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THE DILEMMA OF STUDENT DOWNSHIFTING: PEDAGOGICAL PRACTICES
WHICH INFLUENCE DOWNSHIFTING IN HIGH SCHOOL AGRICULTURAL
SCIENCE PROGRAMS

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ABSTRACT

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The current public education system is saturated with practices perceived as threatening by the student population. This perceived threat can stimulate biological processes which inhibit higher cognition and initiate such behavior as student disengagement and in extreme situations a flight or fight response. Building upon Paul MacLean's triune-brain theory, Leslie Hart defines this phenomenon as "downshifting", a stress induced response resulting in a biological exchange between the neocortex, the limbic system and R-complex in the student's brain. The purpose of this study was to identify components of classroom structure which influence student "downshifting" in a secondary agricultural classroom setting.

Utilizing heuristic inquiry, focusing on both the researcher's and participants' experiences; seven secondary high school agricultural students and one veteran teacher were observed for one academic semester. The teacher and students were informally interviewed throughout the semester and semi-formally interviewed at the beginning and ending of the semester. Additionally, students were videotaped during their speech presentations to illustrate downshifting behavior. Furthermore, a research journal was kept for both observational and personal reflection. Results indicate that all participants

had experienced various levels of downshifting from classroom/school structure, social influence, and pedagogical practice. Additionally, behavioral responses differed according to gender, previous experience and perceived social hierarchy.

CHAPTER 1: INTRODUCTION

Introduction

The national high school graduation rate for the years 1991-2001 remained fairly stable beginning with 72% in 1991 and maintaining at 71% in 2001 (Greene & Winters, 2005). This equates to roughly one in every three high school students dropping out before obtaining a high school diploma. These statistics become more dismal when minority graduation data is extracted. In 2002, 78% of white students graduated with a high school diploma as compared to 56% of African-American and 52% of Hispanic students (Greene & Winters, 2005). When looking at students who were college ready at the end of their high school career, the statistics were similar. In 2002, about 40% of white students, 23% of African-American students, and 20% of Hispanic students graduated from high school with college preparatory coursework (Greene & Winters, 2005).

These statistics lead to several questions regarding the United States' public education system. What factors are causing students to drop out of the educational process at these high rates? Is the current formal educational structure not conducive to educating today's students?

Individuals from the United States Department of Education's School Dropout Prevention Program (2007) identify those students who are at risk of dropping out as

those who have poor academic performance, repeat grades, speak English as a second language, become pregnant, are frequently absent, and come from low socioeconomic backgrounds. They explain that the primary reasons for students dropping out are not clear, as many schools have not required students to participate in exit interviews. When the Oregon Department of Education studied a large group of students from 1991-1995 the rationale given from the 24.5% of students who dropped out included receiving irrelevant coursework, peer pressure, teaching practices which do not comply with student learning style and lack of personal attention (United States Department of Education National Center for Education Statistics, 1999). While these answers attempt to explain the current dropout rates, they suggest a much deeper phenomenon and do not explain the academic and social factors which lead to students dropping out.

Fundamental Assumptions Regarding the Current Public Education System

Educational researchers Renate Numella and Geoffrey Caine (1993) attempt to answer these fundamental questions by rebuking four fundamental assumptions about the United States' current educational system. The first assumption references education as tied to economic and social trends. During the industrialization era, a primary purpose of education was to train youth in simulated workforce environments and give them the vocational skills necessary to work for the local factories. Caine and Caine (1993) metaphorically compare the factory assembly line with that of the current educational system explaining that students move through an assembly line to complete their education. Each academic subject or "part for assembly" is treated as independent and yet when students graduate they are to be a completed project, capable of connecting the

relationships between each subject. Just as in the workforce assembly line, expectations are predetermined, as is the content, standards, skills and facts of today's education system, leaving little room for a student's individual thirst for knowledge and cognitive maturity (Caine & Caine, 1993). This metaphorical comparison is echoed by Leslie Hart (1983) in his critique of Horace Mann's industrial version of public education, "The students were the raw material, fed in at one end, batch processed, and turned out at the other" (p. 14).

The second assumption Caine and Caine (1993) suggest identifies stimulus-response theory, or behaviorism, as it relates to education as an appropriate model for human learning. They argue that this philosophical belief limits individual student growth. They focus specifically on the reward and punishment practices associated with behaviorism. The identifiable techniques utilized by teachers regarding rewards and punishments could have a far larger impact on student self-efficacy and behavior than the initial behavior being addressed. Additionally, a system where rewards, punishments and correct answers are controlled by those in authority limits individual growth and critical thought processes, leaving students to rely on the authority for both correct answers and behavioral approval. Educational consultant Eric Jensen (2000) concurs with Caine and Caine in criticizing the behaviorist model of education, "human beings are not rats; and to account for our unique condition, which includes our propensity to be creative, depressed, oppositional, motivated, and to make conscious choices, a bit more sophistication is required" (p. 3). Jensen believes that students should be encouraged to be intrinsically motivated, making the educational process meaningful. He suggests that

the educational system be revised to evaluate students as individuals rather than as demographic groups in the current factory-model educational system.

The third assumption of today's American school system identifies schools as in touch with, and supporting the needs of, the current generation. Caine and Caine (1993) specifically identify parent/student relationships as an area of concern. In a world where most parents are working and quality family time is scarce, it is crucial for the educational system to educate students in the areas of self-reflection, inquiry, and critical thought in relation to real world context. Many students establish their moral and ethical background through modern electronic communication without the supervision of parents (Caine & Caine, 1993).

The fourth and final assumption identifies current approaches to educational research as sufficient and appropriate. Caine and Caine (1993) criticize educational researchers who only use quantitative measures commonly used in the natural sciences. They propose that research conducted where one variable is measured, while all other variables are held constant, limits educational research and sterilizes it from its true context. "Educational research, like teaching, has focused heavily on the pieces without giving us a greater sense of how those pieces interact in more complex wholes" (Caine & Caine, 1993, p. 20).

Working Within Our Current System

Caine and Caine make an effort to explain historical events that led to the current status of America's educational system by arguing against the four basic assumptions; however, researchers must identify methods which encourage students to graduate in the

current system and to obtain the internal motivation to do so. Hart (1983) criticizes teachers and others in the educational community who blame television, family communication breakdown, limited religious influence, lack of respect for authority, governmental interference, limited funding, and racial and ethnic tension for the demise of education and society. He conveys that educators need to look intrinsically at the student population at hand. Hart encourages teachers to identify new and inventive ways to help students learn during this critical time. In order for teachers to create these new and inventive teaching practices we must evaluate their current educational training.

Traditionally, educational structure and pedagogical practices have been based on such psychological theories as Burrhus Frederick Skinner's (1938) behaviorism, Jean Piaget's (1928) theory of cognitive development, Lev Vygotsky's (1992) theory of social development, Benjamin Bloom's (1984) taxonomic structure of hierarchical thought processes and Howard Gardner's (1993) seven intelligences (Schunk, 1996). If studied in great detail the influences from these theorists on education could be substantial, however, most practicing teachers have limited exposure to child development and psychological theories. This limits the practice of matching learning and behavior with pedagogical practices, creating a further disconnect.

It wasn't until the early 1990's that the biological sciences and behavioral sciences started a joint effort peering into the neuroscience behind the mind/brain connection and cognitive development. In 1989, the U.S. scientific community declared the 1990's as the decade of the brain (Sousa, 2001). With the technology of positron-emission tomography (PET), functional magnetic resonance imaging (fMRI), computerized tomography (CT) scientists are now able to identify and study components

of the brain never before possible (Scott & Wise, 2003). Harvard educational scientists Katzir and Paré-Bleagoev (2006) highlight the current increase in neuroscience research by identifying more than 300 graduate neuroscience programs. Academic fields such as cognitive psychology, education, and neuroscience have merged to initiate areas of study such as neuropsychology, neurobiology, neurophilosophy and evolutionary neuropsychology (Katzir & Paré-Bleagoev, 2006).

Educators and government officials have taken research from the areas of neuroscience and cognitive neurosciences and developed methods for educational practice and governmental policy. This leap to educational practice or “brain-based education” raised tremendous concern and heated debates in the scientific community (Bruer, 1997; Coles, 2004; Jorgenson, 2003; Katzir & Paré-Bleagoev, 2006). John Bruer (1997) warns educators against misinterpreting findings based on neuroscience as there is not yet enough information to make the connection. Bruer surmised that educators are under constant pressure to revolutionize education, and neuroscience findings can become very enticing for an educational platform. One example of policy makers misinterpreting neuroscience research is the 1998 Georgia decision to fund a program providing Mozart CD’s to all new mothers in hopes of generating a population of gifted babies. The Governor based this political decision on data received from two studies. The first stated that listening to Mozart increased college student I.Q. for a short period of time and the other showed a minimal increase in spatial skills of three year olds (Katzir & Paré-Bleagoev, 2006).

Educational researchers who are proponents of brain-based education are also cautious when interpreting research associated with brain anatomy and physiology and its

implications to education. Many suggest that by educating practicing teachers about brain research, teachers can gain a holistic understanding of their students' individual learning and adapt their classrooms/teaching styles to enhance student success (Caine & Caine, 1993, 2001; Jensen, 2000; Sousa, 2001; Sprenger, 1999). Education practitioner Marilee Sprenger (1999) conveys this philosophy in detail in her book *Learning and Memory: The Brain in Action*.

Stress and Threat in the Educational Environment

While most factors of stress seem directly observable, there are many educational factors which are not so obvious. Researcher Eric Jensen (2006) found that most schools exhibit classroom environments which are chaotic, uncomfortable and overwhelming, increasing student stress levels. He also found that the physical structure of the building can induce student stress, using examples such as bad acoustics and poor lighting. Furthermore, students showed that they do not have the life skills to deal with stressful environments, believing that they have no influence over their educational surroundings.

Jensen's findings correlate with the theory of "downshifting" as defined by Leslie Hart (1983). Hart defines the phenomena of downshifting, "When the individual detects *threat* in an immediate situation, *full use of the great new cerebral brain is suspended, and faster-acting, simpler brain resources take larger roles*" (p. 108). In other words stressful environments can limit students' ability to reach their full learning capability and in extreme situations exhibit a fight or flight response.

Purpose of the Study

The phenomenon of downshifting as an evolutionary psychological theory has yet to be rigorously researched in a formal classroom setting. An extensive literature search identified studies in which researchers included Hart's theory of downshifting in their literature review; however, they have yet to test the theory in the public educational system. Other disciplines have performed in-depth studies of the biological and psychological effects of stress response and coping. In the field of psychobiology, researchers have identified many biological responses to induced stress, specifically in relation to post-traumatic stress disorder and prenatal trauma (Kemeny, 2003; Lundberg, 1993; Marshall & Garakani, 2002; Stein, Harvey, Uys & Daniels, 2005). Additionally, topics such as student stress, stressors, and coping mechanisms have been studied extensively by Dungan (2002), Chapman & Mullis (1999), and Frydenberg (1997). In regards to pedagogical practices, it is understood that student support from teachers helps to improve student efficacy (Cassaday, 2004; Osher, Dwyer & Jimmerson, 2006; Sawyer, Hollis-Sawyer, 2005; Seligman, Ollendick, Langley, Baldacci, & Bechtoldt, 2004; Wood, 2006).

As an emerging evolutionary psychological theory, it is imperative that downshifting be tested in an educational setting. Identification of pedagogical methods which influence downshifting could play an important role in the retention of current public education students and possible re-evaluation of our current educational structure. The importance of studying downshifting in agricultural education is crucial. Agricultural education is not like other academic content areas, it immerses the students into practical

environment which are modeled after the studied industries. Talbert, Vaughn, and Croom, (2005) identify the purpose of agricultural education in the following:

To be effective and useful, agricultural education must be a mirror image of the current state of technology in the agricultural industry. Students must use the same types of equipment, perform the same tasks, and be exposed to the same risks as someone who is currently employed in an agricultural profession. Instruction should go beyond general training in agricultural occupations and provide training specific to jobs in the local community (p. 56)

Therefore it is the purpose of this research to add to the current body of knowledge by providing the answers to the guiding research questions:

Guiding Research Questions

1. What current pedagogical practices influence student downshifting in high school agricultural science programs?
2. What behaviors are exhibited when students perceive themselves to be in a threatening situation?
3. What factors, in addition to threat, induce student downshifting?

Definition of Terms

Amygdala: an almond-shaped mass of gray matter in the anterior portion of the temporal lobe

Anxiety: a multisystem response to a perceived threat or danger.

Brain Plasticity: the ability of the brain to rearrange the connections between its neurons

Coping Mechanism: consciously applied skills and defense mechanisms used to reduce stress

Cortisol: the primary stress hormone

Dendrite: a short arm-like protrusion from a neuron

Downshifting: a behavioral response to biological process when threat is perceived

E.E.G.: electroencephalogram, a technique for studying the electrical current in the brain

fM.R.I: functional magnetic resonance imaging, a technique used to identify which regions of the brain are active during a specific task

Frontal Lobe: The largest and most anterior part of each cerebral hemisphere

Heuristic Inquiry: a qualitative framework which allows both research and participant experiences to be included for a deeper understanding of a phenomenon

Neocortex: part of the cerebral cortex and constitutes about 85% of the human brain's total mass, thought to be responsible for higher level cognitive functions such as language, learning, memory, and complex thought

Neurobiology: the branch of biology that deals with the anatomy and physiology and pathology of the nervous system

Norepinephrine: a neurotransmitter that mediates chemical communication in the sympathetic nervous system, used in periods of short-term stress and can increase heart rate and blood pressure

Neuron: the fundamental unit of the nervous system, having structure and properties that allow it to conduct signals by taking advantage of the electrical charge across its cell membrane.

Neurotransmitter: a chemical that is released from a nerve cell which thereby transmits an impulse from a nerve cell to another nerve, muscle, organ, or other tissue

Pedagogy: the art or profession of teaching

P.E.T.: positron emission tomography scan, procedure in which a small amount of radioactive glucose (sugar) is injected into a vein, and a scanner is used to make detailed, computerized pictures of areas inside the body where the glucose is used.

