Journal of Agricultural Education, 61(4), 343-357
https://doi.org/10.5032/jae.2020.04343

Curricular Resource Use and the Relationship with Teacher Self-Efficacy Among New Mexico School-Based Agricultural Education Teachers

Kelsey Thornton[1], R. G. (Tre) Easterly III[2], and Kassandra A. Simpson[3]

Abstract

School-based agricultural education programs have the potential to prepare students for successful lives and enhance career skills related to agriculture. For students to achieve instructional goals, they must have relevant materials. The teacher's thoughts on how a subject should be taught influences their choice of curriculum resources, as well as their use of the resources. These choices ultimately have an influence on student learning. The purpose of this study was to determine the resources used by New Mexico SBAE teachers, examine the PDC of New Mexico SBAE teachers, and examine the relationship between resource use and self-efficacy for New Mexico SBAE teachers. The most frequently used resource was CAERT curriculum. CASE curriculum was determined to have both the highest level of offloading and adaptation. CAERT curriculum was reported to have the highest level of improvisation by teachers. Based on these findings, we recommend that the structure and organization of CAERT should be improved. Research should also be explored on how to develop materials that lead to adapting and improvising from teachers. Professional development and preservice programs should prepare teachers to enhance their pedagogical design capacity by finding various resources, critically analyzing their use, and modifying them to meet the goals of their students.

Keywords: self-efficacy; curriculum; curricular use; curricular resource; pedagogical design capacity; pedagogical content knowledge

Introduction

Educated citizens are essential to the wellbeing of a nation. Youth and adult development have been emphasized through agricultural education for living productive and successful lives (Talbert et al., 2014). The instructional programs in agricultural education have been based on problems associated with the agriculture and natural resources industries. Since these industries are so dynamic, the content of the agricultural education curriculum is also ever-changing and flexible (Phipps et al., 2008). The National Association of Agricultural Educators (NAAE) describe a wide variety of skills taught to students through agriculture, food, and natural resources subjects. These skills include science, math, communications, leadership, management, and technology.

The term curriculum has been described by Phipps et al. (2008) as the "set of experiences, courses of study, and activities outlined by an educational program in which students must engage to achieve the desired educational outcomes of the program" (p. 112-113). Curriculum development encompasses teaching standards, depth of content, sequencing, and related issues (Finch & Crunkilton, 1999). The objectives of the curriculum are met during instructional time when the teacher guides student learning in the classroom. Resources must be available and used efficiently by teachers (Talbert et al., 2014). Curricular resources are special materials that are needed to deliver the lesson and engage students in instructional activities. Materials could include references, handouts, instructions, media,

[1] Kelsey Thornton is a teacher of agriculture at Baker County Middle School, 211 Jonathan St, Macclenny, FL 32053 (kthornton4@ufl.edu).
[2] Dr. Tre Easterly is a Professor of Agricultural Education in the Department of Agricultural Education at the University of Florida, 305 Rolfs Hall, Gainesville, FL 32611 (tre.easterly@ufl.edu).
[3] Kassanda Simpson graduated with her master's degree from New Mexico State University and now owns a photography business and teaches youth photography classes, ksimpsonphotos@gmail.com

and supplies. For students to achieve instructional goals, they must have relevant materials (Phipps et al., 2008).

Some resources and teaching approaches have shown more potential than others. Assessment of curricular resources through comparing other teachers' experiences, the authenticity of the developed resources and its connection to content standards is needed before utilization (Talbert et al., 2014). To meet this growing need for effective resources, a variety of both free and for-profit curricular resources have been recently developed for agricultural education (Thoron et al., 2016). Resources have been made more accessible through efforts to provide forums for resource sharing between agriculture teachers such as the NAAE communities of practice platform (NAAE, 2019). Curriculum packages and materials have been developed by various companies. The Center for Agricultural and Environmental Research Training (CAERT, 2019) has developed numerous lesson plans, slide presentations, and other resources for agricultural education. "Prebuilt" and "customizable" courses were developed by iCEV curriculum to be used either as a stand-alone curricular resource or a supplemental resource with existing lessons (iCEV, 2019). There has also been an effort to blend curricular resources with professional development. The National Agriscience Teacher Ambassador Academy was developed to prepare teachers to incorporate inquiry-based instruction but also provides access to resources ranging from low-cost labs to pre-packaged kits from educational resource companies (NAAE, 2019). The curriculum for agriscience education (CASE) was developed to provide lesson plans and instructional materials to teachers presented through in-person professional development. The curriculum package incorporates inquiry-based science concepts through the use of activity-, project-, and problem-based instructional strategies (CASE, 2012).

The literature has shown that the quality of resources available to teachers has been highly variable. Mercier (2015) reported the development of quality curricular resources has shown value in helping teachers implement meaningful agricultural instruction. Despite the promise shown by curricular resources, there is still a need to improve how teachers interact with the resources. According to Mercier (2015), training on how to access and evaluate curricular resources and adapt them to be used in their instruction should be offered to teachers. When teachers are required to teach a scripted curriculum, they often resist (Brown, 2009). There have been calls for improving curricular resources and teachers taking a central role in the curricular design process (Barrick et al., 2018; Mercier, 2015). The lack in clarity of how teachers should design instruction using curricular resources has led to inconsistency in the functional design of curricular materials.

