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Mapping the Domain of Subject Area Integration: Elementary Educators' Descriptions and Practices

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Abstract. A review of relevant literature reveals that integration is a difficult practice to define, yet elementary teachers are quick to speak positively of it and many claim to integrate in their practice. If there is a lack of consensus about what integration means, what then are these teachers doing when they say that they integrate? This study investigated five cases in an effort to establish how elementary teachers describe the domain of subject area integration. Qualitative data was collected through interviews with the participants and observations of the integrated lessons they taught. The data revealed a healthy mix of commonalities within and differences between the teachers' descriptions and practices. These similarities and differences revealed a model of integration that goes beyond the linear continuums common in the literature. Instead we propose a model of the domain that consists of four variables. These variables can be used to describe with great detail an individual practice of integration and allow educators and administrators an opportunity to consider and plan for growth in the application of subject area integration.

Keywords: Integration; Interdisciplinary curriculum; Elementary Education; Curriculum and Instruction

Introduction

The practice of subject area integration began in the early part of the twentieth century; however, its philosophical origins have been traced into the 1800s. Mathison and Freeman (1997) credit Herbert Spencer's writings of 1855 for founding the idea of integration. The British psychologist suggested that the last step of a changing or adapting organism was that of integration. Fifty years later Spencer's explanation of the organism as a whole was translated, by Gestalt Theory, from the field of natural science to that of psychology (Humphrey, 1924). In the world of education this produced two practical realities. First, the learner was seen as a whole in need of meaningful learning experiences

reflecting this "wholeness." Second, learning was not simply a linear process with new ideas being added onto existing ones. Instead, it was complex and interactive—filled with rebuilding and transformation (Harrell, 2010). It was this progressive thinking that led to integrated curriculum and authentic experiences which make learning meaningful (Mathison & Freeman, 1997).

Through the first half of the twentieth century, integration was advanced in both theory and practice by innovators such as John Dewey and Hollis Caswell (Bunting, 1987; Fraley, 1977). Then, in the 1980s and 90s integration experienced another surge in popularity. Once again, integration was on the minds of educators, researchers, and policy makers. This rich period in the history of integration has been attributed to curriculum organizational theory, brain research, and learning theory (Hartzler, 2000). Whatever the impetus, several of the movement's most cited advocates sprang up during these years, including James Beane, Robin Fogarty, and Heidi Hayes Jacobs. It was a time of significant research; Hartzler (2000), looking with a specific criteria, located and analyzed thirty quantitative studies on integration—all between the years of 1985 and 1997. Also during this time, a number of United States policy organizations turned to integration for answers including the National Association for the Advancement of Science (NAAS), the Bradley Commission on History in Schools, the National Research Council (NRC), the National Council of Teachers of Mathematics (NCTM), the American Association for the Advancement of Science (AAAS), and the National Council for the Social Studies (NCSS).

With so much interest and support, it appeared that the promotion of subject area integration would be a fixture of education in the United States for some time; however, in the years surrounding the turn of the century, calls for accountability resulted in a surge of high stakes testing. Over the next decade efforts in integration declined as teachers faced the pressure of the No Child Left Behind legislation and the achievement expectations associated with it (Musoleno & White, 2010).

In spite of these challenges, those practicing integration have continued to believe in its ability to bring the curriculum alive (Treacy & O'Donoghue, 2014). This faith has been rewarded by recent policy changes. Integration has been brought back to the vanguard in the United States. With the arrival of the Common Core State Standards (National Governors Association Center for Best Practices, 2010) and Next Generation Science Standards (NGSS Lead States, 2013), relevance has once again been added to rigor. This shift in thinking is not novel, but it has thrust subject area integration to the forefront of the conversation among policy makers and educators. The resurfacing of integration brings with it both benefits and challenges. Research has shown that students experiencing integrated curriculum are more motivated to learn (Brown, 2011), find their studies more meaningful (Leung, 2006), and do as well if not better on standardized tests (Hartzler, 2000; Vars, 1997). Nevertheless, teachers who chose to integrate subject areas face a number of challenges. Mcbee (2000) consolidates, from a number of authors, a list of these barriers which include a lack of professional development and the compartmentalization of content in published

materials. These challenges are further complicated by the literature's lack of uniformity in defining integration.

The literature presents a complex and diverse picture of integration; however, this leaves it unclear as to what elementary educators mean when they say that they "integrate." With expectations for integration found in such policy documents as the United States' Common Core State Standards, it is important to form a clear picture of what in-service teachers are doing when they integrate (Collier & Nolan, 1996). With this purpose in mind, this research pursued two main research questions:

1. How do elementary educators' descriptions help map the domain of subject area integration?
2. How do elementary educators' practices fit within the resulting map of the domain of subject area integration?

Situating the Study

The title of the Common Core Standards for English language arts is *English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects*. This title makes it clear that ELA skills are a necessary element to understanding in the content areas—a reality well established in the literature (Brozo, Moorman, Meyer, & Stewart, 2013). The standards demand a high level of reading competency and bring back an emphasis on content area writing (Gewertz, 2012). These expectations combined with the push for nonfiction text—even for the youngest students—will require a successful integrated response. Still, the expectation is not simply an application of general language skills. Rather, there is a focus on content specific reading and writing which often includes technical skills (Hoachlander, 2014). The goal is that by drawing and synthesizing meaning from multiple texts, content knowledge would increase (Ciecierski & Bintz, 2015). Also, writing about what is learned would further strengthen the understanding.

Review of Relevant Literature

Literacy across the Curriculum

The Common Core's call for an increased emphasis on literacy across the curriculum is not a new idea. Content area literacy was a major topic in the literature of the 1980's and 1990's (Langer, 1986). The American Library Association (1989) described the need for informational literacy and how it would be achieved through an active, integrated curriculum based on real-world problems. The primary thrust of the movement was using reading and writing to facilitate learning in the content areas (Harp, 1989; McKenna & Robinson, 1990). Reading and writing about content knowledge stimulates thinking (Dickson, 1995) and serves to facilitate student metacognition (Harp, 1989). At the same time, using these skills while engaged in the content provide a meaningful backdrop for the complex tasks of literacy development. Subject specific applications allow students to explore their understandings of literacy while focusing on the content (Taylor, 1989).

Defining Integration

Over the years attempts have been made to define integration and its relative terms. Instead of endeavoring to nail down one definition, most authors propose a continuum or range of integrated approaches (i.e. Applebee, Adler, & Flihan, 2007; Jacobs, 1989; Lonning, DeFranco, & Weinland, 1998). Several authors do propose a broad, all-encompassing definition: "[Integration is] bringing together in some fashion distinctive components of two or more disciplines" (Nissani, 1995, p. 122); "Integration involves relationships—relationships between different subject areas, relationships between different content, relationships between different skills . . ." (Hartzler, 2000, p. 19). Wang, et al. (2011), divide the domain into two categories of integration they label as "multidisciplinary" and "interdisciplinary." From another perspective, Kain (1993), Shriner (2010), and Toren, et al. (2008), argue that all varieties of integration can fit within two approaches. The approaches they identify are Beane's (1992) student-centered, integrative approach and Jacobs' (1989) subject-centered curriculum, approach.