R-Complex: the oldest brain, includes the brain stem and the cerebellum

Stress: a person's response to environmental demands or pressures

Stressors: an agent, condition, or other stimulus that causes stress to an organism

Synapse: the junction across which a nerve impulse passes from an axon terminal to a neuron

Synaptogenesis: rapid early growth of synapses in the brain

Threat: a sign of impending danger or damage

CHAPTER 2: LITERATURE REVIEW

Evolution/Metamorphosis of Educational Thought

Men have never readily accepted new ideas. Our schools and general thinking are cluttered with beliefs long proved absurd by contemporary knowledge. Man has demonstrated over and over again that the last thing he wants are new ideas, even when they are desperately needed. Ideas are welcomed as long as they do not contradict theories on which scholarly reputations have been erected.
(L'Amour, 1978, p. 175)

Educators are constantly debating whether certain educational philosophies are better than others. This is apparent in our school systems today. It is especially recognized in the different generations of working teachers. The age discrepancy within the teaching population creates an environment where diverse values and training may dictate pedagogical practice (Strauss, 2005). Some educators favor a more traditional behaviorist model to teaching based heavily on the works of John B. Watson (1924) and Burrhus Frederick Skinner (1953). The term “traditional” relates to an educational system based upon the behaviorist model. Other educators favor a constructivist model of learning based on the works of Jean Piaget (1970) or a social constructivist model such as those based on the works of Lev Vygotsky (1962). However, in the last decade a new approach to learning has further added to the pedagogical debates, “brain-based” learning stemming from the constructivist movement.

Constructivism

Educational researcher Bettina Brown (1998) defines constructivism as a theory of human learning focusing on the belief that people construct meaning through interpretive interactions in their social environment. Constructivists believe previous knowledge forms the basis for further learning and creates meaning specific to the individual (Jensen, 2000). Within the context of constructivism lie several conflicting viewpoints, and in some cases a philosophical dichotomy exists. Some educators believe mental structures come to reflect a common static reality, while others believe no reality exists outside of the individual's understanding of the world (Brown, 1998). Additionally, there is a discrepancy in belief regarding how much social interaction with teachers, peers, family and others contribute to the individual's construction of knowledge (Schunk, 1996). Some extreme constructivist philosophies promote very little structure from teachers toward students, making student learning highly individualistic. Others view the teacher's role as not only to observe and assess the classroom environment, but to also interact with the students and promote higher cognitive thinking (DeVries, 2002).

Many educators subscribing to the constructivist philosophy utilize integrated curricula. They focus on enhancing learning by studying subjects through various viewpoints, allowing students to gain a holistic understanding. Students interact outside of the classroom to understand practical content applications. Ultimately, constructivists want students to take a more active role in their education by setting individual goals and monitoring their own progress (Schunk, 1996). The focus of constructivist teaching is student empowerment, moving students away from rote memorization and towards metacognition and self-evaluation (Brown, 1998).

There are various forms of constructivist approaches. Schunk (1996) outlines three viewpoints as exogenous constructivism, endogenous constructivism, and dialectical constructivism. Exogenous constructivists believe that obtaining knowledge is based upon a reconstruction of structures existing in the external world and environmental interaction. Endogenous constructivism deals with a pre-determined mental structure allowing knowledge to be developed through cognitive abstraction in a predictable sequence, in line with Piaget's theory of cognitive development. Dialectical constructivists maintain that knowledge is constructed through social interactions between other individuals and their environment, which relates to Bandura's theory of reciprocal interactions.

In recent decades, constructivist theorists have extended the traditional focus on individual learning to address collaborative and social dimensions of learning. It is possible to see social constructivism as a bringing together of aspects of the work of Piaget with that of Bruner and Vygotsky (Wood, 1998). Vygotsky believed that all higher mental functions begin in the social environment (Schunk, 1996). It is through these philosophical beliefs that the constructivist approaches to education have been formed.

Brain-Based Learning

Deeply rooted in the constructivist movement lies the emerging philosophy of brain-based learning. Eric Jensen (2000) defines brain-based learning as, "learning in accordance with the way the brain is naturally designed to learn" (p. 6). It is a multidisciplinary approach to understanding learning which utilizes findings from areas

of psychology, neuroscience, and education. Jensen cautions that it is not an individual discipline nor is it a prescribed methodology; however, it is a process of thought which focuses on “what is good for the student brain” (Jensen, 2005). Proponents of the brain-based movement utilize pedagogical practices which include utilizing individual students’ base knowledge to help create deeper meaning and educational relevance, creating deeper emotion with educational practice, initiating physical movement to enhance brain activity, eliminating negative stress in the educational environment and creating an atmosphere conducive to learning (Jensen, 2005).

Educational researchers Caine and Caine (1993) identify the importance of focusing on the implications of brain research toward education as it confirms many of the valid social criticisms of the current educational system. Caine and Caine (1993) understand that educators do not need another method, approach, or model which guarantees educational success, “from the viewpoint of educational theory and methods much of what we say has been said or done before” (p. viii). Brain-based learning provides a framework for a deeper understanding of what we already know.

One of the primary concerns brain-based educational researchers have is the structure of the current educational system. During the industrialization era, a primary philosophy of education was to produce a workforce for local factories (Caine and Caine, 1993). As a result, our current educational system expects students to obtain the same academic content and skills each year, regardless of their adolescent development. Students are measured by state mandated, standardized tests which determine how effective each school is in facilitating predetermined curricula. This is in direct opposition to the body of knowledge from research conducted in developmental

psychology. Researchers' Arthur Chickering (1993), Erik Erikson (1978), and James Marcia (1966), have identified several stages of adolescent development and identity. These stages support environments which allow for experimentation with various social and academic roles, freedom of choice, pursuit of meaningful achievement, freedom from excessive anxiety, and time for reflection and introspection. Additionally, there is flexibility as to the age when students will achieve and accomplish each stage. In some cases, students will regress to previous developmental stages due to extreme environmental influence. Brain-based proponents and developmental psychologists concur that the current educational system is lacking in several of these areas.

Brain-based researchers and analysts also examine the compatibility of the educational system in accordance with the human evolutionary process. They maintain the belief that humans learn in complex environments which have a more practical and individually meaningful environment. Jensen (2000) describes the evolutionary belief toward educating students for real world application, "our students are bringing a survival-oriented genetic blueprint to "work" each day. It is up to us to create the conditions whereby their brain will "choose" or "select" the learning that will best enhance their chances of survival" (p. 5). The negative behaviors associated with students and their reluctance to learn may be due in part to their innate perception of survival in the school setting, "The "negative" behaviors they learn- put downs, deceit, attacking, avoidance, and peer pressure- are to be expected as long as students perceive their survival is at stake" (Jensen, 2000, p. 5). This principle calls for a complete renovation of the educational environment.

Professional Discrepancies Associated with Brain-Based Learning

The 1990's has been labeled the "Decade of the Brain," describing the large emphasis on research in the neurological and psychological sciences (Bruer, 1999). The neurological studies during this time created a wave of interest from individuals in the fields of cognitive psychology and education. As interest increased, educators began to create a variety of interpretations toward educational practice and with interpretation came criticism.

Recently, many educators have looked to the neurosciences to support their pedagogical practices and in some cases educational policy. Interdisciplinary assumptions have sparked heated debate in the psychological, neurological, and educational fields. Joseph LeDoux (1996a) cautions that although results from neuroscience research are very enticing, it is very easy to misinterpret their application in educational practice. Proponents of brain-based learning also heed this warning as they look toward data from the neurological and psychological sciences. Jensen (2005) acknowledges the difficulty of interpreting brain research, "One must be cautious and prudent in how research is interpreted and ultimately used ... our policy is to look for basic neuroscience research and match it with data from applied psychology or cognitive science" (¶, 3). Educators should be hesitant when looking for a definitive study which identifies certain pedagogical approaches as being more brain compatible than others. Sousa (2001) also cautions educators to be critical of neuroscience research but refrain from becoming so cautious that it prevents progress in the educational sciences.

As the multidisciplinary approaches to understanding the biological mechanisms of student learning in their educational environment are in their infancy, it is haphazard to

assume that pedagogical approaches cause positive brain development. To initiate an empirical study which identifies relationships between brain-based teaching techniques and student brain activity researchers would have to implement the following steps: (1) train teachers to teach using brain-based approaches and make sure that they are consistent throughout the study; (2) include a control group which would not be exposed to any brain-based strategies, including schools without threats or confusion; (3) schools would include mismatched curriculum, be devoid of arts and physical education, and untrained teachers would only teach using strict lecture format; (4) researchers would have to identify a fair assessment which measures students health, state of happiness, confidence, learning skills, honesty, humility and self efficacy; (5) implement double blind and longitudinal studies in which neither the researchers, students, or teachers knew which methods were being used; (6) measure student brain activity and formation using functional magnetic resonance imaging (fMRI) or positive emission tomography (PET) technology in the classroom which they are accustomed to without disruption (Jensen, 2005). Technology such as PET scans which detect radioactively tagged sugar within a participant's brain tracking blood flow which is used as an indicator of brain activity and fMRI which also measures blood flow through oxygen composition through digital imaging, are commonly used on an individual basis and have yet to be practical for educational settings (Sousa, 2001). It is highly unlikely that this form of research will be available in the near future; therefore, educators must look critically at results from neurological and cognitive fields when looking for a better understanding of student learning. However, there are neurological and psychological studies which could have an influence on student brain development and learning if further tested.

Neuroscience and Neuropsychology: A Foundation for Learning

For nearly a century the science of the mind and the science of the brain have been studied independently. It was not until the last fifteen years or so that the two divergent sciences collaborated to form a discipline of cognitive neuroscience (Bruer, 1999). Social neuroscientist Mark Raichle (2003) applauds the merger but cautions that there needs to be a common understanding of measurements and questions posed between the fields, “This is clearly a challenging and multidisciplinary work in progress for all concerned” (p. 759). This is also true with the application of cognitive neuroscience to educational practice. Many educational researchers and educators have tried to make a direct theoretical connection between the neurosciences and pedagogical practices, often making inaccurate assumptions in the process. Bruer (1997) argues that educators should be looking at the more established bridges of education and cognitive psychology and then toward the emerging bridge between cognitive psychology and the neurosciences rather than making direct assumptions from the neurosciences.

Educators who are proponents for brain-based learning cite numerous neurological studies as a basis for their pedagogical platform; in these citations lay consistent areas of research. The primary neurological research categories which educators base brain-based learning approaches on include: synaptogenesis or rapid early growth of synapses in the brain; brain plasticity and environmental enrichment in which students are immersed in situations which initiate new synapse formation; brain lateralization or brain dominance according to right and left hemispheres; and the relationship between emotion and neurotransmitters.

Synaptogenesis

One of the most mentioned studies educators cite in support of synaptogenesis comes from Chugani, Phelps, and Mazziotta (1987). Using positive emission tomography (PET) and a glucose tracer, Chugani and his peers measured glucose metabolism rates in the brain of newborn babies and adolescents. They found that glucose consumption spiked at two to three months of age, which coincided with improvement in visuospatial and visuosensorimotor skills. Additionally, Chugani et. al. (1987) found glucose consumption in the newborn brain increased between the ages of six to eight and eight to twelve months. The spike occurred in the frontal cortex correlating with the implementation of cognitive behaviors such as stranger anxiety. Furthermore, the increase in glucose consumption corresponded with the expansion of the dendritic fields in frontal cortex. The rise in glucose consumption peaked again in years one and three and maintained at that level until ages nine or ten (Jacobs, Chugani, Allada, Chen, Phelps, Pollack, & Ralieg, 1995). Chugani, Hovda, Villablanca, Phelps, & Xu (1991) found that in cats and vervet monkeys, there is a correlation between glucose metabolism changes and synaptogenesis. Synaptogenesis was measured by slicing the animal's brain and counting synapsis in the brain tissue. Their assumption was that changes in glucose provide an indirect measure of synaptogenesis in humans. Educators have chosen these studies to assist them in validating the theory of critical developmental periods in brain maturity as well as strengthen the argument regarding proper nutrition and neural development (Sprenger, 1999).

Enriched Environments and Brain Plasticity

While synaptogenesis occurs early in child development and slows due to synapse selection or “pruning” around early adulthood, there are studies which show evidence that the brain continues to create new synapses through experience or brain plasticity (National Research Council, 1999). Greenough, Black and Wallace (1987) identify two subcategories of synaptic growth defined by environmental experiences, experience expectant, and experience dependent. They propose that experience expectant plasticity deals with experiences that have been continuous throughout human evolutionary history, “Since the normal environment reliably provides all species members with certain experiences, such as seeing contrast borders, many mammalian species have evolved neural mechanisms that take advantage of such experiences to enhance developing sensory and motor systems” (Greenough et. al., 1987, p. 540). To summarize, the human brain overproduces synapses during the early part of life and then prunes those that are not used early on.

The other form of plasticity is experience dependent. Experience dependent plasticity is synapse growth with information that is unique to each individual and is contextual. It is this form of synaptogenesis that brain-based proponents focus on as supporting continued learning and brain growth in accordance with environmental factors or environmental enrichment (Greenough et. al., 1987). Educational researcher Eric Jensen (2006) defines environmental enrichment as, “a positive biological response to a contrasting environment, in which measurable, synergistic, and global changes have occurred” (p. 47).

Several studies have been completed using rat species in a lab setting to identify experience dependent brain plasticity. Kilgard, Pritesh, Vazquez, Gehi, Schreiner and

Merzenich (2001) used electrical activation of the basal forebrain to measure neurotransmitters associated with cortical plasticity in adult rats. The sample population included rats that were acclimated to the laboratory environment with those who were naive to the laboratory environment. Both samples were subject to foreign auditory tones; acclimation to the tones was measured through neurotransmitter concentration in the basal forebrain. The hypothesis proposed that the naïve rats that were placed in the new environment would have higher neurotransmitter levels than those who were acclimated to the environment. The analysis from the results imply that rats who adapted more quickly to the auditory tones increased brain activity and cortical plasticity (Kilgard et. al., 2001).

Percaccio et. al. (2005) also completed an auditory experience dependent plasticity study. Randomly chosen rats were placed within an enriched environment consisting of various sounds relating to behaviorally meaningful tasks such as wind chimes and bells at the entrance of a ramp, and motion detectors that created a sound for the water source. The control rats were placed in a standard lab environment or cage. The researchers claim that rats placed in the enriched environment had a larger increase in electroencephalographic (EEG) levels throughout the study with the implication that the environment increased brain activity and therefore learning.