Ball and Cohen (1996) called for educative curriculum, or curricular materials that promote teacher learning and create individuality in design. Educative curriculum materials create opportunities for teacher adaptation and provide helpful materials like rubrics, student work examples, and descriptions of how teachers enact lessons (Davis et al., 2017). Educative curriculum was found to significantly improve teacher content knowledge and lead to improved student learning (Davis et al., 2017). Krajcik and Delen (2017) noted educative curriculum are effective at helping teachers develop new teaching strategies, adding new tools to their teacher toolbox. However, despite this promise, issues in existing curricular resources were also found. Curriculum that is too structured and designed to be "teach-proof" has been shown to have poor implementation (Thornton, 2005). In math education, numerous commonly used curricular resources were found to have poorly stated instructional goals (Remillard et al., 2018). In agricultural education, Lambert et al. (2014) reported that when switching from teacher-centered to learner centered approaches, the CASE training was found to be difficult to implement by some teachers. In addition, not one of the teachers were able to teach the entire curriculum as it was originally designed (Lambert et al., 2014).

While some schools have provided an abundance of teaching resources, others do not (Talbert et al., 2014). The resources teachers choose to utilize can differentiate based a teacher's experiences, beliefs, knowledge, and dispositions. The teacher's thoughts on how a subject should be taught influences their choice of curricular resources, as well as their use of the resources (Remillard, 2005).

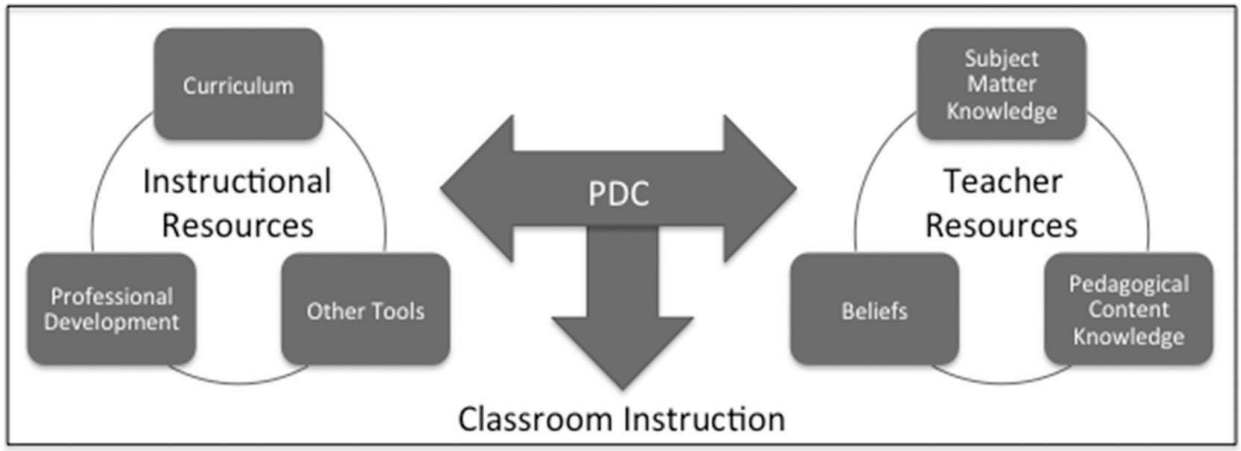
These choices ultimately have an influence on student learning (Matsumura et al., 2006; Stein et al., 2007).

Theoretical Framework

The Pedagogical Design Capacity (PDC) framework guided the study. PDC was adapted from Brown (2009) and Knight-Bardsley and McNeill (2016) (see Figure 1), and depicts the relationship between instructional resources, teacher resources, and the classroom instruction provided as a result of the relationship. Teaching is an act of design (Brown, 2009). To help students achieve their goals, the professionals must locate and evaluate resources to design meaningful experiences. According to Brown, the traditional curricular design model provides constraints for teachers by presenting specific lesson plans or set instructional procedures to follow. While the word constraint can have a negative connotation, constraint can be a good thing when talking about curriculum design because it provides a detailed plan for instruction (Brown, 2009). When teachers design classroom instruction by combining their own knowledge and background with the curricular resources they choose to use, PDC is engaged.

Figure 1

Framework for Pedagogical Design Capacity (Brown, 2009; Knight-Bardsley & McNewill, 2016)



According to Brown and Edelson (2003), there are three patterns that describe how teachers use curricular resources. Offloading describes the level of modification teacher lend to the curricular resource. Teachers who are unfamiliar or uncomfortable with a specific subject area tend to offload their instruction onto the curricular resource and teach with little modification. Resources that designers anticipate will be used with a high degree of offloading should clearly communicate the learning goals and have detailed teacher directions. Another pattern of curricular use is adaptation, which refers to the level a teacher adds their own design elements to the curricular resources. Most resources lend to a certain degree of adaptation, but some resources allow for a greater deal of adapting and may be more appropriate for teachers with stronger PDC (Brown & Edelson, 2003). Resources that lead to a high level of adaptation include open-ended assignments, general concepts, and less scripted directions. The improvisation pattern is demonstrated during classroom instruction. Resources that guide student-centered instruction, elicit discussion, or use student questions to guide the instruction require a high level of improvisation by the teachers. Teachers who are developing the PDC may have a more difficult time with resources designed with improvisation. According the Brown and Edelson (2003), there is not an ideal blend for the patterns of curricular resource when designing resources. Curriculum designers should consider the PDC of the end users of the resource and design the resources accordingly.

The conceptual framework of PDC also explores the impact of teacher resources (Brown, 2009; Knight-Bardsley & McNewill, 2016). Teacher resources were described as an interaction of subject matter knowledge, teacher beliefs, and pedagogical content knowledge. Pedagogical content knowledge consists of a combination of student, instruction, curriculum, assessment, and orientation knowledge (Kind, 2009). Agriculture teachers' previous interactions with agricultural education as a student or work in production agriculture helped shape their pedagogical content knowledge (Rice & Kitchel, 2017a). Rice and Kitchel (2018) reported that when developing their pedagogical content knowledge, plant science teachers combined their beliefs about teaching and learning with their beliefs about the purpose of agricultural education. These interpretations of beliefs are influential when agriculture teachers seek new curricular resources to improve their teaching (Rice & Kitchel 2017b).

