Educational Considerations

Volume 47 | Number 1 Article 8

June 2021

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Recommended Citation

Boche, Benjamin; Bartels, Selina; and Wassilak, Douglas (2021) "Reimagining an elementary teacher education preparation program: Striving for integrated teaching," *Educational Considerations*: Vol. 47: No. 1. https://doi.org/10.4148/0146-9282.2254

Reimagining an Elementary Teacher Education Preparation Program: Striving for Integrated Teaching

Benjamin Boche, Selina Bartels, and Douglas Wassilak

The quintessential elementary school classroom provides students with instruction in at least four main subject areas: literacy, math, science, and social studies. And it is typical for elementary school teachers to have the same set of students all day with students only seeing other teachers for "special classes," i.e. art, music, and physical education. This structure of K-6 instruction is common, but university teacher preparation programs deliver curriculum in stand-alone courses often entitled "methods of teaching" connected to a content area. Typically, university coursework is spread over a series of four methods classes loosely coupled with field experiences (Darling-Hammond, 2006; Labaree, 2006). The preservice teacher (PST) must then piece together their teacher education program themselves during their student teaching semester. According to Bain and Moje (2012), the PST is expected to integrate these disparate courses and experiences despite being the least experienced member of the education community. Elementary PSTs, in particular, must have pedagogical content knowledge (Shulman, 1986) in all four major content areas and have an extra level of understanding where they connect the content areas together. Much of this connection between content areas is driven by the standards movement that has sought for more integration of knowledge and skills for each content area (National Governors Association, 2010).

In order to combat the disparate nature of the four methods classes and the somewhat ineffective field experiences, the authors - two elementary education faculty and a Director of Field Placement - initially revised the elementary education program to include a three-week immersive field experience for both the fall and spring semesters. At the onset of the initial revision, PSTs had the option of when to take the four content area methods courses. The authors hoped that in providing PSTs with a more focused field experience, the movement towards integrated teaching of the four content areas would be a natural outcome of being in an elementary classroom all day. However, this was not the case for how we prepared our PSTs nor for what they encountered in the classroom.

In seeking out potential schools with whom to partner for our three-week field experience, we discovered that literacy and math were often the sole emphasis of the elementary classroom. Our PSTs were allowed to teach social studies content and standards, for example, if it was included as a single lesson during a small group reading session and then only to fulfill our social studies methods course requirements. Science teaching was scheduled for two or three days a week in the afternoon and only if time allowed, which was not always the case. To no fault of the mentor teachers from our partner schools, our redesigned field experience component did not yield the results we hoped it would to help our PSTs make connections across their methods courses. PSTs need to have much deeper experiences during methods courses to make these connections explicit during the practicum experience. PSTs need to be taught and must practice their techniques in the methods classroom before a practicum to make these integrated teaching connections deeper within the practicum experience (Kavanagh et al., 2019).

Since the expectation is for elementary PSTs to be prepared to teach all of the content areas in their classroom all the time, becoming fully integrated across the curriculum could serve as a way to deliver the content areas in a fluid manner without each subject being siloed in distinct learning blocks. Therefore, in order to best support our elementary PST to be fully ready to teach in an integrated elementary classroom, our PSTs needed an understanding of teaching standards for each content area and how to integrate each of these content areas. Keeping this in mind, we sought to redesign our elementary education program even further to support these new understandings and endeavors.

Theoretical Framework

Integration. Although several have been proposed in the teaching profession, there is no official, agreed-upon definition of integrated teaching (Venville et al., 1998). Some research has been conducted on integrated teaching with few empirical studies supporting integration. The research noted that this approach is "frequently embedded into other reforms, such as block scheduling and multi-age grouping" (Czerniak et al., 1999, p. 423).

Interest in curricular connections with science, mathematics, and engineering dates back to the 1870s, when Calvin Woodward—a mathematics professor—began employing manual training methods with mathematics and engineering students. This early integrated teaching approach explored teaching and learning between and among two or more of the subject areas, and/or between a subject and one or more subjects. There is a perception that all fields must be included to be an integrated lesson. One research team (Sanders, 2009) argued instead that the subjects should be presented in such a way that students can easily see the connections between them rather than considering them as standalone fields. Similarly, expanding on Woodward's work, Stoddart et al. (2002) examined ways to deliver integrated curriculum. They came up with three principal approaches to teaching integrated content areas which is the focus for this study: (a) a thematic approach characterized by the use of overarching themes to create connections among domains; (b) an interdisciplinary approach in which content or processes in one domain are used to support learning in another; and (c) an integrated approach in which emphasis on two or more domains is balanced.