Other researchers and authors do not address the fluid qualities of integration; but instead, speak with some confidence in their own view of the domain.

- Gehrke (1998) defines curriculum integration as, "A collective term for those forms of curriculum in which student learning activities are built, less with concern for delineating disciplinary boundaries around kinds of learning, and more with the notion of helping students recognize or create their own learning" (p. 248).
- Case (1991) defines content and skill integration as: "Connecting the understanding promoted within and among different subject areas or disciplines . . . . Integration of skills and processes refers to so-called generic skills and processes. The call to 'teach reading and writing in the content areas' is an example of integrating reading and writing 'skills' into subjects such as social studies and science" (p. 216).
- Beane (1992) sees most "interdisciplinary" models a part of a "multidisciplinary" category. In his view, an interdisciplinary curriculum is one in which the concepts and activities are derived by the needs of a central theme. There is no specific concern for how each discipline may contribute to the study; "And although we may draw from one or another discipline of knowledge, the act itself is done without regard for subject area distinctions" (pp. 46-47).
- Brown (2011) seems to take his thoughts a step further. Not only does he speak with conviction on definitions, he separates multidisciplinary and interdisciplinary approaches from what he calls "true" curriculum integration. The major distinction he draws is that "true" integration requires student involvement in the design process. In doing so he claims, "Few educators [understand] the design of 'true' CI" (p. 195).
- Collier and Nolan (1996) recognize ambiguity in terms, but express a confidence in distinguishing between integrated curriculum, interdisciplinary instruction, and thematic instruction. "While a review of the literature indicated a clear distinction between the three instructional models . . ." (p. 7).

Diversity may abound in defining integration, yet foundational principles still exist. Beginning with integration's foundations in Gestalt psychology and the progressive education movement and following the literature through to present day, two consistent threads emerge. First, integrated curriculum in some way addresses connections between discipline content and/or skill. Second, integration enhances the relevance of school through meaningful experiences and/or student-centered approaches.

Part of the frustration in defining the terms surrounding integration is alleviated by seeing the wide range of approaches not as competing models, but rather complimentary ones under a large umbrella. Some researchers speak directly of a continuum of integrated practice and propose their own (i.e. Applebee et al., 2007; Huntley, 1998; Leung, 2006; Lonning et al., 1998). Others infer or leave the possibility open in their presentation of the terms (i.e. Beane, 1992; Fogarty, 2009; Jacobs, 1989). Few of these authors agree on the terminology to be used at each stage of the continuum; however, there appears to be some agreement as to the scope and directionality of a continuum of integration. In scope, the continuums or variations stay solidly on the side of curriculum and content. In direction, Mathison and Freeman (1997) point out that most suggested continuums move from discipline based models at one end to totally integrated ones at the other end.

Teachers' Descriptions of the Domain

Considering the years that integration has been a topic of research and the rich diversity of approaches, it is surprising that few studies have investigated in-service educators' definitions or descriptions of the domain. Of course, throughout the literature the presence of teachers is felt. Many worked closely with the movement's foundational theorists (i.e. Beane, 1995; Fogarty, 2009; Jacobs, 1991). Others participated in integrated programs under study (Greenleaf et al., 2011; Lonning et al., 1998; MacMath, Roberts, Wallace, & Chi, 2010; Romance & Vitale, 2001). A number have shared experiences, beliefs, or challenges (Applebee et al., 2007; Dowden, 2007; Greene, 1991; Harrell, 2010; Leung, 2006; McBee, 2000; Offer & Mireles, 2009; Shoemaker, 1991; Vars, 1991; Wang et al., 2011; Weilbacher, 2001). Some even participated in crafting integrated curriculums (DeCorse, 1996; Kain, 1996). However, our review uncovered only three studies since the mid-90's where in-service educators helped to describe or define the domain of integration (Collier & Nolan, 1996; DeCorse, 1996; Stinson, Harkness, Meyer, & Stallworth, 2009). Two of these studies included elementary educators. DeCorse (1996) studied how pre-service training prepared teachers to teach integrated lessons. As part of her research, she found that experienced teachers held to a variety of definitions. These educators were doubtful about their ability to fully practice what they believed integration to be. Collier and Nolan (1996) sought to understand elementary teachers' perceptions of three integrated instructional models. They reported findings similar to DeCorse. When presenting three models of integration—integrated, interdisciplinary, and thematic—teachers' descriptions differed. The responses were unclear and, at times, contradictory. The researchers concluded that professional development was needed for the clarification of terms and the success of any implementation (Collier & Nolan, 1996; DeCorse, 1996).

Methodology

Context and Participants

We worked from the inquiry paradigm of constructivism in this study. Instead of beginning with a deductive framework, like Collier's and Nolan's (1996) work, our desire was to understand the participants' constructed reality (Shadish, 1995). Since constructivism purports reality to be relative and multiple because of social and contextual factors (Lincoln, 1990), it captured the essence of our goals. With the rich variety of definitions present in the integration literature, educators will no doubt have constructed their own contextualized reality. Therefore, it made sense to employ this naturalistic inquiry paradigm. Our research design was case study as it is a preferred choice for answering "how" questions (Yin, 2003).

Participants were identified using a combination of snowball and maximum variation sampling (Patton, 2002). A snowball sample was accomplished by talking to school principals about teachers in their building who integrated frequently; direction was also given by one of the district's instructional coaches. Following the leads supplied, five participants were selected based on several demographic factors for maximum variation: grade levels taught, current grade level, and years of experience. These participants were assigned pseudonyms for purposes of anonymity. Employing a multiple-case model has the advantage of being more robust than the classic single case design (Yin, 2003).

Data Collection

For our case study research, data were collected by conducting interviews and observing lessons. Collecting qualitative data best fits the ideals of the constructivist framework (Lincoln, 1990). The following pattern was used in data collection: pre-observational interview, lesson observation, and post-observational interview. The first interview was 30 to 45 minutes long and was conducted in the participant's classroom at her convenience. A pilot tested interview guide (Maxwell, 2005) was used as a framework for the first semi-structured interview. Data were collected during the interview by audio recording. The final question of this interview asked the teacher to perform two tasks with the Matrix of Integration (MoI) depicted in Figure 1. Each participant was asked to mark the location that best described her current practice and mark the location that best described what her teaching would look like in a perfect world.

Shortly after the first interview, a 30 to 60 minute lesson involving subject area integration was observed. Data collection during the observation consisted of typed notes. In the days following the observation, a second 30 to 45 minute interview was conducted with the participant. Again, a pilot-tested interview guide was used for the semi-structured interview. The final question of the interview asked the teacher to place one more mark on the MoI. The participant was asked to mark the location that best described the lesson taught for the observation. The overall process—pre-observation interview, lesson observation, and post-observation interview—was completed with each participant within a two-week period of time.

The MoI (Figure 1) used during the interviews was developed during a pilot study. It attempted to blend the literature and our own experiences to picture the domain of integration. For the purpose of labeling the MoI, Huntley's (1998) terminology was used to establish three of the four points.