Both studies measured brain activity through EEG. The researchers chose to use experimental rather than observational designs; however, there are several confounds which could possibly influence their results. The authors state that the role of various neurotransmitters is inconclusive therefore, they are unsure whether or not certain concentrations of neurotransmitters are directly correlated with brain plasticity or cortical

neuronal growth. There are multiple factors which influence environmental plasticity including social interaction, behavioral relevance, and physical activity which were not controlled for in either study (van Praag, Kempermann & Gage, 2000). Additionally, rats were used in these and many other neurological and psychological studies. The generalizability of results across species, in this case from rats to humans, has been criticized by Hart (1975). Hart identifies rats bred in laboratory conditions as being “about as close as we can get to a living non-animal” (p. 22). He does grant that there have been substantial intellectual gains using laboratory animals; however, he highlights that all animals have brains that develop in complex environments in a state of freedom rather than laboratory conditions. Other scientists support the cross- species generalizations. Renner and Rosenzweig (1987) identify similarities between mice, gerbils, ground squirrels, cats, and primates supporting similarities between all species regarding brain structure.

Brain Lateralization

Roger Sperry (1974) made a startling discovery when he found that the hemispheres of the brain acted independently when disconnected. Sperry and his graduate student Michael Gazzaniga conducted a series of studies on humans who underwent the surgical processes disconnecting the left and right brain hemispheres, a procedure used to limit epileptic seizures. They then charted characteristics associated with each hemisphere, the left hemisphere being primarily associated with analytical procedures; sequencing, word and letter recognition, while the right hemisphere is primarily associated with creative procedures; spatial memory, face and object recognition (Sousa,

2001). Thus began the theory of hemisphericity or lateral brain dominance in individuals. This theory, often misunderstood, has been utilized by educators for several years, haphazardly, and is still highly debated in the psychological and neurological sciences.

Fink, Halligan, Marshall, Frith, Frackowiak, and Dolan (1997) conducted a study measuring brain activity with both global and local visual stimuli. Global visual measures were identified as being large alphabetical letters created with local visual stimuli or smaller alternative letters (e.g.: a large letter G was formed with smaller letter m's). Positron emission tomography (PET) scans using radioactive tracers and MRI technology were used to measure regional cerebral blood flow within each participant. The researchers suggest the study provides direct evidence that there is hemispheric specialization for global and local processing of hierarchical visual stimuli. They believe that globally directed attention predominantly involves the right hemisphere while locally directed focus primarily involves the left hemisphere. Platel et al. (1997) studied the functional anatomy of music appreciation. The researchers studied selective attention to musical pitch, timbre, rhythm, and semantic familiarity with tunes using PET scans to identify localized areas of the brain through blood flow concentration. Their results showed that there was left hemispherical dominance with the rhythm, pitch and familiarity tasks while right hemispherical dominance for the timbre task. Positron emission tomography scans showed that the pitch task identified more blood flow in the area of the brain believed to process visual mental imagery while the rhythm task identified more blood flow in the area of the brain believed to process sequential sounds.

Both studies examined provide strong evidence that there is a relationship between information processing and hemispheric allocation of that information within

their subject population. However the generalizability of their findings is very limited. In both studies the subjects were right handed French males. No women or individuals from other cultures were examined in either study. Cultural and gender diversity could possibly have a large impact if the study were repeated. The Platel et al. (1997) study examined six subjects all of which had musical backgrounds; individuals with no musical background were not studied. The total population studied in both studies was limited to 22 individuals and therefore can not be used as strong evidence for classroom instruction.

The Biology of Emotion and Cognition

Another emerging topic in the neurological, psychological, and educational communities is the correlation between emotion and cognition. Neuroscientists Drevets and Raichle (1998) conducted a meta-analysis of studies measuring cerebral blood flow during emotional and higher cognitive processes. They found that there is a possibility that neural activity is less active in areas required for emotional processing during higher cognitive processes. Additionally, there is a possibility that neural activity in the higher cognitive processing levels is suppressed during emotional distress. However, they are hesitant in making broad statements regarding emotion and cognition, “the existence of an interrelationship between cognition and emotion is intuitively appealing because it seems to commonly manifest itself in human behavior, few empirical data exist to substantiate or characterize such interactions” (Drevets & Raichle, 1998, p. 379). Yet in a later research summary where both animal and human neurological studies were analyzed, Phillips, Drevets, Rauch, and Lane (2003) found that there are direct links between areas of the brain which are contributed to being areas of cognition and emotional states. They

found that human emotion functions in two neurological systems, the ventral system and the dorsal system. The ventral system, which includes such areas of the brain as the amygdala and prefrontal cortex is significant in identifying the emotional relevance of environmental stimuli and the production of affective states (Phillips, et al., 2003). Additionally, the dorsal system, which includes the hippocampus and dorsal regions of the prefrontal cortex, “regions where cognitive processes are integrated with and can be biased by emotional input, is important for the performance of executive functions, including selective attention, planning, and effortful rather than automatic regulation of affective states” (Phillips, et al., 2003, p. 510). These contradictory philosophies by the same researcher in a relatively short period of time illustrate the rapid advancements in neurological knowledge.

Researchers from the field of neuropsychology have delved into the biological, physiological and behavioral processes of the human brain. Researchers Adolphs and Damasio (2000) have taken an in-depth look at the multifaceted role of the amygdala in human emotion. They found that it plays a key role in identifying facial expressions and their meanings as well as conditioned behavioral response. Neuropsychologists Tucker, Derryberry and Luu (2000) have identified the anatomical and physiological components which induce human emotion and behavior. They concur with MacLean’s (1978) Triune-Brain theory and specifically look at the evolutionary processes associated with human emotion. Tucker, Derryberry and Luu (2000) suggest that the human brain has evolved from a reptilian mechanism which initiates a reflexive response based upon perceived threat, to a complex circuitry which has the ability to identify possible threat stimuli,

synthesize the information, and then give an appropriate behavioral response to the original stimulus:

The evolutionary trend toward organizing perception and behavior according to “distant” information appears to be extended in the human brain, through memory capacities that allow continual integration of past experience to anticipate the events of the future. These memory capacities cannot be understood by a strictly cognitive analysis. The complex corticolimbic interaction of the massive human cortices is regulated adaptively by motivational and emotional controls of limbic and subcortical systems. (Tucker, Derryberry, & Luu, 2000, p. 59)

It is through this biological collaboration that emotions control motor, autonomic, and sensory processing (Tucker, Derryberry, & Luu, 2000).

In Buck’s (2000) summation of the speed at which the brain processes emotional information, he found that there are two identifiable speeds. There is a fast process of emotional information when directly associated with the amygdala and a slower informational process when the information is associated with the neocortex. LeDoux (1994, 1996b) found that the emotion “fear” influences this response directly. The intensity of perceived threat allocates which process will be utilized. Additionally, LeDoux (1996b) found that memory is dichotomous in relation to neurological fear response. The *implicit emotional memory* system associated with the amygdala coincides with the *explicit memory* system associated with the hippocampus to create the appropriate behavioral responses toward perceived threat (Buck, 2000).

Affect

The term “affect” has varying definitions according to the discipline in which it is used. In psychology, affect is defined as, “The feelings and emotions that an individual brings to bear on a task” (Ormrod, 1998, G-1). However, in neuropsychology it is defined

from a more biological perspective. Buck (2000) defines affect as, “the direct knowledge-by-acquaintance of feelings and desires based on readouts of specifiable neurochemical systems evolved by natural selection as phylogenic adaptations functioning to inform the organism of bodily events important in self regulation” (p. 47). In other words, affect is a gene-based, neurochemical process which directs both our primal and intricate behaviors.

Buck (2000) suggests that affective response and rational cognition are linked through a hierarchical biological system in the brain. He identifies four hierarchical levels in which behavior is derived from emotional cognition. The most basic level of biological systems controlled by affective response is the *reflex* level. Buck (2000) characterizes the reflex level as being “innate” with little or no flexibility. The second level, entitled the level of *instinct*, pertains to “fixed” biological systems which initiate internal behavior. The third level, *drives*, involves the more flexibility in that it exhibits various levels of hunger and thirst. The fourth and final level is identified as *affect*, and is the most flexible, creating highly complex feelings such as love and empathy.

Downshifting

An evolutionary psychological theory which was established decades before our current knowledge of the brain and yet is continually referenced in both educational and psychological realms is Leslie Hart’s (1983) Proster Theory. The term proster is derived from the words *program structure*, which form the basis of the theory. Hart (1983) identifies Proster Theory as the brain’s ability to initiate a hierarchical program which adapts to external stimuli; “it is a collection of stored programs, related to a particular pattern, which can be used as alternatives” (p. 95). As the brain recognizes or matches

familiar patterns of external stimuli, it initiates a hierarchical pattern of programs which begin with a general category and continue to categorize down to more specific tasks until the function or response is completed (Hart, 1983). For example, when the brain recognizes a door, the brain initiates programs of identification and continues to analyze and categorize down the prosters until it identifies how the door opens and exactly how much pressure should be used when opening the door or which direction to turn the handle. This process is established through repetitive experience, base knowledge, and innate response.

Within the brain, neurons contain two primary roles utilizing synapses to connect with other neurons, they either excite neurons into firing or inhibit neurons from firing. “In the brain, a program will be implemented only when the total of excitatory impulses (“on” or “go”) applied exceeds the total of inhibitory impulses (“off” or “wait”)” (Hart, 1983, p. 96). Different programs or prosters are grouped together for a common response and may be used only one at a time. Prosters are grouped based on internal bias which will not be changed unless they are evaluated in a contextually relevant method pertaining to an individual’s previous knowledge (Hart, 1983).

In contextual agreement with Proster Theory lies the “downshifting” phenomenon. Leslie Hart (1983) identified the phenomenon of “downshifting” as relating to evolutionary neuroscientist Paul MacLean’s (1978) triune brain theory. MacLean theorizes that human brains have evolved into three interrelated yet separate components.

The first brain in the evolutionary process is entitled the Reptilian Complex or R-complex. The R-complex is responsible for such primal functions as digestion, circulation, and breathing, as well as response to threat in the fight or flight response

(Canon, 1915; Caine & Caine, 1993). In addition, several primal behaviors are associated with the R-complex. Behaviors such as territoriality, ritualistic display, nesting, mating, and flocking seem to be derived from the human brain stem or R-complex (Caine & Caine, 1993; Hart, 1983; MacLean, 1978).

The second and more developed brain proposed by MacLean is the limbic system or old mammalian brain. The limbic system is said to be the first emergence of a more mammalian brain, separating mammals from reptiles. Accordingly, the limbic system is identified as the “emotional center” responsible for such behaviors as parental care, audiovocal communication, and play behavior (MacLean, 1990).

The third and most recently developed brain is entitled the new mammalian or neocortex. The neocortex is the largest of the three evolved brains and is responsible for language communication and writing as well as logical and operational thinking (Caine & Caine, 1993). The neocortex is able to assess scenarios of threat more accurately than the quick responses of the R-complex and limbic system, and often suppresses the more primal responses depending on the initial interpretation of threat (Hart, 1983). However, in situations where imminent threat is perceived the neocortex relies on the more primal responses associated with the R-complex for quick reactions.

Hart (1983) has taken MacLean’s triune brain theory and adapted it to threat response. Hart identifies the phenomena of downshifting, “When the individual detects threat in an immediate situation, full use of the great new cerebral brain is suspended, and faster-acting, simpler brain resources take larger roles” (p. 108). Hart relates this to the lack of recall after a car accident. The participant can not provide detail to a police officer or insurance company as the brain has downshifted into a primal survival mode

bypassing the neocortex. In addition, Hart admits that the perception of threat, whether emotional or physical, and degree of downshifting is dependent upon each individual.

This can be explained through a biological perspective. Under perceived threat, the old mammalian brain or limbic system sends chemicals through the body overriding the neocortex while interacting with the R-complex to make rapid decisions. One of the primary chemicals released during perceived threat is cortisol. Once a threat has been established by the brain, the hypothalamus sends a message to the adrenal glands above the kidneys and the hormone cortisol is released. Cortisol is then released into the blood stream and at high levels, influences brain synapses, immune systems, and digestive processes in the body, diminishing a persons' ability for higher cognitive processes (Sprenger, 1999). Cortisol works in concert with the neurotransmitter adrenaline to initiate the fight or flight response (LeDoux, 1996b; Sprenger, 1999). Cortisol can block serotonin production, which affects the nueropinepherine levels causing flight or fight behaviors (Sprenger, 1999).

Hart identifies the areas of physical threat, separation from mother or peer group, and natural phenomena such as storms and earthquakes, as innate threats developed over years of evolutionary experience. He relates the theory of downshifting to the educational setting by identifying such characteristics as children "freezing" in their tracks unable to move or speak, unable to think, stabbing wildly at possible answers, breaking into tears, vomiting, acting up or possible violence as visual signs of downshifting in reaction to perceived threat. Today's educational environment proliferates opportunities for downshifting whether it be the confinement of a classroom, the power of the instructor to punish, demean, embarrass, reject, and cause loss of status, or the constant practice of

being made to perform in constant danger of ridicule and public failure (Hart, 1983). “If we now remind ourselves that virtually all academic and vocational learning heavily involves the neocortex, it becomes plain that the absence of threat is utterly essential to effective instruction” (Hart, 1983, p. 110).

The Transition to High School

I urge the next generation of middle school educators to help save the ninth grade. The middle school concept has, too often, not been able to fulfill its announced intention to make the transition to high school a smooth and successful experience. In fact, the transition to high school has never been more treacherous nor the consequences more personally disastrous for so many. All over America, thousands and thousands of ninth graders are and have been painfully failing. ... We can no longer allow all the good work you do in middle schools to evaporate in the first six weeks of high school (George, 1999. p. 10).

Students making the transition from the middle school to the high school are finding it more and more difficult to adapt to the everyday stresses within the high school setting. Upon entering high school, students come to find a more impersonal, peer competitive, grade oriented, and teacher centered environment (Eccles, Midgley, & Adler, 1984; Mizelle & Irvin, 2000). Additionally, they are immersed in a situation which forces them to make decisions regarding academic tracts, vocational choices and extracurricular activities, implying final applications toward their academic and vocational future, and causing further anxiety (Hertzog & Morgan, 1999; Mizelle & Irvin, 2000).