Content Integration. ***Literacy and the Role of Knowledge Building.*** In examining the standards for English Language Arts (ELA) teaching, the message is clear to support students in developing knowledge for and through reading. As knowledge and comprehension are interconnected (Pearson et al., 1979; Cervetti & Hiebert, 2015; Hwang & Duke, 2020), ELA instruction should be focused on activating current content knowledge and building new content knowledge. Pearson et al. (1979) showed that students with well-developed background knowledge are not only able to better remember information from a text but are also better supported to engage in inferring and higher-level comprehension processes. Similarly, Hwang and Duke (2020) argue that students with better content-specific knowledge have higher comprehension achievement as well as the ability to gain even more content-specific knowledge in the process. Reading instruction, therefore, may be more effective when it is situated in knowledge-building goals rather than in a generic context (Guthrie et al., 2004; Halvorsen et al., 2012).

Cervetti & Hiebert (2015) advocate that "teachers need to be adept at identifying what bodies of knowledge are required for full engagement with a text's content and what their students know about the content" (p. 262). The goal is to create discipline-specific literacy practices and content knowledge. When literacy instruction is combined with content area instruction, students' conceptual learning, reading motivation, writing skills, and use of comprehension strategies increases (Cervetti et al., 2012; Guthrie et al., 2004). Additionally, students become more adept at recognizing and understanding how to use the knowledge and information gained from content in everyday situations (Palincsar & Duke, 2004). In essence, elementary teachers are specifically tasked with determining how to build knowledge across content areas and across the school day in meaningful and relevant experiences.

Elementary Educators Science and Mathematics Teaching. In this current age of educational reform, the onset of Science, Technology, Engineering, and Mathematics (STEM) education has picked up international notoriety. Unfortunately, the level of enthusiasm for STEM has not been met with the same level of clarity. If ten teachers were asked what integrated STEM is and how it is taught, there will likely be ten different answers.

Research has shown that at the elementary level integration of these four areas (science, technology, mathematics and engineering) has the largest impact on students. It is important in the early years to integrate across several content areas in the youngest learners (Becker & Park, 2011). Not only is teaching in an integrated manner important, but it is also key for PST to take their methods courses and apply it in the field (Adams et al., 2014). STEM learning and teaching through integrated, place-based activities had a positive impact on PSTs' understanding of place-based approaches, their perceived ability, and projected intent to design and implement place-based STEM learning activities. This place-based field experience is key to the PSTs' planning and delivery of integrated STEM lessons and is further solidified when there is collaboration between university professors. It is important for professors to model integrated teaching across methods courses, especially through the STEM lens, as it can lead to increased understanding in preservice elementary teachers' definitions and enactment of STEM lessons (Bartels et al., 2019; Rinke et al., 2016). Lesson planning artifacts in the integrated methods coursework also showed increased facilitation of STEM literacies with specific attention to content integration between engineering, design, and arts inclusion. Not only is it best practice to integrate methods courses for PSTs, but the integrated coursework generates very positive attitudes towards the integrated mathematics and science teaching approach, and teachers would be more likely to implement the practice in their classrooms (Treacy & O'Donoghue, 2012).

Connecting Content Knowledge with Teaching. Shulman (1986), in *Knowledge Growth in Teaching,* focused on the teacher as a transformer of subject matter. Through courses and practical experiences, teacher preparation program graduates successfully develop and implement instruction that represents current subject matter in a form that promotes in-depth understanding and the ability to apply knowledge to new situations. Shulman found that teachers need three interconnected components to successfully teach: content knowledge (CK), pedagogical knowledge (PK), and pedagogical content knowledge (PCK). Generally, PSTs learn CK in their general education and minor coursework. This knowledge concerns understandings of science, reading, writing, history, and other coursework. PK is gained through generic coursework in the education department such as classroom management and curriculum courses.

PK enables the teacher to deliver content to students that is appropriate for their developmental and cultural needs. PCK enables teachers to integrate their understanding of the content area and their understanding of how to deliver that content appropriately to their students. PCK demonstrates that certain methods of delivery work better for different content areas. PCK helps the teacher discern the best way to teach a specific lesson. Elementary school teachers are challenged by the need to develop PCK to teach at least *all* four major content areas: mathematics, science, literacy, and social studies. In addition to having PCK in all content areas, elementary teachers must have an extra level of understanding where they connect the content areas together.

