"VISITOR TO ALL, NATIVE TO NONE": HOW DIGITAL-NATIVE

TEACHER EDUCATION STUDENTS USE *BRICOLAGE* AND

MULTIPLE MODALITIES TO CONSTRUCT KNOWLEDGE

A Dissertation
by
DONALD LLOYD PRESNELL

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Abstract

"VISITOR TO ALL, NATIVE TO NONE": HOW DIGITAL-NATIVE TEACHER EDUCATION STUDENTS USE *BRICOLAGE* ANDMULTIPLE MODALITIES TO CONSTRUCT KNOWLEDGE. (December 2012)

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The focus of this study is the current generation of "digital native" or "millennial" pre-service teachers and how, in their dual roles as last-semester students and future teachers, they adopt and use multiple modes to construct knowledge and actively reflect on the processes and potential of multimodality. It is a hermeneutic phenomenological study, concerned with the lived experiences of the participants and the multiple "texts" they create. The researcher uses the multimodal concept of bricolage—a nonlinear set of processes by which students adopt and "piece together" from multiple sources to construct meaning—as a frame for describing and analyzing how pre-service teacher education students engage multiple learning modes. Included in this process are the different types of multimodal "texts" these student-teachers produce and create.

Using data collected from an original survey (Multimodal Knowledge Construction Survey), student-participant interviews, teaching methods faculty interviews, and classroom observations, the author provides extensive description, analysis and discussion of how these "digital native" pre-service educators construct, synthesize and interpret meanings through

multiple modes—including nontraditional modes and traditional ones, such as print-based—as well as how students engage multiple modalities and different media forms to create or affect meanings, including the types of "texts" students produce and create beyond traditionally print-based ones.

As technologies and media forms proliferate, these simultaneous student-teachers must be aware of and actively reflect upon how different modalities contribute to and shape their own learning experiences as well as the learning experiences of their future students. The researcher calls this process "modal and textual awareness," or MTA. These future educators must not only acknowledge but also appreciate and embrace multiple modalities and their accompanying affordances as a diverse source of pedagogical strategies for improving student learning.

The conceptual framework and guiding research questions are based on the multimodal studies of Gunther Kress, whose studies in turn are based on the pioneering work of the New London Group. Other components of the framework include Gardner's multiple intelligences, Mayer's principles of multimedia learning, and media forms. The two major themes of the study are students' modal and textual awareness and an inherent, shared tension between structure & guidance and creativity & choice. The three major implications of the study address critical media literacy, assessment, and 21st century learning skills.

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To Cohort 17, the Eutrapelian Serious Players: Remember the promise.

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To my dissertation chair, Dr. Sara Olin Zimmerman. You are a wise and amazing mentor, coach, role model, colleague, and source of support and encouragement. I could not have made it without your help.

Dedication

For Martha and Sofía.

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Chapter One

Introduction

In today's "digital" world, students engage multiple modes or modalities to consume and produce many types of "texts" through a variety of sources. That is, in addition to the traditional and foundational modes of reading and writing, they have any number of available sources from which they can employ and utilize different learning modes to create and construct meaning. In a single day, for example, a student could watch a movie and a television show; send and receive text messages; listen to a podcast; play a video game; build a personal website; write columns, essays or entries on paper or in an online blog; or create a piece of visual art with either physical materials or a computer package like Photoshop.

Modes of learning—or modalities—can be as varied as the number of learners who use them. Jewitt and Kress (2003) define "modes" as a "regularised organised [*sic*] set of resources for meaning-making, including, image, gaze, gesture, movement, music, speech and sound-effect" (p. 1). Kress (2009) adds that these resources are "socially shaped and culturally given" (p. 54). While undeniably central to and necessary for learning, the traditional learning modes of reading and writing are no longer the *only* modes of learning.

Aside from reading and writing, there are non-traditional modalities, which broadly speaking include any modes that are not exclusively print-based. It is important not to equate the *sources* available to students (television, film, YouTube, video games, etc.) with the *modes* students adopt, consciously or unconsciously, to become engaged learners who actively construct meanings. *How* students multimodally construct knowledge is more

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important than *what* tools, sources or media types they use to do so. Jewitt (2008) states that it is the representational, student-constructed form that is "integral to meaning" and that "the ways in which something is represented shape both *what* is to be learned … and *how* it is to be learned" (p. 241).

The majority of students today comprise the generation known as "millennials," students who were born after 1982 and who do not even view technology as "technology." It is simply a part of their lives. It is part of who they are and how they learn. Prensky (2001) coined the terms "digital learners" or "digital natives" to refer to these students. Hobbs (2010) captures the transitional phase and relevance of multimodal learning and teaching in the ongoing educational milieu of millennial students and the early generation of millennials who are now beginning to enter the field as beginning teachers—"millennials teaching millennials," so to speak. She proposes that "literacy" is gradually "beginning to be defined as the ability to share meaning through symbol systems in order to fully participate in society" (p. 16). Similarly, the idea or concept of "text" is "beginning to be understood as any form of expression or communication in fixed and tangible form that uses symbol systems, including language, still and moving images, graphic design, sound, music and interactivity" (pp. 16-17). Students should know that their interests and backgrounds are valid and that they are not only consumers but also creators and constructers of knowledge.

Print-related modalities, then, while undeniably important and foundational, should contribute to a "broader, more complex multimodal suite of designs" for students as they construct meanings (Brown, Lockyer, & Caputi, 2010, p. 192). Gee and Hayes (2011) agree, hinting at the learning and assessment potential for multimodal strategies and assignments: "[Multimodal texts] can allow for more aspects of experience to be represented and

juxtaposed efficiently and creatively than can texts composed merely of words" (p. 119). As Kalantzis, Cope, and Cloonan (2010) observe, "media are intrinsically multimodal, and the peculiarities of a medium defined by its specific mix of modes" (p. 67).

A crucial educational component for helping students recognize, develop, appreciate and understand these multimodalities and their related forms and meanings in their lives is that of critical media literacy. Alvermann and Hagood (2000) define critical media literacy as the process wherein students pay critical attention to the variety of texts they consume and create, where they reflect on how they and others—individually and as a part of particular groups and cultures—construct ideas, identities, relations, meanings, and new texts and literacies (p. 194). Learners may be able to reconcile these aspects, or they may construct a new set of meanings.

Level and Hoseth (2008) identify four characteristics of the so-called digital natives or millennials:

- They are "digitally literate, moving easily between both real and online/virtual environments";

- They are "always on" and connected through some form(s) of digital media;

- They multitask, rapidly navigating between activities;

- They prefer experiential learning, or "learning by doing";

- They are "constantly engaged in activities that promote and reinforce social interaction." (p. 37)

The same authors also note that these students are *bricoleurs* who are well-skilled in *bricolage*, "the ability to piece together information obtained from multiple sources" (p. 37). They are non-linear thinkers and constructors of knowledge. These students come from

different backgrounds, and they all have different ways of approaching and becoming engaged with their education. They engage and consume numerous *digital and non-digital* media forms *and* engage and create unique multimodal processes with which to construct and create meaning. Kress (2003) calls these processes semiotic, where individuals both *articulate* "outwardly made sign[s]" and *interpret* "inwardly made signs" (p. 37).

Research Problem Statement

This study examines how pre-service teacher education students use "bricolage" in order to construct meanings and become actively engaged learners. Level & Hoseth (2008, p. 37) and Wilber (2008, p. 565) define bricolage as a nonlinear, multimodal process by which students piece together and create from multiple sources. I use the concept of bricolage to frame my research design for describing and analyzing how students synthesize multiple learning modes to construct meanings, along with the different types of "texts" (print or otherwise) they produce and create in educational settings, i.e, the classroom.

Schwartz and Rubinstein-Ávila (2006) use the term "hybrid" texts, wherein traditional print-based reading is "expanded into postmodern readings that combine print text, graphic images, and sounds" (pp. 47-48). Though some students may actually prefer and/or have been "passively" educated via traditional one-way transmission, i.e., teacher-to-student information transfer, the majority of 21st century students will daily utilize and engage numerous media forms and multiple modalities. As a result, they will learn in more variegated and nontraditional ways; the participants of this study and all of their cohort members (i.e., future teachers) will need to how to identify and work with multiple modalities, their own as well as those of their students.

Purpose of the Study

Studying the current generation of pre-service teachers and how, as future teachers, they adopt and use multiple modes to construct knowledge and actively reflect on the processes and potential of multimodality, presents both challenges and opportunities for higher-education professors and administrators, especially in colleges of education. As veteran teachers retire, they will be replaced by newly certified teachers. These new teachers will comprise the first generation of educators who came of age as millennials or digital natives. Walsh (2008) captures both the possibilities of multimodal learning and the inherent issues and implications concerning multimodalities:

> Multimodal literacy incorporates the traditional literacy strategies of reading
> and writing combined with the use of different modalities and semiotic
> systems. These modalities have always existed but have not had the potential
> within communication that is now available. As students combine different
> modalities it is essential that they understand them because those aspects of
> literacy that many adults refer to as 'basic' or 'traditional' do not exist in the
> same way for students of today or the future. (p. 106)

As Luke (2000a) suggests, educators must proactively develop corresponding effective and appropriate pedagogies for digital-native students. If not, then student learning and the definition(s) of literacy will be set forth and determined by "corporate experts" (p. 71). All teachers need to overcome notions of deficit learning and foster recognition and appreciation that "there are different yet effective ways to be literate" (Heuer, Fall 2007, p. 61). Kress, Jewitt, Ogborn, and Tsatsarelis (2001) note the implication for assessment. Assessors may rely on "common sense" (p. 176) approaches to assessment, which

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traditionally assume content-specific criteria instead of mode-specific criteria. The shifts that occur between and among other modes, then, could not be accurately assessed by virtue of their very forms.

As Unsworth (2008) states, we need to make a "break with the monomodal pedagogies of the past" (p. 400). Kress (as cited in Bearne, 2005) asserts that by not studying and integrating multimodal learning and pedagogical processes, educators fail to "[recognize] and [attend] to the real position of the learner" (p. 295). Such failures would only ensure that educational policy considerations and creations remain bound by the past and irrelevant to the present and future.

Research Questions

The focus of this study is how students, teacher education students in particular, are metacognitive about multiple learning modes and the relationship to their own education. Such a study can give rich insight into pedagogical practices and student needs and expectations of those practices. The study analyzes and interprets students' awareness of how different learning modes contribute to and shape their learning experiences, in addition to how this awareness will inform and contribute to their effectiveness as future teachers. Following are the research questions guiding the study:

- How do students construct, synthesize and interpret meanings through multiple non-traditional modes (as opposed to traditionally and exclusively print-based ones)?

- How metacognitive are students about multiple learning modes?

- How does student engagement of learning modes and choice of different media forms create and affect meaning?

Methodology Overview

This hermeneutic phenomenological study included eight pre-service, teacher education students. Four students were elementary education majors, and four were middle grades education majors. The study is concerned with the lived experiences of the participants and the different types of multimodal "texts" they produce and create. The multimodal concept of bricolage is used as a frame for describing and analyzing how pre-service teacher education students engage multiple learning modes as both students and teachers.

The starting point for the study was the Multimodal Knowledge Construction Survey (MKCS), an original online survey created to gather initial "snapshot" data of the larger student-teaching cohort, from which the eight participants were randomly selected. Individual interviews were conducted with the eight study participants, as well as with four randomly selected teaching methods faculty members. Eight one-time teaching methods course observations were also conducted in the four subject areas required for both elementary and middle grades majors: language arts; mathematics; science; and social studies. These "converging lines of inquiry" (Yin, 1994, p. 92) reflect the very nature of multimodality and multimodal studies, which demand variety and multiplicity of data sources and collection.

Significance of the Study

As "digital-native" millennial students continue matriculating into colleges and universities, educators face the critical challenge of how best to facilitate and encourage student learning. Beach and O'Brien (2008) assert that we must not "assume an artificial binary between in-school and out-of-school worlds" (p. 779). Ignoring—or failing to utilize

and build upon—the multiple modalities students engage as they learn and create knowledge is to remain educationally and pedagogically static and inert, beholden to "school-sanctioned traditional pedagogies" (p. 779). Current and future educators must not only acknowledge but also appreciate and embrace multiple modalities and their respective and intersecting affordances as a diverse source of pedagogical strategies for improving student learning.

Though many authors agree in general that "digital natives" (students who were born into a digital culture, as opposed to "digital immigrants" like me) can refer to individuals born since the early 1980s, what we see at this point in time is a generation of digital-native college students who were born in the early years of the twentieth century's final decade. With respect to those who are intending to major in some area of education, be it elementary, middle grades, or secondary, our universities have a generational cohort of digital natives who will be preparing to teach younger digital natives.

In order to be effective future educators of digital-native millennials, the teacher education students in my study—who are themselves digital-native millennials—will need to be highly metacognitive about the learning preferences, approaches and processes, their own as well as those of their students. The implications extend to pedagogy and content (instructional strategies and integrating multiple modalities) as well as assessment (assessing different types of modalities and literacies, including but not limited to print-based ones). Present and future educators need to maintain a solid base for teaching but also allow it to be flexible, engaging, meaningful, and situated (as opposed to fixed). Doing so actually fulfills educators' professional responsibilities to be reflective practitioners.

Most education-related multimodal studies to this point focus on a few contexts: multimodality and adolescent learning in general (Bean, 2010; Boyd & Thompson, 2008;

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Hinchman & Sheridan-Thomas, 2008); "digital literacies" (Alvermann, 2002; King and O'Brien, 2002); multimodality and writing instruction for elementary school teachers (Bearne and Wolstencroft, 2007); and multimodality and arts instruction for primary and secondary school teachers (Albers and Sanders, 2010). Until the present study, no studies have focused exclusively on digital-native, millennial teacher education students and how, as they are concluding their careers as students and beginning their careers as teachers, they construct, create and interpret meanings through multiple modalities.

Educational and Political Reciprocity.

Participants of the study will directly benefit by learning to be more cognizant and reflective with regard to their learning and how they can improve their teaching when they enter the field. Jewitt (2008) allows for focus on meaning-making as a multimodal design process instead of a monomodal and passive process of transmission and reception (p. 263). Stein (2008) calls for expanding the notion of a classroom into a space that generates and sustains epistemologies "where teachers work more actively with the kinds of knowledge and capabilities young people are doing and using outside the confines of school in order to make effective pedagogical connections to them in class" (p. 885).

This study will benefit educators and administrators, especially those in colleges of education, by presenting to them a detailed and analytical contemporary portrait of collegiate student learning and concomitant multimodal processes; in turn, it will help educators who consistently and proactively seek to improve their pedagogies. Unsworth (2008) believes that teachers can take on an even more important educational role by becoming orchestrators of "literacy-learning opportunities" instead of the "sole source of literacy knowledge" (p. 399). Further, he stresses the pedagogical benefits of having teachers take on the role of

"explicitly teaching students how the 'grammars' of multiple semiotic modes—such as image, music, language, and movement—function separately and in articulation in the construction of meaning" (pp. 399-400).

As Figure 1 (below) indicates, the relevance of my study is both politically and educationally systemic and iterative. As more digital-natives enter universities and teacher education programs, professors and colleges of education will need to collaborate to ensure that they create and modify appropriate pedagogies that respond to and incorporate students' multimodal approaches to knowledge construction. Schools, administrators and policymakers, professors and students will complement and reinforce each through ongoing recursive and complementary policy, pedagogy and learning processes as subsequent generations of digital-native student bricoleurs continue to matriculate and in turn become subsequent generations of educators and policymakers.
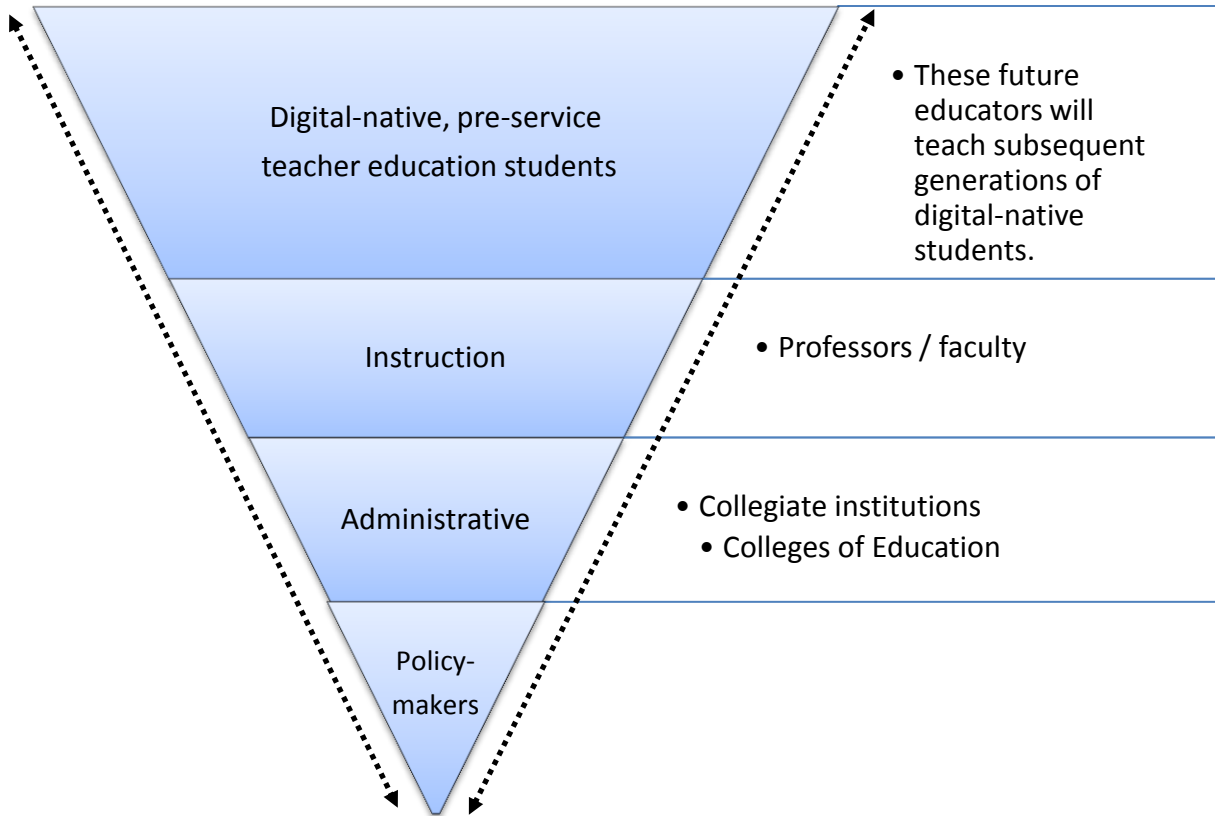
Figure 1: **Systemic educational and political relevance of the study.**

Definitions of Key Terms

Affordances: Inherent qualities or characteristics of a mode that can be used by an

individual for meaning-making (Jewitt & Kress, 2003, p. 14).

Bricolage: A nonlinear, multimodal process by which individuals piece together and

create from multiple sources (Level & Hoseth, 2008, p. 37; Wilber, 2008, p. 565).

Though the concept was originally introduced by Levi-Strauss (1966) in an

anthropological context, it has since been adopted by numerous disciplines and fields,

including qualitative research (Denzin & Lincoln, 2011, p. 4). The present study uses

bricolage and the study particpants who are constructing knowledge (i.e., the

"bricoleurs") in the context set forth by Weinstein and Weinstein (1991), in which the "result of the bricoleur's method is an [emergent] construction" (p. 161).

Digital natives or **millennials**: Students who were born after 1982 and who do not even view all of the digital technology that surrounds them as "technology." It is simply a part of their lives; it is part of who they are and how they learn. Prensky (2001) coined the terms "digital learners" or "digital natives" to refer to these "millennial" students who are coming of age at the beginning of the new millennium. By contrast, all other (older) individuals are considered **"digital immigrants."**

IDP: This acronym stands for "Instructional Design Project," an extensive unit of five lesson plans that all of these students must successfully create and submit to satisfy state standards for teacher education program performance and student performance.

Mode or modality: A "socially shaped and culturally given" (Kress, 2009, p. 54) resource for meaning-making, "including image, gaze, gesture, movement, music, speech and sound-effect" (Jewitt & Kress, 2003, p.1). Of multimodality, Jewitt (2009) notes that all modes "consist of sets of semiotic resources" that all individuals "draw on and configure in specific moments and places" to "shape communication and meaning" (p. 2). Though the context of the present study is that of education, "a variety of disciplines and theoretical perspectives can be used to explore different aspects of the multimodal landscape" (Jewitt, 2009, p. 2).

Transduction: A multimodal process wherein knowledge is changed or transformed *across or between different modes* (Bezemer and Kress, 2005, p. 17).

Transformation: A multimodal process wherein knowledge is changed or transformed *within single modes* (Bezemer and Kress, 2005, p. 17).

Organization of the Study

Chapter One has provided an introduction to the topic of multimodality, including multimodal texts and students' multimodal knowledge construction. Chapter Two provides both an extensive review of the literature on education and multimodality and the theoretical and conceptual framework for the present study. Chapter Three illustrates the methodological strategy and design for the study. Chapter Four presents the results of the various forms of data collection, while Chapter Five includes a discussion of the study, along with conclusions, implications, limitations, and suggestions for further research.

Chapter Two

Review of the Literature

Introduction

Chapter Two provides a detailed review of the literature on multimodal studies and their pedagogical implications, the theoretical and conceptual background of multimodal studies, and the theoretical framework for the present study, primarily informed by the works of Gunther Kress. Today's educational and instructional spaces are far beyond the proverbial crossroads. Depending on one's point of view, they present either a millennial divide or a millennial frontier. Educators, however, cannot afford to take such a divisive and binaristic stance. The ever-prescient John Dewey (1961) knew the danger of simple educational dualism as early as 1916: "As formal teaching and training grow in extent, there is the danger of creating an undesirable split between the experience gained in more direct associations and what is acquired in school" (p. 9).

It is an ineluctable fact that millennial learners have different learning styles than the educators who preceded them as students. While many sound the alarm, others such as Rosen (2010) see the positive potential of this educational, not to mention cultural, epoch: "This is truly the 'creative generation,' and if allowed, they will redefine the notion of schoolwork in a way that preserves its integrity but expands its forms" (p. 213). As Jewitt (2008) writes, students navigate and engage their own unique "mediascapes" in, from and through which they multimodally construct knowledge (p. 261).

According to Sharples (2005), what this digital age of learning offers is a "re-conception of education" that "removes the solid ground of classroom instruction, and of education as the transmission or construction of knowledge within the constraints set by a curriculum, and replaces it with a cybernetic process of learning through continual negotiation and exploration" (p. 6). Stein (2008) insists that a "multimodal social semiotic approach to learning is not a framework for pedagogy but a reconceptualization of learning" (p. 877). Johnson (2005) illustrates such a multimodal reconceptualization with his notion of "consilience," an interdisciplinary approach to analyzing popular culture on different levels that "must connect to each other, in a kind of consilient chain" (pp. 206-207). So, for example, a television series or video game—and how a student/player/viewer works through and interprets it—could be analyzed through such interrelated levels as narratology/semiotics; media theory; economics; sociology; and neuroscience.

Heuer (2007) notices a correspondence between many highly visual media and learner modes and that they all can be strategically and creatively manipulated to create multiple literacies (p. 61). Ignoring and failing to utilize the learning nexus of critical media literacy and multiple modalities is denying the contexts, contributions, and potential of all students and educators; such an omission is neither democratic nor educational.

Jewitt (2008) asserts that "the time for the habitual conjunction of language, print literacy, and learning is over" (p. 241). Beach and O'Brien (2008) agree, noting that "current school practices continue to revolve almost exclusively around print-based traditional, formalist conceptions of literacy" (p. 779). They deem the result a "mismatch" that perpetuates the negatively connoted "deep grammar of schooling" in too many students whose in-school and out-of-school lives are routinely segregated for no other reason than

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tradition. Papert (1993) is even more direct and critical. He presents a "parable" of time-traveling nineteenth-century teachers who, if transported to a contemporary classroom, "might notice that some standard techniques had changed" but "would fully see the point of most of what was being attempted and could quite easily take over the class" (pp. 1-2). Gee and Hayes (2011) observe that language has always been 'multimodal' (combining words, images, and sounds) as are many messages conveyed via digital media and, indeed, many other media today" (p. 1). All of these scholars agree that multimodality "is more pervasive, diverse, and important today than ever before" (Gee & Hayes, p. 1).

Multimodality: a definition

Stein (2008) gives a concise definition of modes and multimodality: "[A]s a field of study [it] is concerned with how human beings use different modes of communication, like speech, writing, image, gesture, and sound, to represent or make meaning in the world" (p. 871). Jewitt and Kress (2003) refer to a mode as a "regularized organised [*sic*] set of resources of meaning-making" (p. 1). Jewitt (2009) identifies multimodality as an extension of "the social interpretation of language and its meanings" to a culture's "whole range of representational and communicational modes or semiotic resources for making meaning" (p. 1). Bearne and Wolstencroft (2007) include the key qualification that these modes can be combined in different ways and presented through various media (p. 20). Wilber (2008) seems to conflate college students' innate "bricolage" abilities with critical media literacy skills:

College students clearly see the proliferation of information and multiple points of view online as productive resources, rather than as a millpond of potential dangers

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regarding credibility, originality, and truth to be waded through painfully and

precariously as is sketched by some. (p. 565)

However, while students may have innate facilities with different *resources*, they may not be

critically aware of both multiple resources *and multiple modes*.

Theoretical and conceptual background of multimodal studies

Multimodality as a field of study is still in its infancy. Jewitt (2008) dates its

inception to around 1996 and traces its lineage to two main influences: Halliday's (1979)

social semiotic theory set forth in *Language as a Social Semiotic*; and Arnheim's "visual

communication and perception" models from his 1969 work, *Visual Thinking* (p. 246).

Halliday's systemic functional grammar (SFL) posited two primary functions for language:

it should be socially situated, and texts should be understood and appreciated as complex

signs (Jewitt, 2009). Halliday's (1979) framework offered three metafunctional categories.

The "ideational" refers to the actual nature of events, including participants, objects, and

circumstances. The "interpersonal" aspect refers to the relationships between communicants.

The "textual" component refers to the informational role of language and how information is

conveyed. As Unsworth (2008) notes, Halliday's SFL is a "metalanguage" that links

"language structure, meaning, and context" (p. 380).

Over several decades and works, and with key collaborators such as van Leeuwen

(Kress & van Leeuwen, 2001; Kress & van Leeuwen, 2006) and Jewitt (2003; 2005), Kress

has emerged as the leading contemporary scholar of social semiotics and multiple modes.

Kress's work with multimodality is central because he brings together the linguistic and the

visual and includes other modalities and representational types (Kalantzis, Cope & Cloonan,

2010).

Another key component of multimodal studies is the New London Group's (1996) landmark article "A Pedagogy of Multiliteracies," in which a group of scholars set forth and articulated the five principal multimodal design types or "metalanguages": linguistic, visual, audio, spatial and gestural (p. 83). A sixth type is "multimodal," comprising any combination(s) of the five broad modalities. This work is central to and inextricable from all subsequent and continuing studies on multimodalities and student learning. Tyner (1998) notes that the New London Group stresses the "semiotic nature of design for meaning making in cognitive work" (p. 80). Like Kress, the group asserts that students are (or should be) active designers and constructors of meaning instead of mere recipients. Learners do so by engagement with and "manipulation of language, discourse, and literacies," which entail multiple modal and literacy types (Tyner, 1998, p. 80).

Predominant forms and foci prior to my study.

Jewitt (2008), a leading scholar in multimodal analysis and a frequent collaborator with Kress, observes that the ethnographic case study has been the primary form used by scholars thus far in the early years of multimodal studies and analysis. Wilber, née Cammack (2008), performed a related "small-scale, ethnographic study" with close observations of three students in a one-semester history course and documented "tensions between old and new literacies that became apparent over time" (p. 575). Other case studies describe the multimodal processes and modal affordances different learners use in specific learning environments: creative practices of youth (Gustavson, 2008); adolescent girls and multiliteracies (Nichols, 2008); children's text-making at home (Pahl, 2003); teenage writing and the Internet (Lam, 2008); and, at the center of multimodal studies and from the field's

leading scholar, *English in urban classrooms: A multimodal perspective on teaching and learning* (Kress et al., 2005).