- "An *intradisciplinary* curriculum is typified by instruction that focuses on one discipline" (p. 320).
- "An *interdisciplinary* curriculum is one in which the focus of instruction is on one discipline, and one or more other disciplines are used to support or facilitate content in the first domain" (p. 320).
- "An *integrated* curriculum is one in which a teacher, or teachers, explicitly assimilates concepts from more than one discipline during instruction" (p. 321).
- *Needs driven* was one researcher's term to describe a fluid delivery of instruction based on the current need instead of a daily schedule of subjects. Beane's (1992) work supports this variable by describing the flow of instruction as being concerned with the content or skill needed in the moment.

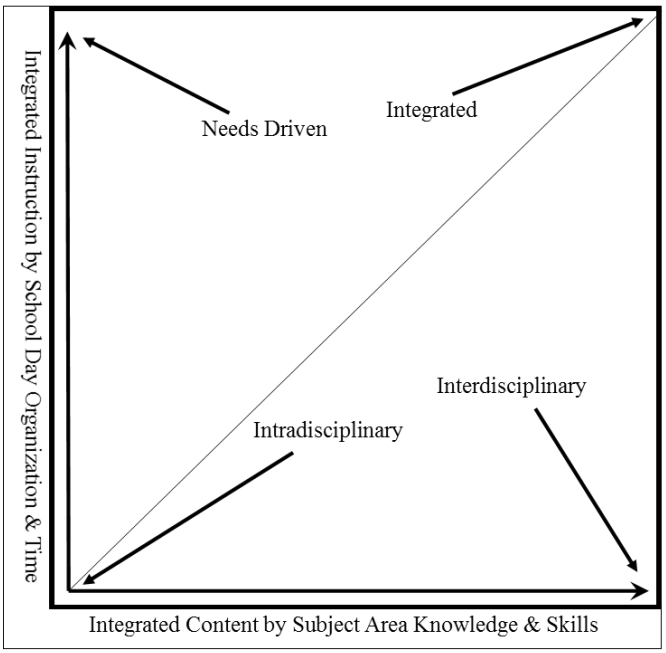

Figure 1: The Matrix of Integration (MoI) displays, at one time, two variables involved in integration.

Data Analysis

The unit of analysis in this study was the individual, and the method of analysis was case study (Yin, 2003). The recordings were transcribed shortly following each interview. These transcriptions were entered into the HyperRESEACHER software program and coded as a case study. We used a combination of inductive and deductive themes while coding these data. The deductive themes arose from the pilot study and the review of the literature. Using HyperRESEARCH's reporting feature, quotes were grouped by theme. From this themed data, a case study was written and then emailed to the participant for

member checking to enhance reliability (Patton, 2002). All five case studies were returned with positive comments. Finally, the case studies were compared in a cross-case analysis to identify broader themes and highlight complex ideas (Yin, 2003).

Findings

Each of the five case studies are displayed in order according to the grade level taught by the educator. At the conclusion of the individual cases, the cross-case analysis is summarized.

Cullen Case

Ms. Cullen, a kindergarten teacher with 26 years of experience, saw integration as making connections and a natural part of teaching. "Boy, I think it's really hard not to. The minute I think of a topic, I think of the books that go with it because that's just a love of mine and I think because I've seen kids love that." This type of organic teaching included subject area connections as well as connections of any kind. "I'm a believer in connections. I don't really care what the connection is. It's firing a synapse; it's growing curiosity and questions and interest. And those are all good things." Cullen believed that integration enriched learning experiences by creating more connections and increased the probability of meaningful learning. "I think [reading] hits a different area. And I don't want to say it cements it, but it either sparks interest, or it creates a synapse connection to what they were doing with their hands." Therefore, when Cullen planned for instruction, she often sought to integrate. She built her integrated lessons around science content and the inquiry process, yet she did not plan with a detailed structure designed to ensure a certain number of subject areas or skills got brought into the lessons. Instead, she allowed for the integration to occur more naturally. "I guess I don't feel like I purposely set out to integrate like, 'This will be a math table, and this will be a social studies table.'" Because of this organic process, Cullen struggled to place her current practice on the MoI (see Figure 2). "I guess I have no idea where I would plot myself, but I would of course like to be—this is where I'm aiming (pointing to upper right corner)." Eventually, she agreed to place a triangle over the area that most closely pictured her practice. Cullen conceded to this because she felt that when she did integrate it was a natural process, and things were delivered concurrently without a lot of planning for specific content areas.

The observed lesson was an inquiry-based science lesson that integrated ELA, math, social studies, and art. It was a multiday lesson about water; the science content involved the states of water, water's interaction with other materials, and the water cycle. Cullen stated that tackling such lofty scientific learning goals and such complex concepts was only possible through high levels of integration. She particularly saw the value of integrating reading, writing, and speaking. Reading was integrated in the books about water Cullen read to the class, the station where an adult helper read books about water with small groups, and the station where students explored books on their own. Writing was integrated at the station where students created their own books about water. Speaking was integrated throughout as Cullen used inquiry based questioning to explore student understanding, as well as, at the end of the lesson

where students had a chance to present art work and their water books in front of the class. As with placing her full practice on the integration matrix, Cullen struggled to determine where the observed lesson belonged—readily admitting the process was difficult. "It is! Because I don't really set out planning, it just kind of happens. It's the way that I see things." In an effort to help Cullen place her lesson, we talked her through what we had seen. At that point, she readily agreed that the lesson itself belonged up in the upper right hand corner of the MoI.

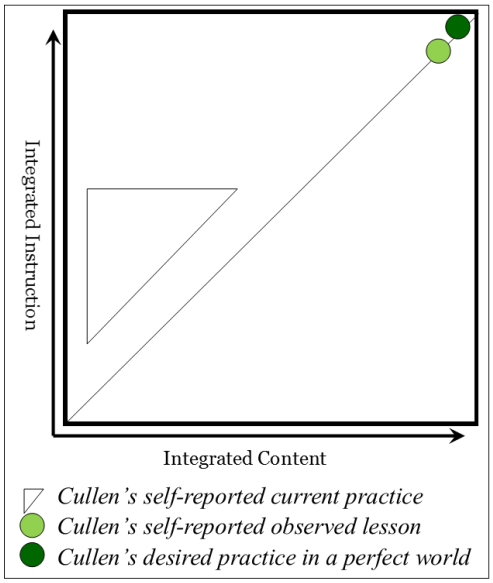

Figure 2: Cullen's MoI completed during the interviews.

In a perfect world, Cullen felt that she would like to balance out that ability to integrate organically, with an increased level of structured planning so that she had a more complete integration of all knowledge and skill. She referred to this as a good balance between the delivery of content on the *y* axis and the combination of content on the *x* axis. "I would hope that it would be balanced and that's hard in kindergarten because we're always leading up to something else . . . . I guess I'd like it to be up here and be using both of these." She also felt that this balanced approach should be in the upper right hand corner of the MoI, where everything was integrated. At first she felt like some rote things needed to be handled in isolation. But, as we discussed it, she determined that even low level knowledge and skill could and should be integrated. "Then I would go all the way up because even those little rote things like drill and practice numbers we could be making it slightly more exciting."