Literature surrounding teacher interaction with curricular resources has varied between enacting education reform by providing intact curriculum to be used by teachers with high amounts of offloading (e.g. Wilcox et al., 2014), to teachers engaging as the curricular designers and promoting self-sufficiency (e.g. Ellingson, 2018). Examining how teachers interact with resources in a more natural way would provide a balance between the two opposing viewpoints. According to Wilcox et al. (2014), if teachers adapted new curriculum to fit their needs, they were more likely to implement it into their instruction. Amador (2016) reported elementary math teachers vary when interacting with curricular resources by shifting between offloading, adapting, and improvising. According to Polly (2017), elementary math teachers often used supplemental materials, including online resources such as Teachers Pay Teachers. Polly also reported that even when mathematics resources were designed to be the primary curriculum, teachers still used them as supplemental resources. Dietiker et al. (2018) described how teachers examined, interpreted, and enacted various curricular resources. They concluded that curricular practice should move away from designing resources to be taught with high amounts of offloading and instead, support teachers to make informed decisions about curricular usage.

Teacher self-efficacy is a measure of a teachers' self-belief in their teaching ability. Self-efficacy is a part of the social cognitive theory of self-regulation that has a strong impact on human thought, motivation, and action (Bandura, 1991). Bandura (1991) stated self-efficacy beliefs influence the choices individuals make, their goals, how much effort they offer in a given task, how long they endure under difficult circumstances and setbacks, and whether their thought patterns are self-hindering or self-aiding. A teacher's self-efficacy relates to their perceived judgment of ability to bring about desired outcomes regarding student learning and engagement (Amor et al., 1976; Bandura, 1977). People who judge themselves as more capable, set higher goals for themselves and will be more committed to reaching said goals. Individuals who have self-doubts about their capabilities are easily discouraged by obstacles or setbacks (Bandura, 1991). There are links between agriculture teachers having low self-efficacy and their decision to leave the classroom (Knobloch & Whittington, 2002; McKim & Velez, 2015). Additionally, perceived self-efficacy coincides with the evaluations of actions. According to Bandura (1991), individuals expressed interest in activities they perceive themselves to be self-efficacious and from which they receive satisfaction from achieving desired outcomes. Bandura and Schunk (1981) found self-efficacy to be a better predictor for intrinsic interest than actual ability. It is more probable that teachers with high self-efficacy will implement new strategies or approaches (Guskey, 1988). An increase in science teaching self-efficacy was reported by Ulmer et al. (2013) for teachers who participated in a CASE institute. CASE certification was found to be a significant self-efficacy predictor according to McKim et al. (2017). A connection between self-efficacy and curricular use was indicated by these findings.

Despite the various research related to methods, models, and practices that are effective in leading change (Lindner et al., 2016) and the American Association of Agricultural Education's National Research Agenda (Thoron et al., 2016), little research has been conducted to examine the curricular resources utilized by school-based agriculture education teachers and how those various resources relate to teacher self-efficacy (Bandura, 1977; Tschannen-Moran & Woolfolk Hoy, 2001).

Purpose and Objectives

The purpose of this study was to determine the resources used by New Mexico SBAE teachers, examine the PDC of New Mexico SBAE teachers, and examine the relationship between resource use and self-efficacy for New Mexico SBAE teachers. The study explored the National Association of Agricultural Education Research Priority Area 5: Efficient and Effective Agricultural Education Program (Thoron et al., 2016). The study was guided by these objectives:

1. Describe the self-efficacy of New Mexico SBAE teachers.
2. Describe the curricular resources being utilized by New Mexico SBAE teachers, and how they interact with each resource.
3. Describe the PDC patterns of New Mexico teachers.
4. Examine the relationship between a teacher's self-efficacy and the curricular resources they utilize.

Methods

The curricular use of New Mexico SBAE teachers and their self-efficacy was measured using a descriptive correlational design. A census of SBAE teachers in New Mexico was used because the population was too small to take a representative sample. There were 99 teachers in the population. The New Mexico FFA office and agricultural education coordinator maintains an accurate list of the teachers. The tailored design method was used to illicit responses to an instrument developed in Qualtrics (Dillman et al., 2014). A pre-notice letter with a one-dollar cash incentive was mailed. The initial contact email was timed to arrive the same day as the pre-notice letter. Three follow-up emails were used as reminders to non-respondents. A total of 81 participants completed the instrument yielding a response rate of 81.8%. To test for nonresponse bias, the demographic variables gender and district were compared between respondents and non-respondents using chi-square as recommended by Johnson and Shoulders (2019). No significant difference was found between respondents and non-respondents for gender (X^2 (1, N = 99) = .01, p < .05) and FFA district (X^2 (5, N = 99) = 5.30, p < .05) thus the findings were generalized the population.

An instrument was developed to examine how teachers interact with various curricular resources. A list of 16 resources used by New Mexico SBAE teachers was developed. The participants were also allowed to enter other resources they used with text entry including the titles of textbooks they used. The participants were asked which of the resources they used. Utilizing skip logic, follow-up questions were asked to determine how often they used the resource using a sliding scale with hidden numerical responses ranging from 0-100 with 0 indicating never, 25 indicating once per semester, 50 indicating twice per semester, 75 indicating monthly usage, and 100 indicating daily usage. According to Roster et al. (2015) slider scales produce comparable, or superior, data to radio-button scales and are more engaging for participants. Participants were asked to indicate the structure and organization of the resources they selected using a sliding scale with two anchor points where 0 indicated very-poor and 100 indicated very-good. Three items were used to measure the PDC patterns of curricular interaction. Offloading was measured using 0-100-point sliding scale where 0 was anchored with *not familiar* and 100 was anchored with *familiar*. Adaptation was measured using a 0-100 sliding scale where 0 was anchored with *no modification* and 100 was anchored with *a lot of modification.* Improvisation was measured a 0-100 dichotomous scale with *no improvisation* and *a lot of improvisation* as the anchors. Teacher self-efficacy was measured using the 12-item short form of the Teachers Sense of Efficacy Scale (TSES) (Tschannen-Moran & Woolfolk Hoy, 2001). The TSES has been known as a valid means to measure teacher self-efficacy. The TSES scale had a pre-existing Cronbach's alpha of α = .80. The pilot test yielded a reliability of α = .83 and a post-hoc reliability was α = .85. The instrument was piloted to a group of 34 SBAE teachers in another state. Resource options were added based on the responses and knowledge of resources available to teachers in New Mexico. Curriculum from Eastern New Mexico University (ENMU) and Western New Mexico University (WNMU) were used by some teachers teaching a dual enrollment course. American Welding Society (AWS) provided curricular