The primary focus of most of the literature so far has been with adolescents' use of and facility with multiple modes. Luke (2003), for example, speaks of "media (ted)" texts for "children," the implied context being K-12 (p. 398). The majority of studies have been broadly concerned with adolescent learning (Hinchman & Sheridan-Thomas, 2008; Boyd & Thompson, 2008) or specifically focused on adolescents' multimodalities and multiliteracies (Alvermann, 2002; King & O'Brien, 2008). Bearne and Wolstencroft (2007) maintain this focus on multimodal literacy using the lens of visual writing instruction for elementary-level students, while Albers and Sanders (2010) concentrate on the arts and multimodality at all educational levels.

Very few studies have focused on collegiate-level multimodality, let alone that of pre-service teacher education students. One such study is Cammack's dissertation (cited earlier), *By any means necessary: Understanding the literacy and technology practices of using multimedia in a college history* course (2008). Another is Hynd, Holschuh, & Hubbard's "Thinking like a historian: College students' reading of multiple historical documents" (2004). Despite the relatively small amount of directly appropriate (i.e., age and level) literature, what makes the present study unique is that it addresses and moves beyond level (collegiate) and into a specific cohort of college students: digital-native, pre-service teacher education students.

Conceptual Framework

The conceptual framework for the study is based on the work(s) of Gunther Kress, who for two decades has proposed that language can no longer be the "sole, the main, let

alone the major means for representation and communication" and meaning-making (Kress, 2003, p. 35). As early as 1997, Kress observed that children are "thoroughly experienced makers of meaning" (p. 8) who construct knowledge via an array of diverse modalities, including but definitely not limited to language and print literacy. Unfortunately, even today educators continue to ignore this facet of learning; there remains a "focus on the single medium of lettered representation," and children's multimodal forms of communication and knowledge construction receive little or no emphasis "due to the demands of the present school curriculum" (Kress, 1997, p. 9).

Kress (2003) calls for a theoretical change beyond "language alone to a theory that can account equally well for gesture, speech, image, writing, 3D objects, colour, music and no doubt others" (p. 36). Kress (1997) acknowledges Piaget's (1954) learning structures and stages but wants to go further and observe and describe the "enormous variety" of students "in their engagement with the stuff of their cultural environments" (p. 166). He also incorporates both the social meaning-making ideas of Vygotsky (1962) and Bakhtin (1986), and Halliday's (1979) language-based focus on context-specific and resource-based knowledge construction. (See Figure 2, below.) Following Kress, this study examines how students use multiple learning modes to construct meaning, along with the different types of "texts" they produce and create.
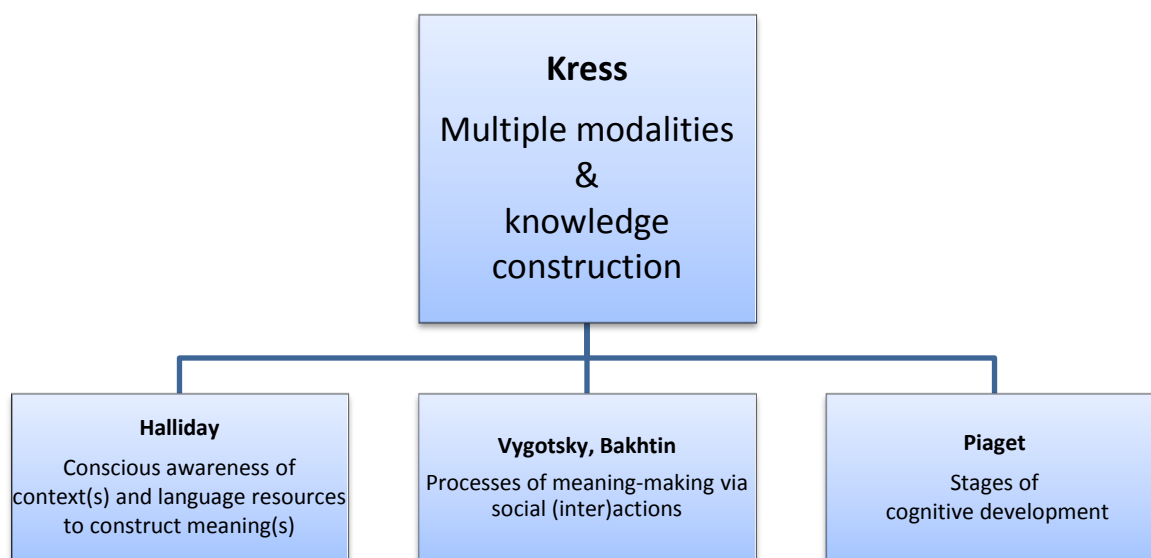
**Figure 2: Gunther Kress theoretical framework for
multimodal knowledge construction.**

Jewitt (2008) proposes that *how* students represent knowledge is strongly influenced

by their choice of both modes and media. These choices comprise a "crucial aspect of

knowledge construction, making the form of representation integral to meaning and learning

more generally" (p. 241). Elaborating on the centrality of design to multimodality, Stein

(2008) includes both teachers and students as "designers of meaning." Teachers make

specific choices about teaching (how and what), and students make communicative and

representational choices (p. 875). Jewitt (2009) adds that a primary aspect of social semiotic

multimodal analysis is "mapping how modal resources are used by people in a given

community/social context." That is, "the emphasis is on the sign-maker and their [*sic*]

situated use of modal resources" (p. 30).

When they engage multiple modes, student learners/designers adopt and utilize a

variety of affordances, defined by Jewitt & Kress (2003) as any material's "inherent

qualities" which can be culturally and semiotically used by an individual for meaning-making (p. 14). Learners may operate and function in one particular mode or in a modal ensemble, what Walsh (2008) calls a "convergence and interrelationship between modes" (p. 102). Bezemer and Kress (2005) note two processes that occur during knowledge construction via multiple modes. "Transformation" occurs within single modes, while "transduction" takes place when changes occur *between* modes (p. 17).

Luke (2003) discusses a "conceptual shift" from "collection to connection" in which learners think laterally and associatively across forms, genres, texts and modes using a "meta-awareness" to make connections and a "meta-language" to describe and articulate those connections. Doing so affords learners "the very rhizomatic conceptual and cognitive maps required to read through and think through localized branching of larger global knowledge units (disciplinary or otherwise)" (pp. 399-400).

Also paying attention to how individuals perceive, shape and create meanings is Gardner's theory of multiple intelligences. Introduced in 1983, this theory incorporates elements of biology, sociology, psychology and anthropology to illustrate in what ways learners are predisposed to learn. According to Gardner (2011), everyone has a primary intelligence "type." In recent years he has added two more intelligence types to bring the total to nine: linguistic; musical; logical-mathematical; spatial; bodily-kinesthetic; interpersonal; intrapersonal; and naturalist.

Closely related to multimodality and multiple intelligences is Mayer's (2005) cognitive theory of multimedia learning. As the name implies, Mayer focuses more on multimedia forms and their related affordances, as opposed to learners' innate intelligences or larger modalities or modal ensembles and combinations. Nevertheless, the theory contains

several principles addressing how students create and construct knowledge. Consider, for

example, three of the central principles: multimedia, modality and coherence. The

multimedia principle holds that students learn better from *combined words and pictures* than

from words in isolation. The modality principle states that students learn better from

combined graphics and narration than from combined graphics and printed text, while the

coherence principle states that students learn better from *combined graphics and narration*

than from the threefold combination of "graphics, narration, and on-screen text" (p. 6).

Mayer's principles contribute to what Kress (as cited in Bearne, 2005) calls the

"question of how knowledge is configured and constantly reconfigured" (p. 291). The modes

with which digital-age students engage, synthesize and create is important because "the way

that [knowledge] is configured, materialized, sets the ground on which the learner engages

with it, it shapes the learner's learning" (p. 291). As Figure 3 (below) illustrates, the process

is at once active, metacognitive; overlapping; recursive; fluctuating but stable and consistent.
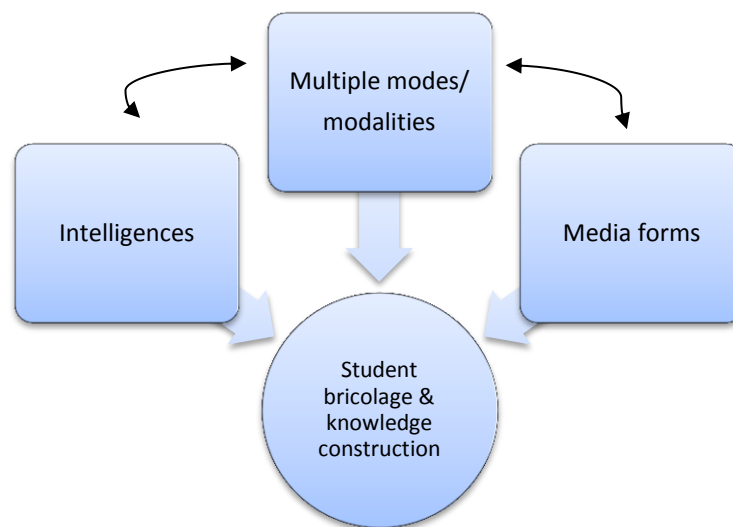
**Figure 3: Knowledge construction via multiple modes,
intelligences and media forms.**

My study uses these ideas from Kress, Gardner and Mayer as a beginning and builds on them by extending them to the educational milieu of teacher education students who are completing their final semester as undergraduate college students. In effect, these millennial bricoleurs will be a veritable educational paradox in the subsequent semester: they will be final-semester college *students* and first-semester *educators*. My analysis begins with Mayer's (2009) three basic processes for active learning: selecting, organizing, and integrating. Kalantzis, Cope, and Cloonan (2010) offer a model of multimodal analysis that includes a five-by-five structure. They list five "dimensions" (p. 71) of meaning making (representational; social; organizational; contextual; and ideological) and five modes of meaning (linguistic; visual; gestural; spatial; and audio). I combine their approach and include Mayer's as well, and go further by adding the six dimensions of qualitative analysis used by Kress, Jewitt, Ogborn, and Tsatsarelis (2001) in their early work *Multimodal teaching and Learning*:

- students' selection of elements from lesson or class resources;

- students' adaptation of these elements;

- students' adoption or appropriate of outside elements;

- students' arrangement or "design" of elements into "texts"; and

- students' modes of representation; the "materiality," or physical properties, of the student-produced texts. (p. 38)

As Kalantzis, Cope, and Cloonan (2010) point out in introducing their model, active and meaningful teaching and learning "[require] a metalanguage that is accessible to students and able to be generated by teachers and students in various teaching contexts" (p. 71). Bull and Anstey (2010) also note the importance of active, multimodal knowledge construction:

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"[W]hen our students are competent with the codes and conventions of all semiotic systems, they can become re-makers and transformers of literacy rather than users of stable semiotic systems that simply reproduce what has come before" (p. 79).

It is just these types of multimodal meaning-making by pre-service teacher education students I work to describe and analyze. As with Kress et al. (2001), my transcriptions and ultimate analyses "can be seen as a textual representation" of the "relations between modes" (p. 37). Also, my examples and analyses can be "approached as concrete traces of the cognitive work involved in their production; that is, treated as semiotically expressed responses" (Kress, et al., 2001, p. 38).

Summary

This literature review has provided a detailed historical overview of multimodal studies and how all modes and media continually disseminate specific and particular meanings for students and teachers, all of whom may be considered as "designers" of meaning (Kress, 2010, p. 2). Stein (2008) employs the term "*multimodal social semiotic approach* to learning" (p. 875). Demonstrating a keen understanding of Jewitt & Kress's (2003) ideas about modes and multimodality, Stein poses four key questions regarding multiple modes and social semiotics that are central to my own inquiry:

- How do modes shape what is represented?

- How do differences in modal representation reshape what is represented?

- How are learners and learning affected, changed, and shaped by the differences in mode, the material differences entailed, and the different senses called upon or engaged in the use of a mode?

- How do differences in mode interact with difference in media to affect ways and
  possibilities of learning (*media* is defined as technologies for making and distributing
  messages such as book, screen, radio, and billboard)? (p. 876)

The following chapter will set forth and detail the methodology for this research study.

Chapter Three

Methodology

This chapter presents the methods used to conduct this study, beginning with a discussion of the guiding, qualitative research paradigm and the hermeneutic phenomenological nature of the study. Also addressed in this chapter are reflections on prior pilot research; site and participant selection strategy and procedures; data collection, coding and analysis; validity considerations; and limitations and strengths of the study.

Qualitative Interpretive Study

My study of how pre-service teacher education students utilize, engage with and reflect upon multiple modalities is firmly rooted in the interpretvist paradigm. As Glesne (2011) states, this paradigm is accompanied by "the ontological belief [that] reality is socially constructed, complex, and ever changing. What is of importance to know, then, is how people interpret and make meaning of some object, event, action, perception, etc." (p. 8). An interpretvist approach lets the researcher observe, explore and analyze in order to better understand the experiences and meanings of the research participants. This approach helps the researcher take on the "emic" (insider) viewpoints of the participants and allows an "open and emergent" exploratory research design (Bloomberg &Volpe, 2008, p. 13). It enables the researcher to provide contextually specific student views of and attitudes toward multiple learning modes and media forms.

Qualitative research allows for rich descriptive data and analysis. Student participants can shed light on current pedagogical practices related to multimodality,

including when, where, why and how these practices have been utilized by faculty. Students

can also indicate their own attitudes toward and critiques of how they use multiple modes

and forms in their everyday lives, as well as in their academic lives. I employed qualitative

approaches to observe, record, analyze and interpret how pre-service teacher education

students use multiple modes to construct, view and interpret their own meanings. This is

important because few descriptions and studies of this phenomenon exist in the literature.

Most have addressed multimodal knowledge construction and metacognition only in the

context of adolescents' engagement with multimodalities (Bean, 2010; Boyd & Thompson,

2008; Hinchman & Sheridan-Thomas, 2008).

My guiding research paradigm is a qualitative one, at once internalist, constructivist

and interpretivist. Bredo (2006) states that an internalist epistemology "highlights the power

and autonomy of mind, language, or culture to construe things differently and to make new

considerations relevant" (p. 5). Similarly, Guba (1990) notes that according to internalist

constructivism realities are both multiple and subjective; they are "socially and experientially

based, local and specific, dependent for their form and content on the persons who hold

them" (p.27). Such a qualitative research approach provides contextually specific views of

and attitudes toward different learning modes and media forms.

Student participants can shed light on current pedagogical practices related to

multimodality and can also indicate their attitudes toward—and critiques of—how they use a

variety of modes and forms in their everyday lives, as well as in their academic lives. Since I

study how students synthesize multiple learning modes to construct meaning, along with the

different types of "texts" they produce and create, my research employs the hermeneutic

method or "circle," wherein interpretation "proceeds using current understanding of the

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whole to decipher a part, and current understanding of various parts to decipher the whole, working back and forth until a coherent interpretation emerges" (Bredo, 2006, p. 15).

The qualitative interpretivist paradigm is well suited to my research questions since it allows me to focus on meanings, understandings and processes (Merriam, 2009). Multimodal processes are inherently subjective and are thus especially open to an interpretive and qualitative approach. As Glesne (2011) notes, interpretivist theory building generates "thick" description instead of mere reporting; it considers "every human situation as novel, emergent, and filled with multiple, often conflicting, meanings and interpretations" (p. 35). Merriam (2009) concurs, noting that qualitative researchers are "interested in insight, discovery, and interpretation rather than hypothesis testing" (p. 42).

Hermeneutic phenomenological inquiry.

For this study, I conducted a hermeneutic phenomenological study of pre-service teacher education majors in Appalachian State University's College of Education. As the name indicates, this approach combines phenomenology—the study of lived experience(s)— with hermeneutics, which is concerned with the interpretation of "texts." Specifically, this hermeneutic component comprises the researcher's attempts to "derive a richer understanding of the context that gives [a text] meaning" (Bloomberg and Volpe, 2008, p. 12). Creswell (2007) uses a slightly different wording, "hermeneutical phenomenology," to refer to this type of research (p. 59). It is a process wherein the researcher "mediates" between multiple meanings among multiple lived experiences of the participants (Creswell, 2007).

Smith, Flowers, and Larkin's (2009) description of this research approach connects directly to the study's central research questions: "[W]e are concerned with where ordinary everyday experience becomes 'an experience' of importance as the person reflects on the significance of what has happened and engages in considerable 'hot cognition' in trying to make sense of it" (p. 33). I observe, study, analyze and interpret how late-phase teacher education students view, construct, synthesize and interpret meanings through multiple modalities, including their metacognitive awareness of how different learning modes contribute to and shape their learning experiences. Since I also study and interpret the variety of "texts" these students produce for class assignments, the process of data collection and analysis includes the "hermeneutic circle." Bloomberg and Volpe (2008) describe this analytic process as an iterative one in which "a text is understood by reference to the context in which it was generated; the text, in turn, produces an understanding of the originator and context" (p. 12). The result is what Smith, Flowers, and Larkin (2009) call a "dynamic, non-linear, style of thinking" and analysis that permits numerous different perspectives and "ways of thinking about the data" (p. 28).

Reflections on Prior Pilot Research

In the fall 2010 semester, I conducted a pilot qualitative study at Appalachian State University whose purpose was to describe how students adopt multiple learning modes in order to become effective and engaged learners. Along with modes (or modalities), I paid special attention to forms: what gets taught (and learned) and how that "what" gets taught (and learned). I interviewed six students, three male and three female. Four of the students were freshmen, while two were first-semester seniors. I interviewed each student once for anywhere between forty minutes to an hour, depending on the pace and flow of the interview.

I also completed four one-hour field observations of three First Year Seminar class sessions and one freshman-level geography class session.

My primary observation was related to gender and multiple modes. Reading comics and graphic novels, for instance, engages any number of modes as readers negotiate and interpret movement, images, dialogue, plot, and how they interact and work together. With this particular set of students, though, none of the females had ever read comics. On the other hand, two of the males were strong (avid) comics readers while the third was an occasional reader. The obvious implication for education is that comics and graphic novels are a medium that best engages male students. I used this observation to inform the text-related interview and survey questions I created for the present study. The digital-native student-teachers'oversight of the multimodal and instructional potential of comics and graphic novels would emerge as a sub-theme of the students' modal and textual awareness (MTA).

Selection Strategy

My primary strategy for participant and site selection is what Creswell (2007) calls "purposeful sampling" (p. 62). Maxwell (2005) uses the synonymous phrase "criterion-based selection" (p. 88). My selection strategy of purposeful or stratified sampling allowed me to focus on two specific groups of students: elementary education majors and middle grades education majors. My rationale is that both majors are housed in the College of Education, whereas the secondary education majors are distributed among several other colleges within the University. Keeping my sample to a single college and its two principal majors ensured more uniform data collection. The symmetry of the observation schedule also contributed to this uniformity. There are eight methods courses, with four devoted to

each major. Further, both majors have methods courses in the same content areas: language arts; mathematics; science; and social studies.

A unique aspect of multimodality is that all modes are different and will be adopted and utilized by different learners. Thus, even though some learners may construct meaning in similar ways, they will never do so in *exactly* the same ways. Multiple modes and their multiple learner-specific permutations will always be different. As a result, my strategy adheres to Maxwell's (2005) second and fourth possible goals for purposeful selection; it captures heterogeneity and variation while at the same time "establish[ing] particular comparisons to illuminate the reasons for differences between settings or individuals" (p. 90).

After receiving written approval from the University's IRB, I shared my study plans with the appropriate department chairs and received their written support as well. I began the study by selecting all teaching methods courses required for elementary education and middle grades education majors. Both majors are required to take four methods courses in the following areas: language arts, mathematics, science, and social studies.

I contacted all of the teaching methods professors via email and secured permission to email their students about participating in the Multimodal Knowledge Construction Survey (MKCS). In order to glean richer contextual data from the entire cohort of pre-service teacher education students, I created this survey as a broad starting point for data collection. Utilizing Appalachian State University's iteration of Web survey software SelectSurvey, I wanted to create and have the student participants complete a "multimodal texts" survey modeled on that of Bearne and Wolstencroft (2007, pp. 8-9) that could provide qualitative, student-reported responses relevant to students' learning styles, multiple intelligences and modal preferences.

With the assistance of the University Registrar's Office, I compiled a non-duplicated list of all students enrolled in these specific sections. I then emailed these 178 students to request their participation in the survey, with a short mention of a subsequent email I would be sending to request their participation in interviews for the study. I then contacted all of the professors via email and provided them with both a research lay summary and a participation request letter. Of 27 total course sections, I received agreement to participate from 17 sections. (Some professors taught more than one section of a particular course. Also, the middle grades science methods course comprised a lecture and a lab, with the same students enrolled in each. Therefore, I count this class as a single section since it had the same professor and students.)

From these 17 sections, I used the random selection feature in Excel to select teaching methods courses (and professors) to observe in all four subject areas (language arts, mathematics, science, and social studies) at both levels (elementary and middle grades). After I completed one field observation in eight different teaching methods classes (one in each subject for both teaching levels), I again used the random selection feature in Excel to select four of these eight professors for a one-time interview. The random selection yielded representation for each of the four subject areas. Also, the two teaching grade levels were represented by two professors for each.

Finally, I sent emails to the 111 students enrolled in these particular sections and requested their agreement to participate in a one-time interview with me. I attached a research lay summary detailing my study—including my plan to select randomly four elementary education majors and four middle grades education major—and a participant consent form. Initially, four elementary education volunteers and only three middle grades

volunteers agreed to participate; a follow-up email to the middle grades students still did not yield a fourth volunteer. However, as I was leaving one of my field observations of a middle grades methods course, one of the students approached and said she would be glad to participate. I had my fourth and final middle grades education participant.

As soon as that problem was solved, I encountered another. Two of the four elementary education volunteers—in fact, the very first two students who had initially replied and agreed to participate in the study—would not return my subsequent emails requesting a suitable day and time for an interview. As a result, I was forced to send the original pool of elementary education students a follow-up email explaining my need for two volunteers to replace the two students who were no longer participating. Two students soon responded and agreed to participate and be interviewed. I now had eight student participants: four elementary education majors, and four middle grades education majors.

All student interviews took place in my professional office at Appalachian State University. Most interviews were an hour in length; two of them approached an hour and a half. I reviewed the participant consent form with each participant; all of the participants agreed to the conditions and signed and dated the consent forms. I interviewed the four randomly selected methods professors in their campus offices at times convenient to their schedules.

Site and Participants

The students in this study are upperclassmen who have been admitted to the teacher education program and who are enrolled in a required "block" of teaching methods courses. Upon completion of these courses, students move on to complete a semester of student teaching. After collecting data from the Multimodal Knowledge Construction Survey

(MKCS), over the course of one semester I conducted eight, one-time random observations of teaching methods courses in each area (language arts, mathematics, science, and social studies) for both elementary and middle grades education majors. Later, I interviewed eight randomly selected students from these sections: four elementary education majors and four middle grades education majors.

In addition to these students, I interviewed four professors who have taught methods courses for at least one year and whose careers have involved teaching "digital immigrant" students, as well as the present generation of "digital native" students. Doing so allows for richer data and another related context, that of veteran methods professors, from the same educational milieu. My analysis of professors' observations complements my observation and analysis of how students become bricoleurs and construct knowledge and meaning via multiple media forms and multiple learning modes.

I recorded and comparatively analyzed the collected data from all my sources: the survey, where pre-service teacher education students self-reported their multimodal practices and modal and textual awareness; the teaching methods class observations, where students and faculty demonstrated varying levels of multimodal interaction; and the student and faculty interviews, during which the individuals responded to questions I had designed to correspond with my research questions. (See Appendix E, Interview Schedule for Student Participants.)

My primary focus was to describe, analyze and interpret how digital-native students engage in bricolage by choosing and appropriating different media forms and using different, multiple learning modes to create and construct meanings. I also described and interpreted students' metacognitive awareness of how multimodalities shape their own meaning-making

and their pedagogical choices and decisions as imminent educators. The survey, course observations and faculty interviews served as sources for triangulation and verification of the central data source (the participant interviews) and my textual and thematic analyses.

Data Collection Methods

The Multimodal Knowledge Construction Survey (MKCS) allowed respondents from the larger cohort of pre-service teacher education students to answer questions about how and why they use different modes and media forms, what considerations they take into account, and whether or not (and why) specific subject areas or classes make a difference in how they construct and create meaning (see Appendix D). This step provided a context in which all participants could respond and reflect on how they engage different modalities and modal ensembles to construct meanings. I tailored the questions to correspond with my interview questions for the smaller cohort of eight study participants (see Appendix E). These questions were in turn based on the guiding research questions for the study.

The survey questions were designed to allow for minimal mixed methods in support of "understand[ing] the principles of use and modal resources available in a multimodal representation (a multimodal text) or the situated communicative moment" (Jewitt, 2009, p. 22). As a result, I did not address quantitative validity and reliability. Rather than "seek to establish a universal inventory" (Jewitt, 2009, p. 22) of multimodal processes and the various pre-service teacher education students that use them, I used the survey, classroom observations, and professor interviews as complementary sources to gather richer contextual data that illustrated Kress's (2003) theoretical imperative that we need more than language to "account equally well for gesture, speech, image, writing, 3D objects, colour, music and no doubt others" in the work of student bricoleurs (p. 36).

My primary methods of data collection were participant observations and semi-structured interviews. I conducted eight observations: four of elementary education methods courses and four of middle grades education methods courses. I randomly selected eight students (four elementary majors, four middle grades majors) to interview. Semi-structured interviews allowed a more flexible use of interview questions (see Appendix E), where I as the researcher could guide the respondents according to their variant responses instead of adhering to a rigid set of ordered questions that would restrict the generation of potential qualitative data (Smith & Osborn, 2004, pp. 232-233). During the fieldwork, I kept a field log in which I generated and maintained notes, observations and reflections on all of these participant interviews and all of the teaching methods course observations.

I emailed a lay summary to students in several class sections explaining my study and asking for volunteer participants (Appendix A). I also emailed a research lay summary and participation request letter to teaching methods faculty (Appendix B).

Data Analysis

Over the course of the fieldwork, I maintained a field log with daily entries that included observations, reflections, research memos and transcribed interviews. I also created a coding system with which to record, track and analyze all of my data. For coding and data analysis, I employed Dedoose, a qualitative and mixed-methods research software system offered online under the auspices of SocioCultural Research Consultants. I populated my database with both broad codes and more specific sub-codes and themes and used specific code and theme notations and colors, including code application and code co-occurrence charts, to help me organize and analyze the data. (See Figure 4.)

Codes	Multimodality	Modes	Monomodal instruction	Multiple modes	Linguistic	Gestural	Audio	Music	Spatial	Visual	Processes	Affordances	Transformation	Transduction	Dimensions of Meaning Making	Representational	Social	Organizational	Contextual	Ideological	Modal & Textual Awareness	TEXT	Comics	Video games	Design	Technology & Media Forms	Media Forms	PowerPoint	Video	Learning preferences & pedagogy
			3	3	2	4	9		7	6				1		1	11	2	3	3		1			1	1		4		1
			1	9	5	3			4	10		1				2		2				2			3	8	3	1		
			6	15	7	1	7	2	3	10				3		1	9	4	1	1	4				1	6	1			
				3	15	5	2		8	4						2	5	10	1	1		3	1	1	2	6	1	1		
			2	2	1	2	6		2	1						2	6	3	1	3	2	1	4			8		1		
				12	1	9	4		9	13				3		1	4				2	1			2	5		1		1
			4	1	3	6	7		7	7						1	1				1		1	1		2	1	1		
	4		3	4		2	3		2	3						1	3	3	1	2	1					2	1	3		
	4		19	49	34	32	38	3	42	54		1		7		10	39	24	7	13	8	8	8	1	7	38	7	12	1	1

Figure 4: Coding system.

