hoy, 2001). Research has shown a possible relationship between self-efficacy and curriculum use (Easterly & Simpson, 2020; Khanshan & Yanshan, 2020). However, some studies suggested differently. Thornton et al. (2020) found no significant correlation between teachers' self-efficacy and the use of curriculum-related resources. Ulmer et al. (2013) reported that teachers who completed a CASE institute had increased science teaching efficacy and science teaching outcome expectancy after the initial institute. Within nine months, teachers' science teaching outcome expectancy returned to levels shown before the institute.

Teachers are influenced in how they select, adapt, and improvise curricula based on their perceived self-efficacy (Bandura, 1986), perceived subject matter knowledge, and an educator's pedagogical content knowledge (Shulman, 1986).

This study examined the third-party curricula that Indiana agricultural educators choose to purchase and implement. The study specifically addressed a gap in the literature on how specific third-party curricula affect educators' pedagogical design capacity (Brown & Edelson, 2003; Brown et al., 2009). PDC is defined as educators' ability to identify and use instructional resources (Curriculum, PD, and Other Tools) and teacher resources (Subject Matter Knowledge, Beliefs, and Pedagogical Content Knowledge) to develop instructional episodes (Brown et al., 2009, p. 26; Knight-Bardsley & McNeill, 2016), as well as factors

influencing educators' decisions when offloading, adapting, and improvising curricula (Easterly & Simpson, 2020; Thorton et al., 2020). The features of a given curriculum, affordances and constraints, can influence how educators perceive the value of improvising and adapting the curriculum, and their ability to improvise and adapt the curriculum (Brown & Edelson, 2003; Brown et al., 2009).

Affordances and constraints can be built structurally into the curriculum (e.g., teachers' notes and time suggestions), instilled during professional development opportunities (e.g., direct comments, notes, and strict guidance), and present themselves as current self-percepts and abilities of the educators (Bandura, 1986; Shulman, 1986).

Theoretical and Conceptual Framework

This study utilized Bandura's (1986) Social Cognitive Theory (SCT) as its theoretical framework. The SCT framework employs the triadic reciprocal model, which encompasses the interactions among personal factors, behaviors, and environmental factors to explain the interplay between these components. Bandura stated that behavioral actions are determined through a person's environmental influences as well as their personal factors, which are used to determine the likelihood of accomplishing a task (self-efficacy) and to predict the consequences of their actions (outcome expectancy). For educators, their behavioral factors of pedagogical design capacity (PDC) are based on instructional restrictions (environmental factors) as well as personal factors, including self-efficacy, personal and professional experience, and pedagogical content knowledge. This study used Tschannen-Mooren's definition of teaching self-efficacy as "the extent to which the teacher believes he or she can affect student performance" (Berman et al., 1977, p. 137). Tschannen-Moran and Woolfolk-Hoy (2001) identified three constructs as part of teaching self-efficacy: teachers' efficacy in student engagement, instructional strategies, and classroom management. Bandura postulated that people with high self-efficacy endure longer and put forth more effort into complex or challenging tasks, are more likely to associate failures with a lack of effort than a deficiency of cognitive, social, or physical skills, and are less likely to be impacted by failures in mastery experiences or different forms of social persuasion, and are more motivated (Bandura, 1986). He further posited that a person's self-efficacy should increase or decrease as they encounter successes and failures. He noted explicitly that mastery experiences are the most influential experiences when developing a sense of self-efficacy. Findings in the literature indicate that an educator's self-efficacy does not follow a linear increase throughout studies; rather, it may rise and fall throughout the study (Roberts et al., 2006; Robinson & Edwards, 2012; Stripling et al., 2008). Robinson and Edwards (2012) reported that the self-efficacy of first-year agricultural educators increased throughout their initial year of teaching, and that alternatively certified instructors significantly improved in all three constructs of self-efficacy. Stripling et al. (2008) reported that the self-efficacy of agricultural educators increased throughout their pre-service experience. Consistent with prior findings, Roberts et al. (2006) reported that educators' perceived efficacy in classroom management did not improve over the program, and their perceived levels of self-efficacy changed inconsistently as the pre-service opportunity progressed, which suggested the perceived value of certain experiences.

Mastery experiences are the most influential in developing a person's sense of self-efficacy (Bandura, 1986). Additionally, three other sources of self-efficacy can affect a person's self-efficacy to accomplish a given task: vicarious experiences, social persuasion, and physiological and affective states. McKim and Velez (2016) reported that pre-service agricultural educators may benefit from a shift from mastery experiences to vicarious experiences, and increased positive social persuasion may benefit pre-service agricultural educators. McKim and Velez (2017) reported that several factors could predict agricultural educators' self-efficacy: student teaching experiences, professional development opportunities, and pre-service coursework. McKim et al. (2017) found that the number of agricultural educators in a school-based program, the possession of a CASE certification, the number of students in the school-based agricultural education (SBAE) program, and science credit being offered in the SBAE program, and years of teaching experience were all significant positive predictor of different aspects of self-efficacy. The

authors also found a negative predictor between the number of teachers in SBAE and math teaching efficacy, which could be explained by positive/negative vicarious experiences or social persuasion.