resources used by teachers and was added. New Mexico teachers could use materials from Occupational Safety and Health Administration 10 (OSHA 10) safety training course or from the National Center for Construction Education and Research (NCCER) safety training course to provide safety certification to students. The instrument was reviewed by a panel of experts including an assistant professor in agricultural education, a full professor in agricultural education, a full professor in agricultural economics, and a mater's student in agricultural education and was found to be a valid. Data were analyzed using SPSS version 26. Means and standard deviations were calculated for objectives one, two, and three. Point biserial (r_{pb}) correlations and phi coefficients were used to measure objective four reported using the orders of magnitude described by Davis (1971) and recommended by Miller (1998). From a total of 81 respondents, 54.3% (n = 44) were male and 45.7% (n = 37) female. The respondents averaged 11.97 (SD = 10.4) years teaching and 10.15 (SD = 10.1) years teaching agriculture. Of the respondents, 45.7% (n = 37) reported having an advanced degree.

Findings

Objective 1: Describe the Self-efficacy of SBAE Teachers

The TSES scale was used to measure the teacher's self-efficacy. The teachers were asked questions related to the amount of impact the teacher believed they could have and responded using the scale that included five Likert-type options: (1) nothing, (2) very little, (3) some influence, (4) quite a bit, (5) a great deal. The reported mean self-efficacy for New Mexico SBAE teachers was 3.67 (SD = 0.43; n = 81). The scores ranged between 2.83 and 4.58.

Objective 2: Describe the Curricular Resources Being Utilized by New Mexico SBAE Teachers, and How They Interact With Each Resource

The respondents reported using an average of 7.5 (SD = 3.17) resources. The frequency of number of resources used indicated a normal distribution (see Table 1). The most frequently used resource was CAERT curriculum (89.0%; n = 73). Three other resources were utilized by at least half of the responding teachers; Agriculture Experience Tracker (AET) (68.3%; n = 56), Agriculture in the Classroom (61%; n = 50), and iCEV (57.3%; n = 47) (see table 2).

Table 1

Distribution of the Number of Curricular Resources Utilized by New Mexico SBAE Teachers

Number of Resources	*f*	*%*
2	3	3.7
3	3	3.7
4	9	11.1
5	7	8.6
6	9	11.1
7	12	14.8
8	13	16.0
9	5	6.2
10	6	7.4
11	5	6.2
12	6	7.4
13 or more	3	3.7

Using a 100-point sliding scale, the mean and standard deviation for frequency of use and the teacher's rating of the resource structure and organization were also reported (see Table 2). CAERT was rated as the most frequently used resource among teachers (M = 85.1; SD = 16.6) and was also rated the lowest (M = 53.2; SD = 26.6) for structure and organization. CASE was the second highest

frequency of use resource among teachers (*M* = 84.8; *SD* = 21.5) and was rated the highest (*M* = 88.1; *SD* = 19.4) for structure and organization.

Table 2

Frequency of Curricular Resources Utilized

	Teachers Using Resource		Frequency of Use*		Rate of Structure and Organization*	
Curricular Resource	*f*	%	*M*	*SD*	*M*	*SD*
CAERT	73	89.0	85.1	16.6	53.2	26.6
Agriculture Experience Tracker (AET)	56	68.3	65.0	18.9	59.3	22.6
Agriculture in the Classroom	50	61.0	50.8	24.1	76.0	21.9
iCEV	47	57.3	73.9	20.3	67.6	24.1
NAAE Communities of Practice	35	42.7	72.8	19.6	59.7	21.8
Pinterest	35	42.7	79.7	17.1	57.1	30.9
Dual Enrollment ENMU	37	45.1	72.6	30.4	69.2	23.6
Teachers Pay Teachers	26	31.7	62.0	27.1	70.0	25.4
CASE	26	31.7	84.8	21.5	88.1	19.4
Glen Rose FFA	23	28.0	53.4	20.9	60.4	18.3
United States Department of Agriculture (USDA)	20	24.4	58.9	20.8	62.1	19.6
NCCER	22	26.8	54.7	26.8	69.1	25.7
AWS	19	23.2	71.4	18.3	66.3	26.5
Cooperative Extension Services	15	18.3	61.0	20.3	77.4	22.0
OSHA 10	13	15.9	54.0	36.6	78.0	23.8
National FFA My Journey	9	11.0	56.8	20.2	59.8	22.2

*Responses were reported on a scale from 0-100 and were only measured by the teachers who utilized the resource.