I employed a hybrid coding approach utilizing several "first cycle" coding methods as described by Saldaña (2009). Using "descriptive" or "topic" coding methods, I identified topics of qualitative data passages from interviews and field notes (Saldaña, p. 70). "Process coding" allowed me to "connote action in the data" by coding both "simple observable activity" and "more general conceptual action" (Saldaña, p. 77). "In Vivo" or "verbatim" coding focused on the actual words, phrases and terms used by the research participants and helped me to "prioritize and honor" their voices (Saldaña, p. 74). Finally, I employed "structural" coding that uses content- or concept-based phrases that directly connect to or reflect the specific research questions I used to structure my interviews (Saldaña, p. 67).

My data analysis followed the methods set forth by Creswell (2007) for phenomenological analysis and representation. First, I made detailed descriptions and gathered all of my multiple data sources. Then, after grouping "significant statements" (p.

159) into themes, I wrote both a "textural description" of *what* the participants experience and a "structural description" on the settings and contexts of the experiences (p. 159). A composite description using both description types comprised the phenomenological "essence" of the participants' experiences with multiple modalities (p. 159), while the hermeneutic aspect of my study allowed me to analyze and interpret the variety of multimodal texts the participants produce. I also used mixed methods to include detailed, descriptive analyses and interpretations of all my data sources: survey; observations and field notes; interviews; and various narratives or "text" types.

Validity Considerations

To address validity, I used what Maxwell (2005) calls triangulation, the collection of information from a variety of individuals, sources and settings via a diverse set of methods (p. 112). Yin (1994) calls triangulation a process of "converging lines of inquiry" (p. 92). During the interviews, I used what Maxwell (2005) calls respondent validation or "member checks" (p. 111) to help me solicit feedback from my study participants and ensure that I was not misrepresenting or misinterpreting their thoughts, actions, and perspectives.

As I learned in my pilot study in 2010, I think there is potential for Maxwell's (2005) two main validity threats: researcher bias and reactivity. I had already considered the possibility of researcher bias in my pilot study by recalling Wolcott's (2001) comment that "turning attention to what you expect to discover is one among several possible advantages for early writing" and helps with "focus and creating a meaningful baseline for inquiry" (p. 24). I can see how easy it would be to begin a study with a list of my expectations and then subconsciously tuck those away as the study continues. For instance, without even pausing to reflect, I could already imagine some areas for which I might have expected to get some

interview data: writing skills; preference for group work; attention spans; strong computer skills; and extensive exposure to non-traditional modes, especially comics and graphic novels.

Eventually, if a researcher is not careful and does not make explicit record of expectations, assumptions can creep into the study. Maintaining a detailed, daily field log with reflective, analytic and research memos helped me avoid these validity threats. One method I utilized was "epoche," a process in which researchers intentionally explore their own experiences to become aware of and set aside any biases or preconceived notions (Merriam, 2009, p. 25).

Limitations and Strengths

Maxwell (2005) points out one possible criticism regarding the ostensible selection problem of "key informant bias," where the majority of the data tends to be based on a small population that has already been purposefully selected (p. 91). Such criticism insists that this process creates a false assumption of uniformity or "homogeneity." However, my sampling is purposeful and intentionally small, designed to "elucidate local processes, meanings, and contextual influences in particular settings" (Maxwell, p. 90). Stake (2000) agrees: "Local meanings are important; foreshadowed meanings are important; and readers' consequential meanings are important" (p. 445).

Readers can also decide the applicability of findings to their own situation(s), a process Creswell calls "naturalistic generalization" (p. 163). Figure 5 (below) illustrates this process. Readers can draw conclusions from the study on its own terms, and they can also apply findings to other broader areas. Note how readers can make centripetal generalizations *into or toward* the study and/or centrifugal generalizations *outward* from it and toward their

own fields. Smith, Flowers, and Larkin (2009) recast this process as "theoretical transferability rather than empirical generalizability" (p. 51).
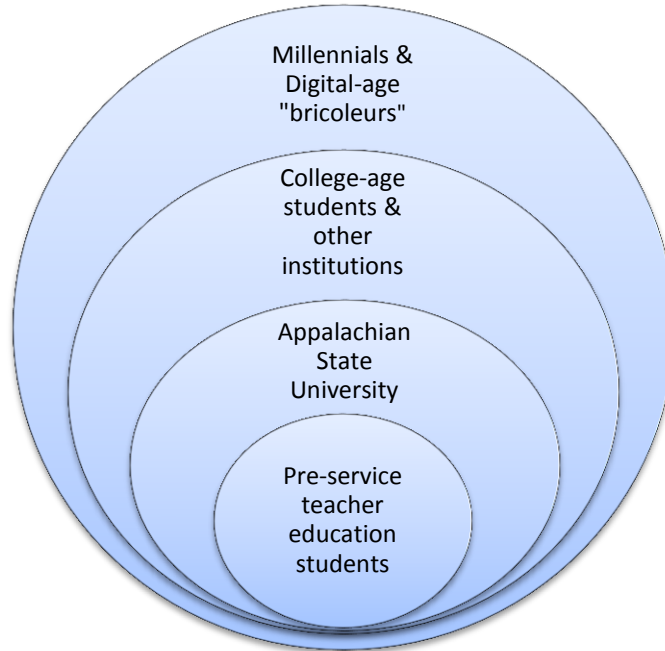
Figure 5: Interpretive study of digital-native, teacher education students.

Policy, school culture and administrative support.

Unfortunately, teacher practice and pedagogy can be shaped by contextual realities of the particular school system in which beginning teachers begin their careers. Despite even the best teacher-preparation and education programs, a clean and clear articulation between colleges of education and individual school systems is often mitigated by "business as usual." Beginning teachers are not guaranteed a venue in which to practice effective (and reflective) multimodal pedagogies. Tyner (1998) recognized this point in the early years of multiple modalities and new literacies studies. She notes that by their very nature, multimodal approaches to teaching and learning will be challenging to implement as "they are not united under a discrete subject area" (p. 82). Further, innovative or even basic beginning

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approaches "require a degree of experimentation that is antithetical to the formal, public schooling bureaucracy" (p. 82).

Thus, the challenge facing multimodal practitioners and pedagogy is the educational system itself, both in systemic and cultural senses. Buckingham (2007) agrees, noting that school policies and practices don't "always translate into practice in straightforward or easily controllable ways: it may be resisted, and it is always interpreted and negotiated in light of the everyday realities of schools and classrooms" (p. 29).

The (mis)perceived reinforcement of traditional, conservative curriculum.

Buckingham (2007) also suggests that any study including Gardner's work on intelligence types may inherently overemphasize learning approaches that are individualized to the point of overspecialization and that divide "knowledge in a manner that resembles the traditional curriculum" with discrete subjects (p. 24). Buckingham (2007) further asserts that the "apparently liberalizing approach of [Gardner's theory] may belie its fundamental conservatism" (p. 24). Buckingham's point is well taken, if the study focuses solely on Gardner's theory. However, my study avoids the potentially confining nature Buckingham addresses, as I include Gardner's work only as a *beginning component* of my description and analysis of multimodal knowledge construction in pre-service, teacher education students.

Following the process used by Kress, Jewitt, Ogborn, and Tsatsarelis (2001), I use analytical and descriptive units or "rhetorical frames" to guide my study instead of broad categories (p. 39). The result is an "account of how actional [*sic*], visual and linguistic resources [work] together to make meanings (a multimodal account)" (Kress, Jewitt, Ogborn, & Tsatsarelis, pp. 33-37). Here again, readers will see one of Maxwell's (2005) stated

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advantages of qualitative research, that of "processes, meanings, and contextual influences" (p. 90).

In this chapter I have presented the methodology of the study, with attention to the qualitative research paradigm and the study's hermeneutic phenomenological design and strategy. Also addressed in this chapter are reflections on prior pilot research and an explication of the site and participant selection strategy and procedures; data collection, coding, and analysis; validity considerations; and the study's practical and theoretical limitations and strengths. Chapter Four will present the study results and the emergent themes; Chapter Five includes an analysis and discussion of findings; limitations and implications of the study; and suggestions for further research.

Chapter Four

Findings

This chapter presents the results of the study, including the major themes and subsequent findings. The first section details the student interviews. Subsequent sections are devoted to the pre-service teachers' responses to the Multimodal Knowledge Construction Survey (MKCS); classroom observations of both elementary and middle grades teaching methods courses and the multimodal processing and interactions that occurred; the individual student and professor interviews, where interviewees discuss their ideas about multiple modes of learning and knowledge construction; and how all of these data sources inform the study's emergent themes.

Student Interviews

Daniel

Daniel is a middle grades education major, with concentrations in mathematics and science; he was the only male participant for my study. Daniel is very polite and reserved and seems genuinely proud to be taking part in the study. I can tell from his several references to "different ways" and "different types" of learning that he has actually read my research lay summary. For the first half of the interview, I am worried that perhaps Daniel is trying too hard to give me responses that he thinks I am expecting. However, he soon begins to provide more detailed responses that do not rely on a form of "different" for qualification or elaboration.

He expresses a preference for assignments that "hit the information in two to three different ways" and allow him to "express my answers, my knowledge, in different ways." His general education science classes, those taken before his teaching methods courses, relied heavily on lectures and tests: "It was up to you just to kind of memorize the information. We didn't really apply it to any situations." As do most students, Daniel has had at least one bad educational experience that has affected how he plans to teach and his awareness of what *not* to do as a teacher.

Daniel's comments reflect a desire to model his teaching after Dr. H, the biology professor whom I had also interviewed for this study. Though he never mentions the word "modeling," Daniel is very aware of how Dr. H tries to make large lecture courses more meaningful and filled with variegated instruction. He mentions her "small" activities, chapter outlines, and mid-term assessment by students of what things have worked well so far in the course.

Daniel, like most of the students and faculty I interviewed, does not prefer the exclusive audio modality of the lecture. He believes that "intermingled within you should have some other type of stimulation whether it be stopping and getting people into groups to discuss it or breaking it up somehow." He follows up on any questions he has about lectures by doing some more research on his own on the Internet. The visual mode is particularly effective for Daniel, especially with his science studies:

> I really like watching on YouTube the science videos. I think they can explain. A lot of times in science, you would like to do a demo, a demonstration to show a certain concept, but maybe you don't have the materials or maybe it's just too expensive, or

the chemicals, maybe, are too dangerous for you to be handling, but you could show a

video of it happening and the students could still see it, and still hear it.

He is also very excited about the visual modalities and obvious curriculum connections of an

animated movie called *Flatland* that was used in his informal geometry class:

Those math simulations, they were used really well, because we were at the time

talking about functions in math class, so that computer simulation of different things

that can be modeled using graphs. So they took a real world situation and simulated it

on the computer and then gave us the equation for what it would look like in

mathematical terms. And that was good to see it presented in different ways.

As I will find out from later research, the film is based on *Flatland: A Romance of Many*

Dimensions, an 1884 novella written by Edwin A. Abbott that uses concepts of time, space,

math and philosophy to create a social satire of Victorian England. It is the story of a man

named "A. Square" and his adventures through such places as Spaceland, Lineland and

Pointland. If Daniel is aware of the multimodal possibilities for this book beyond the

animated video, especially the linguistic ones, he does not mention it to me.

When I ask Daniel to describe some ways he "creates" outside of school, he provides

straightforward and matter-of-fact responses that reflect his unassuming demeanor.

In contrast to the societal stereotype of the digital-native multitasker, Daniel does not fit the

bill: "I like to listen to music sometimes when I study or write, but I have to make sure that I

don't listen to music with words. . . .I'm not supportive of people saying they can multitask."

Daniel is especially reflective as a simultaneous college student and beginning-level

teacher-in-training. He mentions a science experiment in his methods class where they were

learning about density.   They were required to use their prior knowledge and utilize several

calculations and measurements:

> And the big moment came, and I put my test tube in the water and it sank like a rock.
>
> I mean it just went straight down in there. And the failure I think helped me to
>
> understand it more, because we got it out and we started calculating it, and we
>
> realized that to make something just barely float, it had to be a little less dense than
>
> the water. . . .If I had guessed and got it right, and didn't really understand it and just
>
> happened to get it right I wouldn't have learned as much as if I had to go back and
>
> redo it and figure out really what happened.

He says that, not surprisingly, he did not pay attention to such things; as a future teacher,

though, he recognizes the need for reflection, both for his own learning as well as that of his

students. Citing his own experience as a student, Daniel believes that students should

occasionally be given opportunities to choose how they will be assessed in classes.

Liz

Liz is a middle grades education major, whose concentrations are language arts and

social studies. Liz gives immediate and direct responses. Consider, for example, her

preference of "discussion based thinking" over one-way, monomodal audio lectures.

Discussions, says Liz, provide a space for her—or any learner—to "push the discussion

along" and continue actively thinking instead of passively "learning information, memorizing

it and putting it on a paper." Liz is especially enthusiastic about "literature circles," group

discussions that she feels provide an open and safe classroom environment where different

viewpoints can be shared. She never had them as a student and "cannot wait to do them" in

her own classroom.

Nowhere is Liz's sense of input, ownership and involvement more evident than in her passion for Twitter, the online site where people can make observations and even post pictures. Twitter allows Liz to voice more easily her opinions than on Facebook, where multiple comments and responses get generated. With Twitter, Liz says she can voice her own opinion and that "nobody really disagrees or agrees with it. It's just there. You can reply to each other, but it's not meant for conversation." She also says that the members of her middle grades cohort frequently use Twitter for support and to help each other with assignments.

Though in most of her classes Liz's work is assessed based on content, she feels that assessment could afford to be based more on processes, "like how we have approached a project." She cites one class where the professor observes presentations and then "types up an email to us instead of having a rubric in front of her." For Liz, the immediate feedback allows for more original and truthful feedback, "like she's telling you the whole truth about your presentation." Liz also expresses a desire for more experiences with classroom management scenarios and discussions, saying that "we don't have nearly enough practice."

Liz's favorite college course was her adolescent literature class, where "it was the first time that somebody had actually shown me that there is this genre of literature, and it's okay to be an adult and like this literature, whether you're teaching it or not." The course had meaning for her because she felt it was relevant and applicable. The subtext of her comments indicates that, like countless other students before and since, she has been cursorily assigned (forced?) to read Shakespeare:

> It was really great to see how you could take the classics that everybody knows and you can find an adolescent lit. book that covers the exact same themes and topics.

And that was just crazy to me because we don't need to teach *Hamlet* to eighth

graders. That doesn't need to happen. But there are books with the same themes as

Hamlet, so why not use them?

Liz's directness is evident in her response to my question about her experience with

graphic novels: "I can't stand graphic novels personally, but I realize that my students

might." Her closing qualification is crucial, for graphic novels (or "comics") are indeed a

specific type of text. Liz has had this discussion in one of her methods courses: "We

discussed in one of my classes, 'What is text?' And text could be anything. It doesn't

necessarily have to be words on a page. A picture could be text." Liz is at least cognizant of

the *potential* multimodal processes in different text types:

I do feel like a lot of people read them. And if that's how they read, that's how they

read. If you're reading, fabulous. That's how I feel for my students. If that's what

they want to read, I don't care if they want to read graphic novels, video game

manuals.

Liz notes that "a lot of people look at [comics or graphic novels] as children's books,

whereas I think they're more difficult to read than regular books." Her comments indicate

that Liz's modal preference or inclination is highly linguistic to such a degree that the

complementary visual and linguistic modes of this media or text type is totally lost on her.

Again, though Liz does not prefer the text type and its inherent affordances, she does not

dismiss it outright based on her own experiences; she knows that it holds promise for some of

her future students.

Holly

Holly is an elementary education major whose energy and enthusiasm, combined with her wit and gestural emphases, leave no doubt that her (required) second academic concentration is theatre arts. She relishes any chance to be creative, to pretend and role-play. She sees teaching as a way never to leave school and as an opportunity to save children from uninspired, noncreative learning. She believes that learning can be an "adventure" that still "covers the facts" in addition to allowing students "a voice that isn't everyone else's."

As both her comments and her presence during the interview will prove, Holly most engages the spatial and gestural modalities. However, she also demonstrates a linguistic bent and an interest in the social dimension of meaning-making, especially when she expresses her preference for discussions. Note the distinctions she makes regarding group processes:

> I love anything that requires, not necessarily group work, but groups working
> together. So there can be different aspects that can all come together in one giant
> thing, which never happens in group projects. That's why I say group work instead.
> But anything that has multiple people talking and kind of chewing out ideas, I like.
> Because, I mean, I'll learn one way. A person will learn a totally other way. And if
> we can just work together, then we can actually teach this other person something that
> they don't know.

She prefers experiential learning and "being allowed to go explore and have a better understanding" instead of prescribed topics or units focused on "what the state wants you to know." Her engagement of the complementary visual and spatial modes is paradoxical. She has an almost subconsciously artistic and systematic form of notetaking:

It's just doodles, something at the top of them, turns into curlicues, but then somehow

I can link that into an idea that I had over here, so it almost reminds me when I see

the doodle what was going on in class what I was not listening to. I can sometimes

connect it back, saying, "I drew this because I should have been paying attention to

this note."

Of all the students I interview, Holly alone dismisses the broadly applied term "digital

native." She has definite opinions about it:

A parent makes the kid a digital native. Like I said, I grew up- my dad convinced my

mom to buy a Super Nintendo when my brother and I were little because he was

gonna call it educational. I never played it. I played with sticks outside. . . .[Kids are]

from their home town. They're not 'native' to anything. Everything's foreign unless

you introduce it, as a parent or as society. . . .They're not born on the computer. We

all want to think that this is Neopets where you could just magically create

something. But no, it's still reality. It's still the real world.

Her creative endeavors range from photography and photo editing to knitting and sewing.

She concludes her comments on the matter by referring to herself not as a digital native but

as a "visitor to all, native to none." In stark contrast to Liz, from the previous interview,

Holly enjoys reading comics and credits them with helping her learn to read: "They were

more beneficial than any first reader ever will be." She observes that the characters were

more relatable for her and that comics involved "more imagination as well as social

conversation and dialogue."

Her educational utopia, which she flatly terms a "pipe dream," would allow teacher

education students to have hour-long coffee discussion groups instead of prescribed online

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discussion postings and responses. As a teacher, she would love to be able to grade students on passion and energy. Much of Holly's attention would, fittingly enough, be paid to spatial modes and affordances:

> Most of my strategies would be a lot of up, moving. My ideal classroom has no desks, it has no chairs. It has, if anything, beanbag chairs and futons, but giant pillows to sit on. Mats. It has ample amounts of space that, we could be up and moving or we could be on the floor working on something. I run into so many desks as a student, as a child, and now as a teacher in training, I could just do without them in a classroom. They just get in the way sometimes.

As a result of her theatre teaching methods course, Holly is keenly aware of the potential of multimodal instruction, at least in the cross-curricular aspect. She calls it the "class that I learned the most in" and that has made her aware of strategies for learning and assignments that she did not benefit from when she was a child, such as acting out word problems; analyzing story structure by acting out an improvisational "circle story"; and doing a "still frame" reenactment of famous historical events.

Though she speaks more in regard to learning styles, Holly makes a profound statement that could be applied to multiple modes and engaging the modal affordances peculiar to each. Unintentionally, she even makes a connection back to comics, albeit those of the superhero genre:

> I know they tell us as education students that you can't do every mode. You can't cater every single lesson to every single child, but I'm still sitting here, the optimistic student- teacher saying, "Why not?" Why can't I find that one little thing that's going to click with them? It may not be the entire lesson that changed, but why can't I show

them that one little trick that adjusts it to just them. This is their little secret tool.

Make them a superhero that's formed their one little superpower.

If the analogy makes superheroes of her students, who have undergone transformation, then they will have done so through the multimodal process of transduction, where knowledge is changed or transformed between different modes.

Jen

Jen is a middle grades education major whose concentrations are mathematics and language arts. She is never at a loss for words, and her responses support the social constructivism mentioned by two of the professors I interviewed. Several times during the interview she mentions that many of her prior learning experiences were "never made relevant." The ones that were relevant, though, provided her with a hands-on approach that provided her the opportunity to connect subject matter with the real world. Jen strongly prefers group assignments or projects, as long as they are "facilitated correctly." She even has a list of tell-tale signs that the teacher is guilty of ineffective pedagogy in such instances: an overall group grade with no attention to individual student contributions; a lack of communication between teacher and students; and no allowance of in-class collaboration time for students to plan and discuss.

Choice and ownership are important to Jen, but so is feedback:

I do still enjoy standard essays as long as I'm allowed to put my own voice into it and organize it in a sense that I think makes more sense or can get my point across better or is a little bit creative. . . .If there's choice and I'm allowed to choose what I'm writing on or how I'm gonna write it, I feel like I feel more ownership over what I'm doing.

She likes "anything experiential," especially discussion-based learning; the diversity of opinions and input makes learning more meaningful by helping her see things differently or having her own viewpoints challenged. Monomodal audio lectures are not effective at all; at the very least, they need to incorporate some type of interaction or perhaps even some form of multimedia. If not, she will tune out. Jen feels that she has a particular advantage with regard to discussion-based assignments. She is from a midwestern state, where there is no end-of-grade testing and "teachers weren't teaching to the test." This fact enriches her discussions with her classmates and professors and expands their viewpoints as well as her own, whereas with direct instruction "you're only getting one point of view."

Jen has a visual and idiosyncratic style of note-taking: "I do a lot of arrow drawing. Pointing, underlining, circling, starring, highlighting, connecting one thing to the other. It's kind of like organized chaos, but it works somehow. It manages to work for me. I never write word for word." Acknowledging that membership in the millennial generation doesn't make her "any better of a multitasker than anyone else," Jen says she prepares for essay-writing by listening to "really loud music" but also by completely closing down any other potential distractions such as Facebook, Twitter or email. She rewards herself with those after she begins making progress.

When I ask her to describe how she creates outside of school, Jen remembers that as a steakhouse hostess she devised a system to consolidate at least four competing and redundant seating and service charts. I ask her to imagine how something like that could be assessed if she were allowed to submit it for one of her classes. She talks it through for a moment and decides that with this creation she could make curricular connections to math with equations,

graphing, and the line of best fit. She simultaneously pauses and experiences what I would

call a "modal epiphany":

> This is—I'm clever, this is creative. I'm coming up with this off the top of my
> head. . . .So obviously just turning in the thing itself wouldn't really do very much,
> but working with it and turning it into something with graphing, and the connecting it
> to equations and functions and stuff like that. And then that would be something that
> they could grade both on creativity and connecting it to the real world, usefulness,
> and then also on content that is required to learn.

Jen sums up what makes learning meaningful for her when she reminisces about a

passionate and enthusiastic high school British literature teacher:

> Until I took my education classes I never realized how purposeful his teaching
> was. . . .A lot of our assignments were very choice-oriented. . . .It [the literature] was
> something that is so old and old language and way back in the day, like doesn't
> necessarily seem relevant, it was made relevant to us. We were given the opportunity
> to be involved.

She points out that for one multimedia assignment in college, she and her classmates "had to

think as students and then we had to think as teachers." As she prepares to student teach, Jen

obviously continues to do both.

Cathy

Cathy is the fourth and final middle grades major I interview; her concentrations are

language arts and social studies. She began as an art major but after a semester she decided

to change directions, fearing that she might lose her love for art. Since she had always liked

history, she switched to history and secondary education but found the program to be "very

content based." The middle grades program allowed her to concentrate in two subject areas that had always interested her: literature and history.

Though she enjoys reading and responding to both literature and history, Cathy bluntly points out: "I do not like making lesson plans. I do not like making units." What she does like is the "multimodal stuff with technology or just art work," such as the Wix website she created (see Figure 6) for her work in at least three classes:

> I [like] the whole hands on aspect of it. Like, getting to create it and not just like,
> create the written aspect of it, but you have to create the whole page that it's gonna go
> on, and you want images that connect to what you're writing about and stuff. . . .And
> I think it helps to make connections between the real world and like, what you're
> writing, what you're doing in school.
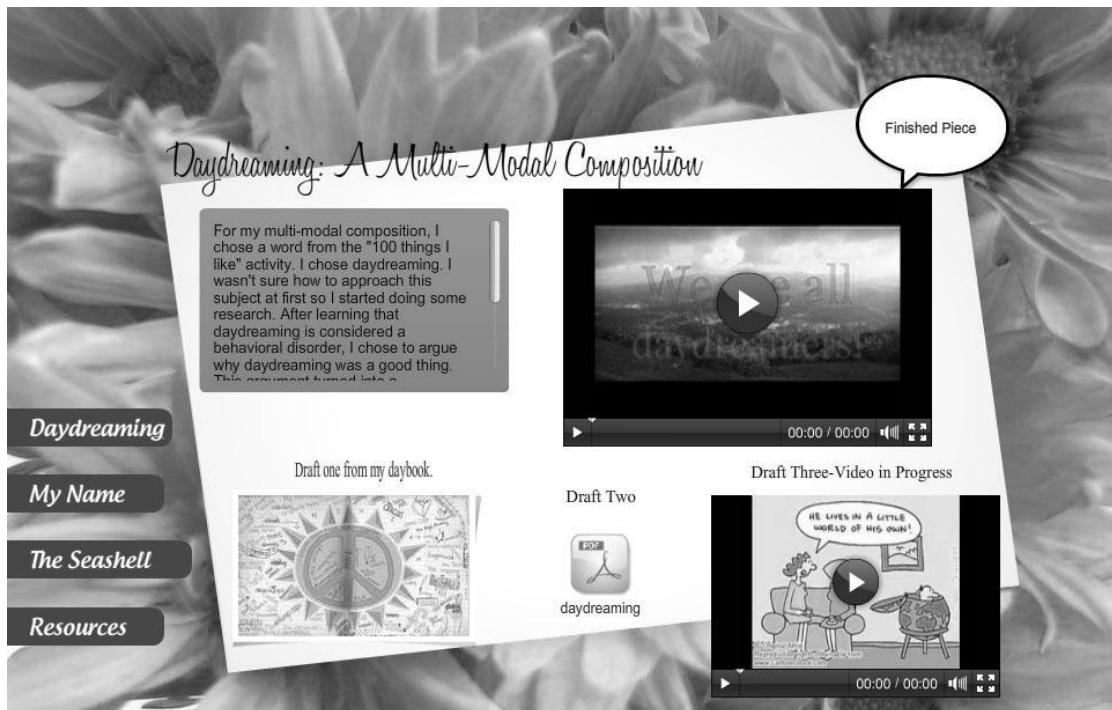
Figure 6: "You want images that connect to what you're writing about and stuff."

Design is a central concept of multimodal knowledge construction, and Cathy illustrates it with her comments about PowerPoint. She doesn't use the term "affordances," but she is well aware of PowerPoint as a visual mode with inherent affordances that can be utilized for effective lecture delivery or presentations: "So people say they're boring, but you can make them really fun if you try, and I think I have that capability, so I can get excited about PowerPoints."

Cathy does not like taking notes on the computer; instead, she prefers "the old fashioned way, pen and paper." Like Holly and Jen, she has a personalized visual system of taking notes, using stars, bullets, connecting arrows and headers. Her approach to writing is hopefully one she can modify or adjust to accommodate learners who, like her, need specific instructions:

Well, the first twenty minutes I stare at a blank screen. The next ten, I usually write my name and date and all that stuff. And then I come up with a nice title. And then I just start writing. Usually it might consist of just, kind of, some ideas, what I want to write about, but after I get my first draft, I try to just let it sit for a day, and kind of think it over while I'm sleeping or whatever, and then come back to it. Because if. . . .and I've done this lately, which is really bad, I've just written a draft, edited it real quick, and then turned it in. And then after the fact, I realized it was the worst paper I've ever written.

Writing habits notwithstanding, Cathy is sincere about her desire to be a middle-school teacher. She notes that she did not have good middle-school teachers and that she wants "to be the teacher I lacked for other students. I want to be that teacher."