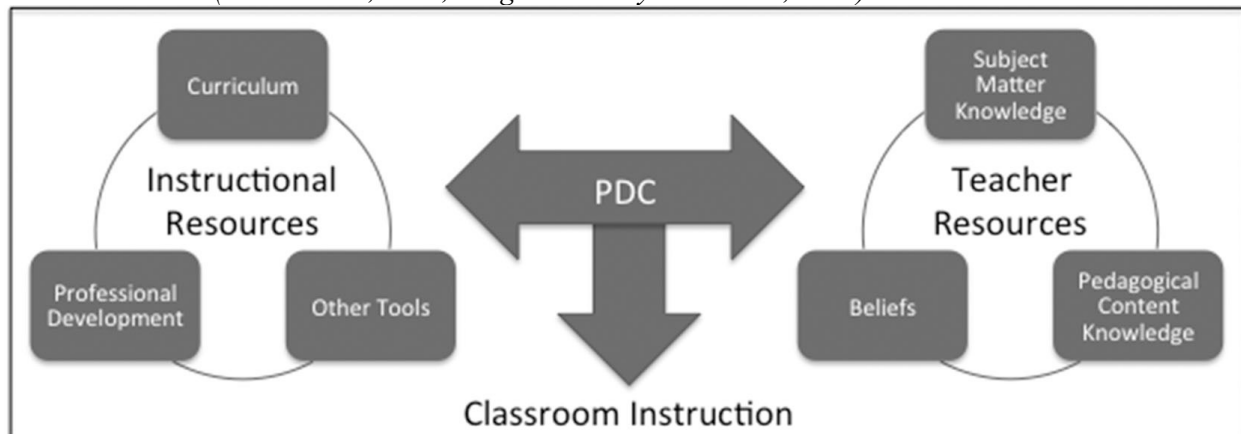
An educator's experiences also play a role in developing their sense of teaching self-efficacy. Knobloch (2006) found that teachers' perceived level of value toward their teacher education program was related to their perceived self-efficacy. Duncan and Ricketts (2008) found that a teacher's educational background (alternative or formal) influenced agricultural educators' perceived self-efficacy. Robinson and Edwards (2012) found that the method of obtaining certification impacted teacher self-efficacy and that traditionally certified educators had the highest self-efficacy scores among participants.

Pedagogical Design Capacity

The conceptual framework that guided this study is the Pedagogical Design Capacity framework by Brown (2009). PDC, defined by Brown (2009), is an educator's "ability to perceive and mobilize existing resources in order to craft instructional contexts," and McKnight-Bardsley and McNeill (2016) defined PDC as "a teacher's ability to mobilize instructional and teacher resources to design instruction to achieve her goals." In this study, it is defined as the teacher's ability to identify and use instructional resources (Curriculum, PD, and Other Tools) and teacher resources (Subject Matter Knowledge, Beliefs, and Pedagogical Content Knowledge) to develop lessons (Brown et al., 2009, p. 26; Knight-Bardsley & McNeill, 2016) (See Figure 1).

Figure 1

PDC Framework (Brown et al., 2009; Knight-Bardsley & McNeill, 2016)



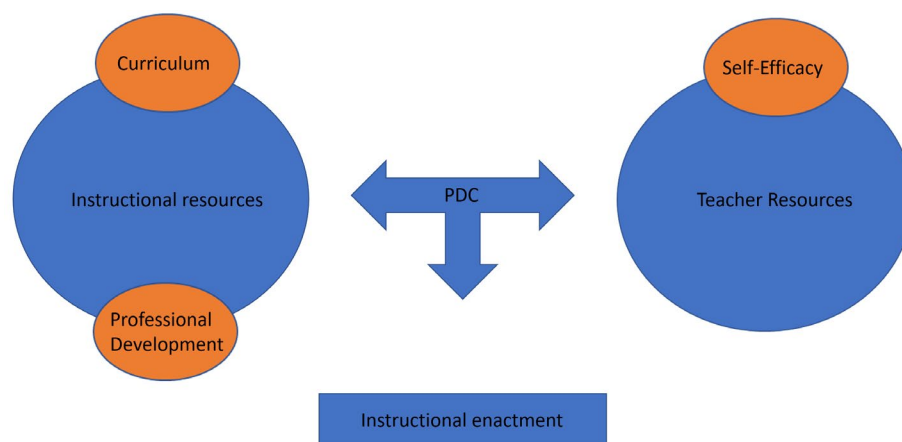
Brown developed this PDC framework with the principle that "all teaching involves a process of design in which teachers use curriculum materials in unique ways as they craft instructional episodes" (Brown et al., 2009, p. 18). Teachers' "craft" lessons are those in which the content and activities are directed toward a goal or desire by the teacher. Brown stated that curriculum-related artifacts guide a teacher's instructional activities due to the affordances and constraints placed within the curriculum-related artifacts, such as "lesson plans, teacher guides, and texts" (Brown et al., 2009, pp. 20-21). Brown (2009) identified three key points: (1) the curriculum-related materials afford and constrain the instructional design of educators, (2) teachers use curriculum-related materials differently based on experience, beliefs, and goals, and (3) educators' design instructional activities based on their planned goals or the desired state for their students and classroom (Brown et al., 2009).

Brown offers a system for analyzing a teacher's interaction with chosen curriculum-related artifacts by comparing the degree of reliance, the "appropriation of the curricular artifacts," or the degree to which educators followed planned guides. The three degrees of artifacts used are offloading, adapting, and

improvising. Offloading is characterized by the most significant reliance on the curricula or by the teacher closely following the provided structure/constraints of the lessons. Adaptation is characterized by reliance on curriculum-related resources and the teacher's agency or by the teacher choosing to adapt curricula to align with their instructional goals. Improvisation is characterized by the least reliance on the instructional resource or by the teacher departing from the instructional resource's structure or intended educational goal. In utilizing Brown's PDC model, this study focused primarily on the influence of curriculum-related resources on an educator's PDC enactment. This study used efficacy as a belief system but did not consider an educator's pedagogical content knowledge, their subject-matter knowledge, or the various components of their beliefs.