Objective 3: Describe the PDC Pattern of Teachers

Using a 100-point sematic differential sliding scale, participants were asked how often modification was used with each resource when making classroom lesson plans. This determined the resource's level of offloading. CASE (*M* = 33.4; *SD* = 23.0) was determined to have the highest level of offloading and Pinterest (*M* = 69.8; *SD* = 27.1) the least. The level of adaptation was determined by asking participants how familiar they were with the content in the resource. The technical agriculture content in CASE (*M* = 85.8; *SD* = 15.3) was most familiar. The least familiar technical agriculture content was in National FFA My Journey (*M* = 42.8; *SD* = 25.0). Participants were asked how often they improvise and are able change lesson plans during class time using each resource to determine its level of improvisation. CAERT (*M* = 71.1; *SD* = 24.8) was reported to have the highest level of improvisation and OSHA 10 (*M* = 33.9; *SD* = 31.0) had the least. Table 3 depicts the patterns of PDC for the utilized curricular resources.

Table 3

Pedagogical Design Capacity Patterns of Utilized Curricular Resources

		Level of Lesson Modification		Familiarity with Content		Level of Improvisation	
Curricular Resource	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*
CAERT	71	68.1	27.4	84.1	17.1	71.1	24.8
Agriculture Experience Tracker (AET)	56	46.8	25.1	51.1	25.2	54.7	23.1
Agriculture in the Classroom	49	45.3	26.5	78.1	22.0	63.4	25.1
iCEV	45	48.9	30.4	73.3	21.7	64.5	25.8
NAAE Communities of Practice	34	61.2	23.4	69.0	21.2	68.2	23.9
Pinterest	34	69.8	27.1	78.1	20.8	67.0	27.7
ENMU Dual Enrollment	33	54.6	23.3	75.5	19.3	54.1	26.7
Teachers Pay Teachers	25	36.2	26.1	70.4	24.2	53.5	21.6
CASE	24	33.4	23.0	85.8	15.3	50.8	25.7
Glen Rose FFA	23	55.9	26.3	69.0	18.0	60.9	22.6
United States Department of Agriculture (USDA)	20	57.9	17.2	60.0	17.9	61.4	17.1
NCCER	19	55.6	20.5	72.1	22.8	60.1	27.2
AWS	17	48.4	26.2	73.3	17.8	55.7	21.9
Cooperative Extension Services	14	48.0	24.3	66.8	24.5	55.1	22.1
OSHA 10	12	35.0	32.5	70.6	24.9	33.9	31.0
National FFA My Journey	8	39.9	15.7	42.8	25.0	43.4	17.1

Note. Responses were reported on a scale from 0-100 and were only measured by the teachers who utilized the resource.

Objective 4: Examine the Relationship Between a Teacher's Self-Efficacy and the Curricular Resources They Utilize

Using point-biserial correlation and Davis's (1971) descriptive magnitudes, the relationship comparison between teacher self-efficacy and curricular resource was identified (see Tables 4 and 5). There were no indications of a substantial positive correlation with teacher self-efficacy and the curricular resources. Agriculture in the Classroom (r_{pb} = .25, p = .02), FFA Blue 365 (r_{pb} = .24, p = .03), OSHA (r_{pb} = .24, p = .03), and AWS (r_{pb} = .23, p = .04) curricular resources all shown a moderate positive correlation. Phi coefficients were used to determine the relationship between resources teacher used. There was a substantial positive relationship between the use of OSHA and NCCER (ϕ = .57, p < .01), Pintrest and Teachers Pay Teacher (ϕ = .52, p < .01), and NAAE Communities of Practice and Pintrest (ϕ = .50, p < .01). A moderate relationship was found between the use of NAAE Communities of Practice and Teachers Pay Teachers (ϕ = .42, p < .01), FFA My Journey and FFA Blue 365 (ϕ = .40, p < .01), Agricultural in the Classroom and NAAE Communities of Practice (ϕ = .39, p < .01), Ag. in the Classroom and Pintrest (ϕ = .39, p < .01), CASE and NAAE Communities of Practice (ϕ = .37, p < .01), Ag. in the Classroom and Teachers Pay Teachers (ϕ = .33, p < .01), OSHA and AWS (ϕ = .32, p < .01), NCCER and AWS (ϕ = .32, p < .01), County extension materials and OSHA (ϕ = .31, p < .01), USDA and Pinterst (ϕ = .31, p < .01), and Glenrose FFA and AWS (ϕ = .30, p < .01).

Table 4

Point-Biserial Correlations (r_{pb}) and Phi Coefficients (ϕ) Between the Teacher Self-Efficacy and Curricular Resources

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Teacher Self Efficacy	--	.15	.25*	-.21	.11	.22	.11	.11	.16	-.04	.24*
2. AET		--	.26*	.18	.19	.14	.24	.15	.22	.07	.06
3. Agriculture in the Classroom			--	.28*	.06	.22*	.28*	.07	.39*	.20	.10
4. CAERT				--	.17	.11	.16	.09	.22*	.12	-.07
5. County Extension Services					--	.03	.02	.15	-.09	.24*	.28*
6. USDA						--	.16	-.08	.20	.16	.21
7. CASE							--	.01	.37*	.01	.16
8. iCEV								--	.05	-.09	.01
9. NAAE Communities of Practice									--	.01	-.12
10. FFA My Journey										--	.40*
11. FFA Blue 365											--

* Indicates significance of $p < .05$.