George and McEwin (1999), educational researchers whose expertise lie in understanding the pressures associated with middle school to high school transition, identify the areas of ethnicity, socio-economics, governmental mandates, educational reforms and the transition from a traditional junior high (grades 7-9) to a middle school

(grades 6-9), as catalysts for high school freshmen underperformance. When looking at our present student population, we find that the American high school student is very different from students of previous generations:

...educators should recognize that the students in the new U.S. high school will increasingly come from economically stressed homes and represent racial and ethnic groups in a multicultural mix that is very different from what the typical high school teacher faced throughout the last two centuries. (George & McEwin, 1999, p. 10)

Career Choices: Career and Technical Education

Finally, there is a population of students that have been traditionally overlooked in the past two decades by our surge toward a more college preparatory curricula, students who do not wish to enter a two year or four year college or university. George and McEwin (1999) identify them as the “forgotten half”. Researchers Cathleen Stasz and Susan Bodilly (2004) of the Rand Corporation initiated a detailed study which evaluated the educational significance of the Carl D. Perkins Vocational and Technical Education Act of 1998 or Perkins III in the secondary school system. The results coincided with George and McEwin’s label of the “forgotten half,” representing both students and teachers. Stasz and Bodily found that even though state policy stressed academic achievement and accountability, vocational education was not part of any accountability systems. They acknowledged large social and professional divisions between historically academic instructors and vocational instructors, “Vocational education and its teachers are marginalized and in the minority in most high schools, yet at the same time bear the biggest burden in making the kinds of changes required to achieve curriculum integration and other improvements” (Stasz & Bodily, 2004, p. xxv).

When there is such a divide in student backgrounds, educational and vocational choices, and pedagogical practice, it is easy to see why students would suffer from forms of anxiety.

Social Anxiety

Social structure and status can be critically important and yet stressful for high school adolescents. It is not bound by the walls of academia, but permeates students' family settings, extracurricular events and peer functions. This intense focus on social hierarchy and social status can often consume many adolescents' thought process and energy; adolescents are more influenced by their peers during this time than any other time (Brown, 1990; Haynie & Osgood, 2005). High school students spend great amounts of time with their friends and attribute great importance to staying in good graces with them. Yet interestingly enough, anxiety can be both positive and negative depending upon the type of interaction (DeVries, Glasper & Detillion, 2003). Negative forms of stress can have detrimental effects to an individual's behavior, brain anatomy and physiology (DeVries et. al., 2003; Gutman & Nemeroff, 2003). In animal studies, prolonged social stress can alter neuropathways, influence behavior, and leave permanent effects such as depression upon the subjects (Fuchs & Flügge, 2003).

Stereotype Threat Anxiety

... human intellectual performance is far more fragile than we customarily think; it can rise and fall depending on social context ... conditions that threaten basic motives-such as our sense of competence, our feelings of belonging, and our trust in people around us can dramatically influence our intellectual capacities and

motivation ... stereotype threat appears to threaten all these things at once.
(Aronson, 2004, p. 16)

Another important form of student threat comes from being identified in a social subcategory or stereotype. Joshua Aronson (2004) has identified students as early as the sixth grade suffering from aspects of stereotype threat. During adolescent development environmental factors can play a key role in stereotype threat and anxiety; Aronson (2004) stated, “Children who are exposed to more prejudice or who are more advanced in their thinking about stereotypes and intellectual abilities will become vulnerable earlier” (p. 19). Students of this age are focused on becoming individuals, their environment and social perception can have a large impact on this process, therefore, social status is of crucial importance. A sense of not belonging to a dominant peer group, or even a represented peer group, can lead to thoughts of self doubt and often non-participatory behavior or “giving up” (Aronson & Steele, 2005). This is evident in studies regarding students chosen coursework. Aronson and Good (2002) found that students will choose less challenging courses and academic opportunities, creating certain success rather than breaking their “fit” within a social subset.

Dr. Claude Steele of Stanford University has studied stereotype threat extensively. He found that being stereotyped has a large impact upon standardized test scores in students of lower socio-economic status, minority populations, and gender (Steele, 1997). However, Aronson and Steele (2005), and Aronson et al. (1999) found that stereotype threat is not specific to minorities and gender, stereotype is contextually based and can have an impact for any population which is grouped or categorized then scrutinized.

Teachers can have a large impact on stereotype threat by either proliferating or diminishing the stereotype through pedagogical practices (Ferguson, 1998). Many times students are influenced by stereotypes associated with academic content and gender/ethnicity of the instructor (Steele, 1997).

Parental Conflict

A primary factor which influences all aspects of student behavior, adolescent growth, and academic performance is the student's parent, parents, or legal guardian. The current divorce rate in the United States averages 48% (Munson & Sutton, 2006).

Cohabitation of non-married couples is on the rise and research has shown that couples who cohabit before marriage report lower marital quality and higher marital instability (Kamp Dush, Cohan & Amato, 2003). However, married couples are not exempt from exhibiting high levels of interparental and child-parent conflict. Researchers Vandewater and Lansford (1998) conducted a study which focused on two family structures, one family in which the married couple had never been divorced and another family which had been divorced and never remarried. Their findings indicate that family structure is not the catalyst in detrimental adolescent growth and behavior, it is the high level of interparental and parental conflict.

The conflict associated with family relationships can have a direct impact on students' academic success. When conducting a South Wales Family Study, Dr. Gordon Harold found that children from unstable homes become at-risk regarding their academic achievement (Cardiff University, 2006). This understanding is particularly important for

educators as they are often unaware of parent-student relationships on a day to day basis and may have to deal with the student's post-behavioral effects.

Test Anxiety

Many factors have the potential to affect the development of test anxiety, with not all of these asserting an influence at the same points in a child's development. Although all evaluative situations will be accompanied by some emotional reaction, it is the individual's past experiences and beliefs, that have been shaped by a multitude of factors that will mould their unique reactions to a test situation. (McDonald, 2001 p. 92)

With the passing of the No Child Left Behind Act, there has been an intense focus on student performance through standardized testing (Mulvenon, Stegman & Ritter, 2005). Students become aware of this pressure as parents, teachers, and administrators give them indicators of the importance of testing, leaving many students to believe that test scores are equated with level of intelligence (McDonald, 2001). Many researchers agree that the focus on standardized testing has intensified student test anxiety. Dr. Jerrell Cassaday (2004) found that student test anxiety directly impacted student performance in three different phases, test preparation, test performance and reflection. Students who exhibit high levels of test anxiety also tend to have more negative self-evaluations regarding themselves and their academic performance (Prins, Groot & Hanewald, 1994).

In direct contrast, Mulvenon, Stegman and Ritter (2005) found claims of student illness, anxiety and stress as a result of standardized testing to be over exaggerated. They found that most students, parents, principals, and counselors felt there was value in the tests and did not report higher levels of anxiety. Additional findings conclude that teachers had high reservations regarding the impact of standardized testing toward

student well being and performance. While there are conflicting theories associated with student test anxiety and student performance, most experts agree that formal examination of student performance has a direct impact on stress levels.

Performance Anxiety

According to most studies, people's number one fear is public speaking. Number two is death. This means to the average person, if you go to a funeral, you're better off in the casket than doing the eulogy. (Jerry Seinfeld)

Student performance is not strictly evaluated by standardized exams. In many academic disciplines student performance is based on practical lab based application, athletic abilities, aptitude to verbally recite or explain concepts, and musical performance. The fear of performing can be very stressful for many students. Many students anticipate ridicule from peers and may have had negative experiences in the past (Ayers, 1990). Commonalities between researchers in music education, speech performance and athletic performance include the areas of audience size and reaction and individual preparation as key variables regarding student performance anxiety (Ayers, 1990; Hipple, 1997; LeBlanc, Jin, Obert & Siivola, 1997).

Summary

The intent of the literature review was to uncover the broad perspectives of educational thought and practice regarding the brain. Additionally, a detailed overview of neurological and neuropsychological studies was presented which linked neurological processes with human emotion and behavior. Furthermore, a description of downshifting

was explained, defining its role in student threat perception and higher cognition. Finally, common forms of threat were explored as they relate to educational performance.

In an agricultural science program students are exposed to several new stimuli. They are expected to take their classroom knowledge and apply it in a practical setting; this may give deeper insight toward student test anxiety and performance anxiety. The National FFA Organization is an intracurricular component of the agricultural classroom, therefore it allows students to be immersed in many social environments. In addition, student often participate in competitive events utilizing their classroom content and skills. This environment is unique in that it has the potential to proliferate the threats discussed in the literature.

CHAPTER 3: THEORETICAL CONSIDERATION

The primary reason for establishing good theory and striving to build it is to eliminate unfounded opinion and miscellaneous knowledge, by organizing what is known or beliefs that are supported with scientific backing into a unified consistent structure. (Hart, 1983, p. 22)

Overview of Research Design

The purpose of this study was to identify components of classroom structure which influence student downshifting. Downshifting is a behavioral response, resulting in a biological exchange between the neocortex, the limbic system, and R-complex in the student's brain. It is the purpose of this study to identify the characteristics which induce this phenomenon in a Midwestern agricultural science and business classroom.

Heuristic inquiry and qualitative analysis were used to understand the essence of the downshifting phenomenon. With the assistance of eight co-researchers, seven students and one veteran teacher, I analyzed various aspects of pedagogical practices which induced downshifting in an agricultural classroom environment.

Guiding Research Questions

1. What current pedagogical practices influence student downshifting in high school agricultural science program

2. What behaviors are exhibited when students perceive themselves to be in a threatening situation?
3. What factors, in addition to threat, induce student downshifting?

Rationale for Research Methodology

While working towards gaining a full understanding of the downshifting phenomenon, I came to the conclusion that implementing an experimental study which would examine neurological evidence that certain teaching practices and educational environments influence student downshifting, is relatively impossible at this time. I came to this conclusion for several reasons. The first reason is that the technology needed to provide evidence such as functional magnetic resonance imaging (fMRI) or positive emission tomography (PET) is not available for implementation in the classroom setting. Secondly, cortisol levels of students could have been obtained from blood or urine samples; however, this is a very difficult task within a classroom and levels may increase or decrease depending on student's perception of the process (Sprenger, 1999). Additionally, I would not be able to create an environment where there were no additional confounds. In many experimental designs, researchers have difficulty proving that a treatment causes the desired effect; they usually report that the experiment provided strong evidence that there is a relationship between the independent and dependent variables (Moore & McCabe, 2006).

Qualitative Inquiry: An Internal Search to Understand Downshifting

During my educational and professional process I have been immersed in many situations in which I have either downshifted myself, or observed my students downshifting. In each case, there was a continuum of emotions and emotional levels which provoked the phenomenon. When I would downshift myself, I did not understand what I was feeling or observing, creating further anxiety. As I reflected on the situation, I often felt embarrassed as I could not or did not act or react in the manner I would have, had I been able to think clearly. There were also times when I did not know why I reacted so intensely in certain situations.

Not only have I downshifted myself, but I have observed the phenomenon in several of my students. Many times I saw students initiate fight or flight responses when reacting to peer influence, student/teacher confrontation, even as a reaction to the school structure itself. Still more intriguing were the subtle downshifting behaviors. As emotions run on a continuum of intensity, observable behaviors may become hard to detect for each individual student. It is from these experiences that I have an internal need to fully understand the “downshifting” phenomenon.

It was important that I examined the phenomenon within its implied environment. I wanted to understand the conditions in which downshifting happens from a personal, student and teacher perspective; therefore, I chose to pursue qualitative inquiry. Qualitative research places importance on the validity of multiple meaning structures and holistic analysis (Burns, 2000). This definition is enhanced by Gall, Gall, and Borg (2003) as they recognize the qualitative assumption that the individual constructs a social reality utilizing internal meaning and interpretation, identifying the individual's

perceptions as transitory and situational. McMillan and Schumacher (2001) define qualitative research as “building complex, holistic pictures with detailed descriptions of informant’s perspectives” (p. 35).

Analysis of Qualitative Frameworks

When examining the qualitative theoretical frameworks which would define my study, I found the frameworks of phenomenology, qualitative heuristics and heuristics. The phenomenological perspective began with the philosophical work of Edmund H. Husserl (1900-1901). Husserl was concerned with rejecting psychologism or psychology’s attempt to absorb logic (Phenomenology Center, 2006). Additionally he was concerned about individuals’ perceptions of phenomena through their senses (Patton, 2002). Educational researchers Gall et. al. (2003) describe phenomenology as “the study of the world as it appears to the individuals when they place themselves in a state of consciousness that reflects an effort to be free of everyday biases and beliefs” (p. 481). Phenomenology peers into the meaning of an experienced phenomenon through both the individual and collective perspectives (Patton, 2002). Upon initial understanding the theoretical framework of phenomenology seemed to fit well into my research quest. However, it did not meet my need to add the researcher’s perspective and insight to the overall understanding of the phenomenon.

I then delved into the qualitative framework of qualitative heuristics, a form of phenomenology. Originating from the University of Hamburg, Gerhard Kleining and Harald Witt have identified a qualitative inquiry with high flexibility. Kleining & Witt (2000) define the forum for qualitative heuristics as, “trying to bring back the qualities of

systematic exploration and discovery into psychological and sociological research” (p. 1). They identify four basic rules which optimize the chance for discovery. The first rule indicates that the researcher should be open to new concepts and change his preconceptions if the data are not in agreement with them. This is highly important when discovering phenomena as the researcher can not be clouded by any preconceived notions. The second rule identifies the topic of research as being preliminary and will possibly change during the research process, which is an important factor when studying the unknown. The third rule implies that data should be collected under the paradigm of maximum structural variation of perspectives. In rule three, Kleining and Witt (2000) imply that research procedures which obtain the broadest perspectives will gain a more holistic view of the studied phenomenon. The fourth and final rule outlines the analysis as being directed toward discovery and similarities. After such broad data collection, this form of data analysis would aid in providing a broad understanding of the phenomena through various perspectives.

Qualitative heuristic inquiry is ideal for understanding phenomena through many contexts and perspectives. However, it was not ideal for my research objective as I wanted to examine the phenomenon in a specific context, the high school classroom.

Finally, I found the theoretical framework of heuristic inquiry. Heuristic inquiry satisfied all aspects of my research question. I was able to add to the depth of the research by including my own experience and tacit knowledge with those of my research participants or co-researchers. Additionally, I was able to be an active participant observer in the research environment, allowing me to obtain a deeper appreciation and understanding of the experienced phenomenon.