Figure 2

Modified PDC Framework



Purpose and Research Questions

The purpose of this study was to describe the relationship between Indiana agricultural educators' PDC and self-efficacy, third-party curricula, and the characteristics of the provided PD by the curriculum designers.

The research objectives were to determine:

1. Characteristics of Indiana agricultural educators' PDC enactment patterns, mean self-efficacy scores, and mean perceptions of curricula and PD characteristics.
2. Spearman rho correlation magnitude (Spearman rho) between teachers' self-efficacy and PDC enactment of AgEdNet.com, ICEV, CASE, CAERT, and OLT.
3. Spearman rho correlation magnitude between the constructs of PD and the teachers' PDC enactment and perceptions of CASE, ICEV, and OLT curricula.

Methods

This descriptive correlational survey study (Quaranta, 2017) aimed to describe the relationship among self-efficacy, curricular features, and curricular use of Indiana middle and secondary agricultural educators. The participants were Indiana middle school and high school agriculture educators ($N = 349$), whose names were listed in the directory in the State of Indiana during the 2021-2022 school year. Given

the highly distributed nature of agricultural educators' curricular use and the small number of late respondents ($n = 10$) from early respondents ($n = 56$) within this study, this study could not generalize to the greater population of Indiana agricultural educators. As such, the interpretation of correlations was limited to the Indiana agricultural educators within this study.

A Pilot Study and Survey Design Committee

Seven pre-service agricultural educators from Purdue University participated in a pilot study in March 2022. These seven participants had recently graduated or were about to graduate in Spring 2022 and were not teaching in an Indiana agricultural education program. The purpose of the pilot study was to help improve the survey structure and wording and to inform the study's face validity. Given the low response rate, reliability scores and correlations were not calculated from the pilot study.

After the pilot study, the researchers refined the wordings and categories based on the feedback. A committee composed of three professors in agricultural education, a graduate student, and an Indiana agricultural educator met to review the structure and wording of the revised survey. All members provided feedback to refine the instrument further. Lastly, members also examined the face validity of the instruments and determined that the questions and content were appropriate to measure teachers' PDC enactment patterns.

Survey Design and Variables

Data was collected using Qualtrics. All the participants received three emails: an initial introduction to the study and participation, and two follow-up gentle reminder messages. The questionnaire consisted of six parts: the consent to participate form, a declaration of curricular use form, a demographic questionnaire, the Teachers' Sense of Self-Efficacy Scale (TSES) short version consisting of 12 questions (Tschannen-Moran & Woolfolk-Hoy, 2001), an instrument designed to assess PDC enactment patterns (Easterly & Simpson, 2020; Thorton et al., 2020), and an original PD instrument developed for this study based on a literature review of effective PD features (Abadiano & Turner, 2004; Bayar, 2014; Birman et al., 2000; Garet et al., 2001; Guskey, 2003; Guskey & Yoon, 2009; Penuel et al., 2007; Wayne et al., 2008). All post-hoc reliabilities were reported using Cronbach's Alpha (α) in SPSS, and reliabilities for the PD instrument were separated by curricula. The TSES is an instrument with an overall reliability of $\alpha = 0.90$, which consists of three subscales: student engagement ($\alpha = 0.81$), instructional strategies ($\alpha = 0.86$), and classroom management ($\alpha = 0.86$) (Tschannen-Moran & Woolfolk-Hoy, 2001). Post-hoc analysis of the dataset showed overall reliability of $\alpha = 0.82$ and subscale reliabilities for student engagement ($\alpha = 0.72$), instructional strategies ($\alpha = 0.59$), and classroom management ($\alpha = 0.78$).

The participants needed to click "Yes" in the consent form to be able to participate in the study. The survey utilized skip logic, and if participants answered no, the survey immediately ended. The declaration of curricular use form had one question, which provided participants with six options: AgEdNet.com, CAERT, CASE, ICEV, OLT, and "I do not use third-party curricula." The demographic questionnaire had three questions: Sex (Male and female), city classification (Urban, suburban, and rural), and years of teaching experience in intervals of five years.

The PDC instrument had six questions that asked the participants about (1) how often they use the curricula, (2) how often they adapt resources, (3) their familiarity with the content, (4) the amount of improvisation of the curricula, (5) their perception of the structure and organization of the curricula, and (6) what curricular resources they use in addition to the curricula. The PDC instrument measured constructs with single items, so reliabilities could not be calculated. The PD questionnaire consisted of 12 questions and measured three constructs: content and pedagogy knowledge, coherence, and active learning. The researchers removed two items due to their descriptive nature, which were used to provide context. Post-hoc reliability showed an overall alpha of $\alpha = 0.86$ for CASE participants and $\alpha = 0.94$ for ICEV participants. For CASE participants, subscale reliabilities were coherence $\alpha = 0.77$, content and pedagogy

$\alpha = 0.72$, and active learning $\alpha = 0.60$. For ICEV participants, subscale reliabilities were coherence $\alpha = 0.87$, pedagogy and content $\alpha = 0.89$, and active learning $\alpha = 0.77$. Except for the demographics, all instruments (TSES, PDC, and PD instruments) used an ordinal Likert scale of 1-5, which contained five options to select. None of the options used reverse coding, and all questions went from 1 (*the lowest attributed score*) to 5 (*the highest attributed score*). For example, there were five options, nothing (1), very little (2), some influence (3), quite a bit (4), and a great deal (5), for participants to select when they answered the question "How much can you do to control students' disruptive behavior?" in the TSES.