Immersive Field Experience. Understanding how to interconnect content areas is an important part of integrated PST preservice education, but another crucial part is being able to deliver these lessons. Authentic field experiences are critical to the development of a highly skilled elementary teacher. It is key that teacher education programs utilize place-based pedagogies within an integrated block of science, mathematics, and social studies methods courses to support elementary PSTs' development. For example, experiences with STEM learning and teaching through integrated, place-based activities had a positive impact on PSTs' understanding of place-based approaches, their perceived ability, and projected intent to design and implement place-based STEM learning activities (Adams et al., 2014). PSTs' teaching efficacy increased after the repeated field-teaching (two semesters) in the aspects of pedagogy/content coordination, fluent teaching process, effective solution-to-student difficulties, and problem posing. The school-based practicum shapes PSTs' effective mathematics teaching shifting it from teacher-centered, theoretical, and procedural approaches to student-centered, practical, and thematic ones (Chiu, 2017; Shelton et al., 2019).

The purpose of this study is not only to look at the impact of an embedded field experience but to further interweave subject areas that are frequently taught in the elementary classroom in a method of instruction that emulates the world in which students live. The main research question for this study was: How does a collaborative and integrated elementary education program impact preservice teachers' knowledge and understanding of an integrated teaching K-6 elementary classroom?

Methodology

Coursework. Before the initial program reform, PSTs had field experience for four content-area methods courses (literacy, math, science, and social studies) in which they observed the teaching of the content and practiced delivering lessons. Each methods course had individual field experiences where students would observe a class in an elementary school weekly throughout the semester. However, the elementary classroom may or may not have been covering that content topic while the students were assigned to observe. For instance, students may have gone to a classroom to observe math on Wednesday afternoons, but math in that classroom was taught in the mornings. Similarly, PSTs took the methods courses in whatever order best fit their schedules. Under the former model, the methods courses were disjointed, and the courses did not build on each other. In the move towards a more integrated approach, field experiences have shifted from once a week for several weeks to a three-week practicum during the semester. PSTs are in an elementary classroom every day for a full day with opportunities to teach multiple

subject areas and learn how to integrate content. Similarly, a new scope and sequence of coursework was created so methods courses can build upon each other. The methods courses are: Foundations of Literacy, Social Studies Methods, Mathematics Methods, Science Methods, Physical Education Methods, Fine Arts Methods, Children's Literature, and Literacy in the Elementary Grades (see Chart 1 for the sequence of coursework).

In this integrated elementary education program, content methods courses were taught in tandem to build bridges and PCK between content areas. For example, the Foundations of Literacy course was taught in the same semester as the Social Studies Methods course. These courses focused on the links between literacy and social studies lessons and provided immediate field work for preservice teachers to observe high quality teachers as well as deliver lessons. Mentor teachers were recruited through our partner schools and selected based on their own teacher evaluations, recommendations from administration, and feedback from the university supervisors.

The methods coursework took place in the preservice teachers' third year of undergraduate studies (see Chart 1). Each methods' block class included a practicum in which preservice teachers were placed in a classroom to participate in and support a full elementary school day. The first semester practicum placed students in kindergarten through second grade classrooms to provide experiences of teaching early elementary grades. In the second semester practicum, preservice teachers were placed in grades three through five. Thus, preservice teachers had at least one placement in each of the two grade bands (early and intermediate) before their capstone student teaching semester. This sequencing also allowed professors to build preservice teachers' understanding of key pedagogical items throughout the entire year including: lesson planning, assessment, child development, and classroom.

The authors of this study were the professors of the methods classes and the Director of Field Placement for this program. Between the three roles, they have over five decades of teaching experience in the classroom and at the university level. The professors of record hold PhDs in their respective content areas. The research team met over one summer to align coursework and plan for the integration between courses and the practicum work. Additionally, throughout the school year, the team met on a weekly basis to review lesson plans and map out integration between coursework and practicum work.

Chart 1: Coursework Sequence

Pre-Practicum	Methods Block One (K-2 Placement)	Methods Block Two (3-5 Placement)	Post Practicum
Curriculum Design	Foundations of Literacy	Literacy in the Elementary Grades	Children's Literature
Educational Foundations	Social Studies Methods	Science Methods	Diverse Learning
Integrated Sciences	Physical Education Methods	Mathematics Methods	Student Teaching

Math for Elementary Educators		Fine Arts Methods	

Sample. The sample included 12 preservice education students at a Midwest private liberal arts university in the United States. The students were selected out of convenience as they were the first students to complete the new elementary education preservice program. All PSTs in the sample took part in the methods coursework as well as student teaching. The PSTs taught content area lessons, assisted their cooperating teachers, facilitated small group teaching and learning, and experienced the profession of an elementary teacher. Additionally, participants also completed their 15-week student teaching placement where they assumed all of the responsibilities of a classroom teacher.