Speaking of the connection between assessment and ownership of her work, Cathy feels that assessment should take into account effort and attention to design:

I think there should be effort. I feel like it shows if you put in effort into these types of things. Like even as far as the colors I chose or the spacing of different things, Like that all goes. I think that might even be like, my artistic perspective, because people that create art should usually, I hope, get judged on the effort they put into it.

What Cathy has done is (inadvertently) to draw attention to the assessment implications of multimodal instruction and learning. As with her comments about her Wix project, Cathy implicitly knows that students are active constructors of knowledge, be it through a visual mode or a combination or suite of modes and affordances.

We close the interview by discussing the notion of "text" and the challenges that Cathy will face as a beginning teacher. She is adamant that she will avoid monomodal print-based instruction, i.e., a reliance or over-reliance on traditional textbooks. Cathy has obviously been in at least one class where "text" has been discussed, for her definition of the term doesn't rely on print-based language:

Normally I think of text as like literature. Something like, stagnant. . .but non-traditional is like, movies, music, YouTube videos. I would even go so far as to say, like, interpretive dance. Anything like that creates meaning, that you gain meaning from.

She wants her students to write, but not all the time. She wants to have them "drawing and creating with their hands and bodies." Though speaking more of learning styles than modalities, Cathy would like to survey her classes at the beginning of the semester to "figure

out what kind of learners they are" and to provide them with choices and options for their learning.

Cathy concludes with an observation that underscores the need for effective integration of technology into schools. She notes the popularity and omnipresence of the SmartBoard but says only rudimentary training has been provided and that most of her college professors use them "more as overhead projectors than they actually do interaction with content or anything like that." Cathy is certainly "apt" with visual modalities and instinctively realizes the importance of design both as a pedagogical tool for teachers and a learning tool for students. She describes herself as "visually able, capable."

Angie

Angie is an elementary education major; her second academic concentration (SAC) is mathematics. Our interview took place in my campus office, but I didn't realize until we started that she had an upcoming class. The result was an interview with a bit of a rushed feel, but Angie proved to be very adept at unknowingly answering follow-up questions before I could even get to them. Angie cites a couple of bad teachers she had as one of her reasons for going into teaching: "I don't want my kids to go through that. I want to make a difference in them."

Throughout the interview, Angie offers ostensibly contradictory responses regarding her learning preferences and emerging pedagogical viewpoints. For instance, she expresses a dislike for history due to the overly factual (in her opinion) nature of the material. However, as evident in her choice of academic concentration, she loves to work out math problems because they have a "definite answer." When I point out the "definitive" similarities between the two subjects—at least in the context of how she has defined the two subject

areas—she is almost at a loss for words: "It may have been a bad teacher, it may have been something, but I just really don't like social studies."

Angie describes herself as someone who prefers visual and hands-on learning. She mentions a specific math class from the present semester where the manipulatives enabled her to grasp the concept for area in a way she had never known: "I had never seen that before. And it was like, 'Why has no one told me this?'" Similarly, she cites a science class where they were doing a unit on sound, with tuning forks used in a number of different contexts and scenarios. She is unaware of employing synaesthesia to describe her meaning-making:

> I'd never thought that that's how sound was. It was vibrations going up the string, around my finger, and into my ear. And it just really hit home with me. I'm teaching that to my kids in three weeks, because of how much I learned from that. It just meant so much to me, that it was just like, "Oh my gosh!" It was so eye opening.

The students I have interviewed to this point all indicate an aversion to one-way, monomodal audio instruction, specifically, lectures with no meaningful interaction or effective utilization of material. Angie is no exception: "I don't like stories being read to me. I don't like just listening to someone talk." She states more directly, "I'm not going to pay attention to you if you're just going to stand there and talk." Angie is different from the other students in that she puts a unique spin on Mayer's (2005) cognitive principles of multimedia learning (p. 6).

Mayer (2005) suggests that students learn better from *combined words and pictures* than from words in isolation (multimedia principle); that students learn better from *combined graphics and narration* than from combined graphics and printed text (modality principle);

and that students learn better from *combined graphics and narration* than from the threefold combination of "graphics, narration, and on-screen text" (coherence principle). In order for a lecture to be meaningful for her, Angie needs the complement of printed words (as opposed to graphics or pictures): "I love a PowerPoint slapped full of notes. And I know you're only supposed to put like six words per bullet, whatever. But slap it full of notes, and as I'm writing, I'll listen." Moreover, if she has something visual on her end, she claims better listening and memory skills. She recalls an art class in college:

> Each person got a block of modeling clay. And the teacher was like, "I want you to play, do whatever you want, create whatever you want, while I read this story to you." I can still remember pretty much every word to that story, because I was doing something while I was learning, like, while I was listening.

She draws the line of digital-native multitasking between personal and educational endeavors. She boasts of personal multitasking but acknowledges that she cannot multitask as a student: "I have to do one subject at a time. One assignment at a time. And once I've started an assignment, I have to finish it before I can move on." As we conclude the interview, I am astounded when Angie tells me not only that she has had no experience with a podcast, but that she has "never even heard of it." When I tell her that it could be as simple as a digitally recorded and transmitted lecture, she admits that such a thing could help her eliminate distractions and maintain focus.

Madeleine

Madeleine is an elementary education major whose academic concentration is social studies. She likes practical, task-oriented types of assignments, especially ones that will help her reflect directly on what she has done in the classroom; she is enthusiastic about writing

lesson plans, again because of the practical benefit of having created something that she can take with her when she begins teaching. One counter-example she gives is the interview assignment that Dr. E mentioned, where students have to conduct a diagnostic interview with elementary students of varying levels and then analyze and reflect on how those students reason:

> It kills anyone who's gonna be a good teacher to sit there and not be able to correct a
>
> student when they're doing a problem wrong. . . .and that was torture. Just, like,
>
> having to sit there, and then there's barely enough time in class to do the interview…

She segues into the IDP (Instructional Design Project), which she says "drives me crazy": "The IDP is not very practical. It just seems like a waste of our time when we could be in the classroom, learning, getting really useful experience." She notes that she has even had a discussion with an actual school principal who was more interested in a prospective teacher's classroom management and communication than in the IDP project.

Madeleine is a "religious note-taker" who prefers individual assignments over group ones because the differing ideas and group discussions interfere with her ability to keep good notes and have "a record of the things I learn so I don't forget them." Regarding lectures, Madeleine likes them but qualifies that they must have some level of interactivity and engagement on the part of the lecturer. She needs a complementary action or task when she is hearing a lecture: "I like taking notes and hearing straight lecture kind of stuff." Though group assignments aren't her favorite, Madeleine has taught herself to overcome her initial shyness and reticence by "necessity" and by "taking advantage of the time I have doing group work just to get more ideas."

She also likes independent instruction because allows her to control her own pace and work at things; Madeleine thus describes herself as an experiential learner who loves "trying to figure out my own way to make them." She depends on detailed assessment from her professors to provide her with motivation and let her know she is meeting expectations. Despite that need, as well as her expressed need for grading rubrics and detailed feedback, Madeleine believes that her teachers should be unbiased and should acknowledge the voice and ownership of the student:

> I get teachers have their own opinions, but they also need to respect that of their students. So if the teacher doesn't necessarily agree, that doesn't mean that the student has to be wrong. I mean there are different ways of looking at things.

Madeleine prefers to work and create via the linguistic and spatial modes. She recalls a children's literature class that was, ironically for her, very open-ended; students were to search for 40-50 children's books that fit a particular genre. The genre was the only set detail; the students had to review and select the books instead of having them specifically assigned. Despite the open nature of the assignment, Madeleine (a self-described "book nerd") relished the assignment because it allowed her to sort and categorize, which she already was used to doing in her personal library. She enjoyed working with not only the literature but also with the classification and categorization; this dimension of multimodal meaning-making is that of organization and is also evident in her test-taking. Since she is "really good at connecting things," she likes to "skip around everywhere on tests."

Madeleine's facility with the linguistic mode is an avenue for her to explore and incorporate other modes. She recalls her difficulties with reading traditional print texts as a

child and seems at least somewhat aware of the potential to incorporate and perhaps even create other types of text with different affordances. She says jokingly,

> I know how to reach so many different students because of the things I've learned in my classes. I won't have a problem reaching them. I know the resources I need to find to find ways I can reach them and that kind of thing. I'll bring them over to the dark side of books.

Kara

Kara is an elementary education major with a social studies concentration. Aside from a couple of grade levels that she refers to as memorable, Kara did not have a lot of hands-on activities or experiences: "My science classes followed pretty much like, the teacher would tell us about the content and we would do a worksheet, fill in the blank or take a test or whatever, and we weren't actually involved in any hands-on things." For the few meaningful experiences she had in elementary school, she remembers doing "a lot of projects" and "a lot of thinking outside the box," in addition to having "a lot of choices."

Kara recalls two specific experiences that detracted from effective meaning-making for her. The first was in fourth grade:

> We sat in the classroom all day long, and [the teacher] talked in a monotone voice, and she was really disorganized. . . .I was real, real worried about my grades and stuff, and that was probably one of the worst things, was for her to lose my paper. I felt like she just didn't have any passion for teaching.

The other experience was with a high school AP English teacher:

> I was very grade-oriented. I always wanted to make good grades. I was a perfectionist. If I made a B or a C, I felt like I had failed. I had to make A's. And my

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teacher was. . .every paper I wrote in that class, I got a C or a C-, and no feedback, no

nothing. . . .I thought I couldn't write, I thought I was the worst writer. Something

about it, I was really upset about it. And ever since then, I've not liked to write a

paper.

In light of these two experiences, one can understand Kara's discovery and embrace of

discussion-based assignments and hands-on activities. As she points out, "If I'm actually

involved in an experiment or the discussion, and I know that's gonna be expected of me, then

I learn it and keep it." She mentions her science methods course for this semester and

elaborates on their importance for personal meaning-making:

So like, the experiments that we did, the sorting and the classifying, the making

observations and then talking about it, and I like discussion. I think I learn a lot by

talking to other students and hearing what they have to say about an assignment or a

reading. I think that really helps me.

Kara is engaged by discussions and writing assignments that provide her the

opportunity to reflect. She mentions one education course where she was assigned to write a

series of essays based on her experiences as a learner. The assignment gave her the

opportunity to reflect threefold: as a former student, a current teacher education student, and

a future teacher. Her love of discussions is evident in her further remarks about the same

class:

Every day, we had discussions. And she did a lot of community building, team-

building activities. . . .And so our goal was to get our ideas out there and learn from

other people's ideas. . . .I had to do the readings, but I wanted to do the readings, and

I wanted to learn the stuff we were learning so that I could provide input in class and

like, be a valuable member of the community.

Kara's multimodal preferences, then, lie within the social and ideological dimensions of

meaning-making. She also engages the organizational and representational dimensions of

multimodal knowledge construction via her note-taking system, which shares similarities

with a few of the other study participants:

I think I do better when I write notes or draw pictures with them, because then I can

kind of organize them the way I want to. And I'm really organized. I have to have

bullets and headings and like, hierarchy.

Kara most engages the visual and spatial modes. Her comments support Mayer's

(2005) multimedia principle, in which word and picture combinations help students learn

better than from words alone. This principle proves true for Kara with regard to lectures:

If I was to listen to a lecture on tape or something, driving down the road, it would be

absolutely pointless. I just can't retain the information that way. And if they use a

PowerPoint, that's better too for me because I can see it. I can see the information

and see pictures and make connections. But if they just stand up there and talk, I

can't. I can't learn anything.

The same applies to her note-taking process. She refers to a specific example from her

science methods course:

We did a food web, and we talked about what owls eat, and so I could have written it

out, but instead I drew pictures and like, the levels and everything. . . .If I have

pictures and words, I couldn't just have pictures, and I couldn't just have words. I

have to have both, and it helps me to make connections, I think.

Kara has had recent experiences—two favorite assignments—where she engaged both the visual and spatial modalities. One was a scavenger hunt activity she created, for which she had to take pictures of geometrical concepts and upload them; the other was a photo essay of scientific and natural processes, including accompanying questions related to the pictures (see Figure 7). She demonstrates an innate awareness of visual and spatial modes and their particular affordances and related dimensions of meaning-making.

How has the land been changed in these pictures?

What are some natural occurrences that may have caused these changes? What are some things that could have been done to prevent them?
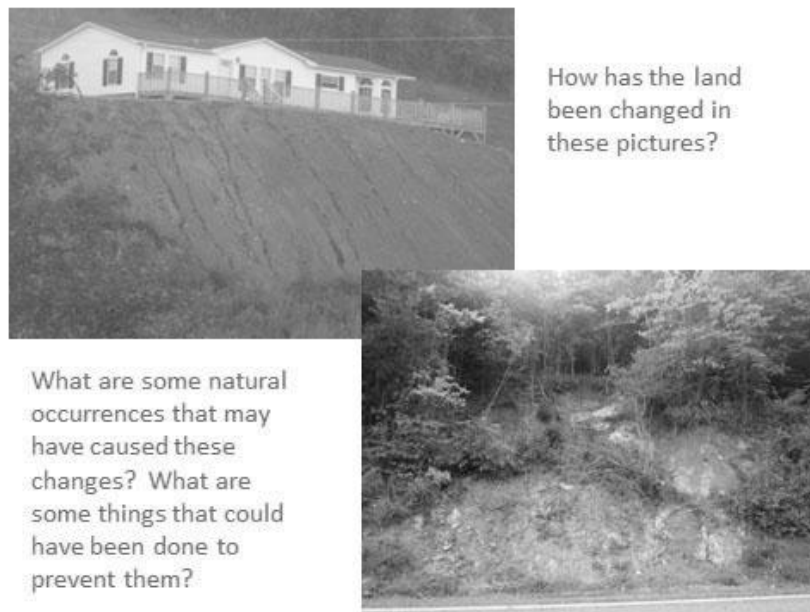
Figure 7—Photo essay: The visual and spatial turns.

Major Themes

I collected data for the study from student participant interviews; the Multimodal Knowledge Construction Survey (MKCS); field observations of the teaching methods classes; and teaching methods faculty interviews. I grouped the data under two large coding schemes—multimodality, and learning and pedagogical preferences—each with its own series of sub-codes (see Appendix F). The following are the two major themes that emerged from an analysis of the coded data in the four major data sources:

- students'modal and textual awareness (MTA);

- students' inherent, shared tension between structure & guidance and creativity & choice.

Modal and textual awareness (MTA).

The first major theme to emerge from my various data sources relates to my second and third research questions, addressing how metacognitive and reflective these pre-service teacher education students are about multimodal processes and their role in knowledge construction of learners (including the participants themselves as well as their future students), in addition to how students' engagement of learning modes and choice of different media forms create and affect meaning. I have named this process "modal and textual awareness," or MTA. Jewitt (2008) states that students' multimodal processes are a "crucial aspect of knowledge construction" that make "the form of representation integral to meaning and learning" (p. 241).

MTA and the student-teacher participants.

Daniel thinks the audio and visual modes hold the most potential for himself as a learner and, in a comment seemingly at odds with his remarks about design and creativity as well as his academic concentrations of mathematics and science, he thinks that he is comparatively weaker with regard to spatial modalities and affordances.

Liz does not mention the word "mode" or "modality," but she is in the early stages of recognizing multimodal possibilities and affordances without specifically articulating them. She does speak knowledgeably about different types of text. Liz also engages the audio modality when she is involved in meaningful class discussions, especially the literature circles that she feels are so full of potential for her future students. Her affinity for

expressing herself on Twitter is also evidence of the audio modality. What she realizes but does not articulate—since she, like the other participants, does not yet possess the "metalanguage" (Luke, 2003) for multimodal reflection—is that both of these activities encompass all of the broad social dimensions of meaning-making, especially the social and the ideological. That is, with both activities, Liz considers "the way meaning connects/relates to the producer and the recipient" as well as draws "attention to the possible motivations of the creator and consequent positioning of the receiver" (Kalantzis, Cope, & Cloonan, 2010, p. 71).

Holly is easily the most "modally aware" of all the interviewees. Her modal preferences are visual, spatial and gestural, though she does not feel—or want to be—confined by them:

> I like to think that my brain's a little switchboard that I can just be like, "And I'm in this situation now, so I'm going to switch gears and learn this way." So not only learning with how I see things or how I hear it or how I had to touch it, it's kind of a different situation that lends itself to different ways of learning.

Jen is planning a math unit on fractions where instead of taking a test, the students will create their own recipe books that will rely on and incorporate the fractions they have studied in addition to foods and family history. Like the other students I interviewed, Jen does not use and is not aware of such multimodal terms as "affordance" or "transduction," but she does demonstrate an incipient and as yet unarticulated understanding of multimodal teaching and learning.

Cathy enjoys creating and designing PowerPoints; she was especially enthusiastic about the Wix website she created that acted as a "master website" for her work in at least

three classes She enjoys the affordances of this technical medium and visual mode, as they allow her to be creative, hands-on and reflective with particular attention to design.

Angie is in the early stages of modal awareness, just beginning to realize—albeit instinctively and more in the realm of learning styles—the importance of multimodal instruction. The tension between structure and creativity is on her mind, even as she prepares to begin student teaching:

> It worries me that I'm gonna be, like, stuck in the way that I learn that the kids aren't gonna be able to pick up. . . .I haven't been taught how to teach kids that, like how to teach outside of what you're comfortable with.

Even though Madeleine's modal preference is linguistic, she has yet to cultivate an awareness of other "text" types such as comics ("I'm not huge into comics") and video games ("I'm not big on video games"). She says, "I like words in books. I like to read, because it kind of helps me visualize things on my own." Nevertheless, though she is not yet teaching and is not referring to multimodal processes as such, she demonstrates an implicit desire to move in that direction:

> I feel like I would not be satisfied teaching students the same thing in the same way over and over again. . . .I have so many different diverse lesson plan ideas, like how this will really affect this person, how you can extend this idea to affect a language learner, and that kind of thing. So, I don't know I just, I have so many different ways of teaching in my head, I want to kind of try all of them, like, on my own. Not in a "you're being graded" setting.

Kara's engagement with discussions and interest in photography indicate her primary multimodal preferences as visual, audio, and gestural. Conversation and sharing with others

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add the social and ideological dimensions of meaning-making, while her visual note-taking

system and photographic compositions are evidence of the organizational and

representational dimensions of multimodal knowledge construction.

MTA and the Multimodal Knowledge Construction Survey (MKCS).

I created this survey to collect data for a beginning "snapshot" of the student-teacher

cohort from which I would interview eight students for the study. I opened the online survey

two weeks before I began conducting teaching methods classroom observations; I sent two

email reminders during that period asking students to complete the survey. Forty-eight of the

178 students (27%) completed the Multimodal Knowledge Construction Survey, which

included a total of 25 questions (see Appendix D). The questions were based on the

following:

- gender;

- major and academic concentration(s);

- Gardner's multiple intelligences;

- presentation/lecture learning preferences (Mayer's principles of multimedia learning);

- time spent with various media.

The final question was a short answer response box where students were asked to write their

definitions of "text."

Elementary majors.

Of 43 elementary education majors, 29 students (67%) indicated social studies as

their second academic concentration (SAC). Ten of the 29 elementary majors with a "social

studies" second academic concentration (SAC) listed "logical-mathematical" as their weakest

intelligence (34%).

Middle grades majors.

Four of the five middle grades respondents (80%) indicated language arts as one of their two required concentrations. Three of the five middle grades majors (60%) indicated social science as one of their two required concentrations, and three of the five majors (60%) listed *both* language arts *and* social sciences as their required concentrations. Two of the five majors (40%) indicated science as one of their two required concentrations. One of the five MG majors (20%) indicated mathematics as one of the two required concentrations.

Intelligences.

The two highest reported strong intelligence types were "interpersonal" and "bodily-kinesthetic." Of the 48 survey respondents, thirteen listed "interpersonal" as their strongest intelligence (27%) and nine listed "bodily-kinesthetic" as their strongest intelligence (19%). All of these students reporting these strengths are elementary education majors. The two highest reported weak intelligence types were "logical-mathematical" and "musical." Of the 48 survey respondents, fourteen listed "logical-mathematical" as their weakest intelligence (29%) and eleven listed "musical" as their weakest intelligence (23%). Two male students completed the survey. One was an elementary education major, the other was a middle grades major. One indicated a logical-mathematical intelligence, and the other indicated a visual-spatial intelligence. Neither reported a "personal" (inter- or intra-) type.

Mayer's (2005) principles of multimedia learning.

The multimedia principle is significantly supported, as 45 of the 48 respondents (93%) said that they learn better from lectures/presentations that include both printed text *and* pictures. Less persuasive is confirmation of the modality principle, which states that students learn better from *combined graphics and narration* than from combined graphics

and printed text. Fifty-two percent of the student respondents indicated that they learn better

from combined graphics and narration; however, 48% indicated that they learn better from

combined graphics and printed text, as held by the modality principle. Finally, the responses

to the third Mayer-related question appear incongruent with Mayer's coherence principle,

which states that students learn better from *combined graphics and narration* than from the

threefold combination of "graphics, narration, and on-screen text" (p. 6).   Forty-two of the

respondents (88%) indicated the opposite of the coherence principle by noting a preference

for combined graphics, narration and printed text over the dual combination of graphics and

narration.

Time spent with media.

Forty-four percent of the respondents spend up to one hour per day reading and/or

writing on Facebook or other social networks, while forty percent do so between one and two

hours per day. A third of the respondents (33%) listen to music up to one hour per day, and

another third do so between one and two hours per day. Forty-four percent spend between

one and two hours per day reading and sending email, while 48 percent spend up to one hour

per day text messaging. Over half (54%) of the respondents indicated that they do not play

computer and/or video games; over half (58%) do not spend time blogging. Three of the 48

respondents (6%) read or spend time with comics.

"Text."

When asked to write a brief narrative definition of the word or concept "text," five

out of 48 students (10%) provided responses that did not rely on traditional notions of text as

predominantly or exclusively print-based. They included in their definitions such terms as

media; paintings; graphic novels; bar graphs; stoplights; body language; blogs; video;

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textbooks; pictures; interaction with people; dress; and appearance. One student astutely noted that "the absence of certain things could be a text as well." The fact that 90 percent of these digital-native teacher education students used traditional, print-based definitions of "text" is telling, for it indicates that perhaps these future educators are not quite the "experienced makers of meaning" as Kress (1997, p. 8) holds. The majority of the respondents do not appear to be fully aware that "text" is more than language-based and can be "any form of expression or communication in fixed and tangible form that uses symbol systems" (Hobbs, 2010, pp. 16-17).

MTA in the teaching methods classroom.

Classroom observation 1.

Dr. N begins the class: "We'll talk about writing today." Students are to take five minutes and respond to the PowerPoint slide of writing-related questions and prompts. She then calls for the class to "pull together" to begin a group discussion of these prompts. The anecdote that stands out the most for me comes when Dr. N calls on Olivia, a non-traditional student who is definitely closer to my age than her cohort teaching peers. Judging from their comments, I surmise that Dr. N and Olivia must have been my public-school contemporaries. Olivia shares her early writing experiences: writing down information directly from (print) encyclopedias; writing a report on Nepal; and having no opportunity for any form of creative writing until high school. As students continue to share, Dr. N interjects that she was never allowed to practice scaffolding or to write multiple drafts.

Dr. N segues from the group discussion to a lecture guided by several PowerPoint slides. She discusses the power of writing, that writing is a communication tool that can transmit information, extend knowledge, and that can be expressive and even therapeutic.

She makes a comment that I could not have scripted any better to relate to my research questions. She points out that so many "old school" teachers focus only on writing conventions instead of content and process (such as word choice, etc.). She has just noted that there are teachers who perpetuate monomodal instruction and literacy practices. Without even mentioning "multiple modes," she illustrates that a multimodal approach to writing instruction would certainly help provide students with authentic tasks and supportive writing environments: free writing; building prior knowledge; video; reading literature; among others. "Giving kids something to look at is powerful," she says. She asks students to get into their literature circle groups and share with the class how they will make their presentations.

Once again, almost as if scripted, this class becomes a living example of multimodal knowledge construction. One group is planning to create a playlist of songs that connect to the emotions and themes of their chose book. Another group is making a print booklet. A third group will create a "coming attractions" movie trailer for their book. Finally, though their details are still being fleshed out, one group will do a silent presentation, with no words or music. As Dr. N circulates among the room and the students collaborate, the noise level increases along with several multimodal ironies. While we are seated in a course devoted to language arts teaching methods, one student in front of me pulls up the Sam Cooke classic song "A Change Is Gonna Come" (an audio medium) on YouTube (a video medium).

Classroom observation 2.

My second methods course observation begins as I enter a classroom with two rows of student tables sitting perpendicular to the "front" (left side) of the classroom. It is a hot, noisy classroom as all the students chat and wait for the class to begin. All twenty students

and the professor, Dr. E, are female. Aside from this fact, the greater irony of this observation is not lost on me; my first impressions and observations of "Teaching Mathematics in the Elementary School" involve geometric terminology.

Apparently, I have chosen to observe the first day of student group presentations. A group of three students distribute worksheets and some small-block manipulatives for the other students to use for the upcoming activity/lesson. Three words are written on the board—flip, slide, turn—and below each is a large L-shape figure.
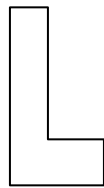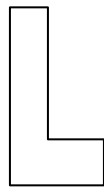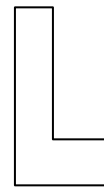
Flip   Slide   Turn

The group members call for two student volunteers to come to the board and draw a "flip" object. They do so, in essence drawing a backward "L," and the same group member instructs the other "students" to draw the same shape in their flip charts and write the words "reflection" and "flip." She then recites the definition of these synonymous terms and points out the mnemonic device "FL": the two letters from the middle of "reflection" that also begin the word "flip."

The next group member calls for two more volunteers to come and draw a "slide" object. Both draw "L" shapes, ones that still look like the letter "L" but are merely placed in a different location. The group member points out a new mnemonic, "SL," the first two letters of "slide" that also happen to be middle letters of the word "translation," a synonym

for "slide." The third group member calls for volunteers to come and draw "turn" figures. After they have done so, the group member uses her arms illustrate the turning action of the new drawings. The professor, Dr. E, interjects with a question. "Where is the point about which it was rotated? She uses her own L-shape manipulative to demonstrate the point of rotation. Dr. E elaborates just long enough for the group member to have an epiphany. The student then revises the definition she gave a moment ago by including a key adjective. She tells the class that a "turn" is a "transformation that rotates around a *fixed* point."

As the three group members distribute new worksheets for practice and begin circulating among the students, Dr. E gives the group a suggestion for providing directions to students: "Say it, write it, say it again." At that moment, I experience my own epiphany. Earlier in the day, while volunteer-teaching Spanish to my daughter's first-grade class, I was reviewing numbers with the class when one boy pointed out to me that it would help if I wrote out or spelled the numbers while I was reviewing them. In one day, and from an early point in the student spectrum to a much farther end, I saw Mayer's (2005) multimedia principle in action: students learn better from *combined words and pictures* or representations than from words in isolation (p. 6).

Dr. E and the group members continue to circulate and interact with the students. Dr. E pauses and instructs everyone to draw a point of rotation for practice. "Take another sheet of paper, trace the arrow, put the pencil where the point of rotation is, and lift the paper." She models her own instructions by drawing on the board.

The class continues working through practice problems, with Dr. E visually, gesturally and spatially guiding them. Work and activity continue, as Dr. E distributes a variety of colored markers for students to use on the dry erase board. She takes out a

yardstick and uses it and the markers to continue drawing figures for examples and practice. She tells the students to take out a piece of paper and do actual physical tracing. As if to eliminate any perceptions that such an activity is simple and void of true meaning, Dr. E makes a statement that sounds as if she and I have discussed my research about multiple modalities. (We have not, though she will later be one of my random selections for a faculty interview.) What she says has the oxymoronic simplicity and profundity characteristic of a proverb: "'Spatial' is not a matter of intelligence but of experience."