Analysis

Data were analyzed using IBM Statistical Package for Social Sciences (SPSS) version 28.0.0.0 (190). The researchers used frequency (f), means (M), standard deviations (SD), and Spearman rho correlations to determine the relationship among curricular features, teachers' PDC enactment, and PD features. Following the interpretation of the magnitude of correlations by Davis (1971), only descriptive magnitudes were reported using Spearman rho (r_s) correlations equal to or greater than 0.5 (large correlations), and above were reported to demonstrate a relationship between the variables (Cohen, 1988). All correlations were presented by curricula and should not be used to compare curricula directly.

Participants

The population for this study was all agricultural educators in Indiana ($N = 345$). Of the 345 contacted, 73 participants participated in the survey. The participation rate for the study was 21.1%. Of the 73 participants, females were the majority at $n = 45$ (61.6%), with males at $n = 28$ (38.4%). The variable city classification was given three categorical options, which were rural, suburban, and urban. Participants primarily self-identified as rural instructors at $n = 56$ (76.7%), while one-sixth of participants responded as suburban ($n = 12$, 16.4%), and urban participants as the smallest classification ($n = 5$, 6.8%). Participants' teaching experience in this study was designed to be in intervals of 5 years, ranging from 0 to 40 years of teaching experience. Participants in this study were primarily newer teachers, with 0-5 years of teaching experience at $n = 27$ (36.9%). Educators with mid-range level of teaching experience included 6-10 years, $n = 12$ (16.4%), and 11-15 years, $n = 10$ (13.7%). A total of 13 participants (17%) had more than 20 years of experience, with intervals between 21 and 40 years of experience, each with five or fewer participants.

Curriculum and Criteria

This study included only prepackaged curricula outlined by subject (e.g., animal science or plant science) or course outlines (e.g., AFNR course or Animal Science). Five commercial products (AgEdNet.com, CAERT, CASE, ICEV, and OLT) were identified and included in the study. Additionally, commercial products were selected due to their pay barrier to access the curricula and standards alignment, and they were offered nationally in the United States.

Twelve educators used AgEdNet.com (11.1%), with an average of five additional resources used in conjunction with the curricula. Eighteen educators used CAERT (17.59%), with an average of six additional resources used in conjunction with the curricula. Twenty-six used CASE (26.85%), with an average of six additional resources used in conjunction with the curricula. Twenty-one educators used ICEV (23.15%), with an average of five additional resources used in conjunction with the curricula. Six educators used OLT (9.26%), with an average of six curriculum-related resources used in conjunction with the curricula. Lastly, 13 educators said they do not use third-party curricula (12.04%).

Results

All correlations were presented by curricula and should not be used to compare curricula directly. The purpose of this study is not to compare curricula but to describe the relationship between Indiana agricultural educators' PDC and third-party curricula, self-efficacy, and the characteristics of the provided

PD by the curriculum designers. Additionally, given the varied sample sizes between curricula and the lack of information on how this sample reflects the selected population, this study could not generalize to the greater population of Indiana agricultural educators, and the specific characteristics of the curricula reported by the study participants could not be generalized to characterize the individual curricula.

Objective 1: To determine the characteristics of Indiana agricultural educators' PDC enactment patterns, mean self-efficacy scores, and mean perceptions of curricula and PD characteristics.

The first research question of this study was to describe the mean scores and standard deviations of Indiana Agricultural educators' frequency of curricula use, perceived structure and organization of provided curricula, PDC enactment by the curricula, self-efficacy scores, and provided PD characteristics. These behavioral characteristics establish the basis for Research Question 2 correlations (refer to Table 1 for participants' descriptive results for frequency of use and perceptions of structure and organization of curriculum). Participants who reported using the third-party curricula monthly, and who also rated the structure and organization as well-structured, included: AgEdNet.com users ($M = 3.08$, $SD = 1.51$), with curricula rated well-structured ($M = 3.58$, $SD = 0.52$); and CAERT users ($M = 3.50$, $SD = 0.86$), with curricula rated well-structured ($M = 3.56$, $SD = 0.51$). Participants who used the CASE ($M = 4.15$, $SD = 1.26$) curricula reported using it on a weekly to daily basis and rated the structure and organization of the CASE curricula as well-structured ($M = 4.31$, $SD = 0.74$). Participants who used the ICEV ($M = 3.52$, $SD = 1.37$) curricula reported using it monthly to weekly and rated the structure and organization of ICEV curricula as well-structured ($M = 3.76$, $SD = 0.54$). Participants who used the OLT ($M = 2.50$, $SD = 1.23$) curricula reported using it between two times a semester to a monthly basis and rated the structure of OLT curricula as average ($M = 3.33$, $SD = 0.52$).

Table 1

Participants' Frequency of Curricula Use and Perceived Structure and Organization

Curricula	Frequency				Structure and Organization	
	<i>f</i>	%	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
AgEdNet.com	12	11.1	3.08	1.51	3.58	0.52
CAERT	18	17.59	3.50	0.86	3.56	0.51
CASE	26	26.85	4.15	1.26	4.31	0.74
ICEV	21	23.15	3.52	1.37	3.76	0.54
OLT	6	9.26	2.50	1.23	3.33	0.52

Note. All Items in this table utilized a 1 (lowest attribute) to 5 (greatest attribute) scale.