Theoretical Framework

Heuristics

Heuristics looks deeper into both the participants' experience and researchers' insight, giving a deeper understanding to all parties. Patton (2002) defines heuristic inquiry as "a form of phenomenological inquiry that brings to the fore the personal experience and insights of the researcher" (p. 107). Heuristics differs from phenomenology in four distinct ways. The first difference includes emphasis on the connectedness and relationship of the researcher with participants and the phenomenon being studied, while phenomenology includes a more detached analysis. The second difference pertaining to heuristics is that it focuses on essential meanings and the internal search to know from both the researcher's and participant's perspective, while phenomenology highlights the descriptions of those who experienced the phenomena first hand. The third difference entails a creative synthesis which includes the researcher's intuition and internal understanding of the phenomenon which is not represented in phenomenology. The fourth and final difference is representation of individuality from the participants in heuristic study, whereas phenomenology primarily focuses on the conjoined experience (Patton, 2002).

Heuristic research was developed by humanistic psychologists Clark Moustakas (1990), and Douglass & Moustakas, (1985). Douglass and Moustakas (1985) define heuristics as, "a search for the discovery of meaning and essence in significant human experience ... It requires a subjective process of reflecting, exploring, sifting, and elucidating the nature of the phenomenon under investigation" (p. 40). Moustakas (1990) describes heuristic researchers as having a passionate and disciplined commitment to

understanding a phenomenon and remaining with a research question until it is answered. Once the question has been answered, an internal knowing or tacit knowledge is obtained (Polanyi, 1967).

Moustakas (1990) validates the heuristic process by identifying the internal process a researcher must go through to begin heuristic inquiry. The first step is to *identify the focus of inquiry* “Through exploratory open-ended inquiry, self-directed search, and immersion in active experience, one is able to get inside the question, become one with it, and achieve an understanding of it” (Moustakas, 1990, p. 15). Once the topic has been identified, the second step is to enter into a *self-dialogue*. The researcher must examine the topic or phenomenon in every aspect of his life. He must allow intellect, emotion, intuition, and compassion to intertwine when internally examining the chosen phenomenon “The heuristic researcher is seeking to understand the wholeness and unique patterns of experiences in a scientifically organized and disciplined way” (Moustakas, 1990, p. 16). The third step, and possibly the foundation of heuristic inquiry, is obtaining a *tacit knowledge* regarding the phenomenon in question. Social scientist Michael Polanyi (1967) defines tacit knowledge as a way of knowing without being able to explain in formal terms why one knows “we can know more than we can tell” (p. 4). In other words, one can have a deep understanding of a phenomenon by obtaining bits of information through the various senses, creating a “hunch” or “gut feeling”.

When we curtail the tacit knowledge in research, we limit possibilities for knowing. We restrict the potential for new awareness and understanding. We reduce the range and depth of meanings that are inherent in every significant human experience. (Douglass & Moustakas, 1985, p. 41)

The fourth step, bridging the gap between tacit knowledge and explicit knowledge, is the attainment of *intuition*. During the intuition process, the researcher utilizes his tacit knowledge to assist him in observing, defining, and analyzing the reality of the observed and lived experience. Moustakas (1990) stresses the importance of intuition by stating, “without the intuitive capacity to form patterns, relationships, and inferences, essential material for scientific knowledge is denied or lost” (p. 23). The fifth step, *indwelling*, is a disciplined concentration which links personal experiences with intuition forming a deeper understanding of the phenomenon. The sixth and final step of internal rigor is that of *focusing*. When the researcher focuses on the topic of inquiry, he maintains an open mind, freeing his perceptions from internal bias. The researcher is then able to identify the phenomenon holistically as he examines its many possible facets (Douglass & Moustakas, 1985).

As the researcher navigates through the six stages or steps described by Moustakas, a more complete and holistic picture is formed through the researcher’s perception. The progression is not sequential, but various stages are revisited over and over. It is through this disciplined process that the researcher forms an internal frame of reference, which is continually critiqued and analyzed as the phenomenon is explored with research participants.

Phases of Heuristic Research

Since heuristic inquiry utilizes qualitative methodology in arriving at themes and essences of experience, validity in heuristics is not a quantitative measurement that can be determined by correlations or statistics. The question of validity is one of meaning: Does the ultimate depiction of the experience derived from one’s own rigorous, exhaustive self-searching and from the explications of others present

comprehensively, vividly, and accurately the meanings and essences of the experience? (Moustakas, 1990, p. 32)

Methods of heuristic inquiry are open ended, meaning that although there is a disciplined, scientific process which illuminates a focus of inquiry, there are various, inventive techniques which may become appropriate to fully understand the complexity of a phenomenon. Every method must relate back to the initial question and methods must be used to obtain deep, rich data which will reveal the nature, meaning, and essence of the phenomenon of study (Moustakas, 1990). There are six disciplined phases of heuristic research which are completed independent of the methods utilized.

Initial Engagement

In order for a researcher to fully engage in lengthy internal and external dialogue and discovery, he must find a topic which ignites a true passion, a topic which holds meaning for both the researcher and society (Moustakas, 1990). During the initial engagement process, researchers blend their personal history with the phenomenon in question, deepening their curiosity. As the researcher ponders over the phenomenon in relation to their own life, he begins to apply the phenomenon to others in society, deepening their understanding. Eventually, the clutter of questions fueled by initial curiosity begins to narrow, leading to a focused research question. Moustakas (1990) describes the initial engagement process when, “the investigator reaches inward for tacit awareness and knowledge, permits intuition to run freely, and elucidates the context from which the question takes form and significance” (p. 27).

Immersion

Once the question is established and defined the researcher must immerse himself into the phenomenon. In other words, the researcher lives the question in waking, sleeping and personal and professional states (Moustakas, 1990). The immersion process must become intense and complete, allowing the researcher to become intimate with the topic. During this process any aspect of life is examined for relevance regarding the question, allowing for new insight into the phenomenon, “Virtually anything connected with the question becomes raw material for immersion, for staying with, and for maintaining a sustained focus and concentration” (Moustakas, 1990, p. 28).

Incubation

After the intensity of the immersion process the researcher retreats from the intense focus of the question for an incubation period (Moustakas, 1990). During this time the researcher detaches him self from all facets of the research. Moustakas believes that this allows the researcher’s internal tacit knowledge to fully develop. He relates this process to forgetting someone’s name; no matter how hard one focuses on remembering the name, it does not present itself. Yet, after focusing on another task, the name seems to come to mind rather easily. Moustakas (1990) describes the incubation period as, “allowing the inner workings of the tacit dimension and intuition to continue to clarify and extend understanding on levels outside the immediate awareness” (p. 29).

Illumination

The illumination process consists of two facets. One includes the understanding of new dimensions regarding the chosen phenomenon. The other includes correcting misconceived notions regarding initial perceptions of the phenomenon. This process only happens after exposure to various aspects of the question have been explored during the immersion process and tacit and intuitive information have assisted in better defining the experience during the incubation period. Illumination allows for various pieces of information form into a full understanding of the question.

Explication

The purpose of explication is for the researcher to be able to verbally describe what has been consciously awakened by the continued tacit evaluation. During the explication process, the researcher may become aware of new themes associated with the question (Moustakas, 1990). This includes refining the internal understanding of the phenomenon by utilizing focus, indwelling, self-search, and self-disclosure, and ultimately dominant themes are developed (Moustakas, 1990). As the researcher advances through this process he, “explicates the major components of the phenomenon, in detail, and is now ready to put them together into a whole experience” (Moustakas, 1990, p. 31).

Creative Synthesis

The final phase of heuristic research is creative synthesis. At this point the researcher is fully versed with the data and its primary themes (Moustakas, 1990). The

researcher is then challenged to present the data in a creative synthesis. This is often presented in a narrative form, utilizing direct quotes from both the researcher and the participants. However, researchers are encouraged to express their understanding through poems, stories, drawings, paintings or by some other creative form (Moustakas, 1990).

The creative synthesis component must be presented in such a way that:

the researcher must move beyond any confined or constricted attention to the data itself and permit an inward life on the question to grow, in such a way that comprehensive expression of the essences of the phenomenon investigated is realized. (Moustakas, 1990, p. 32)

The following section describes the setting where the heuristic process was used to examine the downshifting phenomenon.

Site and Participants

A Midwestern agricultural science program was chosen for a case study analysis for one academic semester based upon its historically traditional structure of agricultural education and its rural location, a community of 3,015 people. Detailed descriptions of the academic community including basic background information, student ethnicity and percentage of free and reduced lunch are provided in Tables 1-3. McMillan and Schumacher (2001) identify case study as a “bounded system” chosen for uniqueness or to illustrate a specific theory. Patton (2002) suggests using case study analysis for organizing data for in-depth studies and cross comparisons. Gall, Gall and Borg (2003) identify three purposes for utilizing case study analysis, to produce a detailed description of a phenomenon, to develop possible explanations for a phenomenon, and to evaluate a phenomenon. I chose case study analysis to assist me in gaining a deeper understanding

of the specific educational structures and practices associated with the phenomenon of student downshifting.

Table 1
Sample School Background Data

Student Enrollment (9-12)	Graduation Rate	Average Teacher Age
522	84.70%	46 yrs.

Source: Indiana Department of Education 2004

Table 2
Student Ethnicity Based on Percentage

	Native American	Asian	Hispanic/Latino	Black	White
Student Ethnicity	0%	1%	5%	0%	94%

Source: Indiana Department of Education 2004

Table 3
Free and Reduced Lunch Based on Percentage

	Free Lunch	Reduced Lunch	Paid Lunch
Lunch Division	19%	7%	74%

Source: Indiana Department of Education 2004

Agriculture coursework was specifically chosen as it utilizes three primary components unique to agricultural science education. The three components consist of: classroom instruction, which is heavily based on laboratory skills; the state and national FFA organization which provides students with leadership opportunities; and the Supervised Agricultural Experience Program or SAEP which provides opportunities for biological research and or student employment in various agricultural fields (Talbert, Vaughn & Croom, 2005). These crucial components allow for practical application of classroom content as well as for leadership and scholarship opportunities, creating a holistic learning environment for agricultural education students.

Within the agricultural science program, one course was chosen for in-depth data collection utilizing case study analysis. McMillan and Shumacher (2001) warn that by adding more cases to a study, the researcher lessens the depth of analysis at any one site. The selected course, entitled *Fundamentals of Agricultural Science and Business* contained seven students, five boys and two girls, and was taught by a male instructor with over 24 years of teaching experience. Not all of the students were in the ninth grade; one male student was in the tenth grade and one male student was a twelfth grader. The course was taught five days a week from 9:50 a.m. until 10:40 a.m. During the 13 week period, the instructor covered the topics of shop safety, basic arc welding, oxyacetylene torch cutting, the FFA Creed, and basic parliamentary procedure. A course description is included in Appendix A, and a diagram regarding the classroom layout is included in Appendix B.

This class was chosen because of the opportunity to observe downshifting as students are placed into a new academic environment and social structure. The transition to high school can cause anxiety with incoming freshmen (Mizelle & Irvin, 2000). Additionally, the curriculum included a heavy focus on mechanics and metal fabrication, which exhibit many safety concerns, as well as its integration of the fundamental components of agricultural education.

Role of the Researcher

When conducting heuristic inquiry, the researcher becomes fully immersed in the phenomenon of question (Moustakas, 1990). This includes exploring the experience with research participants and conducting internal discussion and evaluation, creating an

internal frame of reference. Therefore, my role as researcher was as a participant observer. Participant observers, “simultaneously combine document analysis, interviewing of respondents and informants, direct observation, and introspection” (Denzin, 1978, p. 183). The participant observer has to utilize multiple, overlapping strategies which help him fully engage in the experience while also gaining valuable insight from the participants around them (Patton, 2002).

As a participant in the school setting, I found myself in a variety of roles. At times I took the role of “student,” fully engaged in the classroom environment, participating in discussion, and involved in the lesson. Other times I acted in a more instructor-based role, giving guidance to students and aiding in facilitating the lesson. Which role I chose was determined by each situation. I utilized roles which would give me the best insight and perspective of downshifting as it unfolded before me. For instance, if a student were being disciplined and a confrontation was evoked, I chose the role of student, identifying with and observing the other students in the class. This role gave me the best perspective of “feeling” the downshifting as it unfolded. Alternatively, I chose the role of instructor when a student was afraid of a welding instrument, giving me the perspective of a teacher and the ability to ask the student questions as the behavior was observed. This delicate balance was crucial when obtaining multiple perspectives of the phenomenon.

While managing the multiple responsibilities of data collection as a participant observer, I also had to balance the etic and emic perspectives of my observations and findings. I had to utilize etic, or “outsider” data collection approaches which distanced me far enough from the instructor and students to identify downshifting as it is observable by others, while also using emic, or “insider” approaches which allowed me

to experience downshifting with the instructor and students. Michael Quinn Patton (2002)

best describes the etic/emic struggle in the following:

Experiencing the setting or program as an insider accentuates the participant part of participant observation. At the same time, the inquirer remains aware of being an outsider. The challenge is to combine participation and observation so as to become capable of understanding the setting as an insider while describing it to and for outsiders. (p. 268)

Data Collection

During the search for the essence of student downshifting in the agricultural classroom environment, I utilized several data-collection techniques which allowed for internal reflection as well as external dialogue with research participants or co-researchers. Moustakas (1990) uses the term co-researchers as the research participants are not specifically being observed by a third-party researcher, but are active participants, joining in the learning process with the primary researcher. Data were collected for 13 weeks, a total of 22 visits, during the fall 2006 academic semester. Primary sources of data collection included: reflective recordings; an observational journal, which documented the classroom environment, classroom structure, and student/teacher behavior; conversational interviews with co-researchers and a collection of classroom artifacts, all of which I describe below.

During the research process, co-researchers were assigned pseudonyms to protect identifiable information. Additionally, the research process was evaluated through the university's institutional review board (IRB) governing research on human subjects, Appendix C.

Reflective Recordings

Reflection and introspection are important parts of field research. The impressions and feelings of the observer become part of the data to be used in attempting to understand a setting and people who inhabit it. (Patton, 2002, p. 264)

Throughout the process of heuristic inquiry I maintained a reflective journal. This journal took the form of a digital recorder which I kept with me at all times. I recorded self dialogue, theoretical and practical questions, personal insights, memories, relevant observations and corrected misconceptions throughout the experience. The use of the digital recorder was crucial as it was easily accessible and could capture my thoughts immediately. Additionally, I found it extremely useful during the initial engagement, immersion and illumination processes.