For one problem, Dr. E points out in a linguistic turn the mathematical shades of meaning for the word "orientation." She continues with another problem, but one student doesn't seem to be understanding: "I'm confused." Dr. E asks for more elaboration, and she uses more gestures and yet another drawing to help the student understand. For the second time in one class, I see Mayer's multimedia principle at play. This student needs more than words (audio mode) to help her understand. Unwittingly, she supports the principle when she says, "It helps to write it out." After Dr. E writes out the letter combinations for the angles, the student begins to understand. (See Figure 8.)
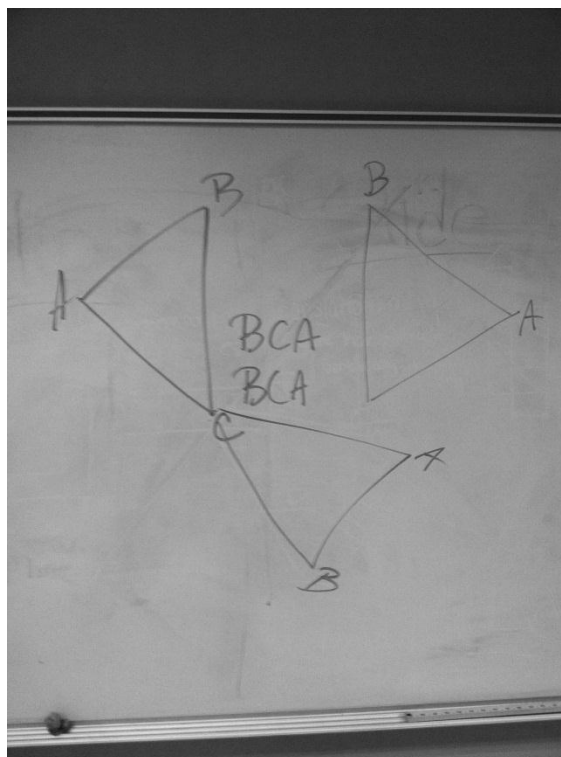
Figure 8: "It helps to write it out."

Classroom observation 3.

My observation for "Teaching Science in Middle and High Schools" is the only one of my observations that does not take place in the College of Education; I am instead in a classroom in the Rankin Science building. As the students settle in for class, Dr. H opens with a call for discussion of the 5-E Learning Cycle: engage; explore; explain; extend; evaluate. Dr. H shows in this class that she is truly engaged in student learning. Her attention to detail and the processes of modeling and guiding are already on display; the far right side of the dry erase board is filled with two sets of plans for today's class.

The class discusses articles devoted to the need for revising and modifying cookbook labs. The discussion segues into one on guiding students and responding to them in classroom settings. Dr. H then asks them what type of questions they would ask as teachers in order to redirect the students into more meaningful exploration and engagement. She

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notes one of her own strategies: "I have students work through the thinking process with me." The discussion continues, with students offering ideas. Dr. H adds another technique from her repertoire; she suggests going beyond merely following a correct answer with confirmation and asking the student to "lead me in your thinking."

After a five minute break, the class reconvenes and Dr. H instructs the students to break into groups and review their bacteria data. Dr. H circulates among the students and reinforces and models all of her earlier suggestions for interacting with and making comments to students. Dr. H comments, "I noticed there were lots of new questions," and launches into the "bacteria for breakfast" activity. She distributes test tubes to the students and instructs them to make some predictions and inferences about the test tube contents, using evidence for support. From my vantage point at the rear of the room, I notice that the mystery content is some sort of white liquid, not quite congealed but not entirely fluid. The odor is neither entirely offensive nor pleasing, more an attention getter than ideal olfactory experience. The students begin to look, observe, smell, touch, manipulate and react, and Dr. H reminds them of the "wafting" technique of smelling, to be used when one needs to smell but is unsure of the danger. While the students trade short, informal verbal observations, Dr. H gives them the opportunity to taste the concoction using Pyrex cups and spoons.

Dr. H takes out a small dry erase board and asks the students to help her write down ideas, guesses and evidence. Their guesses include yogurt, sour cream, cottage cheese, and Greek yogurt. In between the comments, Dr. H continues to interject with a series of guiding questions. The students are then instructed to clean the test tubes and return to the center tables for another activity.

The new activity is based on a previous assignment. The students will now share their findings about a specific type of bacteria to the class in addition to drawing a representation of their types on the dry erase board. The students must also share the name of the bacteria and facts relating to shapes, textures and uses. (See Figure 9.) To complement the discussion, Dr. H takes a small dry erase board and keeps tally marks for uses, with columns for "good," "bad," and "neutral." The drawings and discussion continue.
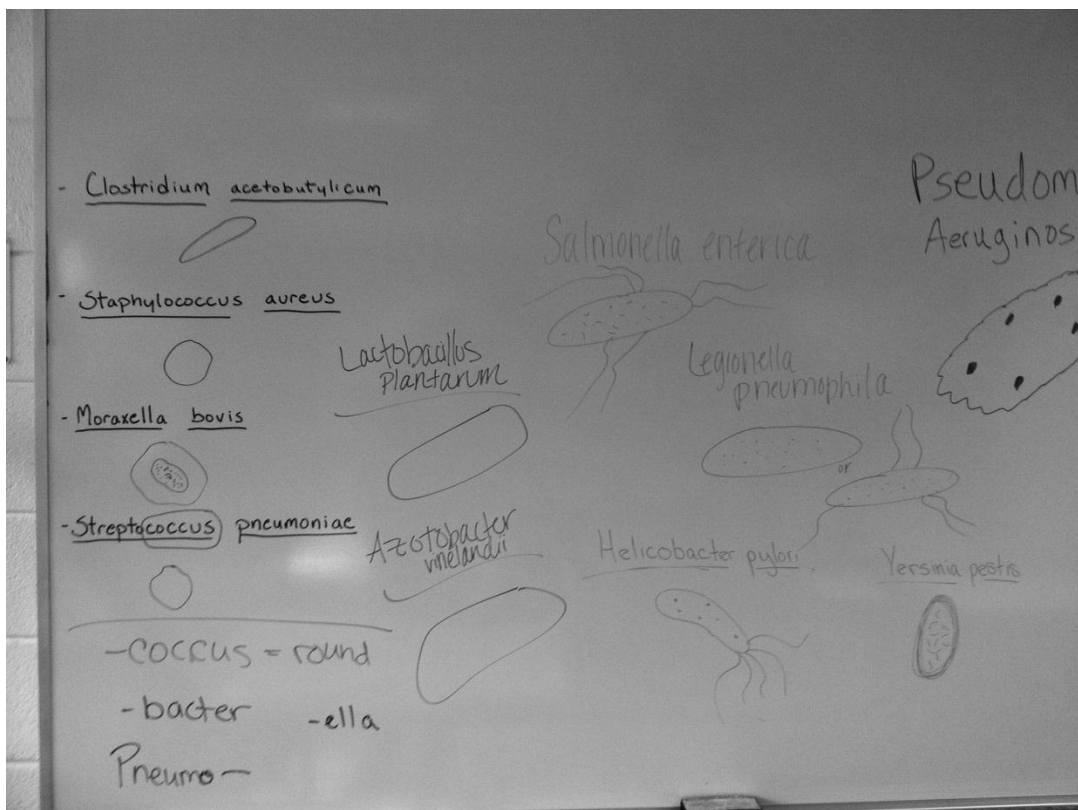
**Figure 9: The linguistic, visual, spatial, and gestural turns—naming and depicting bacteria.**

Dr. H instructs the students to break into groups and focus on the bacterial patterns and shapes. She draws attention to the linguistic naming conventions, pointing out that the names are based on and reflect the bacteria's spatial and visual properties. "Coccus," for example, is so named because of its spherical or spheroidal shape.

Dr. H asks the students to take five silent minutes to reflect and respond in their journals: "What have we learned about bacteria?" She instructs them that in the next class they will share their responses to all of the questions raised in today's class, including the answer to the "bacteria for breakfast" mystery substance. She closes with some informational items relating to assessment rubrics and the Instructional Design Project (IDP).

Classroom observation 4.

"Development of Literacy for Learning" is a teaching methods course in language arts for elementary education majors. Dr Q welcomes me and lets me sit on the far right side of the room, at a table nestled just next to the computer podium. Straight ahead of me sit six evenly spaced tables with anywhere from two to four students seated at each one. Of the 19 students in the class, 18 are female. Dr. Q brings a collection of different children's books and fans them out for display on a table just in front of me. As the class gets settled, I can make out some of the titles: a Judy Blume book, whose title I cannot make out; Roald Dahl's *The Witches*; Eric Carle's *The Very Hungry Caterpillar*; *Olivia*; *A Bad Case of Stripes*; and a few others. Dr. Q begins with a brief review of "Storymaps" from their previous class meeting. She now wants the students in groups to choose one of the books on the table and create a story map for the book. The purpose for today is to discover different ways to use the Storymap tool and to share the results with the class.

The students come to the table, make their book selections, and return to their table groups to begin discussions. Dr. Q checks in with a group as they discuss "problem" and "resolution." She asks them, "How would you use this in your classroom?" The groups continue to work and create, and I notice that they seem very social, yet engaged. They are

reading aloud from books, and they are happy. They are enjoying this activity. Dr. Q brings

the class to order, and the presentations begin.

The visual representations for all of the Storymaps are very creative and have a

variety of artistic flourishes. Group One, working with *The Very Hungry Caterpillar*,

presents a caterpillar drawing where each circular section of the caterpillar represents such

topics or concepts as problem and resolution. Group Two, *A Bad Case of Stripes*, has created

a bulletin board for students to discuss and chart story elements such as setting, problem,

rising action, and so on. Group Three, working with the young children's book *No, David!*,

has made, in the words of one of the presenters, a "foldable brochure thing."

Group Four has taken a "list" approach to map the story elements of Roald Dahl's

Matilda. For *Olivia*, Group Five presents a multifold visual representation that includes

story-related design elements of scissor cuts, pictures and print. For *A Lucky Dog*, Group Six

presents an "informational" document, a columnar foldable that could be used for both an

outline and a timeline of the book. Group Seven presents a minimal set of drawings and

words and professes that *When I Was Young in the Mountains* has "no storyline" and that

they were perplexed by the "randomness" of the book. Nevertheless, Dr. Q works to keep

them thinking and alleviate their concern by asking, "How about if you want them [students]

to revisit the text and increase comprehension?" After Dr. Q listens to the response, Group

Eight—also working with *No, David!*—presents a visually impressive rendering on a double-

sided accordion-folded document. Group Nine concludes with a full single-page drawing for

Mr. Lincoln's Way.

Though up to this point Dr. Q and I have not discussed my research, she closes this

part of the class with a comment that is at once simple, profound and epigrammatic regarding

multimodal knowledge construction: "The more times students interact with text, the more they understand." Considering the highly visual nature of the Storymap activity or strategy, a great deal of that interaction would result from the display of these documents or artifacts. However, none of the classrooms where my observations take place have any space— bulletin boards, cork boards, etc.—devoted to the display of student assignments and creations, notwithstanding another class's concept maps haphazardly taped to the back wall of this room. This absence lends another dimension to the modality of space: the (non) utilization of physical space to complement or reinforce pedagogy.

Dr. Q moves from the Storymap activity and introduces the QAR (question-answer-relationship) reading strategy, which teaches inference and provides a "common vocabulary" for students and teachers to read and discuss written texts. She introduces the strategy's four levels of questions: "right there" and "think and search" (both text-based), and "author and you" and "on my own" (both knowledge-based). She avoids monomodal audio instruction by giving a handout with three different visual depictions of the QAR process/strategy.

Classroom observation 5.

My next observation is of "Social Studies in the Elementary School." Dr. P has arranged the student tables in a large semi-circle. After introducing me to the class, she takes a few minutes for warm-up with the class by discussing service learning, current events, and professional organizations for social studies teachers. She returns a previous written assignment with what appear to be rubrics and extensive written comments; the students eagerly and immediately begin reviewing their feedback.

Dr. P then distributes a quiz she has named "Chocolate IQ" and gives them five minutes to complete it. Among the 20 questions—most of which are short answer or fill-in-the-blank—I see listed such disparate and ostensibly trivial questions as

- What is lecithin, a product in most chocolate bars, and why is it there?

- How did the cacao bean, from which chocolate is derived, get to Europe? When?

- The chocolate chip and the movie *The Wizard of Oz* entered the American scene in what year?

- Name a state that allows the addition of alcohol to chocolate products.

- Which country has the greatest per capita consumption of chocolate?

After five minutes, Dr. P begins to review the answers with the students. She instructs the students to look back over the quiz and begin identifying particular topics and themes. They immediately identify marketing, production and geography. Dr. P pulls down the display screen in front of the class and projects a PowerPoint slide of possible chocolate-related lessons, such as history of chocolate; world in a chocolate bar (geography); consumer choices and nutrition; and chocolate production, distribution and labor.

Dr. P is taking an everyday, real-world item or commodity and using it to help students make connections to and create effective lesson plans for social studies (history, economics, political science, geography, among others) and other fields and disciplines (science, health, medicine) including popular culture. Throughout the rest of the class, she will remind them of these connections and get them to think about and respond to them. This lesson is one that generates seemingly countless connections to curriculum standards and standard courses of study.

Dr. P begins with a chocolate and history; she and the students discuss the Aztecs, Quetzalcoatl, Cortéz, Montezuma and the historical background of chocolate. She moves on to a discussion of the "world in a chocolate bar" and displays a concept on the screen to guide their brainstorming and thinking. Responses include economics, trade, and science. Dr. P calls for a short break of about five minutes. The class resumes and in the total opposite of what Hobbs (2006, March) calls a "non-optimal" use of video, Dr. P cues up a four-minute segment of the film *Willy Wonka and the Chocolate Factory* (1971) and instructs the students to pay close attention for evidence of economics concepts within the segment. After the segment—and despite the students' pleas to continue watching the film—Dr. P asks them to respond with concepts evident in the clip. They do so: greed; the Wall Street bailout; production; labor; scarcity; wants versus needs. Dr. P draws connections to the film *Blood Diamond* and the North Carolina lottery.

She segues into chocolate and nutrition, asking "How many of you read labels as kids?" Though only a couple of students raise their hands, Dr. P has planted the idea for potential health-related lessons. She plants another idea, this time for consumer economics: "We could do *Consumer Reports*-type activities." Dr. P then takes out a bag of M & Ms and begins distributing varying numbers of pieces to different students. She poses some hypothetical questions regarding who has more pieces and why. The discussion turns to such topics as wealth, trade imbalance and unequal distribution.

The professor continues with questions and prompts. Theft is mentioned; Dr. P makes a reference to Robin Hood and the related possibilities of language arts connections. Another student mentions taxes and taxation; Dr. P adds financial concepts such as loans, payments, collateral. Connections to the mathematics curriculum are discussed. They

discuss symbolism and the possible ways chocolate could represent power. Bartering is mentioned, as is chocolate and its relation to labor issues. These connections relate back to the "Chocolate IQ" quiz questions about the top consumers and producers of chocolate in the world. She dismisses the class with a pronouncement that at once summarizes today's class and speaks to the value of multimodal teaching and learning: "Letting kids go through the process is huge."

Classroom observation 6.

The classroom for "Science and Science Teaching in the Elementary School" has an open and spacious feel to it. Like Dr. H's middle grades methods science classroom, this one has student tables in the center and the perimeter of the room is lined with science paraphernalia. I scan the room and do a silent head count of students; there is only one male student among the cohort of twenty. I have not met Dr. L, but I can tell that she has taught in the public schools before. She begins class on time with a quick review for these future teachers of clear expectations and inquiry-based assignments. After a short reminder about the upcoming final exam, she moves on to the morning quiz.

Student chatter abates, and Dr. L passes out the quiz. Two questions will require examining two pictures now displayed on the screen. One image is a cloud formation; the other is a multi-colored leaf. The remaining questions call for the students to define "intertia" and to draw a simple graph based on a table of figures relating to force and motion in a hypothetical fifth grade science activity. This quiz is not a monomodal (audio) one where the professor reads the questions and the students write their responses. Instead, it engages the linguistic, visual and spatial modes. (See Figure 10.) A couple of students have questions about the leaf picture, so Dr. L takes a moment to clarify. The leaf has some red

and some yellow, she notes, but "it's more important to understand the *process* instead of the pigment names."
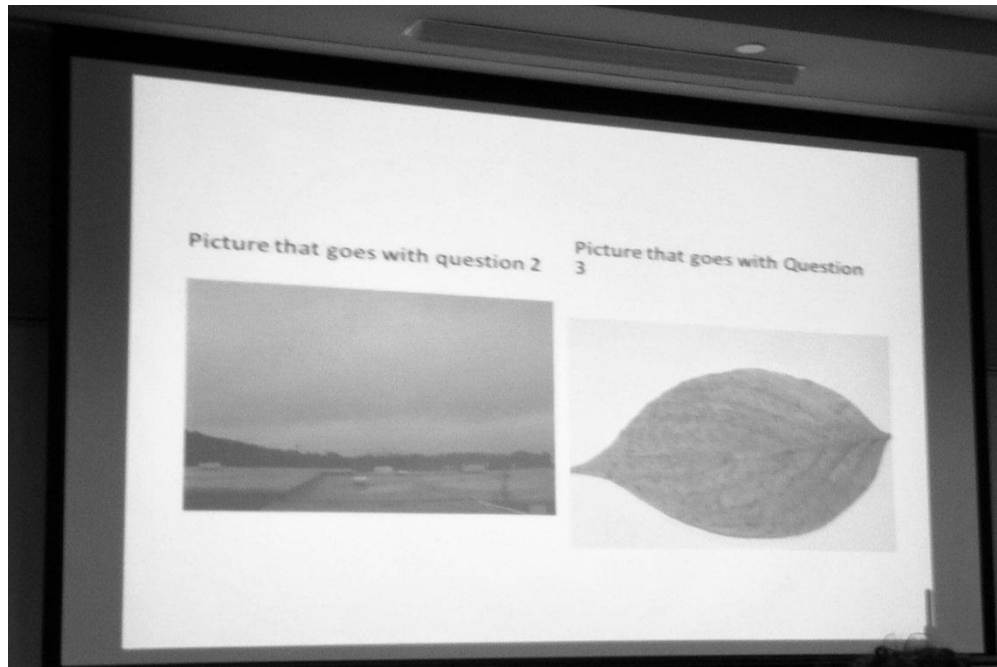
Figure 10: Science quiz—the linguistic, spatial and visual modes.

As students complete the quiz, they get into groups and work with their plant and seed observations. They move to the plant lights along the perimeter of the room and begin making observations and discussing hypotheses while jotting notes in their journals. After several minutes, Dr. L says they will now switch from plants to animals. "Start a fresh page in your journal," she says. "From memory, draw the best picture of a grasshopper you can, with details." As Dr. L distributes trays and magnifying glasses for an upcoming task to each table of students, she instructs them to look at each other's drawings and generate a list of grasshopper characteristics. Dr. L facilitates a discussion and writes the list on the board: eyes; 2 antenna; jumpy legs (big); 3 body segments (head, thorax, abdomen); 6 legs (maybe 8?); wings. Emphasizing the nature of multimodality and how different modes have different affordances, one student comments, "They chirp—you can't draw that."

After more discussion, Dr. L distributes a real (preserved) grasshopper to each table, resulting in peals of laughter and noise from the students. She calls their attention to procedures and then instructs the students to observe, examine and do another new grasshopper drawing. The students continue to observe and examine; several take out their phones and snap pictures of the grasshopper they can use to guide their drawings. Dr. L interacts with the students, and a few minutes later she brings the class back together to discuss their findings. "Now switch to your 'teacher hats'," she says, and instructs the students to compare their first grasshopper drawings with the new ones. Dr. L tells these future teachers that drawing is "an important tool in your arsenal. It's a fantastic assessment tool," an especially beneficial for younger children, visual learners, ELL (English language learner) students, and students with learning disabilities.

The last hour of the class is devoted to a collection of "centers" Dr. L has set up around the room among the student tables and the outer observation counters lining the walls. Dr. L has typed a list of the centers on a Word document displayed on the screen: "parent and baby," which is a collection of animal pictures for students to piece together; "mystery objects," organisms in a large, glass container the size of a fish tank; a set of acrylic models in which different insect species are encased; "mystery mouths," a book containing a variety of detailed photographs of animal facial characteristics; and a silkworm observation center. The students rotate between the centers about every seven minutes, continuing their observation, investigation, inquiry and collaboration.

Dr. L continues to circulate among the groups, and another science professor en route to his office stops to join a discussion of spiders and lead an impromptu mini-session on conducting effective Boolean Internet searches on spiders. Dr. L incorporates this unplanned

but informative session into the centers discussions and reminds the students to match up their observations and findings in the centers with the NCSCOS (North Carolina Standard Course of Study). Dr. L and the students share some final observations and comments.

Classroom observation 7.

I conduct my observation of "Mathematics in the Middle Grades" in a very small classroom. The student tables are joined in U shape and face the front of the room and the dry erase board. Two male students and ten female students comprise this small class. Dr. R is amiable and energetic and allows me to introduce myself (and my study) to the class. This introduction proves valuable; in response to my comment about needing one more participant from the middle grades majors, at the end of class a student comes to me and offers to be interviewed for my study.

Dr. R begins class by posing a question: "Theoretical versus empirical. What's the difference?" He fields student responses and concludes with the example of a coin flip as empirical. Circulating inside the U formation, he points at students and in reference to coin tosses and probability he asks, "How do you figure that out?" He moves back to the dry erase board and, writing an "H" and a "T" to represent "heads" and "tails" for a coin toss, begins drawing two diagonal lines from each letter and connecting them to more "H" and "T" letters, representing possible outcomes for the coin toss. With input from the students, he begins listing all the possible outcomes for each toss, based on the "tree" diagram: HH, HT, TH, TT, and so on.

Dr. R asks if there isn't a simpler way. He mentions Pascal's Triangle and asks students where and when they were shown it before. They respond, and Dr. R states that what we are dealing with are "triangular numbers." On the board he draws an "X," then two

Xs directly underneath, then three underneath that row, and then four under that row, until he

has the following pictorial representation:

X

XX

XXX

XXXX

Dr. R looks at me and asks, "Don, where have you seen that before?" I have been focused on

taking notes and am at a loss for a response. He helps me out: "Bowling pins." Not leaving

me time to become visibly embarrassed, he mentions "binomial expansion" to the class and

proceeds to write two equations on the board:

$$(x+y)^2 = x^2 + 2xy + y^2$$

$$(x+y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$$

He draws attention to patterns and moves back and forth between the students and the

dry erase board, all the while offering to the students a series of guided questions and

comments about patterns. The discussion culminates with one student having a mathematical

epiphany. "Whoa!" she exclaims. Affirming her discovery, Dr. R adds, "No one in high

school ever showed me." He further illustrates the point by writing some even lengthier

examples of binomial expansion, exponents, and patterns, to which another student responds,

"That's blowing my mind!"

Dr. R then tells the students that he always wanted "to teach stuff not to remember,

but hands-on stuff." He proceeds to writing rows of sums on the board (1, 2, 4, 8, 16, 32, 64,

etc.) and introducing "theroretical." With input from students, he draws a "sample set" of

numbers placed in a combination of six rows and columns. To aid their understanding of the

theoretical, he tells the students that in a moment each one of them will roll a pair of dice 36 times and track the results. Once the dice-rolling begins, the only noise that remains is the sound of dice hitting the tables; the students are so focused on rolling and tracking results that they are not talking at all. Dr. R pulls up a website with clickable images of dice rolls and outcomes, along with a running results chart as they continue discussing probability.

For the remaining 40 minutes of class, Dr. R will guide his students in discussing hands-on, real-world applicability of statistics, randomization and probability in a variety of personal, cultural, social and historical contexts and examples: dental insurance; sports (baseball and the film *Moneyball*); gambling; lotteries; gaming (Yahtzee, McDonald's Monopoly); birthdays; voting (the Truman/Dewey and Bush/Gore elections); and history. The visual, spatial and gestural modalities have been dominant (see Figure 11) but are brought together and cohere via the spoken audio modality of the teacher-student exchange.
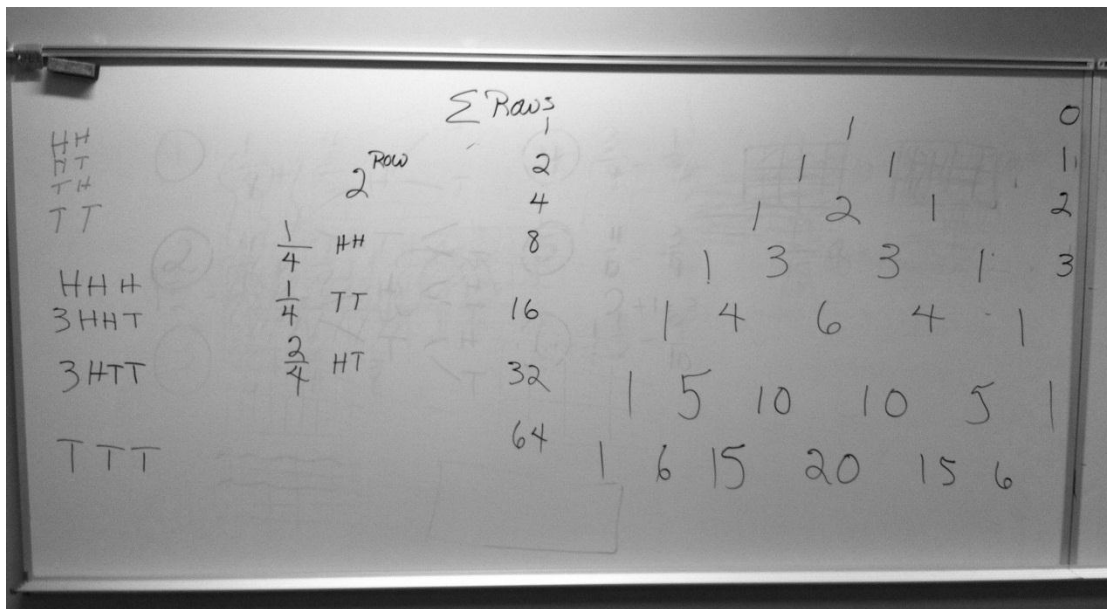

Figure 11: The visual, spatial and gestural turns—coin toss, dice roll, Pascal's Triangle, and probability.

Classroom observation 8.

My final observation takes place in a classroom that is easily the smallest I have visited. The student tables here form a square that imitates the box-like feel of the room: a square within a square. Seated around the square formation are twelve students, only one of whom is male. Dr. C is the professor for this class, "Social Studies in the Middle Grades." He is seated among his students as they are engaging in pre-class small talk. The first fifteen minutes of this class turn out to be more social media than social studies. An outspoken female student offers an extensive description of the social media site Tumblr, which she says is a "community of things you can't say on Twitter or Facebook." It includes blogs, video, audio, posts, and dashboard (but no chat feature).

Dr. C jumps right in and asks her questions regarding PayPal and Facebook. The student continues speaking as two female students arrive late and take their seats; she is still talking about Tumblr. The professor and students discuss even more social media and technology, including Skype and iPhone apps. Dr. C then transitions to discussing professional organizations and related announcements. He then calls for the three previously planned discussion group activities to begin.

The first group of three students offers a "classroom" role-play based on the question, "What has Jefferson done for our country?" The "teacher" asks the question, the other two members reply with rehearsed answers, then the question is offered to the class at large. As the discussion ensues, Ronald Reagan is mentioned by someone in relation to the presidency; one student innocently admits that she thought Ronald Reagan (instead of Gerald Ford) was the President who was remembered for his frequent physical stumbles. Dr. C interjects that "Jefferson was a really shrewd politician." The discussion continues and includes several

historical figures and topics: Aaron Burr, Sally Hemmings, slavery, and diplomacy. With

the discussion winding down, Dr. C discusses "balancing biases," context, and points of

view.

   The second group comes to the front and distributes slips of paper with written

questions or prompts. One of the members draws a large Venn diagram (approximated

below in Figure 12). The left circle is given the heading "success," while above the right

circle is written "failure." The spatial intersection of the two circles is titled "in-between."