The PDC enactment of agricultural educators was divided into three generic categories of actions: familiarity with content (offloading), modification (adapting), and improvisation. Participants who used the AgEdNet.com ($M = 3.42$, $SD = 1.08$) and OLT ($M = 3.17$, $SD = 1.33$) curricula reported that they had an average familiarity with technical content. In contrast, participants who utilized CAERT ($M = 3.78$, $SD = 0.73$), CASE ($M = 3.85$, $SD = 0.97$), and ICEV ($M = 3.57$, $SD = 0.87$) reported being very familiar with the technical content. In addition, participants who utilized the AgEdNet.com ($M = 2.75$, $SD = 1.06$), CAERT ($M = 3.44$, $SD = 1.04$), CASE ($M = 2.62$, $SD = 0.94$), and ICEV ($M = 2.81$, $SD = 1.03$) curricula made a moderate amount of adaptation to the curricula, while participants who utilized the OLT ($M = 2.17$, $SD =$

0.75) curricula reported making a little amount of adaptation. All participants reported a moderate amount of curriculum improvisation, regardless of the curriculum.

Table 2

Indiana Agricultural PDC Enactment Separated by Curricula

Curricula	<i>f</i>	Offloading		Adapting		Improvising	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
AgEdNet.com	12	3.42	1.08	2.75	1.06	2.83	1.03
CAERT	18	3.78	0.73	3.44	1.04	3.33	0.84
CASE	26	3.85	0.96	2.62	0.94	2.81	0.89
ICEV	21	3.57	0.87	2.81	1.03	2.62	0.97
OLT	6	3.17	1.33	2.17	0.75	2.50	0.55

Note. All Items in this table utilized a 1 (lowest attribute) to 5 (greatest attribute) scale.

Indiana agricultural educators' teaching self-efficacy was collected using the TSES instrument (Tschannen-Moran & Woolfolk-Hoy, 2001) using a 1-5 scale: Nothing, Very Little, Some Influence, Quite a Bit, and A Great Deal. The instrument measured three constructs: Student engagement ($M = 3.37$, $SD = 0.54$), Instructional Strategies ($M = 3.92$, $SD = 0.46$), and Classroom Management ($M = 3.83$, $SD = 0.52$). The aggregate teaching self-efficacy score was $M = 3.71$ ($SD = 0.39$).

Table 3

Indiana Agricultural Educators' Teaching Self-Efficacy Averages

Teacher Self-Efficacy Construct	<i>M</i>	<i>SD</i>
Student Engagement	3.37	0.54
Instructional Strategies	3.92	0.46
Classroom Management	3.83	0.52
Overall Teaching Self-Efficacy	3.71	0.39

Note. All Items in this table utilized a 1 (lowest attribute) to 5 (greatest attribute) scale.

Three of the curricula chosen for this study offered PD opportunities for educators to support their use of the curricula: CASE, ICEV, and OLT. Participants were asked to answer questions reflecting on their PD experiences provided by third-party curricula developers. All CASE ($M = 4.15$, $SD = 0.75$), ICEV ($M = 3.25$, $SD = 0.86$), and OLT ($M = 3.00$, $SD = 1.27$) participants reported that the PD aligned to some extent with their Indiana state standards and course materials. CASE PD ($M = 4.45$, $SD = 0.67$) aligned a lot with the participants' educational goals, while ICEV PD ($M = 2.94$, $SD = 1.18$) aligned to some extent, and OLT PD ($M = 2.17$, $SD = 1.47$) aligned a little. CASE PD ($M = 4.35$, $SD = 0.75$) curricula aligned a lot with the participants' preferred pedagogy, ICEV PD ($M = 2.81$, $SD = 1.05$) fairly aligned with their preferred pedagogy, and OLT PD ($M = 1.5$, $SD = 0.84$) aligned a little with their preferred pedagogy. CASE PD ($M = 4.30$, $SD = 0.73$) aligned a lot with educators' planned course outline, ICEV PD ($M = 3.13$, $SD = 1.02$) fairly aligned, and OLT PD ($M = 2.33$, $SD = 1.51$) aligned a little with their planned course outline.

For the *content and pedagogy* construct, CASE PD participants reported that it helped a lot to enhance participants' science content knowledge ($M = 4.00$, $SD = 0.92$) and pedagogy and content knowledge ($M = 4.45$, $SD = 0.61$). ICEV PD participants reported moderate improvements in science content knowledge ($M = 2.88$, $SD = 1.30$) and pedagogy and content knowledge ($M = 2.75$, $SD = 1.00$). OLT PD participants reported moderate improvements in their science content knowledge by a moderate amount ($M = 2.50$, $SD = 1.23$) and small improvements in their pedagogy and content knowledge ($M = 2.33$, $SD = 1.03$).

For the *active learning* construct, CASE participants reported that CASE PD helped a lot to prepare educators to teach the curricula ($M = 4.45$, $SD = 0.76$), engage educators ($M = 4.10$, $SD = 0.72$), effectively demonstrate the quality of instruction ($M = 3.70$, $SD = 0.92$) and that participants agreed that the length of the PD was appropriate ($M = 3.65$, $SD = 0.99$). ICEV participants reported that ICEV PD prepares the educators to a certain extent to teach the curricula ($M = 3.00$, $SD = 1.04$), engage educators ($M = 3.00$, $SD = 0.96$), effectively demonstrate the quality of instruction ($M = 3.00$, $SD = 0.96$) and that participants agreed that the length of the PD was appropriate ($M = 2.71$, $SD = 0.91$). OLT participants reported that OLT PD helped a little to prepare educators to teach the curricula ($M = 2.17$, $SD = 0.98$), effectively demonstrate the quality of instruction ($M = 2.33$, $SD = 0.82$), that participants agreed that the length of the PD was appropriate ($M = 2.00$, $SD = 1.10$), and that it engaged educators to some extent ($M = 2.50$, $SD = 1.05$).