The role of participant observer is an intense multidimensional practice. While participating in various roles within the classroom environment I found writing both an observational journal as well as research journal a difficult task. I utilized the digital recorder to enhance my written observations immediately after I left the research site. This helped me accomplish two tasks: document what I had recently observed; and reflect on what I had just observed. Reflective recordings were transcribed and erased after data analysis.

Observation Journal

No universal prescriptions about the mechanics of and procedures for taking field notes are possible because different settings lend themselves to different ways of proceeding and precise organization of fieldwork is very much a matter of personal style and individual work habits. (Patton, 2002, p. 302)

As a participant observer, I also maintained an observational journal. In the written observation journal, I chronicled both verbal and non-verbal interactions in the

classroom. Non-verbal communication can be crucial to research observations and can assist in confirming verbal statements “The recording of facial expressions, gestures, and movements can be triangulated with verbal data” (McMillan & Schumacher, 2001, p. 434). This is especially true when observing downshifting behavior as the response may be entirely non-verbal (Hart, 1983).

As a university supervisor of student teachers, I have practiced the detailed and focused skills mandatory for quality observation journals. This is a complicated task as it includes “verbal portraits of research participants, reconstruction of dialogue, description of the physical setting, accounts of particular events, and descriptions of the observer’s behavior” (Gall, Gall & Borg, 2003, p. 272). Both a traditional journal and a researcher-designed observational sheet (Appendix D) were utilized during this study.

Conversational Interviews

Dialogue is the preferred approach [in heuristic inquiry] in that it aims toward encouraging expression, elucidation, and disclosure of the experience being investigated ... there may be moments in the interview process when the primary investigator shares an experience that will inspire and evoke richer, fuller, more comprehensive depictions from the co-researcher. (Moustakas, 1990, p. 46)

The quality of information obtained from interviewing is largely impacted by the skills of the interviewer (Patton, 2002). It is very important in the heuristic process that the researcher understand how to gain the confidence of the co-researchers. The co-researchers in a heuristic conversational interview must be willing to say freely what they need to say and feel is relevant to the research question (Moustakas, 1990). Additionally, the primary researcher must be an empathetic listener who is flexible in his ability to respond to the flow of the conversation, revealing accurate and heartfelt responses concerning the phenomenon (Moustakas, 1990).

A relationship with my co-researchers was built through conversational dialogue before, during and after class. Individual and group discussions regarding course format, instructor styles, peer influence, classroom environment, and technical content were informally conducted on a regular basis. Additionally, humor was used throughout the semester as a catalyst for both student and instructor rapport. I believe that my previous experience in conducting formal interviews and my professional experience as a secondary agricultural instructor assisted me in becoming comfortable in the classroom environment and building trust with my participants.

During the conversational interviews, no interview guide was used as it would constrict the flow of conversation. To have an interview guide would have limited the depth of response as the factors associated with downshifting behavior are not defined, and student and teacher behavior were unpredictable. Patton (2002) concurs with this format:

No predetermined set of questions would be appropriate under many emergent field circumstances where the fieldworker doesn't know beforehand what is going to happen, who will be present, or what will be important to ask during an incident, or experience (p. 342).

However, two semi-structured interviews were conducted during the third and thirteenth week of direct observation. The semi-structured interviews were implemented using an interview guide developed on the theoretical definitions of downshifting as described by Hart (1983). A copy of the developed interview guide is presented in Appendix E. Interviews were transcribed and content was erased after data had been analyzed.

Classroom Documents and Videotape

In contemporary society, all kinds of entities leave a trail of paper and artifacts, a kind of spoor that can be mined as part of fieldwork. (Patton, 2002, p. 293)

Throughout the semester I obtained such documents as course syllabi, individual assignments, and formal lesson plans. Documents, such as non-verbal communication, can assist in confirming or not confirming verbal cues (Patton, 2002). Additionally, students were videotaped during their recitation of the FFA Creed, exhibiting their behavior as they performed in front of an audience as well as being evaluated by their instructor. Both forms of data were used to establish themes during analysis.

Data Analysis

During the investigative process, I utilized Moustakas' (1990) eight procedures of heuristic analysis. This allowed me to explore rich data sources while gaining a comprehensive understanding of downshifting in the researched environment. The first step consisted of physically organizing and synthesizing the obtained data. Data sources such as interviews and reflective transcriptions, video, field notes and classroom documents were gathered and separated by source.

Next, I immersed myself in the material for a sufficient amount of time until the data were fully understood. Throughout this process I gained a holistic understanding of my own experiences as well as my co-researchers', and the minutest details were explored. Internal dialogue was consistently analyzed and material was examined and re-examined until I was confident that I understood each experience.

The third procedure was tri-fold. At first, I set aside the data and removed myself from the research, allowing for tacit and intuitive knowledge to present itself. With a renewed energy, I returned to the data for further analysis; however, this time I identified consistent themes projecting from the data, sometimes identified as “open coding” (Strauss & Corbin, 1990). Lastly, notes were taken to develop thematic descriptions of each participant’s experience.

Once depictions of individual co-researcher’s experiences were obtained, I returned to the original data of each participant. During this process I analyzed whether the notes I had taken were congruent with the themes and qualities of the original source, reanalyzing the data accordingly. If there were conflicting data sources, co-researchers were re-questioned for affirmation.

Once the above process had been completed for one participant, I utilized the same analytical procedures for the rest of the co-researchers. This process allowed the full depth of each individual participant’s phenomenological experience to present itself.

I then began to study the individual depictions as a group, representing a collective experience. Immersed fully in the data, I would identify connected individual themes into a developed group depiction, often identified as “axial coding” (Strauss & Corbin, 1990). Moustakas (1990) describes this composite depiction as, “including exemplary narratives, descriptive accounts, conversations, illustrations and verbatim excerpts that accentuate the flow, spirit, and life inherent in the experience” (p. 52). The group depiction identifies the core meanings of the phenomenon as experienced by both the participant and the group as a whole (Moustakas, 1990).

Next, I returned again to the raw data and selected students who represented the group as a whole. I then developed individual portraits of these students from data obtained throughout the research process including interviews, discussions, video, and observations. The individual portraits were designed in such a way that “both the phenomenon investigated and the individual persons emerged in a vital and unified manner” (Moustakas, 1990, p. 52).

My final task was to develop a creative synthesis which illuminated the essence of the downshifting phenomenon. Moustakas (1990) describes the creative synthesis process in the following way:

The researcher taps into imaginative and contemplative sources of knowledge and insight in synthesizing the experience, in presenting the discovery of essences-peaks and valleys, highlights and horizons ... there is a free reign of thought and feeling that supports the researchers knowledge, passion, and presence: this infused the work with a personal, professional, and literary value that can be expressed through a narrative, story, poem, work of art, metaphor, analogy, or tale. (p. 52)

My creative analysis is explained in great detail in the following chapter.

Limitations of the Study

A primary limitation to the study is that it is an emerging theory. Therefore, there are no previous studies on which to build. This demonstrates the importance of fully understanding the phenomenon myself rather than identifying its characteristics as a third-party observer.

Another limitation is the time allotted for observation. I was only able to observe classroom interaction for 22 days. This was due to the complexity of researcher responsibilities and academic semester length. Although the course chosen was a full

year course, student rosters changed during the second semester. Time constraints did not allow for a complete understanding of the day-to-day teaching practices or classroom activities.

Finally, the results obtained from this research are context specific, meaning that results will only pertain to the subjects studied during the established time period. In addition; Hart (1983) admits that the perception of threat and degree of downshifting is dependent upon each individual. This limits a full understanding of the downshifting phenomenon as only the primary researcher and eight co-researchers are represented. I believe, however, that valuable insights were possible during this time, and that they contribute to the emerging understanding of the phenomenon.

Researcher Perceptivity

In the following section, I identify areas of my personal and professional background which correlate with the areas of threat discussed in chapter two. I emphasize the social and educational difficulties associated when I moved from an urban school to a very rural school during the middle school to high school transition. I then define my initial experiences in agricultural education as a high school student and the social and educational anxieties associated with immersion into a foreign culture and environment. Next, I highlight my experiences as a student teacher in agricultural education. Finally, I explain the educational environment and interactions with my students as a practicing teacher in a suburban agriculture program in Indiana.

I grew up in a predominantly Latino urban neighborhood in Denver, Colorado. As a youth, I was unaware of the racial and socioeconomic stressors which existed in the

environment. The day-to-day life within our community, which included exotic dance clubs, liquor stores, tattoo parlors and drinking bars seemed common place. I observed several adult disagreements while walking my sister to and from school as people from our community clashed. The mix of lowrider culture, or people who modify their car's suspension so that it rides as close to the ground as possible, street gang and biker culture, or groups of individuals who drive motorcycles, was unique to the area.

Being one of the few Caucasians in the school district did not seem to be out of the ordinary until I entered middle school. Teachers in the middle school would use English-speaking students as interpreters for Spanish-speaking students in their content areas. I don't remember ever being truly fluent in Spanish, but I do remember being able to communicate to others how to complete a math problem. Additionally, I don't remember honors classes being offered in middle school, which was a sign to me that the school district was not interested in encouraging their students academically.

Middle school seems to be the time that many children begin to explore their individual identities (Rathunde & Csikszentmihalyi, 2005). This is also the time when my friends began identifying racial differences and identifying or proliferating stereotypes. I could no longer go over to my friend's house as I had been labeled as a "Gabacho," slang for "white boy". Close friends whom I had known since first grade now treated me with contempt. I can remember feeling extremely confused and angry, in fact, I began to hate being different, being white. I watched as social cliques began to develop and many of my friends joined the local gangs and I felt ostracized when I chose not to participate. There was a feeling of loss as I knew that the lifespan of my one time friends could have been shortened due to their social choices.

Life in this type of social setting can be complex. While at school one day I observed several events take place. In the morning I watched my friend get high by smoking marijuana in the bathroom. He had just been beaten by his dad that morning and that was his way of coping. My friend had many conflicts with his father, but this seemed to be the most violent. This incident supports Harold's theory that children from unstable homes are more likely to become at-risk. My friend began missing classes and smoking drugs during school hours, increasing his likelihood for dropping out of school (Cardiff University, 2006). Later that morning, my social studies teacher was knocked unconscious in class by an enraged student who also happened to be a doped-up gang member. No one in the class moved to help the teacher until he left. We knew the student was a very violent person and we did not want any more casualties. Finally, I watched as three of my fellow students were handcuffed and taken to the juvenile detention center by the local sheriff.

Needless to say, I had to personify a certain attitude to survive within this environment. I had to be seen as "tough" and as someone who should not be confronted. To establish this persona, I participated in many fights and did not back down when confronted by peers. In fact, I remember a time when a classmate of mine held a knife to my throat during a passing period, threatening to cut me for my shoes. I told him to go ahead and cut me as I would eventually find him and retaliate, to which he began to laugh and tell me that I was "cool." I had won respect in his eyes. While this may have established some credibility with my peers as being "tough," I found that many times I became extremely anxious during the confrontations. In addition, I befriended individuals who were members of the local gangs, walking the thin line between being associated

with a gang and not becoming a member myself. If I were seen as weak, it only got worse, and the opportunities for threatening situations were vast.

Understanding the environment in which they lived and the potential opportunities for their children to get into trouble, my parents and I moved to a very rural town on the Eastern Plains of Colorado in 1990. The town consisted of a total population of 3,500 people and the ninth grade class, in which I was newly enrolled, included 38 students. The students in my class were Caucasian and many of them came from agricultural farms and ranches, creating a very foreign environment for me.

The first year was terrible. I tried acclimating to my new surroundings by participating in sports and joining extracurricular clubs. During my first day on the football field, I was punished by my peers as I took each of their “initiation blows,” otherwise known as cheap shots. It seemed the more frustrated and angry I became, the worse the physical punishment was, especially from the upperclassmen. The situation did not change as I entered the wrestling season. I can not count the number of black eyes and bloody noses I had from my teammates who were out to prove their athletic and social dominance.

My peers were also far more advanced academically than I was. They seemed to flourish during their first year of high school while I struggled. I had not been exposed to the academic rigor that the rural students had and needed a tutor for the first time. I was enrolled in an Algebra I course, and three weeks into the semester the teacher explained that I didn’t have what it took to be a good math student and that I should take the more applied vocational courses as they were designed for students like me. This devastated me and made me angry enough to do all I could to prove him wrong. I eventually

received a “B” in his course. It would have been great if that were the only course I had to take with this instructor; however, he was the only math instructor in the school. His teaching style included only lecture, and if I did not understand the concept, I better find someone else to explain it to me. As a result, my academic experience toward math was anything but beneficial. I was labeled as a mediocre student by both the teachers and my peers.

I now understand the behavior of my peers. This was the typical pecking order of males in sports and academics. Their aggressive behavior increased as a threat was established (Haynie, & Osgood, 2005). In this case, I was an unknown entity who could possibly take their position on the team or disrupt their social hierarchy. I also understand that my urban persona did not mesh with the rural mentality of students.

It was not until the middle of my sophomore year that my classmates began accepting me as one of their own. I had relaxed and become more accustomed to rural life, and my classmates began to understand my background better. I even enrolled in my first agriculture course.

I showed up to my first agriculture class with my pant legs rolled up, my hair slicked back and my oversized shirt on, which was the urban style of the time. My classmates could not have looked more different; they wore western jeans, boots, and cowboy hats. I did not understand the functionality of their clothes until later in the course.

The classroom and shop were independent from the rest of the school and had been built by members of the community. There were old books scattered everywhere, some contained information on animal nutrition and animal genetics, while others

focused on range management. The newest book was bought in the early 1980's. The desks were set up in a "U" shape with the teacher's podium in the middle. The walls were plastered with FFA awards, some won as early as the 1950's while others were as current as the year before. It was easy to see that the agriculture program had established many traditions. I could not have been in a more foreign environment.

My first year of agricultural education was unique. My first task, even as a sophomore, was to understand the history of the FFA organization and to recite the FFA creed. This was something that only the first year members did, and was a requirement for the first degree awarded in the FFA chapter, the Greenhand degree. I felt almost degraded that as a sophomore I was doing work with freshmen. The second task I needed to accomplish was to begin my shop safety exams and eventually start welding.