The participants in our sample were two males and ten females. All PSTs in the sample identify as White. They were between the ages of 21 and 30 with only one person having a previous Bachelor of Arts degree from another institution. The practicum methods semesters were in two different elementary schools. The school districts are located in urban and suburban areas within 30 miles of the university. For the student teaching semester, PSTs were placed throughout the surrounding districts. All of the PSTs were at separate schools for student teaching except two who were assigned to the same school.

Data Tools. Several tools were used to collect data: field experience lesson plans, a survey of experiences, video-recorded lessons, and the edTPA (Stanford Center for Assessment, Learning and Equity, 2013) lesson plans and video recordings. Data were collected over three semesters: two practicum semesters (3-week experience) and a student teaching semester (15-week experience). A department lesson plan template is used during all coursework through student teaching (see Appendix A). This template was designed by the department based on the department's framework and the expectations of the capstone edTPA assessment. In particular, the lesson plan template was selected as a data tool because it lends itself to connections between content areas. PSTs demonstrate their thinking through the start of the lesson-planning process by making connections in the standards and objectives, the assessments, and all the way through the various subsections of the lesson plan template. The lesson plan template allows for PSTs to demonstrate their thinking process while planning.

During the practicum, lesson plans and video recordings of teaching were collected. A minimum of 15 lesson plans were collected during practicum (three lesson plans in each methods course). PSTs were also observed for each methods course during practicum. During the student teaching semester, the capstone edTPA portfolio scores were collected along with the post survey. The edTPA portfolio looked at lesson planning, delivery of lessons, and assessment of students. The lesson plans collected from the edTPA were written and delivered during the student teaching semester. All lesson plans written by the PSTs in both the practicum semesters and student teaching experiences are scripted; the scripting of the lesson plans allows the researchers to see the specific connections PSTs were intending to make between the content areas.

The survey asked questions about the immersive field experience, understandings of integrated teaching, and the student teaching placement. The survey was developed as a reflective device for the PST program. The questions were created by the researchers and were validated by

several members of the department. Each question was developed to assess the thinking behind lesson planning and the interconnections between content areas. See Appendix B for the survey questions.

Data Analysis. To analyze the outcomes of the integrated teaching program, a mixed methods approach was employed to expand and compile findings from a variety of data sources (Tashakkori & Teddlie, 1998).

Lesson Plan Analysis. Frequency data for integration was gathered from each lesson plan submitted throughout the study, both in field experience and in student teaching. These lesson plans were written on the template of the department and were collected for a grade. The lesson plans were collected over the course of three semesters. The researchers first individually coded one PST's lesson plans focusing on codes detailing if content was thematic, integrated or interdisciplinary. These codes are based on the work by Stoddart et al. (2002), who defined three principal approaches to the integration of content areas: thematic, interdisciplinary, and integrated. The thematic approach is characterized by the use of overarching themes to create connection (e.g. the theme of apples in a primary classroom where each subject area uses apples in the lesson). The interdisciplinary approach is where content or processes in one domain are used to support learning (e.g. when students use writing to justify an answer in a math lesson). The integrated approach places an emphasis on two or more domains that are balanced (e.g. during a lesson students are taught how to write in response to a mathematical problem).

After individually coding one PST's fourth grade mathematics lesson plan, the research group met and discussed the items that were coded and presented evidence from the lesson plans to arrive at an 80% agreement. For example, the following quote was taken from the lesson plan:

> Students will fill out the investigation KWL chart by placing their given perimeter in the "What I Know" column, record numerical data from all created rectangles in the "What I Learned" column with attention to proper units, and write a detailed comparison of the rectangles that proves their concept of the relationship between side lengths and area.

All researchers confirmed this was not a "thematic code" because it was not a superficial relationship; however, both reading and math were present. This led to the discussion of refining the difference between "interdisciplinary" and "integrated." After a discussion, it was decided that this lesson was interdisciplinary because, although both content areas are used, the PST used writing to teach math, but there was not an equal emphasis on both. Additionally, only the math objectives were evaluated in these lessons and not the writing objectives. The authors agreed that in order to code a lesson as integrated, there needed to be both objectives and assessments for all represented content areas. Several more lesson plans were analyzed and coded together as a research team. For any codes that had a discrepancy, the researchers discussed and reached 100% agreement. The remaining PST lesson plans were divided amongst the researchers to complete coding. After each PST's lesson plans were coded, the data were placed into a table to see if there were patterns across each PST and within the group of PSTs as a whole. Table 1 in the findings section presents the results. To further corroborate these findings, the PSTs video recordings of the lessons were analyzed using the same coding method to compare what was

planned and what was taught. Additionally, these findings were checked against the observation field notes.