Knox Case

Ms. Knox, a first-grade teacher with 22 years of experience, described integration through the lens of teamwork. While she acknowledged that integration did occur within her classroom without the collaboration of fellow teachers, Knox believed true integration involved grade level teamwork. "What it looks like to me is that you're team teaching with a group of people that have the same grade level and the same subjects that you teach . . . . That's the beauty of integration—

when you work with teachers." Knox said that integration was a matter of weaving together subject areas in the way that is best for kids. "It's not how many subjects you can teach at the same time. It's how well kids can relate to real life situations." In her mind, single lessons done by individual teachers could not be considered integration. "It's an ongoing lesson; it's not just one shot . . . . We could do this for the rest of this year if we wanted. We could take quality rather than quantity and just build on what we do this week." Ms. Knox planned for integration by meeting with her grade level teaching team. They met weekly and planned for special integrated units. These meetings were inclusive and welcoming. "It's an invitation to teachers, and I'm learning that you can't demand it . . . . Treat it as novelty and then build with the team." The integration that followed provided meaningful learning that bound together all subject areas. Because of the challenges of bringing team members on board and the time involved in developing these fully integrated units, Knox placed her current practice toward the bottom left corner of the MoI (See Figure 3). Yet, she saw it moving up the center line through the year and ending close the middle by the end of the year. "Well, I'll get [more teachers] involved, and we'll plan more science days . . . . You have to invite them and say, 'hey, wouldn't it be great to save time if we did it this way?'" Knox stated that fully integrating all the time with her team would be the perfect world situation. She placed this near the upper right hand corner of the MoI because she believed there was always room for improvement.

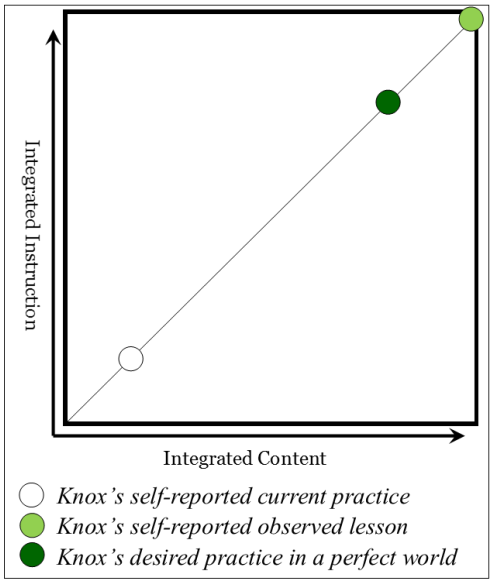

Figure 3: Knox's MoI completed during the interviews.

The observed lesson was a multiday social studies lesson that integrated multiple subject areas. Because of this full integration, Knox placed the lesson in the upper right hand corner of the MoI. The content of the lesson was learning about mapping and focused on students moving from a map of their bedroom up to a map of the world. Reading was integrated through a read-a-loud book. Math was integrated when students used rulers as a tool for drawing their own maps. As Ms. Knox discussed the lesson, which included ELA, social studies,

and math, she described how even that successful integration would be strengthened by in involvement of her grade level team.

Havel Case

Ms. Havel, a first-grade teacher with seven years of teaching experience, described integration as teaching two subjects at one time. While she did see places for skills from one subject to be used as "tools" for mastering content within the primary content area, "true" or "full" integration, Havel asserted, needed to have lesson objectives for all subject areas being taught. She then conceded that this was only her view. "Are you integrating both subjects fully if there aren't objectives attached to both? I think you'd hear arguments for and against." Planning for integration came easily for Havel because she saw literacy as a natural part of every content area. Regardless of what she was teaching, her lessons involved reading, writing, speaking, and listening. "[Literacy is] one common subject that's in every subject—everyday. I'm constantly repeating a word, having them repeat it back—speaking and listening, that covers that. Writing down their thoughts in each of the subjects so you have writing integrated with math and science and social studies." While discussing integration, Havel never used the term "continuum;" however, she did employ several other terms and descriptions. Mostly, she discussed different "levels" of integration, but she exchanged this with "full" each time she described the highest level of integration. Havel compared previously taught lessons by discussing the difference in the "degree" of integration. "This [lesson] would be like a 1 or a 2—on a scale of 1 to 5—this would be a 2, and that would be a 4 or 5 because of the nature of how I did it."

Clearly having spent time considering how she was integrating as well as the levels at which she tended to integrate, Havel identified the location of her current practice on the MoI (see Figure 4) with some definitiveness and was able to discuss in detail why. She placed herself just past half way to the right side but well below the line. This was where Havel felt her practice belonged because she was not able to integrate everything, yet she did so with every opportunity she could find. She also felt that the inherit structure to her day limited her ability to be any further up the *y* axis.

The observed lesson was a science inquiry lesson; however, the math and ELA integrated into it were of equal importance to Havel. She felt like that was an important feature of integration; each content area needed to have a purpose within the integration—even when it's being used as a tool. "I would say subject area integration is teaching two subjects in the same lesson sequence. You know, not less equally, so, with objectives in place for both . . . . I guess you could say 'full' integration or not 'true' integration if the objectives on both sides aren't being met." She believed this one lesson was a good example of the content areas she typically integrated, but placed it higher on the MoI since she was able to integrate more seamlessly.

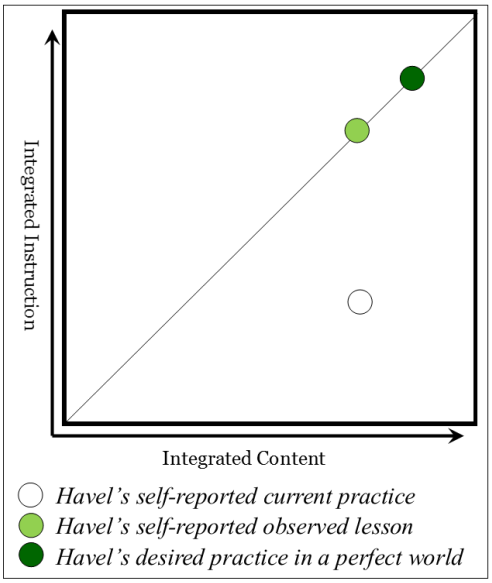

Figure 4: Havel's MoI completed during the interviews.

Ms. Havel was fairly content with the amount of subject area integration she was able to do. The place she really wanted to have more flexibility was in the delivery of her curriculum. In the perfect world she would have as much blending of instructional time as she had connections between content. Her practice would be balanced that way, on the center line of the MoI, up toward the right hand corner. "I think I'd want to be up here; like this, but I still think there would have to be some subject areas that I teach that would have to be—like spelling. I don't think I could teach it any other way just because of the structure involved."