All questions were aggregated into three constructs for the PD questionnaire: coherence, pedagogy and content, and active learning constructs. CASE aggregate scores for the PD constructs: coherence ($M = 4.31$, $SD = 0.56$), pedagogy and content ($M = 4.23$, $SD = 0.64$), and active learning constructs ($M = 3.59$, $SD = 0.51$). ICEV aggregate scores for the PD constructs: coherence ($M = 3.03$, $SD = 0.88$), pedagogy and content ($M = 2.81$, $SD = 1.00$), and active learning constructs ($M = 3.21$, $SD = 0.63$). OLT aggregate scores for the PD: coherence ($M = 2.25$, $SD = 0.95$), content and pedagogy knowledge ($M = 2.42$, $SD = 1.11$), and active learning ($M = 2.87$, $SD = 0.69$).

Table 4

Teachers' Perceptions of PD Constructs

Curricula	Coherence			Content and Pedagogy Knowledge		Active Learning	
	<i>f</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
CASE Curricula	26	4.31	0.56	4.23	0.63	3.59	0.51
ICEV Curricula	21	3.03	0.88	2.81	1.00	3.21	0.63
OLT curricula	6	2.25	0.95	2.42	1.11	2.87	0.69

Note. All Items in this table utilized a 1 (lowest attribute) to 5 (greatest attribute)

Objective 2: To determine the Spearman rho correlation magnitude between teachers' self-efficacy and PDC enactment of AgEdNet.com, ICEV, CASE, CAERT, and OLT.

The second research question sought to affirm the extent to which there was a relationship between a teacher's teaching self-efficacy and curriculum enactment patterns. Correlations were separated by the curricula, and only correlations above 0.5 or large correlations (Cohen, 1988) were reported. Due to the small sample size of OLT participants ($n = 6$), it was removed from research questions 2 and 3 and will not be included in any of the following correlations.

Correlations were separated by the curricula to provide information regarding the relationship between self-efficacy and PDC enactment. Magnitudes were recorded between self-efficacy and how often educators used the curricula, the extent to which the curricula were adapted, their familiarity with the technical content, the extent to which the curricula were improvised, and how well they rated the structure of the curricula.

Overall, the findings showed high correlations for teachers who used AgEdNet.com in self-efficacy and PDC enactment, which affirms Research Question 2.

A high correlation was detected between teachers' overall self-efficacy and curricula use for AgEdNet.com ($r_s = 0.58$). The relationship showed that for teachers who used AgEdNet.com curricula, the higher the self-efficacy scores, the more frequently they utilized the curricula. Of the three constructs measured by the short form TSES and their relation to curricula use, AgEdNet.com showed high correlations for student engagement ($r_s = 0.67$) and instructional strategies ($r_s = 0.56$). No other correlations were found between self-efficacy and curricula use for CASE, ICEV, and CAERT. For AgEdNet.com, a high correlation was detected between teachers' overall efficacy ($r_s = 0.51$), student engagement construct ($r_s = 0.70$), and their frequency of adapting the curricula. No other correlations were found between self-efficacy and adaptation of curriculum for CASE, ICEV, and CAERT.

In addition, for AgEdNet.com, high correlations between teachers' overall efficacy ($r_s = 0.53$), student engagement construct ($r_s = 0.58$), and teachers' familiarity with technical content demonstrated a possible relationship between either the PD or their perceived efficacy in providing students engaging content and their perceived familiarity with their technical content knowledge.

For CASE, a high correlation was detected between teachers' familiarity with the technical content and the instructional strategies construct of the TSES ($r_s = 0.58$), which may have indicated that the more efficacious the individual was toward their knowledge of instructional strategies, the more likely they were to offload CASE curricula.

A high correlation was detected for teachers' improvisation of AgEdNet.com and their overall self-efficacy ($r_s = 0.56$), as well as a high positive correlation for the student engagement construct ($r_s = 0.80$). For ICEV, a high positive correlation was detected between teachers' improvisation and the construct of student engagement ($r_s = 0.55$). No correlations were found between the perceived structure and organization of the curricula and their self-efficacy or the three constructs.

Objective 3: To determine the Spearman rho correlation magnitude between the constructs of PD and the teachers' PDC enactment and perceptions of CASE, ICEV, and OLT curricula.

Correlations were separated by the curricula, and only correlations above 0.5 or large correlations (Cohen, 1988) were reported. For CASE, a high correlation between CASE participants' perception of how active and engaging the PD was and their frequency of curricula use ($r_s = 0.51$). A high correlation was detected between CASE teachers' familiarity with the content and active learning ($r_s = 0.51$). For CASE, the more active and engaging they found the CASE PD, the more often they chose to offload the curricula. For CASE, a high correlation was detected between the construct of PD coherence ($r_s = 0.68$) and active learning ($r_s = 0.61$), which may have shown that their perceptions of the structure and organization of the curriculum increased as their perceptions of how engaging and how much the curriculum aligned with their intended purpose.