Table 5

Pearson Product-Moment Correlations (r) Between the Teacher Self-Efficacy and Curricular Resources

Variable	12	13	14	15	16	17	18	19	20	21
1. Teacher Self Efficacy	.13	.05	.12	.08	.13	-.06	.24*	.17	.23*	.06
2. AET	.01	-.09	.14	.07	.09	.15	.08	.06	.00	-.14
3. Agriculture in the Classroom	.39*	.07	-.06	.33*	.02	.07	.07	.03	-.04	-.28
4. CAERT	.22*	.08	.13	.24*	.08	.08	-.06	-.05	-.09	-.06
5. County Extension Services	-.15	.19	.06	.02	.21	.04	.31*	.14	-.11	.03
6. USDA	.31*	.00	.28*	.16	.17	.00	.14	.23*	.29*	-.02
7. CASE	.21	-.03	-.02	.16	.12	-.03	.06	.18	-.06	-.03
8. iCEV	-.05	-.26	.10	-.05	.24	-.03	.17	.02	.01	-.11
9. NAAE Communities of Practice	.50*	-.20	.12	.42*	.11	.03	-.11	.03	-.01	-.04
10. FFA My Journey	.17	.10	-.05	.10	-.01	.10	.06	.05	-.10	-.02
11. FFA Blue 365	.09	.18	.07	.05	-.03	.18	.17	.19	-.02	-.09
12. Pinterest	--	.04	.18	.52*	-.04	-.08	-.04	.09	-.07	-.25
13. School/Dist		--	-.14	-.03	-.21	.21	-.10	-.01	-.12	-.05
14. Glen Rose FFA			--	.10	.09	-.14	.18	.17	.30*	-.02
15. Teachers Pay Teachers				--	-.20	-.15	-.01	-.18	-.19	-.08
16. Dual Enrollment – ENMU					--	-.21	.14	.11	.08	.02
17. Dual Enrollment – WNMU						--	.06	.25*	.01	-.05
18. OSHA							--	.57*	.32*	-.05
19. NCCER								--	.32*	-.00
20. AWS									--	.00
21. Textbook										--

* Indicates significance of $p < .05$.

Conclusions/Recommendations

Several conclusions can be drawn about the use of curricular resources by New Mexico SBAE teachers. The data show that New Mexico SBAE teachers use several resources to develop instruction for their students. The respondents used an average of 7.5 resources. These findings show either the ideal resource has not been created for SBAE instruction or teachers pick and choose from various resources to find the resources to teach their students. Because teachers engage in instruction in various content areas across agricultural disciplines (Talbert et al., 2014), teachers should be encouraged to explore various sources for curricular materials. Teachers in New Mexico utilized CAERT resources with a high degree of frequency. They also rated the resource as having the poorest organization. CAERT curriculum is provided to New Mexico SBAE teachers without fee and has been used as the bases for end-of-course exams (J. Smith, Personal communication, April 12, 2018). If CAERT is to continue to be the content basis for end-of-course exams in New Mexico, then the structure and

organization should be improved. Teachers who use CAERT curriculum reported being familiar with the content and implementing it with a high degree of improvisation and low degree of offloading. CAERT provides lesson-plans with content delivered through PowerPoint presentations and handouts. These results show New Mexico SBAE teachers are using CAERT largely as a content guide rather than a way to generate ideas to teach lessons and provide learning activities to students. Further studies should examine the best way to outline content for teachers. Perhaps content outlines where standards were unpacked into specific content would be more useful than the traditional lesson-plan/PowerPoint/worksheet format used by CAERT. If teachers have a clearer idea of the content they are to teach based on the standards, then resources could be created a shared that provide a more substantive and engaging way to teach the content to students.

These data indicated CASE certified teachers in New Mexico use CASE with high frequency. Further, the CASE users indicated a high level of organization of the CASE curriculum. Teachers who use CASE report doing so with a high level of offloading. On its face, it appears that CASE curriculum is desirable for agricultural educators in New Mexico. In order to have access to CASE materials, teachers must participate in a multi-day professional development training where the participants are taught the lessons in the curriculum (CASE, 2012). This model of curriculum delivery incorporates multiple parts from the framework for PDC (Brown, 2009; Knight-Bardsley & McNewill, 2016). Blending professional development, curricular materials, pedagogical content knowledge, subject matter knowledge, and providing access to resources shows promise for the dissemination of curricular materials. The high degree of offloading and low levels of adapting indicate teachers who are implementing CASE are teaching the lessons as-is and implementing little of their own flair into the instruction. CASE implementation in New Mexico has begun recently and most teachers who use CASE would be in their first year of implementation (J. Smith, Personal communication, April 12, 2018). Further studies should investigate teachers pedagogical use of CASE after they have taught the course for several years. According to Lambert et al., (2014), those teachers who found success with CASE did not follow the suggested schedule and did not complete the entire curriculum in a school year. Research should be conducted to determine how teachers shift from high levels of offloading to lower levels with the same resource. Further studies should examine the design of CASE curriculum compared to other curricular materials to determine if materials can be designed that lead to adaptive behaviors and higher levels of improvisation. If agricultural education is to emphasize teaching lessons and labs in a scripted way, then CASE holds promise. Further inquiry in this area could determine if teachers move to more adaptive and offloading behaviors after they have more experience implementing CASE. Further research is needed to explore PDC development through CASE and other resources.

There was a relationship between the use of NCCER, AWS, and OHSA curricular resources. These materials are designed for instruction in agricultural mechanics. The relationship shows that some teachers are using multiple resources to teach agricultural mechanics instruction. These resources are also used for dual enrollment certification (J. Smith, Personal communication, April 12, 2018). These resources should be analyzed to determine if they can be improved to be more inclusive or combined to meet the needs of teachers delivering instruction in agricultural mechanics. There was also a relationship between the use of NAAE Communities of Practice, Pintrest, and Teachers pay Teachers. The use of these free-choice resource by the same teachers shows that teachers who use one of these resources is likely to use other resources to inform their practice. Further research is needed to determine how teachers interact with these resources, how the resources are designed, and how these materials impact instruction and ultimately impact student learning.

When the relationship with self-efficacy and curricular resources was examined, there were only moderate correlations found. These results indicate that strong relationships between efficacy and materials used by teachers do not exist for teachers in New Mexico. This shows that efficacious teachers do not use resources differently that teachers with lower self-efficacy and the use of certain resources

does not lend itself to self-efficacy. These findings show limited value in boosting teacher self-efficacy through curriculum enhancement and reform which runs counter to the findings of Ulmer et al. (2013) and McKim et al. (2017) who found a connection between CASE use and self-efficacy. Further research is needed to explore the connection between self-efficacy and the use of various curricular resources.