Bilas Case

Ms. Bilas, a third-grade teacher with nine years of experience, described integration in terms of connections. These connections could be between subject areas or bridging the gap between school and the real world. While regularly planning for integration in a variety of ways, Bilas also saw the advantage of connections that arise through teachable moments—whether they connected subject areas or school learning and life. Bilas planned for subject area integration because she believed that connecting reading and writing to her content area units was critical to maximizing instructional time. "So, like when I was thinking about this last writing assignment . . . the first thing I thought about was my social studies content. How can I build a writing assignment around what I'm going to be teaching in social studies?" This was a regular thought process for Bilas because there was so much ground to cover. Plus, from a pragmatic standpoint, connecting subject areas only made sense. "Why would you be reading other nonfiction texts? That doesn't make any sense. Why not teach your students how to read the nonfiction texts that give them the [social studies and science] content?" While she did not use the term "continuum," Bilas saw levels to integration where higher levels of integration would include multiple content areas. "I guess better integration, if it was on a scale, would be

when you're able to connect multiple disciplines." Bilas conceded that the planning involved in high levels of integration is overwhelming. "I think that it can be difficult on a daily basis so any kind of connecting is beneficial rather than having things taught completely in isolation, separate from each other." Because of this challenge and the constraints of school wide structures, Bilas placed herself towards the bottom left corner of the MoI (See Figure 5).

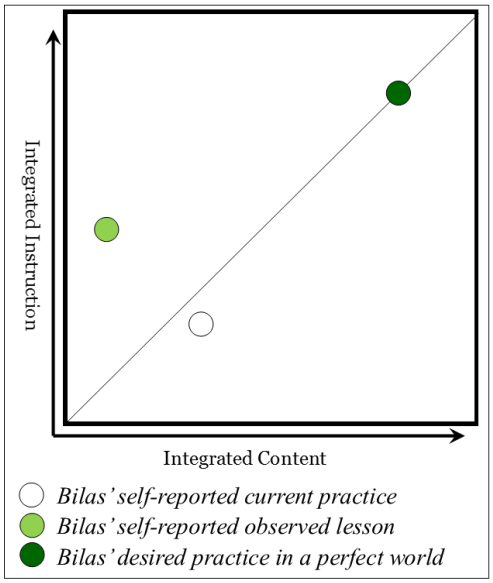

Figure 5: Bilas' MoI completed during the interviews.

The observed lesson was part of a unit studying a traditional Native American story; however, it was the reading skills and not the Native culture that formed the foundation of the unit. The social studies content, science content, speaking, and writing skills were given attention as they were needed. The reading skills taught during the observation were the skill of recognizing traditional stories and the skill of visualization. Social studies was integrated through the traditional Native American story used for the visualization. ELA speaking skills were applied as students presented group work. In other lessons of the unit science knowledge about fire and skills of inquiry were learned and applied. Even though these other subject areas played a small role, Bilas saw it belonging above the center line on and on the left edge of the MoI. "I think it's always going to be heavy on the reading . . . . If you look at the whole unit, it's going to be heavy on the reading throughout."

As Figure 5 shows, Bilas wanted to be integrating most subjects most of the time. She still saw the need for some isolated instruction and isolated content. "So, I don't feel like I can be like, here (pointing to upper right hand corner of the MoI) because math has to be taught in isolation. Especially the last two years I've spent here with these students because I think that they have, in some ways, really weak math skills."

Donner Case

Ms. Donner, a fifth-grade teacher with eight years of experience, saw integration as teaching multiple subject areas at the same time. She thought that it was important for there to be a natural fit in the content being taught, and any subject brought into the lesson needed to contribute to the purpose and goal of the learning. "If it's a natural fit, I'll do it. If I'm pushing, I'll think, 'Eh, maybe this isn't the right thing.'" When we began our discussion about integration, Donner felt that anytime another subject area was brought into a lesson (i.e. writing about science content) integration was occurring. As we explored these thoughts deeper and Donner spent time considering her own practice, she came to the conclusion that "true" integration required knowledge or skill to be taught for each subject being integrated.

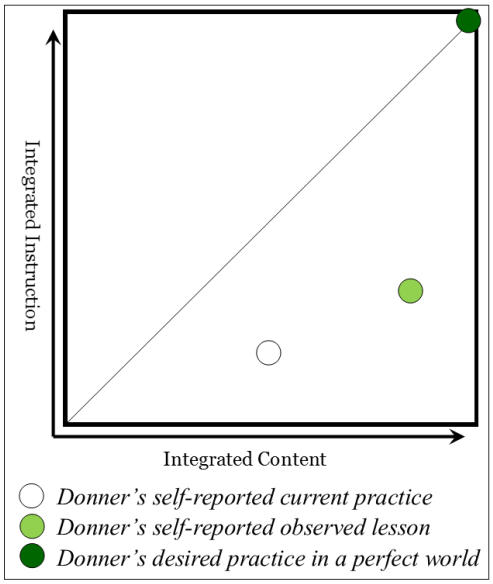

Figure 6: Donner's MoI completed during the interviews.

Ms. Donner's planning for integration occurred primarily around her science content. The main reason for this structuring of curriculum was that she loved science. Since her fifth-grade team rotated students for several subjects, science was also the place where Donner had the greatest opportunities to integrate. "For me, my easiest way to integrate is in science. I look at my standards in science, and 'Well, okay! This is kind of the big idea, and this is what I have to teach. So, how do I push other subjects into that idea?'" For Donner, looking for opportunities to integrate was a natural part of planning. She began with her science standards, but that did not mean that content from other subjects was used merely as a means to an end. She examined the standards of other subject areas to determine what should be brought in—what would be a natural fit and also needed to be taught. "I have an environments kit now, and so, I have to look where I'm at in the math standards . . . . If I can find objectives that meet my objectives in science, that's when I put them together." Because of the challenge of designing such experiences and finding the needed materials coupled with practical limitations with schedules at her school, Donner placed her current practice low on the *y* axis of the MoI (See Figure 6). She did put herself half way

through the x axis because of her focus on bringing subjects together whenever possible.

The observed lesson was about environmental impact and integrated social studies, mathematics, and ELA into the science content. It took multiple days to complete. Working with a group, students developed their own stretch of land bordering a river. Then, Donner explained the potential for pollution with each plan. As students struggled with the realities of human impact, Donner integrated reading through a nonfiction book about river pollution, and social studies through an exploration of the industrial revolution. She then integrated writing as students wrote critical pieces about technological advancement. Since the lesson included nearly all of the subjects, Donner positioned it on the MoI far on the right side. However, she felt that within the lesson there still was significant separation between subject areas; therefore, Donner was not comfortable placing the lesson very high on the *y* axis.

Donner discussed a range in integrated practice throughout the interviews. She saw the highest level as the "best practice" of integration. In a perfect world, this was what her teaching practice would look like. "I would be . . . where you would integrate fully all day, and the curriculum was completely integrated. There [would be] no time constraints—if it was possible."

Cross-Case Analysis

A cross-case analysis revealed common themes within the cases and discrepancies between the cases. Four compatible themes were found within the cases: (1) an organizing description, (2) grounded in content, (3) range of options, and (4) perfect world versus reality. The contrasting themes between the cases were (1) philosophical foundations, (2) planning structure, and (3) depth of integration.

All five participates described subject area integration as combining subjects. Cullen and Bilas used the term "connections," Havel and Donner simply stated that it was teaching multiple subjects at the same time, and Knox referred to it as "weaving." Each statement contained nuances; nevertheless, the foundation was the same.