Based on the findings, the more the curricula align with their course materials and intentions toward teaching, the higher the teachers perceived the structure and organization of the curricula. For ICEV, a high correlation was detected between the PD construct of coherence and their frequency of use of the ICEV curricula ($r_s = 0.56$). Additionally, a high correlation was detected between ICEV teachers' perceptions of coherence and familiarity with content ($r_s = 0.56$). For ICEV, the more coherent they found the curricula with their courses, the more often they chose to offload the curricula.

Conclusions

There are significant relationships to note with agricultural educators' PDC and each of the third-party curricula. While the findings are not to compare curricula, the findings reveal important variances.

AgEdNet.com Summary Findings

In the study, 12 educators reported using AgEdNet.com monthly. These participants rated the curriculum structure as well-structured, and participants chose to moderately adapt, offload, and improvise the curricula. The fact that all PDC enactments were moderate could have been related to participants' perceptions of the value of certain lessons, which the infrequent use of the curricula could corroborate. However, it could also have been related to the structure of the lessons or the teachers' perceptions of the alignment between the curricula and course standards. Further research will need to clarify this relationship.

A high positive correlation was detected between participants' overall teaching efficacy ($r_s = 0.58$), student engagement construct ($r_s = 0.67$), instructional strategies construct ($r_s = 0.56$), and overall curriculum use, which means that as educators' overall teaching efficacy and specific teaching constructs increased, the more they chose to use third-party curricula.

A high correlation between the student engagement construct and the educators' familiarity with the technical content ($r_s = 0.58$), the choice to adapt ($r_s = 0.70$), and the choice to improvise the curriculum ($r_s = 0.80$) suggested a relationship between enactment patterns and cognitions or possible limitation of the instrument to differentiate between enactment patterns.

In addition, high positive correlations were detected between self-efficacy and participants' familiarity with the technical content ($r_s = 0.53$), the choice to adapt curricula ($r_s = 0.51$), and the choice to improvise the curricula ($r_s = 0.56$). Given that these measures theoretically should not have aligned with each other, this may have demonstrated a limitation of the current PDC instrument, with the need to further develop each of the individual constructs as well as the clarity and content of the associated questions.

The initial interpretation of the relationship between self-efficacy and curriculum use was that the more efficacious the individual, the less they would choose to use the curricula as written and the more they would adapt or improvise the AgEdNet.com curricula. While some of the results agreed with this premise, the results were not conclusive. Further research is necessary to determine why participants rely more or less frequently on the curricula.

CAERT Summary Findings

In the study, 18 educators reported using CAERT monthly to weekly. These participants rated the curricula structure as well-structured, and participants chose to moderately adapt and improvise the curricula and frequently offload the curricula. Given the frequent offloading, frequent use of the curricula, and the participants' high perceptions of the structure and organization of the curricula, this could have been interpreted as the perceived value of the curricula. Participants valued the curricula, which led to frequent use, adaptation, and improvisation of the curricula. This suggests that structural perceptions and perceived value of the pedagogy, content, and perception of structure and organization of the CAERT curricula may impact curriculum use.

CASE Summary Findings

In the study, 26 educators reported using CASE weekly to daily. CASE teachers chose to offload the curricula in the study most frequently while sparsely adapting or improvising the curricula. A high positive correlation between their efficacy in instructional strategies and their familiarity with the technical content ($r_s = 0.58$) suggested that the better their understanding of instructional strategies, the more familiar or comfortable they felt using the CASE curriculum. It may have also been suggested that, through the use of CASE curricula, their perceptions of their knowledge of instructional strategies increased. Further clarification is necessary on this relationship. High positive correlations were detected between teachers' overall use of the curriculum ($r_s = 0.51$), familiarity with content ($r_s = 0.51$), and their perceptions of how "active" they considered the PD in regard to engagement and instructional quality. This relationship showed that the more engaged the educators were and the more they perceived the instruction as valuable and high

quality, the more they felt comfortable or familiar with the technical content of CASE. Additionally, a correlation between their perception of how engaging the PD was and their perception of the structure and organization ($r_s = 0.61$) may have suggested that they were either more engaged and retained more from the PD or that their perception of the structure increased due to the engagement of the PD. Finally, a high correlation between PD coherence and their perception of the structure and organization ($r_s = 0.68$) may have shown a relationship between the curricula and PD alignment to educators' personal and professional needs of the curriculum. Further research is necessary to improve our understanding of these relationships.

ICEV Summary Findings

In the study, 21 educators reported using ICEV monthly to weekly. These participants rated the structure of the curricula as well-structured, and participants most frequently chose to offload the curricula while moderately adapting and improvising the curricula. A high positive correlation was detected between ICEV teachers' student engagement efficacy construct and how often they choose to improvise the curriculum ($r_s = 0.55$), which suggested that the more efficacious they were in engaging their students, the more likely they were to improvise their lessons so that the teacher could accommodate student needs. A high positive correlation was detected between participants' perceptions of the coherence, their familiarity with the content ($r_s = 0.56$), and their perceived frequency of use of the curriculum ($r_s = 0.56$). The more they believed that the subject matter and pedagogy aligned with their state instructional needs, and the more they felt familiar with the content, the higher they rated the coherence of the PD.

OLT Summary Findings

In the study, six educators reported using OLT twice a semester. These participants rated the structure of the curricula moderately, and participants did a moderate amount of offloading and improvising while adapting the curricula a little. Given that the curriculum structure was rated the lowest in the study, it made sense that teachers would frequently adapt the curricula while keeping the initial structures of lessons and materials.