Each student must come to the board and write in one of the three areas an appropriate noun

referring to Jefferson. They are to explain and support their responses.

in-between

representative
lover
abolitionist
friend

success
father
politician
husband
president
military leader
writer

failure
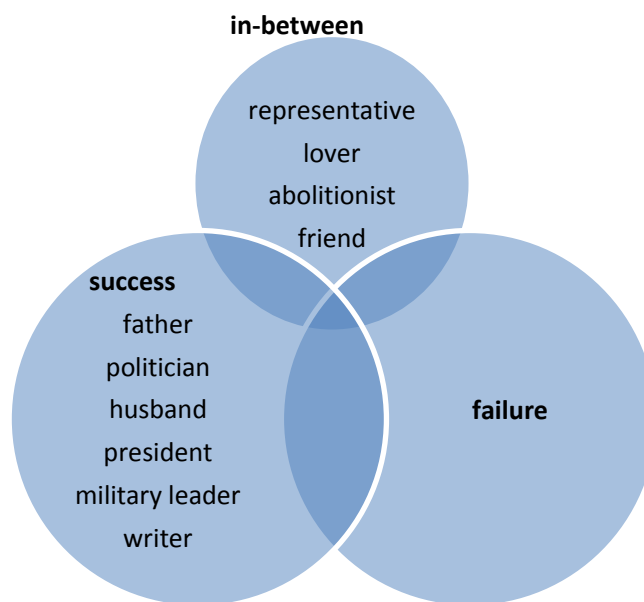
Figure 12: Jefferson—the linguistic, visual and spatial turns.

All the students do so in turn, and discussion continues. Dr. C comments on Jefferson's

times and on slavery. He asserts that Jefferson's biggest success was as a writer, and that he

was an "amazing" diplomat. After more discussion, the third and final group is ready to

begin their discussion activity.

The four group members of the third group distribute a one-sheet handout describing the activity they have named "fishbowl discussion." The instructions call for six people to sit in a circle and for six more people to form a standing circle around the seated inner circle. The inner circle will begin a discussion based on the handout's listed "starter" questions. As the discussion continues, when she is ready to add to the discussion, an outer-circle member is to tap the shoulder of inner-circle member and "replace" her in the discussion. The discussion is to continue until everyone has participated.

The discussion begins, and the activity is another visual reminder that this tiny classroom space is not conducive either for this activity or for a course on teaching methods. It is more suited to small, graduate-level seminar. Dr. C makes weaves together several student comments with his own about biography, autobiography, and the historian's perspective. The discussion winds down, and Dr. C concludes the class by calling the text being discussed a "case study model to apply to what you will be teaching."

Summary.

These students are constructing knowledge via multiple modes, and they are doing so in classes despite the seemingly restricted nomenclature of the subjects. One class, for example, is about language arts without a narrow insistence on and adherence to written language. Another is a math class filled with multimodal instruction and learning and textual creation and generation. Kress (2003) defines "text" as "any instance of communication in any mode or in any combination of modes, whether recorded or not" (p. 48). Problems were engaged, discussed and solved instead of assigned monomodally from textbook to teacher to student. Many texts were created here; not one of them was a textbook. Far from an exercise in rote memorization of names, facts and properties, a science methods class instead engaged

in a combination of multimodal learning and instruction, especially the visual, spatial, gestural and linguistic modes.

In another language arts class, Dr. Q's story map process had students engaging multiple modes: visual (artistic creation and representation); audio (reading aloud, listening and discussing); linguistic (examining and studying written text and how to convey its meaning); spatial and gestural (drawing, mapping and interacting with each other to discuss placement and design decisions). Dr. P skillfully guided a class activity and discussion that engaged her students in several modalities, especially linguistic, audio, gestural and spatial. The elementary grades science class was a busy yet productive class session, where the students began with engaging the linguistic and visual modes and concluded with investigations and observations that involved all of the broad modes (linguistic, audio, visual, gestural, spatial).

Dr. R guided his students through hands-on, real-world applicability of mathematics. The visual, spatial and gestural modalities were dominant but achieved coherence and brought together by the audio modality of teacher-student sharing and dialog. From beginning to end, the middle grades "social studies" class engaged and utilized multiple levels of linguistic, social and spatial modalities, and especially the social dimension of meaning-making. In all of these teaching methods courses, the students were engaged in consistent intermodal processing, which Kress (2003) calls the process of "transduction" (p. 47).

MTA and the teaching methods faculty.

Dr. P

Dr. P has more years of experience as a professor than the other three interviewees combined; having grown up during the 1960s, she points out that "there just weren't a lot of choices" for females. Most of her college classes did not afford her many opportunities to speak, and "there were rarely any group assignments or work. It was pretty much read the material, take notes, take tests." In stark contrast to those days and assignments, she makes sure that she does not perpetuate that monomodal instruction: "I always believed from the get-go [in] offering different kinds of ways for students to show me what they'd learned.…One of the things that I do know is how I prefer learning is not the way that all of my students prefer."

She combines "guided" lectures with discussions and "choice" activities such as a "walking field trip" through downtown Boone, NC, that allows students to explore local history and make connections back to the curriculum. When I ask her about media forms and how they were used when she was a beginning teacher versus how (and what) she uses today, she notes that aside from occasional overhead projectors, film strips, 16 millimeter films, and the omnipresent chalkboard, "there was nothing for them [students] to look at. No images."

I ask about assignments she has given that were particularly effective for student-learning and that were "nontraditional" in the sense of not being monomodal and passively transmitted one way from teacher to students. One such assignment is her "economics and chocolate" lesson, which she has taught for several years with great success (including the day I observed her class).

Dr. N

Dr. N's modal preferences and approaches to learning have remained consistent from her student years to her current role as a professor. As a student, she preferred assignments that called for reading, debate and discussion because "they gave you a chance to figure out who you were and to think things through, and kind of make sense of it all, by going back and forth and talking about it." She believes "in that kind of social constructivism framework that knowledge has to be co-constructed" that helps us "see how others are thinking and then build our knowledge through that." She finds quizzes and tests to be "very surface level type of instruction."

Her modal preference is that of audio, with the social and ideological dimensions of learning: "I like to hash and talk and think things through with people. Whether that's via blogs or in-class discussions, I like that chance. I need to talk things through." Like Dr. P, she does notice a certain tension for students between the freedom to choose an assignment versus the structure and requirements set forth by the professor: "I think they appreciate the choice, but I don't know if they have a past where they were given choices, so it does stress them out a little bit."

Dr. N incorporates a variety of multimodal texts and media forms into her classes. Recent examples include reading such traditional, print-text young-adult novels as *Alligator Bayou*, or multimodal texts such as *Countdown* (a "documentary" novel), and *T-4* (a book, written in verse poems, about the euthanasia project in Nazi Germany). In addition to blogging, which allows students to share their personal and critical responses with the professor and each other, other multimodal assignments for these texts are highly visual, aural and multimedia: writing an IM poem from the perspective of a character; creating

Wordles using words from readings that students think are powerful; and creating cartoons using ToonDoo software. Given the choice to create an alternative response, other students have created multimedia picture collages, incorporating still pictures, music and sign language; "museum walks," where students create and explain artifacts based on the given text; movie trailers; soundtracks; and any number of other multimodal creations. Dr. N has an affinity for comics and graphic novels, "text" types that tend to be ignored and overlooked by many when in fact they are visual texts that have their own multimodal affordances and can be used to support multiple types of literacy, including traditional print-based literacy.

I conclude by asking Dr. N about multimodality and review the broadly named starting points for multiple modes: linguistic; audio; visual; spatial; and gestural. She asserts that "to be able to function in our society, you need to have literacy in all of those" and that "you need to be able to make sense of all of them in order to make informed decisions." She holds the same for being able to create and make meaning from multimodal texts, regardless of their disparate affordances and forms. "There's definitely a cognitive piece going on with all of this, but it's planted in a social context," she says. Citing Purcell-Gates (2004), Dr. N draws an impromptu diagram for to complement her point (see Figure 13). "Pretty much anything that you have to use cognitive processes to make sense of can be defined as a text."
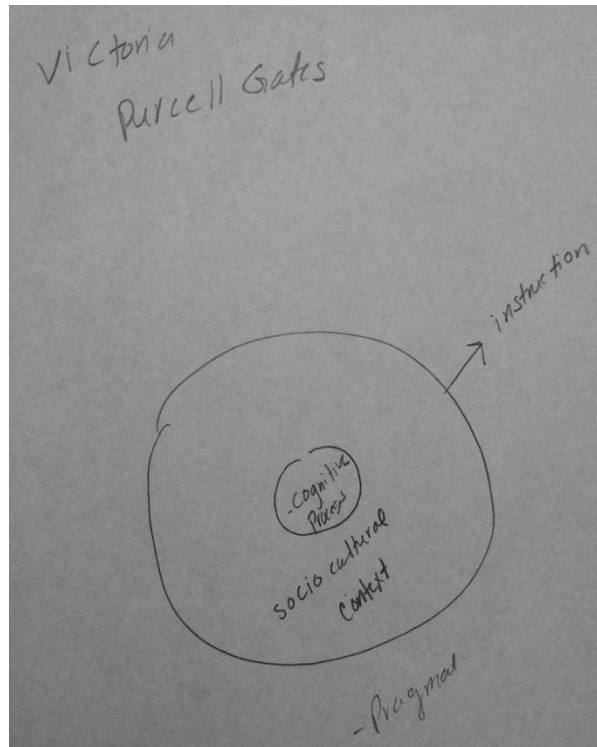
Figure 13: **Multiple modes in a socio-cognitive context.**

Dr. E

This is the same Dr. E whose "Teaching Mathematics in the Elementary School"
course I had observed nearly two months earlier. Like Dr. N—whose interview,
coincidentally, took place only four days before this one—Dr. E describes herself as a "social
constructivist." Also like Dr. N, she prefers group discussions and debates that push her to
think differently and articulate her thoughts. Of monomodal lectures and information
transmission, she says, "I get bored even sitting in meetings and having people talk at me.
I've always thought that was the most boring way to learn anything." Even as a student she
preferred assignments that were useful, relevant and applicable to real-world situations.

Her adherence to social constructivism is evident both in and out of the classroom.
She meets weekly with colleagues to share and review assignments and to debate and discuss
mathematical ideas. She also uses three assignments that force students to ask questions and

challenge them to articulate how they think about math topics and concepts. One assignment is the diagnostic interview, where these future teachers must interview, in cooperation with a classroom teacher, elementary students of varying levels and then reflect on the process and "make pedagogical decisions based on how students reason." Another assignment is called "Launch, Explore, Summarize," where the students are presented a problem to figure out and "then have a whole class discussion on the mathematics involved in what they were doing." In effect, they are simultaneously learning about a concept themselves and teaching it to their cohort colleagues. This was the assignment that was taking place the day I observed Dr. E's class.

A third assignment brings together the audio, spatial and visual modes in a transductive modal process where students debate the relationships between quadrilaterals and work to draw and create visual hierarchies among them. This multimodal assignment creates what Dr. E calls a "rich conversation,"

> where things come up in class that I don't know the answer to. It becomes a huge
> thing of debate and I wind up taking them back on Fridays to the math ed. group and
> we debate it, and then I'll go back to the class and say, "Well, this is what we debated
> about, and this is what a lot of the research says." Because I learn along with them,
> and they know that's part of what being a mathematician is.

For both faculty (Dr. E and her colleagues) and students, then, this multimodal process actively includes the five major dimensions of meaning-making: representational, social, organizational, contextual and ideological.

We talk about this current generation of students, the "millennials" or "digital natives." Like the other professors I interview, Dr. E notices both a sense of immediacy for

answers and information and the ubiquitous tendency to "Google" for answers without bothering to verify the accuracy and credibility of information and sources. On the positive side, though, she notes that the technology has eliminated the need for superfluous, rote memorization. In addition, with regard to pedagogy, she observes, "You have students that are gonna cause you to be a better teacher because they have to think in so many different ways in order to be successful in this society, that we have to teach in different ways."

She also makes a striking comment that erases the real or imagined digital divide. She mentions that she has an electronic version of tangrams—the Chinese puzzles of seven movable, manipulative geometric shapes—on her phone. The goal is to manipulate the tangrams to create certain shadow effects. Though she mentions this game as being for entertainment, she indicates the modal possibilities of this technology: "I could gain a lot of insight into how students think spatially just by watching them play games."

Dr. H

My final faculty interview is with Dr. H, a biology professor whose science teaching methods course I had observed several weeks earlier. At the time of our interview, she had taught at the University level for two years. As when she was a student, Dr. H prefers working with assignments that call for reflection and relevance, which doesn't always happen in a science classroom. She enjoys reading students' reflections and the questioning strategies and specific questions "that they'll use to guide students and scaffold their thinking." By her own admission, Dr. H does not effectively process or construct knowledge via the audio mode. She prefers the interaction and transduction between the visual, spatial and linguistic modes, which also allows for the modeling so important to her:

Sitting in seminars is killer for me. I am not the person who comes up with deep

questions sitting in a seminar. But if I read something, you know, I understand it

much better, or if someone models something for me, or if I have something physical

to interact with to go along with that information.

Dr. H believes that it is her job "to help them learn it, not just to tell them the

information, so I want to use multiple different modalities." She uses several visual media

forms to complement her instruction, including YouTube excerpts, video case studies of

teaching methods and behaviors, various animations and videos, and a non-traditional

"science autobiography" assignment that allows students to take a linguistic modal turn and

reflect upon and write about all of their prior experiences with science.

She also uses what she calls the "murky point of the day," where at the end of a given

lecture students jot down on small pieces of paper or "exit tickets" something they found

confusing or unclear, or something they found most interesting (see Figure 14). This process

allows students another opportunity to engage the linguistic (and perhaps visual) mode and

complement the audio (lecture) mode, and helps Dr. H gauge the effectiveness and clarity of

her lectures and assignments and also serves the practical function of taking attendance. She

can then either modify the lecture or assignment, or she can incorporate the results into the

subsequent class.
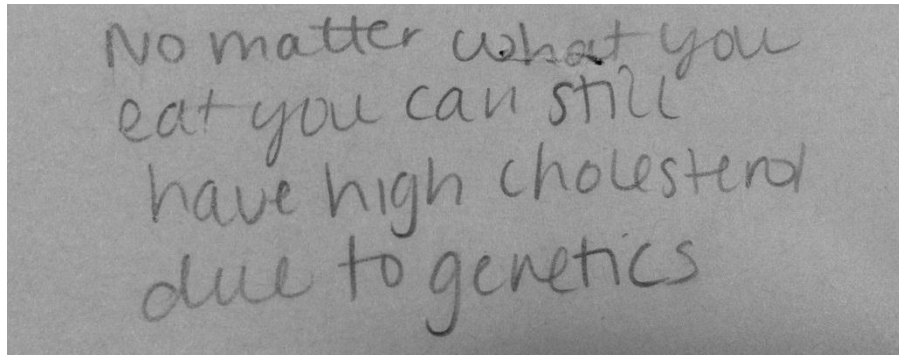
Figure 14: The "murky point of the day" exit ticket and the linguistic turn.

I am excited when Dr. H mentions that she has used comics in her classes before. She uses

"Far Side" single-panel comics to teach observation and inference:

> In my methods class where they looked at a "Far Side" comic and you know, made a
>
> bunch of different observations about it and then we kind of went back and looked at
>
> which ones were actually observations and which ones were inferences. It was like
>
> a—there was like pieces of a worm lying on the ground, and the wife worm
>
> answering the door and the police are there, and. . .you're making the inference that
>
> her husband's been murdered because there's like, half of a worm.

> Dr. H is having her science students engage a variety of modes, affordances and

dimensions of meaning-making. Like Dr. N in language arts, she is having them study,

analyze, interpret and hypothesize using a non-traditional, non-linear and non-print (i.e.,

solely character- or letter-based) type of text to construct meaning. The process is at once

interdisciplinary and multimodal.

> As far as what I have observed in her class and heard her share with me, Dr. H has

incorporated multiple modalities into her pedagogy in her effort to educate future educators.

She avoids passive, monomodal instruction, such as an oxymoronic "lecture about

constructivism," and provides modeling, relevance and reflection opportunities for her students.

Summary.

Dr. P's "economics and chocolate" lesson engages students on a variety of levels via a number of modalities and cross-disciplinary subjects as geography, history, economics, political science, and popular culture, among others. Among the four faculty I interviewed, Dr. N pays the most conscious attention to multimodal texts and multiple modes of knowledge construction. She uses a variety of multimodal texts and assignments, including print-based multimedia texts, comics, and technologies that allow even traditional modes such as writing to be engaged in different, multimodal ways: blogging; thematic and vocabulary highlighting using Wordle; and cartoon creations using ToonDoo; among others.

Dr. E uses an assignment that joins the audio, spatial and visual modes in an interactive process during which students have debates about the relationships between quadrilaterals and then attempt to create visual realizations or hierarchies. The result is what Dr. E calls a "rich conversation," between her and the students and between her and her mathematics colleagues, in a process where attention is focused (though not articulated as such) on the five major dimensions of meaning-making: representational, social, organizational, contextual and ideological. Like the other three professors, Dr. H knows that for meaningful knowledge construction and learning to take place, one-way, monomodal instruction is not effective: "You can't just address something in one way, you need to do it in multiple ways. . . .You can't just expect to say something once in a lecture and they have it. You just can't." However, she is not totally dismissive of lectures and audio-related

modalities. She believes that "some of the skill to being a lecturer is just being able to tell a

good story" and acknowledges that she is "still on that learning curve with the lectures."

Tension between structure & guidance and creativity & choice.

The second major theme relates to my first and second research questions, focusing

on how students construct, synthesize and interpret meanings through multiple nontraditional

modes (including traditionally print-based ones) and how metacognitive they are about

multiple modalities. This theme is the students' experience of tension between structure and

guidance on the one hand and creativity and choice on the other. These digital-native,

teacher education students want and expect detailed feedback on their assignments, in some

cases for guidance and grade improvement, in others for motivation and support. As

members of what Stein (2008) calls the "creative generation" (p. 213), they nonetheless

experience a tension that is manifested in one of two ways.

The first type of tension is evident when the student feels that his or her creativity is

being stifled by the imposition of state-mandated standards and lesson planning, as is the

case with Holly:

> In the school system, you're forced to learn what the state wants you to know, and so
>
> after a while you kind of stop caring. I don't really care what the state wants me to
>
> know, because I'm not interested in it. But taking these things and saying "What are
>
> you interested in? What do I want to learn?" And then being allowed to go explore,
>
> and have a better understanding.

The other inherent form of tension is a paradoxical one; it occurs when a student

knows she is creative, yet still wants some measure of guidance. For example, Madeleine is

passionate about reading and finding ways to make literature exciting and meaningful for her

future students. She says, "I have so many different ways of teaching in my head."

Nevertheless, she feels uncertain and uncomfortable, as she noted when speaking about a

recent class where the professor had a low-key, nonchalant attitude toward grading:

> And we're all like, "You've got to be kidding me. What do you mean don't worry
>
> about our grades? This is huge. This is our future. We have to worry about our grade.
>
> We have to know exactly what you expect from us."

Student-teacher participants' experience of tension.

When I ask Liz about any nontraditional assignments she has had in college, I get an

interesting and unexpected response about Liz as a "digital native":

> I realize that I'm from a younger generation of learners, but at the same time, even
>
> whenever we were in elementary school, we didn't have computers in every
>
> classroom. So now being in college, having to do assignments such as building a
>
> website for students, I feel like is a little nontraditional because I never had it done for
>
> me.

She refers to this process and another one, where she had to create a video and post it to

YouTube, as a struggle; the paradox becomes even more pronounced when she says she

procrastinated so much that eventually just used her phone to shoot the video.

Holly has a paradoxical relationship with or attitude toward technology that indicates

at least a small inherent tension between her desire for creativity and the need for structure.

In the middle of an extended comment about how social media is not "inherently evil," she

makes a stream-of-consciousness transition to e-readers and her love of the printed page:

I was also the kid that I love books, and so people tried to convince me that I needed

to buy a Nook, and I was like, "No. I will never buy a Kindle. I will never buy a

Nook. I will buy my books." And that sounds very Dr. Seuss, but yes.

She goes so far as to cite a study that noted differences between "book" reading and

"computer" reading and concludes, "I don't want to miss out on the books, they're so good."

While disdainful of imposed structure, Holly asserts that with such media as blogs and wikis

for classroom assignments, there actually should be a structure to make the tasks more

meaningful. The ideas generated there should serve a "meaningful conceptual idea."

Jen would want detailed feedback instead of broad assessment, despite being allowed

the voice, choice, creativity and real-world applicability that are so important to her:

I want to know out of a hundred what did I get. What's my percentage? How much

further could I have pushed myself? Where did I go wrong, so that next time I get an

assignment like this, I can look at this feedback.

Such feedback would not even have to be written. Jen mentions one professor who recorded

MP3 audio files with extensive spoken comments and feedback; he would send these to the

students so they could listen to his thorough comments about their work.

The tension between structured guidelines and creativity is evident more with Cathy

than with any of the students I interview. She says she likes "constraints" and direct

instruction: "I like to be told what I need to do. It helps me compartmentalize my thoughts

better, I think to just understand." She is quick to qualify her remark with "open with

constraints," but she definitely "despises" doing unit plans, feeling that is always having to

force connections standards and compare her work with her cohort members to make sure

she is on the right track. Cathy is a self-described visual learner whose love of learning is at

odds with traditional testing and meeting standards: "I'm just like, 'I just want them to learn. I don't know why we have to test,' but we have to test to make sure they learn."

Angie's comments about learning preferences and assignments indicate an inherent need for structure. When I ask her what type of assignment she most likes, she responds, "I would prefer to work on a worksheet or do some kind of booklet." Further, she likes to color, more as an outlet to relax but nonetheless guided by the pre-printed pages. Later, though, when I ask her what kinds of approaches and strategies she would like to incorporate that her teachers didn't, she mentions hands-on learning that will allow more freedom and creativity for both teacher and students.

Angie proves to be the most vocal of all the students I interview about the Instructional Design Project (IDP), which she and all the elementary- and middle grades cohort members must complete:

> The IDP is a unit of five lessons that go above and beyond, and completely over the top in-depth, which I understand would make sense, but I don't see it modeled in my [teaching field experience] classroom. No teacher I have ever met writes lesson plans like that. It's a 30, 40 point lesson plan, and no teacher I know does that. None.

She says the IDP is not helpful or necessary because it is not practical or conducive to meaningful application in the classroom:

> I'm doing it now because I am passionate about my grades, but if it wasn't graded then I probably wouldn't do it, just because I don't see the point. I don't see the need. Lesson plans are fine. North Carolina has made a six-point lesson plan that they like their teachers to follow. I don't mind doing those, because I see my teachers doing them, and I know that North Carolina would like to see those.

Meaningful college assignments for Angie are ones that allow her to "research how education works" and include real-world applications.

Among all the interviewees, Madeleine is the most vocal about the tension between structure and guidance on one hand and choice and creativity on the other: "I don't like open-ended things. I don't like that at all. I like knowing what's expected of me so I can get to that level, and then exceed it rather than feel like I'm kind of up in the air." She seems even more concerned as she prepares to begin student teaching:

> One of my teachers is doing a thing where she's not even grading right now. We
> don't get grades. She doesn't believe in them. . . .And we're all like, "You've got to
> be kidding me. What do you mean don't worry about our grades? This is huge. This
> is our future. We have to worry about our grade. We have to know exactly what you
> expect from us". . . .I guess it's an interesting way of doing it. I think maybe once I'm
> out of this class and I'm able to look back, I'll be like, 'Okay, I can see what she was
> doing.'

Kara does not appear to be uneasy about structure and guidance and the possible effect they could have on her work or creativity. Before college, she had little experience with grading rubrics. She does, though, appreciate detailed feedback, comments and explanations.

Students' tension in the teaching methods classroom.

Classroom observation 1.

Dr. N devotes the final few minutes of her language arts teaching methods class to a discussion of the IDP (Instructional Design Project). This is the first time I have heard this acronym, but it is not the last. It will be mentioned in nearly all of the classes I observe, by

both professors and students. It will also emerge as a major theme in the interviews I

conduct with students. Dr. N reminds these future students always to ask themselves: "What

do I want my [your] kids to learn?"

There must be an ongoing feeling of anxiety for these students, for Dr. N cautions

them not to get stressed, especially by trying to make the IDP double-count for two different

classes. She returns some graded written assignments to the students, who immediately

begin inspecting and reading the written feedback. Class is dismissed, but the worry over the

IDP has not; six students remain after class to discuss it with Dr. N, including one self-

professed "Type A" student whose worry seems to outweigh that of all the others.

Classroom observation 2.

At the close of her mathematics teaching methods class, Dr. E reminds the students of

an upcoming assignment. When she bluntly tells them not to use their IDP (Instructional

Design Project) to double-count for this class and another class that also requires an IDP, the

students turn somber and appear more than a bit worried. This is only my second

observation, yet it is the second time that the IDP has been discussed by a professor with her

students. I am already reminded at this early point that the IDP is a source of great anxiety

for these students as they are completing their block coursework and will in a matter of

weeks begin their student-teaching semester. They segue into a discussion of an article they

have been assigned to read and discuss several terms and their definitions. This closing part

of the class thus has a linguistic component. Once again, I cannot help but notice another

unplanned multimodal symbiosis relevant to my study.

Classroom observation 3.

After all the warm-up activities are checked off on the board, Dr. H broaches the upcoming cookbook lab revision assignment. She instructs the students that they will transform this activity into an inquiry-based activity or experiment and mentions making connections to their IDPs (Instructional Design Projects). The acronym has manifested itself now in three straight observations. Dr. H then discusses identifying NCSCOS (North Carolina Standard Course of Study) goals and objectives. When Dr. H discusses where and how to find cookbook labs, a male student makes a very telling comment. He says that his middle-school lab book was the same one his father had used as a student. Though he does not elaborate, I can only imagine that he will engage in more multimodal science instruction in this single class meeting than he ever did in primary and perhaps secondary school.

Classroom observation 4.

Dr. Q concludes her language arts class by reminding students of reading comprehension strategies from their previous readings. They divide into small groups, with each group choosing a strategy to summarize and present to the class. After a few minutes of discussion, all of the groups present such strategies as character sociograms; cycles of events; concept maps; and anticipation guides. The class dismisses, and I note on the agenda Dr. Q has given me that the final item calls for the students to continue work on their IDPs.

Students' tension and the teaching methods faculty.

Dr. P mentions her "spiritual diversity" assignment, whose origins are Dr. P's own recently published book *Religious Diversity in Children's Literature*. She gives the students choices and has them inquire into faiths other than their own, in a process of "cognitive dissonance" designed to help students understand their own beliefs as well those of other

people. Of this assignment in particular, and of teaching in general, Dr. P says, "I'm trying to take them to a new place or consider something in a new way." Further,

> I think that some of the young people going out, if they've got some flexibility, if they can deal with the ambiguity, if they can think outside the box, I don't think they're gonna have a lot of trouble. I think they'll figure out how to work with all learners, but I think the ones who are narrow in their focus and set in their ways, you know, looking that they don't have to work outside of the regular school day, are not gonna do well.

This theme of tension, between structure & guidance and creativity & choice, surfaces in all of the classroom observations and the personal interviews with both students and professors.

Dr. N notes that adults (i.e., "digital immigrants") "tend to ignore visual literacies." Dr. N does notice a bit of a "digital divide," pointing out unlike her undergraduate "digital native" students, the older "digital immigrant" graduate students are by comparison more hesitant to engage and experiment with newer media forms such as Prezi or blogging. However, the younger students tend to be "over-dependent on the technology" and rush to email with questions instead of reading the course syllabus first. She also cautions about the tendency to use these "digital" terms for students, citing access as a key example:

> We can't group all kids now as millennials or digital natives because rural kids really do not have the same access [to technology], so I do think they're at a distinct disadvantage and we have to be careful to not assume that all kids of this generation have that background.