Also, these educators saw integration as both a planned and natural process. Bilas, Havel, and Donner all explicitly stated that they were constantly looking for opportunities to combine subjects. Knox, emphasized the planning done with a grade level team. Of the five, Cullen spoke the least about structured planning, yet the lesson I observed contained a high level of subject area orchestration. At the same time, each teacher spoke to one degree or another about the organic elements of integrating. For Cullen, Knox, and Havel it was who they were as teachers. Cullen questioned whether she could "disintegrate" if she tried. While clearly more planning oriented, Bilas and Donner felt that true integration required natural connections. They both spoke of combining subjects that had a natural fit.

While none claimed it to be the only way to integrate, four of the five participants described integration that was grounded in the content disciplines of science or social studies. Cullen and Donner planned and taught that way because of their love for science—each referred to the fact that it was how they saw the world. Bilas regularly built her integrated units around science or social studies in order to maximize instructional time and cover all of her ELA standards. Havel integrated based upon science and social studies because she saw literacy as being the one commonality throughout her day. Knox did not discuss planning in this way; yet, the lesson we observed was a social studies based lesson that had integrated other subjects into it.

Each of the five teachers recognized a range of options for integration. They all quickly grasped the MoI and discussed the range present there. Four of them readily acknowledged that their methods of integrating were not the only ways to do it. Cullen and Donner, who most routinely integrated through science only, discussed how their teaching peers had different strengths and passions. Havel, Bilas, and Donner all discussed a range of levels for integration. Havel most frequently termed these as "levels." Bilas discussed the range in terms of "complexity" of integration. Donner, referred to the highest level as "best practice." Even though Knox never directly discussed a range of integrated options, she suggested that her own practice changed in the "amount" of integration throughout the year.

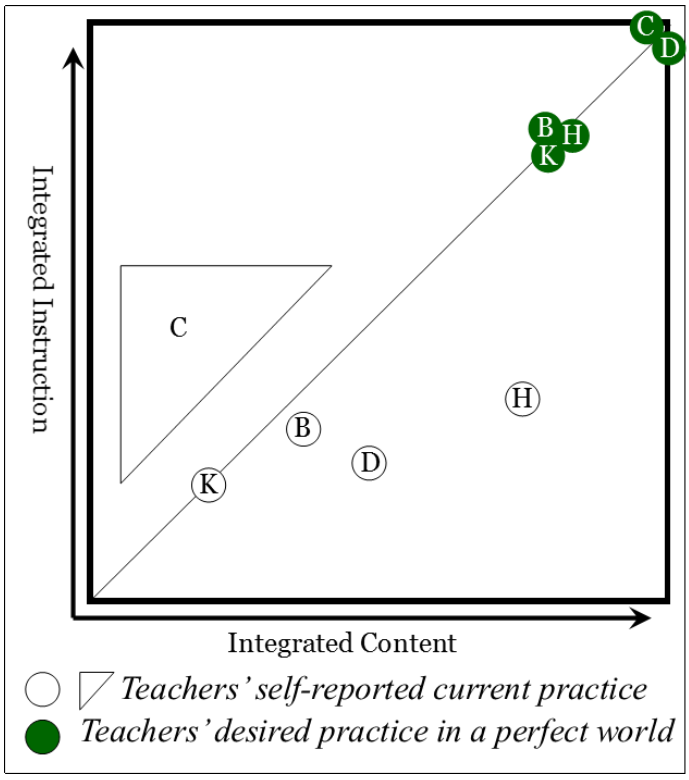

Figure 7: The compiled MoI comparing all teachers' current and preferred practice. B=Bilas; C=Cullen; D=Donner; H=Havel; and K=Knox.

The final common theme across the cases was a discussion of the perfect world versus reality. These educators all placed their current practice at low levels on the MoI and their desired practice at very high levels (see Figure 7). The uniformity in their desire to integrate at or near the "full" level of the upper right hand corner of the matrix was very telling data. This shows that if possible, each of these five educators would like to be integrating at a "full" or nearly full level.

The cross-case analysis also revealed contrasting themes between the cases: philosophical foundations, planning structure, and depth of integration. There were philosophical ideas about integration that differed between cases. In her discussion of integration, Cullen described it as teaching the "whole" instead of the parts. She emphasized the need for students to see the whole so that it makes sense. This idea was unique to Cullen's description. None of the other teachers referenced this view, but Knox discussed a different idea dealing with whole versus parts. She described integration as something that extended through the whole year. Because of this perspective, Knox did not see a single lesson taught in isolation to be part of the domain of integration. Again, no other participant mentioned anything similar. Also, Knox believed that "true" integration was a team effort. Others mentioned this as an option but never attributed higher "value" to the resulting integration.

Differences were present between the participants' planning structure for integration. Two educators discussed using themes for planning but neither explained them in the same way. Havel brought up themes in reference to conceptual ideas that cross disciplinary boundaries. Knox, did not directly state the word "theme"; however, her description of the integrated units taught by her grade level team matched descriptions of thematic units—as presented in the literature. Other participants' planned integrated units topically around a science or social studies foundation. While planning for integration was clearly performed by all participants, it was not as important to Cullen. She described her planning for integration as an organic process. She integrated subjects as the opportunity arose and felt like she never really set out to integrate certain subjects or certain skills.

A final difference between the cases was variations in the depth of integration. In describing the range of options in the practice of integration, there was general consensus about there being "amounts" of integration. At the same time, participants were split over the details. Two teachers, Havel and Donner, believed that true integration required lesson objectives or standards for each subject area in the lesson. In other words, reading an article in science class would not be considered integration of reading unless specific standards or lesson objectives for reading were being met. The other three participants did not state such an expectation.

Discussion

Knowing how teachers describe the domain of integration would be a helpful addition to the literature. This is especially true in the United States with the arrival of new standards emphasizing integration (i.e. *English Language Arts and*

Literacy in History/Social Studies, Science, and Technical Subjects Common Core Standards). The purpose of this study was to explore elementary teachers' descriptions and practices of subject area integration in an attempt to help define the domain.

As the teachers in the study described their practice of integration, a number of commonalities were found; however, with many unique perspectives also present, it still remained challenging to establish a concise definition. This finding mirrors Nissani's (1995) assertion that the very nature of integration makes such clarity impossible. At the same time, Nissani provided a broad definition of integration, and our participants' general descriptions sounded quite similar. In simple terms, subject area integration is combining two or more subjects into a lesson, lesson sequence, or unit. As the participants discussed integration, their ideas regularly agreed with Case's (1991) definition of "skill" integration. According to Case, "skill" integration is bringing skills like reading or writing into content areas like science or social studies.

While none of the participants identified a continuum, they all readily recognized a range of options and approaches to integration. This finding again matches work established in the literature where any number of continuums and options for approaching the task can be found (Adler & Flihan, 1997; Applebee et al., 2007; Fogarty, 1991; Huntley, 1998; Jacobs, 1989; Leung, 2006; Lonning & DeFranco, 1997; Mathison & Freeman, 1997). On the surface it seemed that the participants' understanding of a continuum was only one dimensional. They used terms like levels, amounts, full, range, and true. To some degree, the continuums presented in the literature describe the domain of integration in similar linear terms. At the one end of such a continuum, subjects are separated and at the other, they are integrated (Mathison & Freeman, 1997). On closer inspection the range of options, discussed by the elementary educators in this study, were far more complex and required a model with multiple variables. Even the dual axes of the MoI used during the interviews failed to fully capture what educators described as the domain of integration. As Nissani (1995) claimed, integration must be seen as multidimensional and not linear. With this more complex lens in mind, it became apparent that many of the continuums found in the literature also include more complexity. Though often presented in a linear graphic, most contain characteristics from multiple dimensions that describe movement along the continuum.