Survey Analysis. Researchers met together to code surveys using the constant comparative method (Kolb, 2012). Codes were developed for defining integrated teaching and PST reflections on: observing, planning, and delivery of integrated lessons in both field experiences and during student teaching. After codes were developed, an inter-rater-reliability of 80% or greater was established.

Findings

Integration Frequency Table. As seen in Table 1, the first column indicates the number assigned to each preservice teacher. The next four columns indicate the type of integration found in lesson plans, observations, and video recorded lessons. The first column is no integration of content areas, the second column is thematic integration of content areas, the third column is interdisciplinary integration of content areas, and the fourth column is full integration of content areas. Included in each column is the location of where the integration took place. FE indicates during field experience and ST indicates during student teaching.

Table 1.
Integration Frequency Table
FE= Field Experience
ST = Student Teaching

Preservice Teacher	No Integration	Thematic Integration	Interdisciplinary Integration	Full Integration
1	FE, ST			
2		FE		FE
3	FE, ST			
4	ST		FE	FE
5	FE		FE	ST
6	FE	ST		
7	FE, ST		FE	
8	ST			FE
9	ST	ST	FE	
10	FE		ST	
11			FE, ST	

12	FE, ST			
Total	7 FE None 7 ST None	1 FE Thematic 2 ST Thematic	5 FE Interdisciplinary 2 ST Interdisciplinary	3 FE Integrated 1 ST Integrated
	14 Total None	3 Total Thematic	7 Total Interdisciplinary	4 Total Integrated

As indicated by the Integration Frequency Table, most PSTs had no integration in their field experience and student teaching lesson plans while the next, most common was interdisciplinary integration.

No Integration. According to the Integration Frequency Table, during the two different three-week field experiences, seven out of the 12 PSTs demonstrated no integration of content of any sort, whether thematic, interdisciplinary, or integrated. Similarly, for the capstone edTPA assessment during student teaching, seven out of the 12 PSTs demonstrated no content integration in the planning, teaching, and assessment portions.

Thematic Integration. PSTs integrated content thematically the least, with only one PST thematically integrating content during field experience and two in the edTPA assessment. During field experience, one PST was leading a small, guided reading group in kindergarten where the focus was on learning sight words while reading content about items that are wet. While the sight words of "the," "is," and "wet" were the primary focus with the guided reading text consisting of sentences such as "The ocean is wet," and "The bathtub is wet," the PST also asked the students if they had ever been to a lake or taken a shower or bath, and what happened when they got in the water? After reading the short book, the PST asked the students to describe things that were wet from the story. Similarly, the PST gave the students a short sentence stem writing prompt of "The _____ is wet," and had the students fill in the blank to see if they understood sources and objects that could be wet.

Most of the thematic content integration present in the two PSTs' edTPA assessment was limited in scope as the main focus was on literacy strategies. For example, one PST focused exclusively on cause and effect as the central focus for the unit, and used science and history short books as well as a graphic organizer to capture the content of the books to teach the students about cause and effect. The main focus was not necessarily to learn the content of the short science and history books but rather to examine the presence of cause and effect in history and science. Similarly, another PST focused on story structure in the edTPA, and the story concerns a boy learning a better way to save money. The PST noted that some of their conversation about the story structure centered on money, since the students were also learning about money in math during the time of the unit. These different examples show the PSTs thematically integrated content by the use of overarching themes to create connections among domains (Stoddart et al., 2002).

Interdisciplinary Integration. The majority of the PSTs had interdisciplinary content integration with a focus on reading about content or writing to support content. For reading about content, during the field experience and for their edTPA, PSTs were either given or chose reading materials that featured historical content or were connected to other social studies topics. One PST's guided reading group focused on a biography of Martin Luther King Junior. In addition to having the students work on the literacy strategy of selecting main ideas and key details from the text, the PST also related Martin Luther King Junior's civil rights protests to the anti-bullying week that was currently happening at the school, thinking about the concept of fairness and giving examples of fairness at home or school, and having students think about ways to handle school conflicts or school rules in a peaceful manner. Another PST also made explicit connections to students' backgrounds and experiences by reading a book about holidays around the world and then connecting the celebration of holidays and traditions to students' own traditions and celebrations. The PST primarily focused on the literacy skill of summarizing by having students summarize holidays and traditions found in the guided reading book and their own holidays and traditions to fellow classmates. Finally, for the edTPA, one PST focused on the literacy strategy of asking and answering questions and included geographical content to support this literacy strategy. The PST demonstrated this strategy through modeling:

> What is the Sahara Desert like? I found out the Sahara Desert is sandy, hot, and covers a lot of land. I found this out by looking at picture clues of sand and dunes (hills made of sand) and describing words or adjectives in the text that described what that desert was like.