Dr. E observes in these pre-service, teacher education students an almost palpable tension between structure and freedom: "I do know that they want all this freedom, but then

they really don't like ambiguity when it comes to assignments." She says they "have a hard time bridging the gap between being a student and being a teacher candidate" and that it is difficult for them "to think about making sense of something from the student's perspective versus the teacher's perspective." This difficulty will emerge as one of my major findings, that these future teachers are simultaneous students and teachers who have yet to articulate their own multimodal awareness and metacognition, let alone that of their future students.

Dr. H also notes the tension for these teacher education students surrounding structure and guidance and the ability (or not) to tolerate ambiguity and flexibility:

> For some of the students, the ones who still cling to that direct instruction model, I think they're the ones who are going to have issues. I think they're going to be shocked at how much the students aren't getting because they've just gone off and said ten things in one sentence and now they think that they taught the students about that thing.

She mentions the IDP and her strategy to move them away from a "checklist" mentality and make their experiences with the IDP meaningful and relevant to their teaching: "Rather than me giving them a lecture about what it's supposed to look like, I give them exemplars and have them tell me what it is about that exemplar that makes it a good, quality piece of work."

Dr. H concludes by asserting that the students "who really responded to learning that you have to do things in multiple, different ways" are the ones who will succeed, especially at the beginning of their teaching careers. They all must realize that "you have to give students an experience before you give them information."

Summary

Kress (2003) reminds us that a mode is any "culturally and socially fashioned resource" for communication, representation and meaning-making (p. 45). He also notes that all modes demand "epistemological commitments" on the part of the learner/creator (p. 57). That is, the persons using a particular mode or modal combination are making decisions about such concepts as naming, relationships and arrangement of information and knowledge. The very act of using a single mode or multiple modes is to establish a subjective but meaningful link between knower and known. Further, multimodality is not to be confused or interchanged with "multimedia" or exclusively "digital" modalities. For example, creating a painting and creating a website may both be considered as intermodal combinations of visual, audio, gestural and spatial modes, though they certainly have in common, at the very least, the representational dimension of meaning-making. The other social, organizational, contextual and ideological dimensions multiple modes may be present as well, depending on the learners' use of modes (with accompanying affordances) and their objectives, needs and resources.

The students I interviewed collectively highlight the problematic cultural and societal assumptions regarding "digital natives" or "millennials." For instance, these students do not all have innate technological prowess, nor do they all heavily rely on (or desire) the affordances that technologically influenced modalities offer. Though such sweeping generalizations are easy to make, it is difficult to make those represented by the titles fit the description. One participant said that computers were not prevalent in her primary school, and another participant mentioned that her family never even owned a computer until she was in high school. Perhaps a more accurate cultural title would be "digital-era natives,"

which gives students a temporal identity without implicitly ascribing to them a wide-ranging and long-standing facility with and access to technological tools.

Another of the participants still prefers taking notes "the old-fashioned way" with pencil and paper, while still another at this point in her college career has never heard of podcasts and podcasting. These students are indeed multimodal bricoleurs, constructing knowledge via multiple modalities and from a variety of sources; but neither the modes nor the sources are exclusively "digital" or grounded in technology. The students are not all "digitally literate" as Level and Hoseth (2008, p. 37) posit, though their coursework does immerse them in both traditional (non-digital) and digital environments.

However, as Level and Hoseth (2008) note of millennials, these beginning student-teachers do prefer hands-on, experiential learning, or "learning by doing" (p. 37). As evidenced in the classroom observations, they are much more responsive to and engaged with concepts and material. As Kara says:

> The hands-on. I like to actually do the things and see it, make my own observations. Inquiry based learning is what we're doing. I like that. I like...in math, I have to know the 'why' and not just the facts. Like I want to know why something works, why something happens, and then that always helps me to understand it and retain information better, if I know the 'why'. And I guess the best way for me to learn that is through hands-on activities.

This cohort of students also prefers being actively involved in their learning; they express a sense of ownership and want to be allowed both voice and choice. Jen, for example, asserts:

> If there's choice and I'm allowed to choose what I'm writing on or how I'm gonna write it, I feel like I feel more ownership over what I'm doing, and I'm gonna be

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more proud of my work, and I'm gonna be a little bit more excited to turn it in and get

feedback and see how I'm doing.

Holly agrees:

If it interests a student, then they should be able to go, and they should be able to

experience what they want to learn. And just tie it in. You can always find a weird

connecting link that proves that students are learning what they "need" to be learning.

Most of the participants can recall past educational experiences where "experience"

was more of a noun than a verb, where the teacher was a passive agent of monomodal, one-

way transmission instead of active, creative and multimodal in his or her pedagogy. Kara

recalls that before college, her science instruction was delivered one way, in one mode

(audio) and by one person: "The teacher has all the knowledge and they're gonna give it to

you, and you take and do with it what you will, but you have to know the facts. And it wasn't

like, a deeper understanding."

Jen experienced what Hobbs (2006) calls a "non-optimal" use of video in the

classroom:

We read *The Outsiders* and we watched the movie, and we had to write a paper that

compared the movie with the book, but the movie was just shown once, and then

afterwards if we wanted to take notes, that was on us. There were no prompts, there

was no active involvement.

The written word and film are both different media forms that entail unique affordances, but

if the modes are not actively engaged, processed, reflected on and shared between students

and teachers, then the process can at best be called multimedia, but not multimodal. Liz says

that until college she never got to experience the interactive literature-circle discussions,

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whose inherent social dimension of meaning-making has made her enthusiastic about them; she can't wait to facilitate them when she becomes a teacher. Daniel remembers a high school math class that was static and devoid of any context or relevance:

> We had math class where she would go through the book and whatever examples were posted on the book, or from the book, she would do on the overhead. Exactly those examples, because she knew we didn't look at the book, so we didn't really know that she was doing that. And then she'd give us homework, and that was a format class every single day. I never really realized that she was a bad teacher until I started taking the classes and realized that "Oh wait, you can do so much more!" and engage in, you know, better ways than that.

All of the participants, to varying degrees, indicated concern and desire that their educational experiences—both their own as well as those of their future students—should have relevance, whether in regard to real-world connections and contexts or, more specifically, in service to their future teaching careers. The idea of relevance has been broached by Windham (2005):

> In a world where technologies change daily and graduates armed with four-year degrees are entering the workforce in record numbers, there is an increasing fear among the Net Generation that a four-year degree will be neither relevant nor sufficient preparation when it becomes time to enter the work force. Consequently, students are consistently looking for practical applications of their studies in a real-world context (p. 5.8)

All of the participants specifically mentioned relevance or real-world applicability. Several of the students are like Madeleine, who wants her methods classes to "directly reflect

on the stuff that I've done in the classroom." Similarly, Liz likes the real-world teaching

applications of building Wix websites: "You can give that website out to all your fellow

classmates, or as a professor they can give it out to the students and we can use it for future

references." From the student perspective, Derek notes of his pre-methods science courses:

"It was up to you just to kind of memorize the information. We didn't really apply it to any

situations."

The digital-native, pre-service teacher education students of this study have had both

ineffective monomodal instruction (from their past educational experiences) and extensive

multimodal instruction and interaction, such as the ones I observed in the teaching methods

classrooms. The result is that these future teachers exhibit varying levels of modal and

textual awareness (MTA) and a tension between structure and creativity; these two major

themes are similar to Cammack's (2008) study of students in a one-semester history course

that documented student "tensions between old and new literacies that became apparent over

time" (p. 575).

The concluding chapter includes an analysis and discussion of findings; limitations

and implications of the study; and suggestions for further research.

Chapter Five

Discussion of Findings

In this study, I use the concept of bricolage—a multimodal process where students adopt and "piece together" from multiple sources to construct meaning—as a frame for describing and analyzing how pre-service teacher education students engage multiple learning modes. Included in this process are the different types of multimodal "texts" (print or otherwise) these student-teachers produce and create.

Instead of relying solely on interviews with the eight research participants themselves, I began by administering a survey that allowed the student cohort at large to provide data and responses. In addition, I observed eight different teaching methods classroom observations covering the four major instructional areas: language arts, social studies, mathematics, and science. Finally, I interviewed four different teaching methods faculty to gain further insight into these future educators, these digital-native or millennial pre-service teacher education students.

My research design afforded me a "prismatic," multi-layered, holistic approach to data collection and analysis, one with different lenses or prisms through which to glean and analyze both (minimal) quantitative and (extensive) qualitative data. I used the following three research questions to guide the study:

- How do students construct, synthesize and interpret meanings through multiple non-traditional modes (as opposed to traditionally and exclusively print-based ones)?
- How metacognitive are students about multiple learning modes?

- How does student engagement of learning modes and choice of different media forms create and affect meaning?

From my reviews, coding and analyses of the data, I created two large coding schemes: "learning and pedagogical preferences" and "multimodality," each with its own set of sub-categories (see Appendix F). From these emerged the two major themes of the study: the students' modal and textual awareness (MTA) and the students' experiences of tension between structure & guidance and creativity & choice.

Modal and textual awareness (MTA)

Kress (2003) says that "texts" are the manifestations or results of these processes and may be defined as "any instance of communication in any mode or in any combination of modes" (p. 48). Further, Kress (2007) says that texts, whatever their form, are realizations of the "affective and social positions of their makers" (p. 143). Thus, multimodal knowledge constructors are not only designers of meaning (Stein, 2008, p. 875) but are also creators of texts. Though he is discussing visual images or texts, Unsworth (2001) puts forth three realities for textual composition and creation: a "material" reality, or the actual representation; a "social" reality, or the relationship between producer/creator and reader/recipient; and a "semiotic" reality, or the coherence of the texts produced (p. 18). Kress's (2003) comments highlight the importance of modal and textual awareness for teachers, who deal with a variety of learners in a variety of contexts:

Design does not ask, 'what was done before, how, for whom, with what? Design asks, 'what is needed now, in this one situation, with this configuration of purposes, aims, audience, *and with these resources*, and given *my* interests in this situation?' (p. 49)

My analysis indicates that these beginning student-teachers have instinctual yet unarticulated self-modal awareness; though they tend to substitute "modes" with "learning styles," I can tell by their personal responses and classroom activities that they are in the very early stages of modal awareness. Only after I encouraged elaboration during the interviews did they begin to make connections and realizations about modal processes and affordances. That said, though they are all consumers, producers and designers of various text types, they are *uncritical* consumers, producers, and designers of texts, as indicated by the data.

Even though some of the participants had obviously been involved in previous classroom discussions about what constitutes "text," 43 of the 48 respondents to the Multimodal Knowledge Construction Survey (MKCS) defined the term using print-based language, such as "any kind of written knowledge that one can find." Over half (58%) do not spend time blogging, which is interesting given that they have been required to maintain blogs in at least one of their teaching methods courses (language arts). Blogging is a technological form, but it is also a mode whose affordances have been expanded thanks to its transformation from a merely "physical" form. On the positive side, almost half of the respondents are blogging, which indicates that they will be more likely to incorporate the multimodal processes and affordances of blogging into their pedagogy.

Also surprising is that these digital-native millennials, whose culture is surrounded by music, do not as *future teachers* appear to recognize music as a type of text with multimodal affordances and pedagogical possibilities. According to the MKCS, a third of the respondents (33%) listen to music up to one hour per day, and another third do so between one and two hours per day. However, eleven of the 48 (23%) listed "musical" as their weakest Gardner intelligence type. Although some of the study participants I interviewed

say they listen to music while studying, they appear not to regard music as a modal pedagogical form. On the other hand, as current *students* they do realize and incorporate music into their textual compositions, as they did during Dr. N's language arts class.

Video games and gaming.

Highlighting the problematic nature of the "digital native" moniker is the statistic that over half (54%) of the MKCS respondents indicated that they do not play computer and/or video games. Among the various MKCS responses defining "text"—such as books; magazines; graphic novels; paintings; online resources; email and text messages; blogs; "anything that conveys meaning"; etc.—no respondents included video games or gaming in their definitions.

Not all digital natives are video game aficionados or even beginning-level players. Teachers (beginning-level or otherwise) who dismiss or avoid the visual, spatial and gestural depth of video games would miss valuable opportunities for developing multimodal pedagogies and meaningful student work, creation and production. Madeleine, for instance, will not at this early point in her teaching career be as receptive to the modal possibilities of video games as she is to anything linguistic or literature-related:

> I'm not big on video games and things that kind of kids zone out to, and I feel like
> they don't really learn much from that. I feel like they're just, "Ooh. If this is a game,
> I need to win it," and they don't say, "Oh, this is a game about the alphabet, and
> here's the alphabet letters that I'm learning."

On the other hand, mathematics professor Dr. E observes, "I could gain a lot of insight into how students think spatially just by watching them play [computer or video] games." Kahne, Middaugh, and Evans (2009) note that those who advocate the "educative"

potential of video games call attention to how games can "integrate thinking, social interaction, and technology into the learning experience" (p. 2). For Gee (2007), gaming is in one sense comparable to any number of fields such as literacy criticism or biology, "different sorts of activities requiring different values, tools, and ways of acting and thinking" (p. 7). For digital-native beginning teachers not to realize the multimodal affordances and processes of video gaming on even the most basic level would constitute a veritable digital-age irony.

Comics and graphic novels.

Equally surprising is the digital-native student-teachers' oversight of comics and graphic novels as textual forms with rich multimodal and pedagogical potential. A mere three of 48 MKCS respondents (6%) read or spend time with comics or graphic novels. Among the study participants I interviewed, only Holly appears engaged and excited by the affordances of these text types:

> There's a story happening. There's these characters that were doing something that you could relate to. It wasn't Danny and his dinosaur. It was Garfield the fat cat, who just wants to eat lasagna. I can understand what he wants from life. I am right there with him. And so there was a little bit more imagination as well as social conversation and dialogue.

Liz, though, is quite the opposite:

> My problem with them is, I see a picture when I read anyway, and it messes with the picture that goes on in my head, because there's not enough words for me to imagine it, and having to look at someone else's illustrations, it messes with my imagination.

Madeleine flatly states, "I'm not huge into comics." These last two students sound more like the older, "digital immigrant" students (i.e., older, nontraditional students who would not be considered digital natives) and adults that Dr. N described to me during our interview: "We've been so trained as adults, in my opinion, to look at the print text that we ignore a lot of the visual texts that are available to us."

McCloud (1994) best captures the multimodal possibilities of graphic novels and comics in his influential *Understanding Comics*. Among other things, comics panels "fracture both time and space, offering a jagged, staccato rhythm of unconnected moments" that allow readers to engage in a process called "closure," which "allows us to connect these moments and mentally construct a continuous, unified reality" (p. 67). As with video games, not every "digital native" is an avid reader of comics and graphic novels. However, once again, if these beginning digital native teachers do not explore these texts and their multimodal and pedagogical potentials, then they will not be fulfilling their promise as multimodal, 21st century educators.

Academic concentration areas.

Data from the Multimodal Knowledge Construction Survey (MKCS) show that social studies and language arts are strongly represented by this cohort of student-teachers. Twenty-nine of the 43 elementary education respondents (67%) indicated social studies as their second academic concentration (SAC), while three of the five middle grades students (60%) listed social studies as one of their two required concentrations. Four of the five middle grades majors (80%) indicated language arts as one of their two required concentrations, and three of the five (60%) listed *both* language arts *and* social sciences as their required concentrations. The science and mathematics concentrations, however, are not

as strongly represented. Two of the five middle grades majors (40%) indicated science as one of their two required concentrations, and only one of the five (20%) has a mathematics concentration. Further, just over a third (34%) of the elementary education majors with a "social studies" second academic concentration listed "logical-mathematical" as their weakest intelligence.

The implication here is that fewer teachers in these areas means fewer opportunities for meaningful multimodal instruction and knowledge construction in the mathematics and science areas. Also, both of these content areas were specifically mentioned by some of the study participants in relation to past educational experiences, ones that were not meaningful or memorable due to teachers who were adherents to static, passive monomodal instruction. At this stage in their teacher training, this cohort of future educators is not having that model perpetuated for them.

The teaching methods classroom observations reveal that despite the absence of overt language and references regarding multimodal processes and modal affordances, the student-teachers were immersed in multimodal instruction, processes and projects. All of the classes I observed involved active, experiential activities and assignments that engaged all five of the broad modalities (linguistic, visual, audio, gestural, spatial) and various dimensions of meaning-meaning (representational, social, organizational, contextual and ideological).

Tension between structure & guidance and creativity & choice

The IDP (Instructional Design Plan) is the touchstone for this constant tension. It is a very real symbol of the students' tension between structure and flexibility; most of them feel the IDP is not practical or applicable. Angie describes it this way:

The IDP is a unit of five lessons that go above and beyond, and completely over the

top in-depth, which I understand would make sense, but I don't see it modeled in my

classroom. No teacher I have ever met writes lesson plans like that. It's a 30-, 40-

point lesson plan, and no teacher I know does that.

Cathy calls it "the most redundant, ridiculous project I've ever had to do."

Whether directly related to the IDP or not, this tension emerged as a major theme in

all of the classroom observations, as well as both the student and professor interviews. The

tension reflects the dichotomy of their present roles. They are students, and they are

teachers; as students they are submitting lesson plans, and as teachers they are teaching

lesson plans. As student-teachers they are assessing students, and they are being assessed as

both teachers and students.

This manifest tension may also be reflective of a larger, general tension among

millennials as information searchers. Testing Kuhlthau's Information Search Process (ISP)

model, Holliday and Li (2004) report that "the web has potentially changed students' models

of the information environment and expectations of the research process" (p. 364). The

millennial students in the study expected an "easy" research process; this expectation

fostered a sense of independence, which in turn made the students more likely to avoid

seeking help from librarians. As a result, they tended to "simply give up and assume that the

information they want cannot be found," leading to the "emergence of frustration" (p. 364).

Similarly, a 2007 British Library study focusing on the literature surrounding "young

people and their information behavior" notes that among millennials there appears to be a

"manifestation of a general inclination to take the easiest route possible in undertaking

tasks," as well as a "distinct disinclination to explore" (Willams and Rowlands, p. 15). The

same study finds that "evaluative skills are barely in evidence" (p. 11) and that more training

is needed for increasing information retrieval expertise and better use of digital technologies

and the affordances they offer (p. 10). The caveat here is that digital-native millennials, such

as the beginning teachers of my study, cannot be assumed to be "multiliterate" simply

because they are "multimodal." For these teachers to be effective multimodal knowledge

constructors, as well as co-constructors with and mentors for their own students, they will

need to be deliberate, thoughtful and metacognitive about multimodal processes, affordances,

contexts and implications. As one anonymous respondent in the Pew Research Center's

Internet & American Life Project (2012) points out:

> Learning requires three key underlying skill sets—patience, curiosity, and a
>
> willingness to question assumptions. Unfortunately, the internet can tend to give
>
> answers too quickly and make people think they are experts simply because they can
>
> access anything and everything immediately. Ensuring that youth understand that
>
> really understanding something requires lots of time and substantial amounts of
>
> thinking and questioning is going to be a challenge.
>
> (Anderson and Rainie, p. 31)

Revisiting the conceptual framework

The conceptual framework for this study is primarily based on the works of Kress,

who is concerned with how students construct and represent knowledge via multiple

modalities, defined as any cultural or social resources for meaning-making (Jewitt & Kress,

2003, p. 1; Kress, 2003, p. 45). Also central to the study design and analysis is Kalantzis,

Cope, & Cloonan's (2010) model of multimodal analysis based on the early and influential

work of the New London Group (1996). The model lists five broad types of modes—

linguistic, visual, audio, spatial, and gestural—along with five dimensions of meaning-making: representational, social, organizational, contextual and ideological. I study how pre-service, teacher education students use multiple learning modes to construct meaning, along with the different types of "texts" they produce and create.

As Kress states in an interview with Bearne (2005), "the way that [knowledge] is configured, materialized, sets the ground on which the learner engages with it, it shapes the learner's learning" (p. 291). Kress holds that learners actively construct knowledge using a variety of modes, either in distinct modes or in modal and ensembles. These modes have inherent qualities or characteristics called "affordances" (Kress, 2003, p. 47). He defines the knowledge-construction process within single modes as "transformation," while the process of intermodal (between modes) knowledge construction is referred to as "transduction" (p. 47).

Kress's work, in turn, is based on the prior theories of Piaget (1954), Vygotsky (1962), Bakhtin (1986), and Halliday (1979). Kress does not seek to discount any of these theorists. Instead, he incorporates and extends their ideas. He adheres to all of them: Piaget's stages of cognitive development; Vygotsky's and Bahktin's ideas of social meaning-making; and Halliday's language-based attention to contextual and resource-specific knowledge construction. However, Kress (2003) calls for a theoretical change beyond "language alone" that can account for multiple modes since the traditional modes of writing and speech are now only "a part of the whole landscape of the many modes available for representation" (p. 36).

Diverse learners in diverse contexts demand effective multimodal instruction. Multimodality avoids strict compartmentalization and discrete categorization. Multimodal

processes, for both teachers and students, are active and dynamic, not restricted to labels or types. The pre-service, teacher education students of this study construct and reflect on knowledge in a variety of intermodal and transductional ways. As study participant Holly notes, in relation to multiple modalities, these student-teacher millennials are "visitor to all, native to none."

The framework for multimodal knowledge construction succeeded in accounting for learner differences and in illustrating the difficulty of making assumptions about digital-native students and future educators. Not all digital-native teacher education students are "digitally literate," as Level and Hoseth (2008) propose. While they are "thoroughly experienced makers of meaning" (Kress, 1997, p. 8), they are not fully metacognitive or critical regarding multimodality and the difference between modes and resources, as Wilber (2008) believes.

The conceptual framework also succeeded in allowing for rich description and analysis of the multimodal processes and interactions teacher education students use to construct knowledge. The framework further allowed for the emergence of two principal themes: students' modal and textual awareness, and students' experience of tension between structure & guidance and creativity & choice. Since modalities and modal combinations are as varied as the number of learners in any given context, the multimodal processes and analyses discussed in this study could be modified for and adapted to any educational milieu.

Addressing the gaps

Most of the related studies thus far, including those of Kress, address multimodal knowledge construction in the specific context of adolescent learning (Bean, 2010; Boyd & Thompson, 2008; Hinchman & Sheridan-Thomas, 2008). Alvermann (2002) and King and

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O'Brien (2002) do so as well, with an even more specific focus on multimodalities and multiliteracies in the "digital world." Even more specific contextual studies include Bearne and Wolstencroft (2007) on multimodal writing instruction for elementary-school students and Albers and Sanders (2010) on multimodal arts instruction in education. Few studies focus on multimodality at the collegiate level. Two such studies are Cammack (2005) and Hynd, Holschuh, and Hubbard (2004), though both concentrate on how college students (specifically, those in history courses) use historical documents via multimedia and other sources.

  None of these studies, however, addresses the multimodal perceptions, practices and processes of pre-service teacher education students who are themselves "digital natives." My study is "meta" in nature; it describes and analyzes not just the multimodal knowledge construction processes of *students* but of simultaneous students *and* teachers: digital-native, pre-service teacher education students. These are students who, in order to create meaningful multimodal learning experiences for their future students, must continually and actively reflect upon and assess their own modal learning preferences as well of those of their students.

  This study reminds us that "the nature of teaching and learning is becoming increasingly complex and learners can no longer rely on a single learning design" (Brown et al., 2010, p. 191). The beginning teachers of my study, these "visitors to all" modalities, are faced with the challenge of surmounting traditional, "industrial" educational models that rely on "timetable and disciplinary distinctions and separations of subject specialities and teacher specialists" (Luke, 2000b, p. 435). In order to begin careers as successful educators, future educators can use this study as a guide to help them be metacognitive and reflective

practitioners who recognize and appreciate how different learners—*including themselves* as current students and future educators—employ different modalities to construct knowledge and develop new literacies.

All educators, including teacher education students, professors, administrators, and policy-makers, can use the study's analyses and findings to help them implement, practice and model an effective pedagogy of multiple modalities and multiliteracies, one that "depends on viewing knowledge (and teaching) as integrated, thematic, multimodal, and interdisciplinary" (Luke, 2000b, p. 435). They can incorporate the multimodal processes and concepts discussed in this study to better address and complement students' engagement with multiple learning modalities and "new," non-print forms of literacy, and to move beyond the passive reliance on educational policies and testing requirements that "are still principally focused on the reading and writing of print-based texts" (Walsh, 2008, p. 101).

Limitations

Two limitations accompany this study. The first is the timing of the study. I began seeking and selecting participants during the busiest time of the year for these students. The semester was fast drawing to a close, and they were all working to balance all of their assignments for their second and final "block" semester courses, including the Instructional Design Project (IDP) and final exams; as manifested in the student interviews, faculty interviews, and classroom observations, the IDP created among the students varying levels of stress and anxiety. In addition, as I was conducting the eight student interviews, the students were awaiting news of their student-teaching field placements. Also, the teaching methods faculty were weighed down with a lot of grading as I was scheduling and conducting their interviews. A more optimal time for all involved could have been a few weeks earlier in the

semester. Even that time, though, would have been filled with preoccupations over mid-term exams and mid-semester break.

A second limitation relates to the terminology of multimodality. In both the Multimodal Knowledge Construction Survey (MKCS) and the student interview questions, I used such phrases as "modes of learning." In addition, the survey also included questions directly related to Gardner's theory of multiple intelligences and Mayer's theories of multimedia learning as starting points for gauging students' knowledge of and reflection on multiple modalities. The problem is that the students expressed an inherent tendency to conflate "modes" or modalities with learning styles (such as visual, tactile, kinesthetic); modalities are *not limited to or defined by* individual learning styles.

As Buckingham (2007) has pointed out, a strict adherence to learning styles may "divide up" knowledge "in a manner that resembles the traditional curriculum" (p. 24). Such a categorical approach would negate or detract from the myriad combinations and repertoires of multimodal processes, which can be analyzed and richly described but are not and cannot be neatly classified. However, for the participants to have had a better beginning understanding of multimodality, a short introduction of some sort would have been necessary. Such an introduction would perhaps have "guided" the student participants and diluted or indirectly influenced their responses.

Implications

This study's three principal implications address the continuing need for media literacy in education, the need for more meaningful and varied methods of assessment, and the continued development and implementation of the Partnership for 21st Century Skills. In particular, the implications extend to all digital-native, pre-service teacher education

students, future educators who will teach subsequent generations of digital-native learners, as well as both digital-immigrant and future digital-native professors, faculty and administrators; collegiate institutions, especially Colleges of Education; and educational policy-makers. Consider the traditional mode of writing, which is no longer bound to pen or pencil and paper. This mode may be realized in writing of different kinds, including blogging, text messaging, or web page design. Like any mode, writing will have, depending on where and how it is used, a "functional specialization" and a "functional load" (Kress, 2007, p. 46). Note how Kress traces the multimodal implications for education:

> In school textbooks of thirty, forty years ago, most of the functional load was carried by writing; now that relation has become inverted, and much or most of the load is carried by images of various kinds. This varies from school-subject to school-subject, as it varies from social domain to social domain. (p. 46)

Though media forms are not to be confused with multiple modes, students do indeed use different media as part of their modal suites or repertoires they use to construct knowledge.

Multimodality and media literacy.

Multimodal and textual awareness for students should also include critical media literacy. Considine (1995) defines media literacy as "the ability to access, analyze, evaluate and communicate" information and texts "in a variety of formats including print and nonprint" (i). He also notes that media literacy "involves both reading (decoding) and writing (encoding)" (ii). Gee (2010) is even more explicit about the connection between media literacy and multimodal knowledge construction. He says the process "sometimes involves giving and getting meaning from oral and written language—language used in

media contexts—and from images, sounds, and "multimodal texts" (texts that mix images and/or sounds with words) as well" (p. 33).

Students and teachers alike would benefit from the ability to "access, analyze, evaluate and communicate" (Considine 1995) not only media texts but also their own multimodal preferences, including how certain modes work alone or in intermodal combinations in other modes, including the affordances, advantages and limitations of each. This "meta" analysis would also include a "metalanguage" (Unsworth, 2001; Luke, 2003; Kalantzis, Cope, & Cloonan, 2010) through which all teachers, beginning or otherwise, could generate for themselves and their students a working vocabulary and guiding documents for multimodal and textual analysis. One such document in the context of media literacy is Duncan, D'Ippollito, Macpherson, and Wilson's (1996) "TAP" model or "media triangle," where each side of the triangle (text, audience, production) includes guiding questions for analyzing the creation, production, and interpretations of different media texts" (p. 8). Such guides and processes for multimodal knowledge construction would facilitate teachers' work with and analysis of multimodal and textual awareness, their own as well as that of their students.