Based on findings in this study, we propose a model that maps the domain of subject area integration (hereafter referred to as the Model) comprised of four variables. Table 1 describes and gives an example of a *low*, *medium*, and *high* level for each variable. Evidence from the study, by means of participant quotes, is presented for most variable levels. The first variable, *subject areas in the integration*, identifies the number of subjects being combined. The range of options within this variable was presented on the MoI used in the interviews. The second variable, *frequency of integration*, was one of the most conversed aspects of the practice. The educators in the study all desired to integrate more often and gave detailed explanations about the challenges that make an increase in frequency difficult. The third variable, *delivery of integration*, was also on the

MoI. The range of options within this variable are often challenged by factors out of teachers' control including district mandates, curricular programs, and building schedules. Four of the five teachers in the study pointed to these issues and others as hurdles to an integrated delivery. The final variable, *depth of integration*, was discussed by four of the five educators. This variable has a limited range, but according to some of the teachers in the study, the depth of the combination can create distinct differences in learning experiences.

Table 1. Modeling the Domain of Integration: Descriptions and Evidence.

Variables	Low Level	Medium Level	High Level
Subject Areas in Integration	Lessons combine two subject areas. "I think teachers would normally think about it as just two [subjects] because you don't—you kind of think in pairs I think, naturally." Havel "Moving toward the middle of the continuum represents an increased infusion of one discipline (mathematics or science) into the teaching and learning of the other discipline" (Huntley, 1998, p. 321).	Lessons combine most or all subjects taught at the grade level. "I hope the tactile, using the water with the lids, I hope that that was math and science. What else did we do? We did some writing which is always good . . . . Then, they read it to each other or they read it to the group later." Cullen "Interventions, for example, leads to the study of simple machines in science, to reading and writing about inventors in language arts . . . to drawing and studying Rube Goldberg contraptions in math" (Fogarty, 1991, p. 63).	Lessons are developed around real-world problems that require knowledge and skill from all or nearly all grade level subjects. "So, let's say you're studying the environments. Well somehow you would take your math standards and your science standards and your ELA standards and all of that would kind of be in harmony." Donner "[It starts with] a problem, idea, or concept, and builds knowledge from a variety of areas without regard to disciplinary boundaries" (Adler & Flihan, 1997, p. 7).

Variables	Low Level	Medium Level	High Level
Frequency of Integration	Integrating only a few lessons in the year.	Integrating on a regular basis like one day a week. "Well, I get a [few] more teachers involved, and we plan more science days." Knox	Every all of the time, every lesson, every day, all year long. "I would [like to teach] where you would integrate fully all day and the curriculum was completely integrated." Donner
Delivery of Integration	Knowledge and skill for each subject area is delivered separately. "If I had complete control over my classroom, I would probably be reading science content during my reading block." Bilas	Around half of the knowledge and skill content is delivered separately and about half is delivered as needed regardless of subject area.	Knowledge and skill is delivered as needed regardless of subject area. "I think honestly if you had the perfect scenario [you would] teach a lesson, a unit, where you couldn't really distinguish between [subjects]. Okay, 'this is math and this is the science part.'" Donner "The integrated day is a natural day. Time is structured according to the needs of the students, and the needs of the curriculum are planned around them, rather than institutional demands" (Jacobs, 1989, p. 17).

Variables	Low Level	Medium Level	High Level
Depth of Integration	Knowledge or skill from one subject area is used as a tool to enhance learning in another subject area. "You just have to think about how can one subject be used, if it's math and science, how can math be used as a tool?" Havel "They combined literature and science to make the science content more interesting and meaningful. The literature, they said, had educational value, but the primary emphasis was the science" (Mathison & Freeman, 1997, p. 14)	Standards and objectives are being met for each subject area being integrated. "I think whenever you can integrate the standards from any subject matter whether it be math or reading or whatever it is, I think it makes the integration that much more rich because you're touching on all of the things standard wise." Donner "At the center of the continuum are those activities meeting the curricular objectives for both science and mathematics" (Lonning et al., 1998, p. 313)	Standards from multiple subjects are being met through curriculum developed around real-world problems. No discipline is the "primary" or organizing subject matter. "Curriculum integration begins with the identification of organizing themes . . . . drawn from real-life concerns . . . . [it] transcends subject-area and disciplinary identifications; the goal is integrative activities that use knowledge without regard for subject or discipline lines" (Beane, 1995, p. 619)

Note. There are two types of information found in the cells for each variable. At the top is a short description of the level for the variable. Below the description, most cells have one or two quotations that support the description. These quotations come from the participants in the study and/or from the literature on integration.

We believe that the interaction of the four variables in the Model provides further clarity in mapping the domain of subject area integration. It also allows for an individual to describe the patterns of personal integrated practice. By utilizing a bubble chart, this interaction can be displayed visually. First, the *frequency of the integration* and the *subjects in integration* are assigned to the *x* and

y axes. Figure 8 shows the positions along these axes. As the frequency of the integration increases, the position of the plot moves to the right. Since the range in this variable moves from a single lesson to every lesson in the year, half way across the axis would describe half of the lessons in a given period (i.e. day, month, or year) being integrated. The number of subjects being integrated is displayed on the *y* axis. At the bottom of the axis only two subjects would be integrated. The further up the axis the greater the number of subjects involved. With an increase in both frequency and the number of subjects being integrated, the position plotted would move toward the upper right hand corner of the chart.

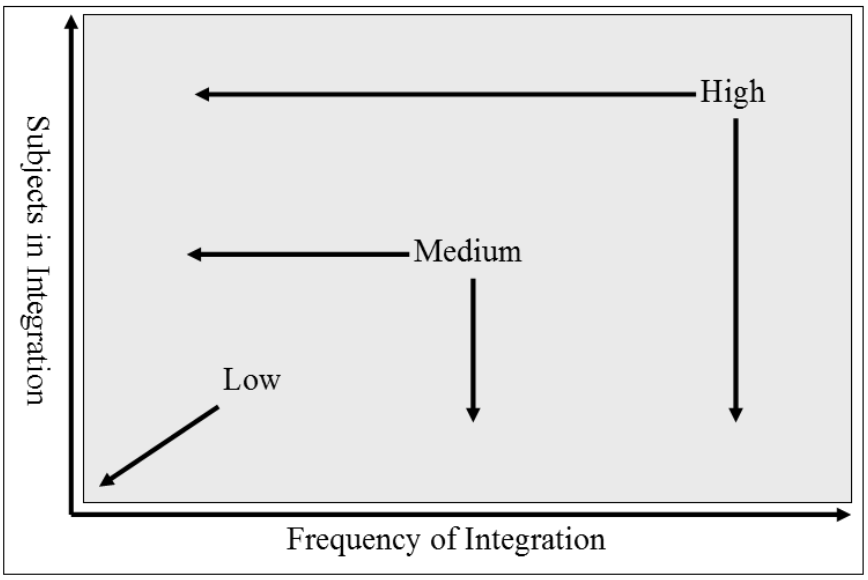

Figure 8: Variables associated with the *x* and *y* axes of the Model.