Discussion

This study outlined that, depending on the curricula, the PDC enactment of Indiana agricultural educators may change. This can depend on several factors, such as self-efficacy, environmental constraints, beliefs and values of the educator, perceptions of curriculum training, and affordances and constraints of the curriculum.

The study addressed questions on the structure and features of the specified curriculum, which was dependent on participants. However, the study did not discriminate between teachers' personal factors and PD enactments. For example, CASE participants showed the greatest amount of offloading, which suggested a reliance on the curricula and the structure. It could also have shown that the participants perceived value in the initial written structure. Therefore, an instrument that discriminates between underlying causes and PDC enactment must be developed. For example, in this study, it was possible for a participant to offload the curricula a great deal and adapt and improvise a great deal. Hypothetically, the relationship could have shown more of a positive, neutral, or negative skew. However, this study showed the overall reliance on curriculum-related resources and the amount of agency the teacher demonstrated when enacting the curriculum.

Based on the correlations of this study, educators' self-efficacy could be correlated with their PDC enactment. However, further research on this subject is needed to affirm this relationship. Currently, the results regarding self-efficacy in this study were mixed, as were the results between Easterly and Simpson (2020), which affirmed the relationship between self-efficacy and PDC enactment, while Thornton et al. (2020) did not find an association between self-efficacy and PDC enactment. Therefore, further research must be conducted to confirm or deny a relationship between self-efficacy and curricula PDC enactment.

Two things must be outlined to improve research: sample size and the choice of the self-efficacy instrument. First, the sample size of the various curricula ranged from six participants to 26 participants, which can be expected due to the exposure to multiple curricula in the state of Indiana and the fact that Purdue University has institutionalized the CASE curricula due to the curricula being offered to all agricultural education graduates. Given this limitation, focusing on a single curriculum may offer more functionality and provide more reliable data. Second, while the TSES is a validated instrument to measure teaching self-efficacy, the question should be asked about the development of a specific instrument to measure a teacher's self-efficacy regarding curriculum development. It is important to note that this study's results indicated that although the TSES offers appropriate measures regarding the participants' beliefs to teach specifically, it does not have enough sensitivity to examine curriculum development as an individual task. Bandura stated that self-efficacy measurement must be "commensurate with the particularity and precision with which performance is measured" (Bandura, 1986, p. 397). This leads us to conclude that research regarding curriculum design as a domain to measure self-efficacy and the conceptualization of measured constructs must be conducted.

While this study showed the variation in PDC enactment dependent on participants' perceptions, it could not determine the underlying causes of PDC enactment. Brown's (2009) PDC Framework offers broad generalizations of underlying causes of educators' PDC enactment, but is not detailed enough to predict PDC enactment or to suggest an outline for curriculum development or specific training for developing teachers' PDC enactment. This study offered commentary on structure but could not define the relationship between curriculum features and PDC enactment.

This paper contributes to the growing body of literature regarding the impact of instructional decisions and outlines variables that impact educators' instructional decisions following the framework outlined by Brown (2009). It is necessary for policymakers, educators, and researchers to understand how educators make instructional decisions to support long-term use of and support for curriculum development. This paper attempted to expand on understanding educators' instructional decisions, but further research is needed to expand and refine the PDC conceptual model and better understand the relationship between curriculum and educators' personal factors and their PDC enactment.

Recommendations

Future research should examine the relationship between self-efficacy and PDC enactment. This study assumed that participants with low self-efficacy would rely more on third-party curricula. While some correlations may have supported this, others did not align with the theory and how individual enactment patterns differed. This may suggest an issue with sampling or the instrument's design, which needs to be reviewed and validated for future studies. Given the large concentration of CASE teachers in Indiana, future research can focus on CASE curricula to achieve a larger sample size. Also, by focusing on an individual curriculum, the research may be able to provide more in-depth data on curriculum features and PDC enactment.

The PD instrument was developed through a cursory literature review and agreement with a panel that included an Indiana agricultural educator and Purdue University professors, as well as through developing aggregate constructs of individual items. An exploratory factorial analysis should be conducted to confirm constructs and to provide construct validity to the study. Depending on the results, further research should be conducted to affirm the relationship between PD and PDC enactment perceptions. Also, questions stated in the PD section can be transferred to the larger instrument regarding overall perceptions of the curriculum and not just the PD.

All participants incorporated 1-18 additional resources depending on the chosen curricula. Still, little research has been conducted on how these resources are selected and incorporated into the curriculum. Therefore, in agreement with Easterly and Simpson (2020) and Thornton et al. (2020), we recommend reviewing how teachers choose and incorporate additional curriculum-related resources and training to

select and incorporate these resources. Also, understanding that educators will use additional resources, third-party curriculum designers may identify and provide suggestions for incorporating them, which can provide opportunities for educators to individualize the curriculum and develop their PDC.

Limitations

This study is limited by the time and the locale of the study, which is limited to the year 2022 in Indiana. The results were a static image and did not represent a constant measure of participants' beliefs and perceptions. The results are not transferable to either the entire state of Indiana or other states in the United States and only represent the participants in the study. The results could not predict behavioral enactment and merely suggested a relationship between the variables. All correlations were an act of interpretation and must be interpreted with care.

This paper outlined a possible relationship between curriculum PD, dependent on how teachers perceived the value of the content and pedagogy presented, how engaged they were, how coherent they felt the training and curricula were to their course outlines and state standards, and teachers' PDC enactment. However, the sample size and the unvalidated instrument demonstrated the need for further instrument development and a more purposeful research design.

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