Worth noting here is that as early as 1993, Appalachian State University's teacher education program (the site of my study) was already recognized by the National Leadership Conference on Media Literacy as "the most sustained institutional effort at preservice [teacher] training" and media literacy" (Aufderheide, 1997, p. 83). Further, in September 1995, Appalachian was the host site for the first National Media Literacy Conference in the United States. Coinciding with these mid-decade movements was the New London Group's (1996) groundbreaking study of multimodality and multimodal processes and design. Nearly

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two decades before my study, leaders in the inextricably connected fields of media literacy and multimodality were already recognizing the importance of a "contrastive metalanguage" that "learners can use for interpreting and creating meaning" (Kalantzis, Cope, & Cloonan, 2010, p. 72) in media messages and creations, as well as their own multiple modes of knowledge construction.

Multimodality and assessment.

Multiple modalities are highly contextual and learner-specific; therefore, any such studies of multimodal processes are inevitably studies of semiotic systems, which Anstey and Bull (2006) define as systems of signs where "each system has its own codes and conventions" (p. 107). They also note the implications of multimodal study and analysis for assessment: "[K]knowledge of semiotic systems is central to students' understanding of how meaning is constructed" (p. 116). Brown, Lockyer, and Caputi (2010) are even more direct about the need for multimodal assessment: "Many of the current assessment practices are too narrow, too limited to cater for the oral, critical, linguistic, visual and technological understandings required by today's learners" (p. 191).

Unfortunately, the participants in my study will more than likely begin their teaching careers in schools and systems that still perpetuate these limited assessment practices. Even if they do not, they will still be bound by narrow practices at the state and national levels. At the very least, the hope is that after the multimodal learning experiences they have had as final semester college students—in addition to their participation in my study—they will avoid the uncritical, passive (and false) acknowledgement of multimodalities as single "learning styles" or simply "digital" or technological media forms. Thankfully, as more

multimodal educational studies are presented, there will be more resources for these digital-native beginning teachers to consult.

Bull and Anstey (2010) provide highly detailed visual matrices and rubrics by which educators and researchers can identify, study, analyze and interpret linguistic, visual, audio, gestural, and spatial multimodal semiotic systems. Bearne and Wolstencroft (2007) have written a thorough text for helping teachers integrate multimodality into classroom instruction. They include several detailed planning forms, checksheets and rubrics for evaluating multimodal texts; gauging students' multimodal developmental levels; and for addressing policy planning, including action and development plans as well as planning and teaching sequences. The implications of "new and multimodal literacies" extend not only to the pre-service level of beginning digital-native teachers but also to professional development for continuing non-digital native (digital immigrant) teachers (Love, 2008, p. 174).

Multimodality and 21st century learning skills.

The Partnership for 21st Century Skills is a national organization whose mission, as articulated in their "framework for 21st Century Learning," is to provide a "holistic view of 21st century teaching and learning that combines a discrete focus on 21st century student outcomes (a blending of specific skills, content knowledge, expertise and literacies) with innovative support systems to help students master the multi-dimensional abilities required of them in the 21st century" ("Framework," 2011). As of 2011, sixteen states—including North Carolina—have taken steps to implement and incorporate the 21st century learning skills movement into their school systems and curricula ("State initiatives," 2011).

Though the organization does not use multimodal-specific language or terminology, the overlap between 21st century learning skills and multimodality is unmistakable. For instance, consider three of the "learning and innovation" skills as stated in the "P21 framework definitions" (2009):

- Use a wide range of idea creation techniques (such as brainstorming);

- Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts;

- Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade).

These are only three of many stated 21st century skills, but they remind us Kress's (2003) assertion that modes are "culturally and socially fashioned" communicational and representational resources for meaning-making (p. 45). Not only must students and teachers *use* different modes, each with its own unique set of affordances and modal processes, but they must also think about *which* modes are best utilized by *which* learners in *which* contexts.

Implicit in 21st century learning skills are the ideas that students and teachers are designers of meaning who employ and engage modes and media to create meanings (Kress, 2010, p. 2). These 21st century learning skills support the idea that effective multimodal knowledge construction includes, but is not limited to, "mapping how modal resources are used by people in a given community/social context" (Jewitt, 2009, p. 30).

The initiative also stresses the need for critical media literacy, one of the principal implications of my study. It calls for students to be able to create and analyze media; to "examine how individuals interpret messages differently"; and to "understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural

environments" ("P21 framework definitions," 2009, p. 5). Once again, though not overtly expressed in terms of multimodality, the initiative's stated desired outcomes for critical media literacy must certainly involve the development of modal and textual awareness (MTA) and multimodal processes. Hopefully, as the 21st Century Skills initiative is incorporated into the curricula and school systems, the digital-native beginning teachers will recognize and build upon the desired outcomes of the initiative and its inherent call for metacognitive multimodal awareness and study of modal processes and affordances. It is important to note that the emerging literature on 21st century skills has begun to include writing that addresses two components of my study. Gardner (2010) discusses his multiple intelligences in the context of 21st century skills, and Lemke (2010) does the same for Mayer's principles of multimedia learning principles (2005).

Further Research

The present study focuses on pre-service, teacher education majors (who are also members of the millennial or digital-native generation) and how they construct via knowledge via multiple modalities and dimensions of meaning-making. The students were in their final college semester and second of two cohort "block" semesters, and on the cusp of beginning their semester of student teaching. Future studies could take a more longitudinal approach and follow a student cohort for their *entire two semesters* of block coursework *in addition to their entire student-teaching semester*. A follow-up interview at the end would give the student-teachers even more to consider and the opportunity to reflect upon their multimodal perceptions, observations and experiences throughout their final three semesters. The student teachers would be answering interview questions from a different perspective, related to true teaching experience. The researchers could follow up on the

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participants' earlier comments about their plans and intentions for how they wanted to integrate multimodal instruction in their classrooms.

Future studies could be even more specific than mine with regard to cohorts. Researchers could study the multimodal knowledge construction perceptions and reflections of *only* elementary education majors or *only* middle grades education majors; a related study could describe and analyze the differences in multimodal knowledge construction *between* these two separate cohorts. Another related study would be the description and analysis of the multimodal processes and perceptions of secondary-education teaching majors, students who will also become teachers but do not share the block and cohort teaching methods experiences of elementary- and middle grades education majors. Another variation on any of these approaches would be a single, extended ethnographic case study of multimodal knowledge construction in specific content areas or disciplines, such as English (Kress et al., 2005) or science (Kress et al., 2001).

Another approach would be to "flip" any of the aforementioned suggestions and focus the studies on non-traditional, non-digital native (digital immigrant) students and their multimodal processes, approaches, perceptions and perspectives. Finally, researchers could conduct single- or multi-site case studies of different schools or schools systems and how their unique school culture, organization and leadership stifle or nurture multimodal teaching, learning and assessment.

Conclusion

The participants of this study are in the early stages of what I have termed "modal and textual awareness," or MTA. They have had multimodal experiences and instruction, even when they have never formally or consciously named and reflected on the acts of multimodal

knowledge construction. They have had classroom instruction and discussions regarding different types of text, but they have not yet transferred that knowledge to their own multimodal textual generation and composition. Love (2008) captures the unique requirements for this digital-native cohort, who are both students and teachers:

> For students to succeed in accessing and using the meanings embedded in these multimodal texts, teachers need to know how to identify their purposes, structures and language features. For students to succeed in writing or constructing such texts to effectively achieve their intended purposes, their subject teachers also need a 'metalanguage' to talk with their students as they critically deconstruct sample texts and explicitly model the structures of the required texts. (p. 173)

What Love omits is the need for both students *and* teachers to be *active metacognitive producers* who are aware of multimodality, the varieties of multimodal processes and the affordances unique to particular modes or modal combinations, including the dimensions of meaning-making. Though speaking of constructivism in general, Bruner (1996) highlights the constructivist imperative, which also applies to multimodal knowledge construction:

> [E]ducation must be conceived as aiding young humans in learning to use the tools of meaning making and reality construction, to better adapt to the world in which they find themselves and to help in the process of changing it as required (pp. 19-20).

At this early stage of their teaching careers, these digital-native bricoleurs demonstrate a range of ways in which they engage different modalities to construct meaning; not all of the modes (or the students, for that matter) are "digital" or technologically advanced, as Prensky (2001) and others would lead us to believe. These teachers-in-training have been introduced to past theorists. They are familiar with Piaget's learning stages,

Vygotsky's cognitive and social development, Bloom's Taxonomy, and Gardner's multiple intelligences. However, they have never received specific instruction on or introduction to multimodality and meaning-making. Multimodal teaching and learning is an active process, one that "utilizes and exploits a range of literacies" and goes beyond familiarity with theory and principle. It is a process of critical discernment, one that extends across all modes, technologies, multimedia environments and media forms (Brown et al., 2010, p. 193).

An earlier introduction to multimodal knowledge construction and processes—perhaps an extended, cross-curricular teaching methods unit that specifically addresses multimodality and multimodal processes—could in theory make these students and future teachers even more metacognitive, reflective and multimodal educators and practitioners. The process would become more recursive, reflective and dynamic, and would foster an educational milieu where multimodal pedagogy and learning are the continuous and constantly realized norm instead of the dormant, unfulfilled and unrealized exception. As "visitor to all" modalities and "native to none," the millennial bricoleurs of this study, as well as their numerous cohort members, can make learning relevant and meaningful for themselves and their students in all educational contexts, digital or otherwise.

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Appendix A

Research Lay Summary to Students

Introduction

I am Don Presnell, a doctoral student in the Educational Leadership program at Appalachian State University. I am conducting a qualitative research study in which I will describe, analyze and interpret how pre-service, teacher education students adopt and use multiple modes to construct knowledge. The study also addresses students' awareness of how different learning modes contribute to and shape their learning experiences, in addition to how this awareness will inform and contribute to their effectiveness as future teachers. By "modes" I am referring to the ways you make and create meaning, via both traditional print-based modes (reading and writing) as well as non-traditional, non-print based modes (written, oral, visual, aural, tactile, gestural, spatial and other modal combinations or ensembles). The working title is "Digital-Native Bricoleurs: How pre-service teacher education students engage multiple modalities and metacognition to construct meaning."

Benefits and Risks

I am requesting your participation because I believe that your input will help me better understand how late-phase teacher education majors learn best. This is no small thing; your college experience will affect the rest of your personal and professional lives, as well as those of your future students. I want to know what modes work best for you and why. As current students and future educators, participants of the study will directly benefit by learning to be more cognizant and reflective practitioners and educators. Participation in this study would

entail the same amount of risk inherent in either a normal classroom setting or a field experience.

Procedures

After receiving all consent forms, I will randomly select 4 elementary education majors and 4 middle grades education majors to interview. I will meet with each student sometime in the next two months for a short interview (an hour or an hour-and-a-half). I would like your permission to tape this interview (using a small digital recorder). I am the only person who will have access to these interviews; transcriptions will be available to my three-member dissertation committee.

Data, Information and Confidentiality

Please understand that there are absolutely NO right or wrong answers here. Should you participate, there is no need to try and offer what you "think" are the right answers. All of your answers are right, in a sense, as they are yours and reflect your experiences and attitudes.

I would also like permission to review and analyze any assignments (regardless of type) you submit for your methods courses. If you would prefer anonymity, I can assign you a pseudonym; if anonymity is not a concern, I can use your real first name. If you decide not to participate in this study, please rest assured that your decision will in no way affect your course grades or involvement in University-related activities.

How the Results Will Be Used

This research study will be submitted in partial fulfillment of requirements for the Doctor of Education (Ed.D) degree in the Reich College of Education Doctoral Program in Educational

Leadership at Appalachian State University. In addition, the information may be used for educational purposes in professional presentations, conferences and publications.

With sincere thanks,

Don Presnell

Appendix B

Participation Request to Faculty

Dear Appalachian Colleagues,

I hope your semester is off to a great start. I am Don Presnell, a doctoral student here in the Educational Leadership program.

By now you should have received either a brief email or in-person request—either from Dr. Mike Jacobson, Dr. Sara Zimmerman, or your department chair—for you to consider participating in my dissertation research. I am conducting a qualitative research study in which I will describe, analyze and interpret pre-service, teacher education students' awareness of how different learning modes contribute to and shape their learning experiences, in addition to how this awareness will inform and contribute to their effectiveness as future teachers.

If you decide not to participate in this study, please rest assured that your decision will in no way affect your teaching duties and University-related responsibilities. Also, please know that this is in no way a program or performance evaluation. It is a qualitative study concerned with both the exciting possibilities of multimodal learning and the inherent issues and implications concerning multimodalities for future teachers and colleges of education.

If you do decide to participate, here are the simple steps with which I would need your help:

- I would like to have *all* the methods students take an online survey I have constructed and will place online at ASU via Drupal or a devoted AsULearn site. I would need a roster of your course(s) with student names and email addresses.
- In addition, I would use these email addresses to contact all methods students and ask their willingness to participate in my study. A brief advance announcement from you to your students would be great.
- I will conduct eight random observations: 4 elementary education methods courses and 4 middle grades education methods courses. There will be one observation for each subject area (social studies; language arts; science; mathematics) in each level.
- Out of all the methods courses (around 30), I will randomly select eight students (4 elementary education majors, 4 middle grades education majors) and four methods professors to interview.

- **Please reply to this email by 5:00 p.m. on Thursday, September 15, with your name and "yes" or "no" responses to the following:**

  o I am willing for my methods students to be contacted about potential participation in the study.

  o I am willing for my methods class(es) to be observed one time.

  o I am willing to be interviewed after random selection.

Thanks so much for your time and consideration. I'm really excited about this fieldwork and research.

Best regards,

Don Presnell

Appendix C

Participant Consent Form

I have read the research summary and agree to participate as an interviewee in this research project, which concerns how pre-service teacher education students engage multiple modalities to construct meaning. I have had the opportunity to ask questions about the purposes and procedures of this study.

I understand that audio taping is a part of this research and that only the principal researcher and his committee members will have access to taped materials and transcriptions. I also understand that the researcher may use some of my course assignment products/artifacts as part of his research and analysis and that the information may be used for educational purposes in professional presentations, conferences and publications. Therefore:

(   ) I give my consent for the researcher to record our interviews with a digital recorder;

(   ) I give my consent for the researcher to collect and analyze documents I have submitted for my methods courses.

I understand that my participation is voluntary and I can end it at any time without consequence and that the researcher may withdraw me from this research at his professional discretion. I also understand that if I have questions about this research project, I can call the principal researcher, Don Presnell, at (828) 262-2828 or contact Appalachian State University's Office of Research Protections at (828) 262-7981 or irb@appstate.edu.

My signature below indicates that I agree to participate in this study:

Participant's signature: _____Date: _____/_____/_____

Name: (Please print) _____

Researcher's signature: _____Date:_____/_____/_____

Multimodal Knowledge Construction Survey (MKCS)

1. Gender:

Male - 2 4.17%

Female - 46 95.83%

Total Answers - 48

2. Which of the following is your major?

Elementary Education - 43 89.58%

Middle Grades Education - 5 10.42%

Total Answers - 48

3. This question is ONLY for Elementary Education majors: What is your Second Academic Concentration (SAC)? Choose one:

Diversity Studies - 0 0.00%

Natural Sciences - 0 0.00%

Global Issues - 0 0.00%

Mathematics - 3 6.98%

The Arts - 1 2.33%

Foreign Language (French, Spanish, etc.) - 3 6.98%

Theater - 1 2.33%

Math, Science, Technology - 2 4.65%

English - 1 2.33%

Music - 2 4.65%

Visual Arts - 1 2.33%

Social Studies - 29 67.44%

Total Answers - 43

4. This question is ONLY for Middle Grades majors: What are your academic concentrations? Select two:

Language Arts - 4 40.00%

Science - 2 20.00%

Mathematics - 1 10.00%

Social Science - 3 30.00%

Total Answers - 10

5. [*] In Multiple Intelligences: New Horizons (2006), Howard Gardner writes that we all possess a primary intelligence "type." Which ONE of the intelligence types listed below do you believe is your strongest intelligence?

Visual-Spatial: Adept at visualizing physical space (s) and environments. Prefer drawing, charts, graphs, maps and jigsaw puzzles. - 8 16.67%

Bodily-Kinesthetic: Skill with bodily movement and physical expression. Prefer hands-on learning and physical activity. - 9 18.75%

Musical: Love music. Facility with and sensitivity to musical concepts and processes such as melody, rhythm, sound and lyrics. - 3 6.25%

Interpersonal: Learn through understanding of and interaction with others. Makes friends easily, shows empathy for others, and enjoys group work and processes. - 13 27.08%

Intrapersonal: Introspective, intuitive, in tune with feelings and personal interests. Prefer privacy and independent study and learning. - 7 14.58%

Linguistic: Use words effectively. Possess strong auditory and verbal skills and enjoy reading, word games and lectures. - 3 6.25%

Logical-Mathematical: Prefer conceptual, abstract thought and reasoning. Like experiments, solving puzzles, and learning concepts before details. - 4 8.33%

Naturalist: Facility with classifying, categorizing and cataloging information. Interested in areas such as biology, botany, zoology. - 1 2.08%

Total Answers – 48

6. [*] Briefly explain why this would be your strongest intelligence.

Total Answers - 48

7. [*] Which ONE of the intelligence types listed below do you believe is your weakest intelligence?

Visual-Spatial: Adept at visualizing physical space (s) and environments. Prefer drawing, charts, graphs, maps and jigsaw puzzles. - 1 2.08%

Bodily-Kinesthetic: Skill with bodily movement and physical expression. Prefer hands-on learning and physical activity. - 3 6.25%

Musical: Love music. Facility with and sensitivity to musical concepts and processes such as melody, rhythm, sound and lyrics. - 11 22.92%

Interpersonal: Learn through understanding of and interaction with others. Makes friends easily, shows empathy for others, and enjoys group work and processes. - 1 2.08%

Intrapersonal: Introspective, intuitive, in tune with feelings and personal interests. Prefer privacy and independent study and learning. - 4 8.33%

Linguistic: Use words effectively. Possess strong auditory and verbal skills and enjoy reading, word games and lectures. - 6 12.50%

Logical-Mathematical: Prefer conceptual, abstract thought and reasoning. Like experiments, solving puzzles, and learning concepts before details. - 14 29.17%

Naturalist: Facility with classifying, categorizing and cataloging information. Interested in areas such as biology, botany, zoology. - 8 16.67%

Total Answers - 48

8. [*] Briefly explain why this would be your weakest intelligence.

Total Answers - 48

9. [*] During a presentation or lecture, how do you learn best? (Select one):

From printed text and pictures - 45 93.75%

From printed text alone - 3 6.25%

Total Answers – 48

10. [*] During a presentation or lecture, how do you learn best? (Select one):

From graphics and narration - 25 52.08%

From graphics and printed text - 23 47.92%

Total Answers - 48

11. [*] During a presentation or lecture, how do you learn best? (Select one):

From graphics and narrration - 6 12.50%

From graphics, narration and printed text - 42 87.50%

Total Answers - 48

12. [*] On an average day, how much time do you spend watching television?

None - 5 10.42%

Less than one hour - 27 56.25%

1-2 hours - 12 25.00%

2-3 hours - 3 6.25%

3-4 hours - 1 2.08%

4-5 hours - 0 0.00%

More than 5 hours - 0 0.00%

Total Answers - 48

13. [*] How much time per day do you watch online video content (movies, tv shows,YouTube, etc.)?

None - 10 20.83%

Less than one hour - 28 58.33%

1-2 hours - 9 18.75%

2-3 hours - 1 2.08%

3-4 hours - 0 0.00%

4-5 hours - 0 0.00%

More than 5 hours - 0 0.00%

Total Answers - 48

14. [*] How much time per day do you play computer and/or video games?

None - 26 54.17%

Less than one hour - 13 27.08%

1-2 hours - 7 14.58%

2-3 hours - 1 2.08%

3-4 hours - 1 2.08%

4-5 hours - 0 0.00%

More than 5 hours - 0 0.00%

Total Answers - 48

15. [*] How much time per day do you spend reading and sending email?

None - 0 0.00%

Less than one hour - 15 31.25%

1-2 hours - 21 43.75%

2-3 hours - 7 14.58%

3-4 hours - 3 6.25%

4-5 hours - 1 2.08%

More than 5 hours - 1 2.08%

Total Answers - 48

16. [*] How much time per day do you spend text messaging?

None - 0 0.00%

Less than one hour - 23 47.92%

1-2 hours - 8 16.67%

2-3 hours - 10 20.83%

3-4 hours - 3 6.25%

4-5 hours - 2 4.17%

More than 5 hours - 2 4.17%

Total Answers - 48

17. [*] How much time per day do you spend blogging?

None - 28 58.33%

Less than one hour - 16 33.33%

1-2 hours - 2 4.17%

2-3 hours - 1 2.08%

3-4 hours - 0 0.00%

4-5 hours - 1 2.08%

More than 5 hours - 0 0.00%

Total Answers - 48

18. [*] How much time per day do you spend reading and/or writing on Facebook or other social networks?

None - 2 4.17%

Less than one hour - 21 43.75%

1-2 hours - 19 39.58%

2-3 hours - 2 4.17%

3-4 hours - 4 8.33%

4-5 hours - 0 0.00%

More than 5 hours - 0 0.00%

Total Answers - 48

19. [*] How much time per day do you spend reading printed newspapers and/or magazines?

None - 16 33.33%

Less than one hour - 24 50.00%

1-2 hours - 7 14.58%

2-3 hours - 1 2.08%

3-4 hours - 0 0.00%

4-5 hours - 0 0.00%

More than 5 hours - 0 0.00%

Total Answers - 48

20. [*] How much time per day do you spend reading online content (books, magazines, websites, etc.)?

None - 4 8.33%

Less than one hour - 14 29.17%

1-2 hours - 25 52.08%

2-3 hours - 3 6.25%

3-4 hours - 1 2.08%

4-5 hours - 1 2.08%

More than 5 hours - 0 0.00%

Total Answers - 48

21. [*] How much time per day do you spend reading comics?

None - 45 93.75%

Less than one hour - 2 4.17%

1-2 hours - 0 0.00%

2-3 hours - 1 2.08%

3-4 hours - 0 0.00%

4-5 hours - 0 0.00%

More than 5 hours - 0 0.00%

Total Answers - 48

22. [*] How much time per day do you spend writing in a journal?

None - 25 52.08%

Less than one hour - 20 41.67%

1-2 hours - 3 6.25%

2-3 hours - 0 0.00%

3-4 hours - 0 0.00%

4-5 hours - 0 0.00%

More than 5 hours - 0 0.00%

Total Answers - 48

23. [*] How much time per day do you spend listening to music?

None - 2 4.17%

Less than one hour - 16 33.33%

1-2 hours - 16 33.33%

2-3 hours - 8 16.67%

3-4 hours - 3 6.25%

4-5 hours - 2 4.17%

More than 5 hours - 1 2.08%

Total Answers – 48

24. [*] How much time per day do you spend creating or making something (visual art, music, photography, various projects)?

None - 11 22.92%

Less than one hour - 20 41.67%

1-2 hours - 12 25.00%

2-3 hours - 5 10.42%

3-4 hours - 0 0.00%

4-5 hours - 0 0.00%

More than 5 hours - 0 0.00%

Total Answers - 48

25. [*] Books have always been considered as types of "text." Briefly describe other sources you feel could be considered "text." In other words, how would you define the word "text"?

Total Answers - 48

Interview Schedule for Student Participants

How do students construct, synthesize and interpret meanings through multiple nontraditional modes (as opposed to traditionally print-based ones)?

1.   Tell me about your decision to be a teacher.

2.   As a student, what types of assignments do you like the most?

     a.   What makes them interesting or effective?

3.   What types of assignments do you like least?

     a.   What makes them uninteresting or ineffective?

     b.   How could you have made them more meaningful if you had been teaching then?

4.   How do you like to learn?

     a.   What are your preferred modes of learning?

5.   When you are in a class, what type of instruction helps you learn better?

     [Direct vs. indirect; Interactive vs. independent; Experiential]
     http://olc.spsd.sk.ca/DE/PD/instr/index.html

6.   How does that type help you learn better?

7.   Describe a course you've had where an assignment was nontraditional (really "different" or "off the beaten path").

a.   How was it assessed or graded?

8.   Describe your note-taking process. In other words, how do you take notes?

9.   Describe your process for getting ready to write an essay or paper.

10.   How do you study? Walk me through one of your typical study sessions.

11.   How does a course subject influence how you study for a class?

How does student engagement of learning modes and choice of different media forms create or affect meaning? What types of "texts" do students produce and create beyond traditionally print-based ones?

12. Which types of media have been used in your college classes?

[Social media (Facebook, Twitter, etc.), websites, wikis, computer software (packages, Google docs, etc.), blogs, journals, text messaging, podcasts, PowerPoint, Prezi, magazines, television, films, YouTube, video games, comics, visual arts, music, dance, photography, others.]

13. Describe how effectively (or not) they were used.

14. Describe some ways you "create" outside of school.

15. Have you ever been allowed or asked to incorporate any of these creations into your classes and assignments? How?

16. If you were allowed to submit these creations for class, what are some ways teachers could grade or assess them?

17. Besides grades for essays and research papers, what are some ways your work has been assessed in your college classes?

How metacognitive are students about multiple learning modes? That is, in what ways are they aware of how different learning modes contribute to and shape their own learning experiences as well as the learning experiences of their future students?

18. Think about a particular class or educational experience in which you were truly engaged in learning. Describe the ways it was meaningful for you.

19. When you become a teacher, what kinds of approaches and strategies would you like to incorporate that your teachers didn't? Have fun with this.

20. How do you think you will be able to use your personal ways and modes of learning to be an effective teacher?

21. When you begin teaching, what are some challenges you might face as you try to meet the needs of students with different learning modes?

Multimodality
- Monomodal instruction
- Multiple modes
  - Linguistic
  - Audio
    - Music
  - Visual
  - Spatial
  - Gestural
- Processes
  - Affordances
  - Transformation
  - Transduction
- Dimensions of meaning-making
  - Representational
  - Social
  - Organizational
  - Contextual
  - Ideological
- Modal & textual awareness (MTA)
  - TEXT
    - Comics
    - Video games
    - Various
  - Design
- Technology & media forms
  - PowerPoint
  - Video
  - Various

Learning & pedagogical preferences

- Assessment
- Choice
- Creativity
- Current pedagogical practices (as beginning student teachers)
- Digital-native millennials' self-perceptions
- Experiential (hands-on experiences & preferences)
- Feedback
- Guidance
- Involvement
- Mayer (multimedia learning principles)
- Modeling
- Ownership & voice
- Past educational experiences
- Relevance, applicability & real-world connections
- TENSION (flexibility vs. ambiguity)
  - IDP (Instructional Design Project) and standards-based planning
  - Structure
  - Various college assignments

Vita

Don Presnell holds bachelor's and master's degrees in English and Spanish from Appalachian State University, in addition to the graduate certificate in Media Literacy. For two years, he taught elementary Spanish (K-8) for two schools in the Watauga County school system. He is the co-author of *A Critical History of Television's The Twilight Zone, 1959-1964* (McFarland, 1998) and has taught multiple sections of college English, Spanish, and humanities courses, including *Basic English; Expository Writing; Introduction to Literature; Literature-Based Research; Writing Through Rhetoric; Writing Through Perception; British Literature*; *American Literature; World Literature*; *Introduction to Film*; *Elementary Spanish*; *Teaching and Learning in the Digital Age*; *The Narrative Art of Comics* (First Year Seminar); and *The Twilight Zone* (First Year Seminar). Recently nominated for the Brantz Award for Outstanding Teaching in First Year Seminar, he is currently the Associate Director of Academic Advising in University College at Appalachian State University.