The students then practiced the strategy of asking and answering questions by using other non-fiction, geography-based texts.

Two other PSTs both focused on interdisciplinary teaching in math by using writing to support content understanding. One PST simply included the following objective to have the students use writing to support math understanding: "Students will be able to explain in writing and describe how they had gotten their answer for the real-world problem with 100% accuracy." Another PST used specific tools to help organize students' writing to support math content understanding. The PST had students fill out KWL charts to solve specific problems and had them label information with correct vocabulary terminology. The PST also used writing samples as formative assessments to discuss areas and perimeters of rectangles. Finally, the PST gave students a variety of real-world word problems related to area and perimeter, and the students were expected to answer the questions with both diagrams of the objects as well as written answers. The PST also expected students to write using specific comparison language, but the PST did not teach the comparison language syntax expectations to students.

Full Integration. For the full integrated approach of content areas, in which emphasis on two or more domains is balanced and includes objectives in more than one content area that are assessed (Stoddart et al., 2002), three PSTs demonstrated integration in field experience with only one in the edTPA assessment. For field experience, the three PSTs integrated the content areas of social studies and literacy. For example, one PST in kindergarten taught a series of lessons on Then and Now. In addition to learning the requisite social studies standards, the PST also assessed this objective: "When writing the words 'then' and 'now' on their assessment, students will shape all

letters correctly with attention to size, correct use of upper/lower case, and fit to the line." In addition, in the third lesson on Then and Now, the PST included the following speaking and listening standard as students discussed different objects related to Then and Now: "K.SL.2.3 Listen to others, take turns speaking, and add one's own ideas to small group discussions or tasks."

During field experience, two other PSTs focused on biographies of important historical figures for social studies. In addition to the reading standard of "Read and comprehend a variety of nonfiction within a range of complexity appropriate for grade two," the PSTs taught a specific reading strategy to help their students pay attention to important dates of the person's life. Both PSTs had their students look for the dates in each of the text's paragraphs and circle them along with underlining the event that happened at each date. The students then used this information to prepare a timeline of the major events in the person's life. This fulfilled the social studies objective of "Given a short passage about an important person, students will be able to use the passage to accurately order the events of the person's life."

Only one PST had integration in the edTPA assessment. The PST's unit focused on learning how to tell and write time. In addition to learning how to tell time from clocks, the PST used three different sentence frames to help the students understand how to tell time to the hour and half hour. The sentence frames challenged them to look at where the minute hand is pointing and where the hour hand is pointing and then come up with the time.

The main objectives of the summative assessment were "When given a booklet with analog clocks, students in writing will be able to explain why the time is an hour or half hour using the given sentence frame with 100% accuracy," and "When given a time on an analog clock, students will be able to write it as a digital clock with 100% accuracy." In addition, the criteria for the summative assessment rubric focused on writing the digital time, using complete sentences with the given sentence frames, and using correct punctuation and capitalization.

Survey Responses. Responses generated from the Preservice Teaching Post Student Teaching Survey indicated that there were varying levels of understanding and application of integrated teaching throughout the three-week practicum and student teaching experiences. When asked to define integrated teaching, the PSTs' understanding of this concept varied to some degree, with half of the responses indicating a clear grasp. The term cross-curricular was used in five of the 12 responses, but the statements were vague and did not convey a high level of comprehension of actual integrated teaching. Two responses from the PSTs did indicate a stronger understanding of the term. One PST stated that integrated teaching is "teaching more than one subject to help enhance the learning of each subject," while another PST asserted the use of "social studies to aid in math or reading" provided this form of instruction.

During the practicum, eight of the twelve PSTs stated they did not observe integrated teaching, but with potential misconceptions, it is possible that the PSTs were unsure how to determine if this form of instruction was implemented by the classroom teachers during their observations. Of the four that reported observations, the integrated teaching included using social studies books for literacy instruction, combining of previous knowledge during the creation of transfer goals, and connecting between lessons taught throughout a single day.