Based on the finding of this study, we recommend focusing research and development to create the best resources for teachers. Resources that have a high degree of offloading can be useful for beginning teachers or teaching a new or unfamiliar concept (Brown, 2009). However, if agricultural education focuses all its curriculum development efforts into paint-by-numbers curricular resources, teachers full PDC may not be realized. Researchers and curriculum developers should examine efforts to create resources that lead to low levels of offloading and higher levels of improvisation. Further research is needed to explore the impacts of these types of resources on teacher development, and more importantly, student learning and outcomes. Further research is also warranted to examine how teachers use resources based on their teaching experience. Because New Mexico teachers use a variety of resources and use them differently, we echo the call of Mercier (2015) for teachers to continue to develop the ability to access and interpret resources. We encourage pre-service programs to guide students on how to find, analyze, and modify resources to meet the goals of their students. Professional development for in-service teachers, especially beginning teachers, should be developed on how to find and implement resources into their classroom.

References

Amador, J. (2016). Mathematics pedagogical design capacity from planning through teaching. *Mathematics Teacher Education and Development, 18*(1), 70 – 86.

Armor, D., Conroy-Oseguera, P., Cox, M., King, N., McDonnell, L., Pascal, et al. (1976). Analysis of the school preferred reading programs in selected Los Angeles minority schools. (REPORT NO. R-2007-LAUSD). *Rand Corporation*. https://www.rand.org /content/dam/rand/pubs/reports/2005/R2007.pdf

Ball, D. L., & Cohen, D. K. (1996). Reform by the book: What is-or might be-the role of curriculum materials in teacher learning and instructional reform?. *Educational Researcher, 25*(9), 6 – 8.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215. http://dx.doi.org/10.1037/0033-295X.84.2.191

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes,* 50.

Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology, 41*(3), 586–598. https://doi.org/10.1037/0022-3514.41.3.586

Barrick, R. K., Heinert, S. B., Myers, B. E., Thoron, A. C., & Stofer, K. (2018). Integrating disciplinary core ideas, the agriculture, food and natural resources career pathways and next generation science standards. *Career and Technical Education Research, 43*(1), 41 – 56. https://doi.org/10.5328/cter43.1.41

Brown, M. (2009). The teacher-tool relationship: Theorizing the design and use of curriculum materials. In J. Remillard, B. Herbel-Eisenmann, & G. Lloyd (Eds.), *Mathematics teachers at work: Connecting curriculum materials and classroom instruction* (pp. 17-36). *Routledge.*

Brown, M., & Edelson, D.C. (2003). Teaching as design: Can we better understand the ways in which teachers use materials so we can better design materials to support their changes in practice?. *The Center for Learning Technologies in Urban Schools.*

Curriculum for Agricultural Science Education. (2012). *CASE lesson development philosophy.* https://www.case4learning.org/images/documents/CASE%20Lesson%20Development%20Philosophy.pdf

Davis, E. A., Palincsar, A. S., Smith, P. S., Arias, A. M., & Kademian, S. M. (2017). Educative curriculum materials: Uptake, impact, and implications for research and design. *Educational Researcher, 46*(6), 293 – 304. https://doi.org/10.3102/0013189X17727502

Davis, J. A. (1971). *Elementary survey analysis.* Englewood Cliffs, NJ: Prentice Hall.

Dietiker, L., Males, L. M., Amador, J. M., & Earnest, D. (2018). Curricular noticing: A framework to describe teachers' interactions with curriculum materials. *Journal for Research in Mathematics Education, 49*(5), 521 – 532. https://doi.org/10.5951/jresematheduc. 49.5.0521

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). Internet, mail, and mixed-mode surveys: The tailor design method (4th ed.). *Wiley*

Ellingson, C. (2018). *Teachers as curriculum designers: Understanding STEM pedagogical design capacity*. (Doctoral dissertation). University of Minnesota Digital Conservancy, http://hdl.handle.net/11299/199085.

Finch, C. R., & Crunkilton, J. R. (1999). Curriculum Development in Vocational and Technical Education. Planning, Content, and Implementation. Fifth Edition*. Allyn and Bacon.*

Guskey, T. R. (1988). Teacher efficacy, self-concept, and attitudes toward the implementation of instructional innovation. *Teaching and Teacher Education, 4*(1), 63 – 69. https://doi.org/10.1016/0742-051X(88)90025-X

iCEV. (2019). *Standards-aligned curriculum: Agricultural science.* https://www.icevonline.com/curriculum/agricultural-science

Johnson, D. M., & Shoulders, C. W. (2019). Beyond magic words and symbols: Rethinking common practices in quantitative research. *Journal of Agricultural Education, 60*(3), 291 – 303. https://doi.org/10.5032/jae.2019.03291

Kind, V. (2009). Pedagogical content knowledge in science education: Perspectives and potential for progress. *Studies in Science Education, 45*(2), 169 – 204. https://doi.org/10.1080/03057260903142285

Knight-Bardsley, A., & McNeill, K. (2016). Teachers' pedagogical design capacity for scientific argumentation. *Science Education, 100*(4), 645 – 672. https://doi.org/10.1002/sce.21222

Knobloch, N. A., & Whittington, M. S. (2002). Novice teachers' perceptions of support, teacher preparation quality, and student teaching experience related to teacher efficacy. *Journal of Vocational Education Research, 27*(3), 331-341.