My first welding experience was very scary. I was using an oxyacetylene torch to weld two pieces of metal together. As I focused on obtaining the right flame and forming a decent pool of molten metal, the flame back flashed and fire jumped from the area around the regulator and my hand. I dropped the torch immediately, in fear, and began running around the shop thinking my hand was on fire, very thankful I had welding gloves on. Once I realized I was not on fire, I instantly felt a fool as everyone in the shop inquired about what happened. My dad was a welder by trade, but I did not have an aptitude for welding. I did not take into account that it was my first time, and I believed it was an innate vocation. Many members of my family had been welders and I believed that it would be natural for me to weld. It took me two days to gain the confidence to weld again.

Luckily, I had an agriculture instructor who was more a mentor and friend than a dictator, like the math teacher. He encouraged me to continue, and I became better and more proficient in welding and other agricultural areas such as animal science, agriculture business, FFA, and agriculture leadership. In fact, I became an active member of the local FFA chapter and held the positions of Chapter Secretary and Vice President. This was the turning point in my life. I had finally found an educational environment in which I was supported and encouraged. I was passionate about agriculture and could succeed in both the classroom and the FFA organization.

I took my lack of rural understanding and coursework that was foreign to me as a positive challenge. Outside of the classroom, I began to work with local ranchers and eventually raised my own livestock. My grades improved over time, and even though I was never totally accepted as a local, I came to develop friends and enjoy my time in high school. In 1995, I was accepted to Colorado State University and thanks to the mentorship of my agriculture teacher, began my journey to become a high school agricultural education teacher.

As part of the requirements of my degree in agricultural education, I student taught in a rural two-teacher department on the Eastern Plains of Colorado. It was a wonderful opportunity to teach students from diverse backgrounds. Many of the 250 agriculture students were from migrant labor families and were enrolled for only as long as the families were in the area.

I was given three days to become acclimated to the new environment and meet the students before I assumed full responsibility of my cooperating teacher's courses. My classroom was connected to the shop area and had a computer and a projector that I used

in giving PowerPoint presentations. There were many times I would lose my voice as I was shouting over the noise of shop equipment all day. I had full access to a paint booth and a plasma arc cutting machine, both of which I had never used, as well as the more common arc, mig (metal inert gas), and oxyacetylene welders and tools.

There are many significant memories regarding my student-teaching experience, however, three of them relate to situations which induced fear perceptions in both my students and me. Part of the requirement of student teaching in agricultural education includes making several Supervised Agricultural Experience (S.A.E.) visits. Students involved with the S.A.E. program utilize knowledge learned in their agricultural coursework and apply it in a practical setting, external to the classroom (Talbert, Vaughn, & Croom, 2005). I was asked by a student to visit his poultry production S.A.E. as he was very excited for me to see it. As I arrived at his house, he took me back to a fully enclosed shanty barn where there were very beautiful roosters. I continued the tour to find more roosters and no female hens. To my dismay, I had discovered an illegal cock fighting ring in the local community. I had no idea how to handle the situation; I finished my tour and left the premises with speed. I had never dealt with a scenario like this and it was definitely not covered in my pre-service training. I was emotionally torn, the student was excited for me to see his operation and had entrusted me with the history of his family, all of whom were illegal immigrants. At the time it seemed as though this was the student's only chance of receiving a decent education, and yet I had a legal obligation to notify authorities of not only his families legal status, but of their illegal cock fighting ring as well.

The second instance made me extremely embarrassed. A student was working on building a sheep trailer. We had only been working on it for about three days and it was time to put the fenders on. The student had to leave early for another class, and I promised him I would finish attaching them by the end of the day. This was my first experience with trailer fabrication and I felt confident enough in my welding abilities to complete this task. I also felt honored that the student trusted me enough to help him.

Throughout the day I measured the fenders, marked their location on the trailer and permanently welded them to the trailer, or so I thought. I made sure the fenders were level long before I attached them; however, I did not make sure that the trailer itself was level. I had welded the fenders on crooked. The next morning I found that I had made a huge mistake and could have damaged my student's trailer beyond repair. I was terribly embarrassed and my confidence level as a teacher and fabricator diminished extensively over the next few days. Needless to say I spent the entire night fixing the problem I had caused. As a result, I understood that it was alright to make mistakes as long as I learned from them and worked to fix the problem.

The third event that caused my students and me to become extremely emotional and concerned, happened during an FFA function. The students were holding an FFA barn dance in celebration of their success at the state FFA convention. We had a barbeque dinner that night and hired a disc jockey for the entertainment. Everyone seemed to have a great time and my cooperating teachers and I were heading home when we received a terrible phone call. On the way home from the dance a FFA member had rolled his pickup killing his girlfriend and putting himself into intensive care. This was the first student death I encountered, and I was not completely sure I could handle the situation

appropriately. I did not believe I could discuss the loss of the student with students as I would have broken down emotionally.

I was very thankful I had two veteran teachers to help me through the process. We drove directly to the hospital to check on the student and console the family. Afterward, we discussed how we would work with our students to help them cope with the situation. We also helped each other cope by talking to each other and reflecting on our interactions with both students. They showed me that it was o.k. for me to be emotional and helped me use my emotions to empathize with students. Many of the students explained to us that they wanted to attend the funeral as it would help them heal. We attended the funeral and the students wore their FFA official dress in honor of their classmate. I believe that this event enhanced my emotional maturity as I was forced to deal with a very difficult and emotional event.

Upon completion of my student-teaching experience I pursued a Master of Agriculture degree in Integrated Resource Management also from Colorado State University. During this time I was able to work with faculty from the College of Agriculture in assisting beef cattle producers in creating a sustainable agricultural business. Additionally, I designed a high school curriculum aid which allowed agriculture students to gain a holistic understanding of managing beef cattle operations in Colorado. My graduate experience allowed me to understand the complexities of communicating with faculty from various academic disciplines and research training. It also allowed me to understand how to facilitate knowledge to adult and youth audiences.

I then moved to Indiana to pursue an agricultural science and business teaching position at a suburban high school. This experience was like moving to another country.

The agricultural practices in Indiana were very different than those of producers in Colorado. Most of the animal production consisted of small swine or poultry confinement operations, compared to Colorado's rangeland beef operations. Additionally, the social culture of Indiana was very different than Colorado. I came across socioeconomic and racial issues that I had not experienced before.

My high school agriculture classroom was very different from the facilities at my own high school and the high school I student taught at. I was given an art classroom on the second floor of the building with no shop facilities. Additionally, I was affiliated with the career and technical education department; but assigned to the science department. The program did not have an advisory committee, a necessary and required community component for successful programs, which could help me understand the history and vision of the program. There were only three FFA members who were on the local roster. I was both disheartened and yet excited to have such a fresh start.

The students who took my agriculture classes the first two years were students who had no interest in agriculture and expected my courses to be easy graduation credits. This was the greatest test: fueling students' interest in agriculture, an area for which they had no contextual knowledge. Many of the students had never worked on a farm and did not understand agricultural processes. It was a challenge I was up to as I had been like them a few years earlier.

I noticed several of my teaching practices boring my students or causing them to completely quit on me. I noticed that the more I lectured or assigned bookwork, the more resistance I felt from my students. Yet as I initiated more student-led discussions and hands-on activities, I received a better student response. I began to completely change my

instruction style and worked hard to establish a classroom free of ridicule and negative criticism. I began to encourage students to take ownership of their learning by asking them to share their experiences and base knowledge. Additionally, I allowed them to choose the content areas they were most interested in. I infused many role playing scenarios into the classes. These required students to step out of their comfort zones by acting in a role with which they may have been unfamiliar with. I believe this created a better student/teacher relationship as well as enhanced the students' interest as they took ownership of their learning process.

My FFA members refused to learn the FFA creed, or a document which represents the fundamental beliefs of students involved in the FFA organization, and parliamentary procedure, a formal structure for running business meetings, as it had no relevance to them. I began to implement teaching strategies which allowed students to achieve personal ownership and meaning toward their educational tasks. The FFA members rewrote the creed in a more modern fashion; in fact, some of the students even performed the creed as a rap. I also had the students try to run a meeting with no structure, showing them the importance of a structured meeting. I had unknowingly implemented many of the educational practices associated with the constructivist philosophy as well as brain-based advocates. The results included higher enrollment in my classes, students who were genuinely interested in the content areas, and an FFA membership of over 50 students.

Even though the program grew and developed, it did not happen without turmoil. I remember a time when I confronted a student about his behavior in front of his peers, which in retrospect I should not have done. He reacted rather violently by throwing a

chair across the room and emitting several curse words in my direction. MacLean (1978) identifies this type of behavior as a “fight response.” The student perceived my discipline as a threat and he biologically “retreated” into the R-complex part of the brain exhibiting primal fight behavior. It took several minutes, after he left, for me to bring the students back to an emotional level conducive to learning.

Another incident occurred when a racial war broke out in my classroom. I walked into my class and several African American students were on the left side of the classroom while several Caucasian students were on the right side of the classroom. Neither side was being polite to the other. I had not dealt with the racial issues of the area. It was a situation which needed to be dealt with immediately as emotions were running rampant. That day we had a lesson on communication, and a historical lesson on the Civil Rights movement.

There was a morning that one of my female students came in to see me before school started. She was in tears and could not speak very clearly. When I approached her to see why she was so upset, she did not speak but began showing me areas of her body which were deeply bruised. She had been involved in a confrontation with her step father the night before and he physically yanked her out of the house and told her not to come back. To add intensity to the situation, the step father was on my newly formed advisory committee as well as a frequent guest speaker in my classes. Seeing my student in such a condition infuriated me and my ability to maintain a neutral demeanor diminished rapidly. Therefore, I calmed her down and we went directly to the vice principal, a third party who was not emotionally involved. It was very difficult for me to maintain composure as

I had several contrasting emotions. I wanted to act immediately and confront the step father, yet I had to handle the situation professionally.

I taught for three years at the suburban school before I was given the opportunity to pursue a Ph.D. at Purdue University. While completing coursework and exploring educational practices, I was able to identify theories which gave deeper insight into the scenarios previously discussed. However, many of them did not define the biological processes associated with the behavior. That is when I came upon Leslie Hart's theory of downshifting.

I believe that my personal and professional experiences have allowed me the opportunity to experience and observe several academic situations which could possibly be perceived as threatening. I experienced them in social, academic and professional situations. Additionally, I have seen several of my students cope with perceived threats in different ways. I now have a deeper appreciation for Hart's theory and its application toward the threatening areas of performance and testing anxiety, parental conflict, and social and stereotype threat anxiety. However, I wanted a better understanding of how perceived threat affects several students in an agricultural classroom.

CHAPTER 4: PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter is divided into two distinct sections. The first section clarifies the initial engagement practice as discussed by Moustakas (1990), and explains how I derived my research topic. The second component is identified as the creative synthesis component, comprised of data analyzed from the immersion and explication processes in the agricultural science classroom. It consists of qualitative assertions and themes which represent the collective group as well as the individual participant. Themes are prominent characteristics featured in the data which have been identified over multiple incidents (Gall, Gall & Borg, 2003). Assertions are overarching theses derived from common themes (Gall, Gall & Borg, 2003). Additionally, I have included excerpts from both my reflective recordings and observational journal and infused them into each assertion (*identified by italics*).

Initial Engagement – Downshifting Everywhere

I began this process by exploring the origins of brain-based learning. This was no small task as the theories associated with brain-based learning do not come from a single academic discipline, but from many disciplines. I found proponents for brain-based learning theory citing sources from such areas as neuroscience, cognitive psychology, social science, computer science, nutrition, and education.

To understand the birth place of brain-based learning theory, I designed a model characterizing a mature tree, representing the various disciplines associated with brain-based learning (Figure 1). Within the figure, academic disciplines, identified as roots, give foundation to the core concepts of brain-based learning, or the trunk of the tree. Additionally, the various branches and leaves represent possible applications toward understanding human learning and eventually adaptations toward educational practice. For the purpose of this study I specifically focused on Leslie Hart's (1983) theory of downshifting.

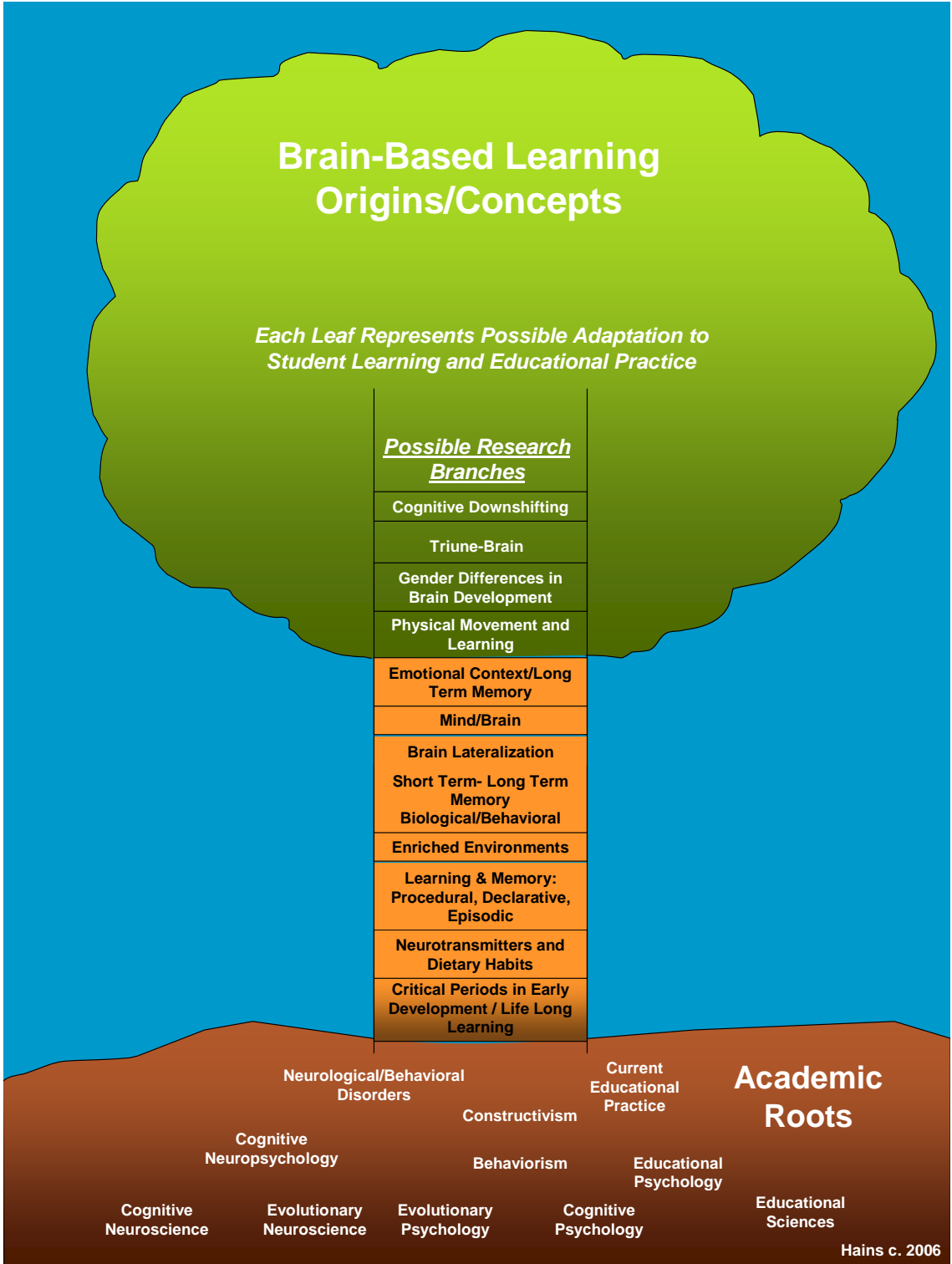


Figure 1: Origins and Applications of Brain-Based Learning Research

In an attempt to understand more fully the theory of downshifting, I began reflecting upon my previous personal and professional experiences, creating an internal basis for understanding the phenomenon. I remembered times in high school when my peers had caused me to downshift by becoming uncommonly cruel as they felt their varsity athletic position was threatened, or that I had challenged them socially or academically. Additionally, I contemplated the teachers I had in class who taught in ways that prevented any form of individual learning.