Descriptions of PSTs' planning and delivering their own integrated teaching during the practicum experience also varied. Four PSTs indicated the inclusion of other content areas during literacy or small group reading lessons. Content reading or themed texts prevailed as the common method. The clearest representation of integrated instruction by one PST was accomplished through "science lessons that involved math measurement and art" and lessons on plant traits where "the students had to draw, color, and measure their plants and plant parts based on the traits given to them." In the majority of responses, integrated instruction did not occur, or it was unclear if it was appropriately incorporated into lesson planning and delivery. Likewise, it was not clear that the intent of the PST planning was to support learning in one domain to another. Details of assessments were missing from all responses; therefore, it was assumed that these also did not explicitly include multiple domains.

Observations of integrated teaching during the student teaching experience indicate that all but two of the PSTs noticed this type of instruction in their classrooms. The approaches that cooperating teachers used varied widely, but one PST "saw the positive ramifications of incorporating this teaching style in all lessons," noting the vitality "for students to build those connections and keep doing so for each content being taught." Many cooperating teachers taught math and science together, but the majority of observations mentioned the use of other content areas in literary or reading.

The PSTs' understanding of integrated teaching and their actual application of this instruction were clearly not in congruence as they detailed integrated planning and delivery during their student teaching. In their survey responses, it is clear that their understanding versus their practice were not compatible. One PST "tried to use interdisciplinary teaching with the majority" of lessons, including incorporating language and concepts learned in language arts in lessons about buoyancy in science and patterns in math. Another noted that "it was easiest to connect language arts to science and social studies" while "math was the most disconnected" noting that they needed more practice in this form of lesson planning. One PST "did plan and deliver integrated teaching during this experience by doing STEM lessons on most Fridays and math lessons that involved reading."

Discussion

When looking at the different types of integration our PSTs implemented in their field experience and edTPA teaching, the most common was interdisciplinary teaching where one content area supported the work of another. This may have been due to the source material for reading, as was the case when non-fiction texts were used to teach reading comprehension (Wray & Lewis, 1998). Similarly, writing was used commonly to support content understanding, particularly in math. There were, however, limited instances where PSTs either fully integrated content areas or taught thematically. In fact, the majority of the time there was no evidence of any sort of integration happening. Integration is not always necessary nor is it always appropriate. For instance, it is equally important to read fiction texts in the elementary classroom and focus on important comprehension aspects such as identifying characters, setting, and plot development. Too often, though, there are limited opportunities in an elementary classroom to

build content knowledge throughout the day (Cervetti & Hiebert, 2015). Teaching in an integrated way more often provides opportunities that otherwise might not be present.

Some of the non-integration happening may be due to limited or no tools available to support PSTs to teach in an integrated fashion. As mentioned previously, many content methods classes are taught separately from either other (Darling-Hammond, 2006) thereby providing no scaffolding during PST education to plan, teach, and assess content integration. Also, PSTs are often not evaluated on integrated teaching methods in both programs and state requirements, which makes it less of a priority for teacher preparation programs. The lack of scaffolding and deliberate planning for integration leads to a lack of knowledge and purpose. For instance, while many of the PSTs in this study did demonstrate interdisciplinary and integrated teaching, oftentimes it was happenstance versus purposeful planning (Fisher & McDonald, 2004). The PSTs were assigned non-fiction texts to use with students in guided reading lessons and planned accordingly to get at the larger themes of real-life events, but this might not have happened if they were given different texts to use. It was only during the edTPA assessments that one PST in the sample made deliberate integration choices to support student learning, specifically teaching students how to write to support mathematical understanding.

In looking at the overall findings, there is a lack of progression in the development of integrated teaching from field experience to student teaching. For example, one PST demonstrated interdisciplinary and integrated teaching in field experience and then demonstrated no type of integrated teaching during student teaching, while another PST made the full progression from thematic to integration from field experience to student teaching. Still others did nothing in field experience and student teaching while other PSTs taught interdisciplinary in both field experience and student teaching. This inconsistency is most likely due to no integration evaluation tools being in place for field experience and student teaching. It may also depend on field experience and student teaching placements as the cooperating teaching may not model explicit integration teaching (Strand & Johnson, 1990).