The third and fourth variables are associated with the circles used to plot the position on the chart (Figure 9). The *depth of the integration* is displayed by the size of the circle—the smaller the circle the lower the level of depth. A small circle, then, would display a practice that uses one or more supporting subjects to facilitate the learning in an emphasized subject. An increase in the level of this variable is displayed by an increase in the size of the circle. Similarly, the *delivery of the integration* is depicted by the shade of color in the circle. A light shade represents a low level of integrated delivery—indicating that knowledge and skill are delivered in isolation. For example, a teacher may have students write about their science content, but the science work and the writing take place during different periods of the day. As the tint darkens, the level of the delivery increases. A dark color indicates that content is being delivered as needed regardless of the subject area or a set schedule of classes.

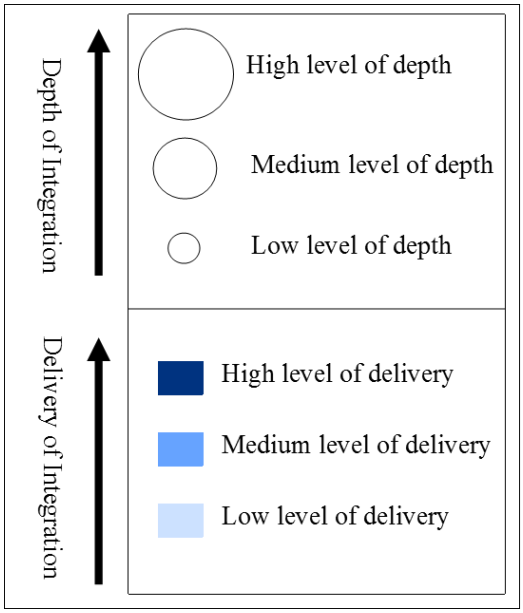

Figure 9: Variables associated with the circles plotted on the Model.

Figure 10 displays the interaction of the four variables in the Model which is designed to map the domain of subject area integration. Plotting a practice on the Model, involves consideration of each variable. Moving from left to right represents an increase in the frequency of the integration. Moving from bottom to top represents an increase in the subject areas involved in the integration. Increasing the circle's diameter represents a deeper integration. Finally, a darkening of the color shade indicates an increase in the integrated delivery. Each circle plotted in Figure 10 represents an individual integrated practice. Three plots have been labeled for the purpose of describing hypothetical teachers. For clarity, we refer to the examples simply as Teachers "A", "B", and "C."

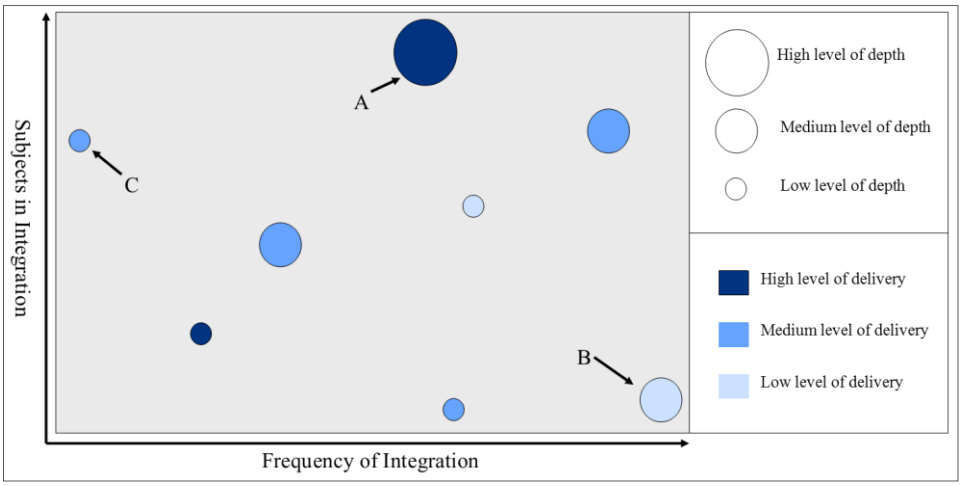

Figure 10: The four variable Model proposed to help map the domain of subject area Integration.

- Teacher A integrates frequently. Over half of the lessons she teaches are integrated. These lessons have a high level of subject area integration as well as a high level of depth in integration. Her curriculum is constructed around real-world problems that are not driven by any one discipline but require the knowledge and skills from most subject areas. Teacher A delivers this integrated curriculum as knowledge and skill are needed without regard for subject area.
- Teacher B integrates English language arts into her science curriculum. These are the only two subjects she integrates; however, her frequency of the integration is high. Teacher B integrates with virtually every science lesson she teaches throughout the year because she uses a science notebook as a central piece to her program. The depth of this integration is at a medium level. She has both science and ELA standards in mind as students write in their science notebooks. Nevertheless, she has a set schedule for her day and does not attempt to do any of the actual writing instruction during her science block. This means that her delivery of integration is at a low level.
- Teacher C rarely teaches integrated lessons throughout the year. When she does integrate, she usually builds these lessons around her social studies content. These lessons connect all or nearly all of the subjects; however, there is a low level of depth. Teacher C is focused only on students understanding the social studies content. The ELA, math, science, and art knowledge and skills that are brought into the integration are only used as tools to support and add meaning to the social studies content. Some of the time, the typical schedule of the day is removed and knowledge and skill are used in the flow of the curriculum. At other times, Teacher C keeps the schedule in place and just uses those blocks of the day to work on pieces of the integration.

Conclusion

While interpreting the data, it became apparent that what educators described and practiced did not fit into a simple linear continuum. Nor was the MoI developed during a pilot study sufficient to capture the full domain of subject area integration. In an attempt to help map this domain and its rich range of options, a Model consisting of four variables was developed. These variables captured key aspects discussed by participants in describing subject area integration. The Model provides a fundamental framework for considering the various options in the range of integrated practice. It could prove useful for a number of stake holders in education. Departments of Education and Curriculum Leadership Teams could compare integrated practice and current teacher understandings of integrated expectations with actual expectations and desired practice. Districts and administrators could use these findings to plan for professional development. Finally, teacher training programs, in concert with Departments of Education, could use these findings to update pre-service teacher education.

The Model interpreted from the data in this study remains untested. Further research on the variables of the Model would help to refine it. One aspect of future research should be to attribute value to the levels of each variable. The

purpose behind the Model of the domain is to describe teacher practice and promote professional development. However, without additional research it remains unclear if each variable is equal in value. Should educators focus on increasing their level of integration on one variable more than another? And, how is the value of each variable influenced by the subject areas involved? These and many more questions need answering to further understand the domain of subject area integration. For now, we hope that the Model can serve to further the conversation of educators everywhere.

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