Krajcik, J., & Delen, I. (2017). The benefits and limitations of educative curriculum materials. *Journal of Science Teacher Education, 28*(1), 1 – 10. https://doi.org/10.1080/1046560X.2017. 1279470

Lambert, M. D., Velez, J. J., & Elliot, K. M. (2014). What are the teachers' experiences when implementing the curriculum for agricultural science education?. *Journal of Agricultural Education, 55*(4), 100 – 115. https://doi.org/10.5032/jae.2014.04100

Lindner, J. R., Rodriguez, M. T., Strong, R., Jones, D., & Layfield, D. (2016). Research priority area 2: New technologies, practices and products adoption decisions. In T. G. Roberts, A. Harder, & T. M. Brashears, (Eds). (2016). *American Association for Agricultural Education national research agenda: 2016-2020.* Department of Agricultural Education and Communications.

Matsumura, L. C., Slater, S. C., Junker, B., Peterson, M., Steele, M., & Resnick, L. (2006). *Measuring reading comprehension and mathematics instruction in urban middle schools: A pilot study of the International Quality Assessment* (CSE Technical Report NO. 681). National Center for Research on Evaluation, Standards, and Student Testing. https://files.eric.ed.gov/fulltext/ED492885.pdf

McKim, A. J., & Velez, J. J. (2015). Exploring the relationship between self-efficacy and career commitment among early career agriculture teachers. *Journal of Agricultural Education, 56*(1), 127 – 140. https://doi.org/10.5032/jae.2015.01127

McKim, A. J., Velez, J. J., & Clement, H. Q. (2017). Exploring relationships between personal variables, programmatic variables, and self-efficacy in school-based agricultural education. *Journal of Agricultural Education, 58*(2), 284 – 298. https://doi.org/ 10.5032/jae.2017.02284

Mercier, S. (July, 2015). Food and agricultural education in the United States. AGree Transforming Food & Ag Policy Report.

Miller, L. E. (1998). Appropriate analysis. *Journal of Agricultural Education, 39*(2), 1 – 10. https://doi.org/ 10.5032/jae.1998.02001

National Agriscience Teacher Ambassador Program. (2019). *National Agriscience Teacher Ambassador Program.* https://www.naae.org/profdevelopment/nataa.cfm

National Association of Agricultural Educators. (n.d.). What is Agricultural Education? https://www.naae.org/whatisaged/

Phipps, L. J., Osborne, E. W., Dyer, J. E., Ball, A. (2008). Using advisory councils and support. *Handbook on Agricultural Education in Public Schools* (81-93). *Thompson Delmar Learning.*

Polly, D. (2017). Elementary school teachers' uses of mathematics curricular resources. *Journal of Curriculum Studies, 49*(2), 132 – 148. https://doi.org/10.1080/00220272.2016.1154608

Remillard, J. T. (2005). Examining key concepts in research on teachers' use of mathematics curricula. *Review of Educational Research, 75(2),* 211 – 246.

Remillard, J. T., Reinke, L. T., & Kapoor, R. (2018). What is the point? Examining how curriculum materials articulate mathematical goals and how teachers steer instruction. *International Journal of Educational Research.* https://doi.org/10.1016/j.ijer.2018.09.010

Rice, A. H., & Kitchel, T. (2018). Agriculture teachers' integrated belief systems and its influence on their pedagogical content knowledge. *Journal of Agricultural Education, 59*(1), 51 – 69. https://doi.org/10.5032/jae.2018.01059

Rice, A. H., & Kitchel, T. (2017a). Shaping pedagogical content knowledge for experienced agriculture teachers in the plant sciences: A grounded theory. *Journal of Agricultural Education, 58*(4), 50 – 64. https://doi.org/10.5032/jae.2017.04050

Rice, A. H., & Kitchel, T. (2017b). Teachers' beliefs about the purpose of agricultural education and its influence on their pedagogical content knowledge. *Journal of Agricultural Education, 58*(2), 198 – 213. https://doi.org/10.5032/jae.2017.02198

Roster, C. A., Lucianetti, L., & Albaum, G. (2015). Exploring slider vs. categorical response formats in web-based surveys. *Journal of Research Practice*, *11*(1), Article D1. http://jrp.icaap.org/index.php/jrp/article/view/509/413

Stein, M. K., Remillard, J., & Smith, M. (2007). How curriculum influences student learning. In F.K. Lester, Jr. (Ed.). *Second handbook of research on mathematics teaching and learning* (pp 319-369). *Information Age.*

Talbert, B. A., Vaughn, R., Croom, B., & Lee, J. S. (2014). Foundations of agricultural education. *Pearson Education, Inc.*

Thoron, A. C., Myers, B. E., & Barrick, R. K. (2016). Research priority area 5: Efficient and effective agriculture education program. In T. G. Roberts, A. Harder, & T. M. Brashears, (Eds). (2016). *American Association for Agricultural Education national research agenda: 2016-2020. Department of Agricultural Education and Communications.*

Thornton, S. J. (2005). Teaching social studies that matters. *Teachers College Press.*

Tschannen-Moran, M., & Woolfolk Hoy, A. (2001). Teacher efficacy: capturing an elusive construct. *Teaching and Teacher Education 7*(17)*,* 783 – 805. https://doi.org/ 10.1016/S0742-051X(01)00036-1

Ulmer, J. D., Velez, J. J., Lambert, M. D., Thompson, G. W., Burris, S., & Witt, P. A. (2013). Exploring science teaching efficacy of CASE curriculum teachers: A post-then-pre assessment. *Journal of Agricultural Education, 54*(4), 121 – 133. https://doi.org/10.5032/jae.2013.04121

Wilcox, A. K., Shoulders, K. W., & Myers, B. E. (2014). Encouraging teacher change within the realities of school-based agricultural education: Lessons from teachers' initial use of socioscientific issues-based instruction. *Journal of Agricultural Education, 55*(5), 16 – 29. https://doi.org/10.5032/jae.2014.05016