This inconsistency also showed up in the survey results. Overall, the PSTs were very vague in their descriptions of what integrated teaching was or did not fully capture the three different types of content integration as outlined by Stoddart et al. (2002). Due to this lack of knowledge, the descriptions of where they saw or delivered integrated lessons in their field experience and student teaching were also vague and nondescript. It is assumed that because elementary education teachers are prepared to teach all subject areas, integration would be more commonplace in both teacher preparation programs and in the classrooms where PSTs conduct their field experience and student teaching. Based on our findings, though, that was not the case with the cooperating teachers in this study. This is similar to the findings from a study of elementary teachers in Korea where, although integrated teaching was encouraged, in-service teachers lacked the theoretical framework to deliver integrated lessons and felt contained by their school systems' selection of curriculum (Park, 2008). Therefore, much more research is needed to understand how to support PSTs, in-service teachers, and administrators to move to a more integrated method of teaching and learning.

Implications for professors include mindfully thinking about designing methods courses to teach PSTs how to design and deliver integrated lessons. Inservice and cooperating teachers should

more mindfully teach across content areas, especially during this time when only reading and math are foregrounded while other content areas are regulated to the background or eliminated altogether. This is especially important given historical contexts and current events. Finally, administrators should seek ways to support both new and veteran teachers in integrated content in the curriculum, hosting planning meetings that provide space and time for content integration, and provide different avenues to integrate authentic real-world experiences that allow for students to reflect upon their lived experiences that are not siloed into individual content areas.

Conclusion

The main research question for this study was "How does a collaborative and integrated elementary education program impact preservice teachers' knowledge and understanding of an integrated K-6 elementary classroom?" It was found that the PSTs graduated from the preservice program and entered their own classrooms with a vague understanding of integrated teaching. Although our program was integrated in the delivery of content methods classes and field experience, the transparency was not revealed to the PSTs during their methods classes and field experience. The practicum field experience tightly aligned with methods classes and better prepared PSTs for their own classrooms better than separate field experiences.

Based on this research, we recommend PST programs adopt the following actions: engage PSTs in reflective practice in their field experience in both their observations of classrooms and in their own teaching, and be explicit in integrated connections in methods courses. Throughout the PST program, specific observation reflections need to be completed that examine integrated teaching in the classrooms they observe. These observations need to be brought back to the methods class to dissect them for reflection and application to future lessons taught by PSTs. Additionally, PSTs should have conversations with their cooperating teachers about how they deliver integrated lessons in their classrooms. During methods classes, professors need to be explicit about the connections between content areas as they are teaching. This explicit, reflective teaching will allow for practice during methods coursework and make apparent how to create these integrated connections when PSTs are writing their own lesson plans (Kavanagh et al., 2019). The university team also needs to be more integrated with partner schools and districts, working with teachers and administrators to understand the integration that goes on in their schools and classrooms. The university team needs to be clear that PSTs are looking for integrated teaching and ask cooperating teachers to point out where they are thinking of, planning for, and delivering integrated lessons.

Further research, based on the findings of this study, is needed to create and validate an observation protocol to evaluate integrated teaching. The design of this tool will allow methods professors and field supervisors to fully evaluate and support integrated teaching by PSTs.

Elementary school teachers in 2020 and beyond are pressured by standardized tests (PISA, TIMS, etc.) to address literacy and mathematical standards, but as it has become more and more apparent, understandings about social studies and science are equally important. As elementary students are living in a world with international health crises, universal human rights issues, and global climate change, it is key for teachers to be able to integrate and teach current social studies and science topics along with teaching literacy and mathematics (Syofyan & Sumantri,

2019). Due to time constraints in schools, it is critical for elementary teachers to optimize time and teach across content areas to model, respond, and prepare students for the world in which they live. This is why it is even more imperative to prepare PSTs to teach elementary content areas and students in an integrated way.

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Appendix A

Lesson Plan Template	
Teacher Candidate:	
Subject:	Grade:
Where in Unit Sequence:	
State Standard:	
Learning Goals/Objectives: Transfer: Meaning: Skills: Knowledge:	
Academic Language	

Vocabulary:	Language Function:	Assessing AL:
Potential Learner Misconceptions		
Materials (attach any handouts or supporting documents)		
Formative Assessment		
Describe the Assessment: Describe how you will evaluate the Assessment:		
Differentiation		
Academic Learning (e.g.-IEP, ELL, 504):		
Personal, Cultural, Community-		
Research/Theoretical Principal (provide citation APA)		
Into the Learning		
Through the Learning		
Beyond the Learning		
Elastic Clause		

Appendix B

Preservice Teaching Post Student Teaching Survey

1. What is integrated teaching?
2. Did you observe integrated teaching in your 3-week immersion experience? Describe.
3. Did you plan and deliver integrated teaching in your 3-week immersion experience? Describe.
4. Did you observe integrated teaching in your student teaching experience? Describe.

5. Did you plan and deliver integrated teaching in your student teaching experience? Describe.