I then transitioned to examples of downshifting as a beginning teacher, as was the case with my first parental conflict and my own vocational aptitude. Furthermore, there were memories in which students downshifted in my class due to social conflict.

Next, I began to see and experience downshifting in everyday activities. One of the most ironic examples came during my preliminary oral exam during my graduate studies program and is explained in my reflection below:

The preliminary exam process was very new to me and I tried to control my excitement for the opportunity as well as my anxiety toward the unknown. As my committee members came in I kept thinking that I should not be nervous as I had worked with them for quite sometime; however, the importance of this meeting was substantial. As I began defending my preliminary questions I found that I was void of all technical vocabulary and began searching the blank slate that was my mind for answers that were there just minutes before. I was downshifting as I was discussing downshifting. (Researcher Journal, 7/24/06)

When watching television I saw several examples of downshifting, including game show contestants who lost their base knowledge as they felt the anxiety of being watched by American viewers. However, one program was particularly fascinating. The program focused on police suspects giving false confessions as they were berated under

interrogation, a prime example of flight response. It was through this immersion process that I began understanding the breadth of the downshifting theory.

My life has always focused around formal and informal education. As such, I have been continually fascinated as to how the educational system expects students of the same age to mature at the same rate as well as understand abstract concepts under a strict time frame. Students are to attend classes for a scheduled time and depart with transferable knowledge, measurable by a standardized exam. In agricultural science education, students are put into situations where they are expected to use highly flammable and potentially dangerous equipment, utilize hazardous chemicals in a practical lab setting, and speak in front of large audiences, increasing the opportunity for perceived threat. It was then that I began to understand the implications of Hart's theory within the classroom. Therefore, it was the purpose of this study to identify pedagogical practices which influence downshifting in a Midwestern agricultural science classroom.

Creative Synthesis – Life In The Classroom

The final phase of heuristic research is the process of creative synthesis. The researcher in entering this process is thoroughly familiar with all the data in its major constituents, qualities and themes and in the explication of the meaning and details of the experience as a whole. (Moustakas, 1990, p. 33)

Throughout the analysis process, I was able to identify four primary assertions derived from the data. These assertions were supported by several themes and obtained through triangulating the data sources for thoroughness. The assertions are alike in that they influence student downshifting on an individual continuum of intensity.

Assertion One: The instructor has an impact on the extent of student downshifting.

The instructor impacts every aspect of the academic classroom (Mizelle & Irvin, 2000). Teachers have control over classroom management, tone of engagement and educational structure. The instructor assists in the process of creating the overall behavior of the classroom (Caine & Caine, 1993). The magnitude of student downshifting was impacted by their perception of the instructor in the areas of classroom discipline, instructor rapport, and teaching techniques.

Classroom Discipline

The instructor, Mr. Smith, has taught for over 25 years in the same community and sets the tone and expectations of the classroom on day one. As the students enter the class they are greeted with a classroom management plan (Appendix F) which they must sign and return to Mr. Smith before they can continue with the course activities. This plan describes expected student behavior and performance as well as offers two options for second offense disciplinary measures. The first option includes an office referral in which the student must visit the vice principal, who is in charge of their punishment and may lead to the student dropping the course. The second option includes what is described as “shop discipline.” Shop discipline includes a swat with a board on the rear end of the student, or corporal punishment. The number of swats depends on the magnitude of the offense and increases if students misbehave with a substitute instructor. In this course students unanimously chose the shop discipline option. Students describe their feelings toward Mr. Smith’s shop discipline option in the data clip below:

Me: How do you feel about your instructor?

Travis: He is the only teacher who hasn't written me up.

Me: So why do you think that is?

Jacob: Because he's got the board!

All: Laughter

Me: Does that intimidate you?

Travis: No, not really, but you know it's just one of them things.

Me: Would you rather have the board or detention?

All: The board!

Brandy: Then you could sign your name on it [stated with pride as evidenced by the conviction of the statement].

Jacob: It depends on what it is...if it's in school I will take the board. If it's out of school I'll just take out of school because then I would have vacation.

Travis: I would rather take the whack than drop out of this class.

Brandy: Yeah, if you get in trouble you have the choice to either go to the office and fail class for the whole year or get three whacks and stay in class.

Andrew: I would rather get three whacks. (2nd group interview, 12/13/06)

I have a hard time understanding the concept of shop discipline. Corporal punishment hasn't existed in the Colorado educational system for decades. The fact that the students favor this form of discipline fascinates me; however, I do believe it adds uh a subconscious component for students to maintain expected classroom behavior. It could also be very intimidating to a student...In many cases it is easier for students to take the swats than deal with their parents' discipline. (Researcher reflective recording, 8/15/06)

Instructor Rapport With Students

Mr. Smith is very involved with the local community and has taught long enough to have had the parents of his current students in class. When I asked Mr. Smith to explain his overall relationship with his ninth grade students and their anxiety toward his *Fundamentals of Agricultural Science and Business* class, his answer reflected the time spent with his students in the community before they attend high school.

Umm, I think for the most part it's simply a general thing, that's just they are freshman. School's new to them, everything, all of their classes uh it's probably a little more intense than they are use to in elementary and middle school. Umm really I don't think I put a lot of stress on them, even though I might and might

not realize it. You know I don't know how much I intimidate kids because of my size [Mr. Smith is a fairly tall and heavysset man] and how much they know me from 4-H and fairs and everything else and maybe sometimes they are too relaxed. So I think the biggest stress is just being a freshman. (Interview with Mr. Smith, 11/15/06)

Mr. Smith's students were asked to identify their feelings toward their instructor as well. They concur with Mr. Smith that their class is predominantly low-stress and that he makes them feel more adult through his actions.

Me: What do you think of your instructor?

Ally: He is awesome....sometimes.

Brandy: Yeah, I have known him a long time.

Travis: Mr. Smith is the best.

Me: What does he do that makes you think he's the best?

Brandy: He's more laid back ... he's not like ... he's not as inforcive.

Travis: He's not like all the other teachers.

Me: What do you mean he's not like all the other teachers?

Ally: Like he doesn't like pressure like as much as the other teachers from like math and everything.

Travis: And he makes ... I don't know, he jokes around as much as you joke around with him. And I think it makes all of us feel more comfortable in his class than all other teachers.

Corey: He has a candy machine and that makes him cooler.

All: Laughter

Corey: He makes you feel a lot more like you're at home.

Corey: Plus sometimes he cusses.

Me: Sometimes he what?

Corey: Sometimes you just need that ... like other teachers are like ... darn it.

Me: Ah, so sometimes you need cussing. Why do you say that?

Brandy: It makes you feel more grown up when people cuss around you, I mean it's not like we're kids anymore.

Jacob: It makes you feel like ... like ... when you were little, people would have to say something else ... darn or shoot because you weren't old enough to hear it. Now you're getting older and it's just a word now.

Brandy: Sometimes it's accidental ... cause he tells us if we ever cuss or something and it's accidental, then it's o.k., but if we do it on purpose it's not appropriate.

Andrew: He's just a great guy. (2nd group interview, 12/13/06)

Mr. Smith has great empathy for his students and does a great job of adapting his humor and personality to establish his rapport with his students. He has known many of them for several years before having them as students and has become a second parental entity to many of them. If the students have external factors which impair a student's ability to learn that day, Mr. Smith does a great job of adapting to meet the needs of that student and help them work through their emotions in a positive manner. Today a good friend to Ally and Brandy was pulled out of school because his mom was sent to prison, this obviously affected their mental capacity and their ability to work on welds. Mr. Smith allowed the girls to collect themselves in the women's restroom and then talk through the situation with the student who was leaving, allowing closure and better understanding of the situation. (Observational journal, 9/26/06)

Andrew was kicked out for nine days due to marijuana use on school grounds, upon returning to class a communication break down between Andrew and Mr. Smith caused a humorous moment.

Mr. Smith: What are some things that you enjoy that you probably shouldn't at your age?

Andrew: Acting somewhat stunned and surprised yelled, "What?"

Mr. Smith: Laughing, "Easy Andrew, I was referring to alcoholic beverages, not your recreational activities. You need to find another hobby."

All: Laughter

The interesting point here is that Mr. Smith was introducing a lesson regarding the impact that agriculture plays in alcohol production and yet, jokingly was able to address a student's personal issue without ridiculing him in a negative fashion. It seemed that Andrew was very defensive regarding his punishment and yet Mr. Smith decreased Andrews's defensiveness by adding humor to the situation. Later, Mr. Smith sat down with Andrew and discussed why Andrew chose his actions and what alternatives could have been utilized. It seemed as though Mr. Smith had changed from classroom instructor to mentor. I can remember [as a secondary agriculture instructor] several instances when students who were on the fringe of society would come to me with enough pent up frustration that they would snap at the first sign of criticism, I always tried to avoid a confrontation by treating them with compassion and understanding, and a little humor. If done, right it can go a long way (Observation journal and reflective recording, 10/18/06)

Teaching Style

Mr. Smith is very diverse in his teaching practice. Sometimes, he utilized independent reading or lecture as sources for instruction. However, most often he used a form of demonstration or classroom discussion.

The atmosphere in class seems very quiet, there is very little enthusiasm. Students are told to read the oxyacetylene chapter and complete the questions at the end of the chapter. (Does Mr. Smith really expect the students to learn in this fashion? I would hate this environment, let alone not learn anything). Students seem extremely bored and almost captive as they work little and find many other objects to focus on.

One of the students who had been through the chapter before is dismissed to go to the soda machine while the other students complete the questions. Many students are yawning and fidgeting.

Twenty minutes into class the instructor began to lecture students about shop safety, particularly in regards to the torch. While lecturing, Mr. Smith told a story of how a family member of his had burned to death because of improper safety precautions with the oxyacetylene torch. (Although, this got several students' attention, you could see that many were terrified about beginning to use the torch now). (Observation journal, 8/16/06)

Today Mr. Smith returned the pre-test welding safety exams. He then took the students out to the shop to review the components of each welder. Students seemed to be fully engaged in the activity as they asked many questions for clarification. Upon returning to class, Mr. Smith asked students to work in groups when reviewing for the retest. Students seem to enjoy this process as their conversations maintain on the topic at hand. The students feel free to share their grades with each other; I believe that this is a sign that they are not threatened by possible ridicule from their peers at this time. Students must achieve 100% on their exams before they can weld in the shop. (Observation journal, 8/21/06)

Mr. Smith came in today and began shooting students with the Airzooka™ I gave him as a gift. This contraption shoots a puff of compressed air for up to 40 feet. As he was shooting at each student, he would ask them to recite a paragraph of the National FFA Creed. The students had to perform or else they would be shot

with a puff of compressed air. Everyone involved seemed to enjoy the activity, and yet it also added a form of accountability as the students should have learned the paragraphs he was requesting. (Reflective recording, 10/26/06)

The students seem to perceive Mr. Smith's teaching style as relaxed and informal.

They discussed their perceptions of Mr. Smith's teaching style in the following interview excerpt:

Me: What about [Mr. Smith's] instruction style?

Ally: It's a lot more easier to understand because he gets more detailed.

Corey: Everything is easier when you have candy.

Rick: He explains stuff to you when you need help.

Me: What makes him different from the other instructors you all have?

All: He makes us feel at home. (2nd group interview, 12/13/06)

Interpretation. Mr. Smith's traditional disciplinary structure or "shop discipline" gives the students a feeling of boundaries. They know where Mr. Smith has drawn the line and fully understand the ramifications of crossing the line. I believe that this gives students a feeling of ease as they know everyone receives the same discipline and there is no wavering. In addition, the students feel that the discipline is quick and then forgotten, there are no remnants of resentment held by the instructor toward the student.

Mr. Smith is an icon in his local community; as such he is respected by both parents and future agricultural students. His ability to take a leadership role in the community invites students to look toward him as a mentor and in some cases a surrogate father figure. I believe this to be the case with Travis, who worked extremely hard to please Mr. Smith in the classroom. The students understand Mr. Smith's personality and

organizational structure long before entering the classroom, allowing for a familiarity not necessarily felt with a new instructor.

Students feel that Mr. Smith treats his students, including freshmen, like adults. He does not shield them from profanity, adult communication, or adult situations as other instructors may. This gives the students a feeling of acceptance and maturity. He utilizes humor to relate to and motivate his students. Finally, Mr. Smith empathizes with his students allowing them to become at ease during very chaotic situations.

Mr. Smith's teaching style focuses on repetition and application. When given written exams the students must repeat the exams until they receive a perfect score. Next, they must apply their knowledge toward the oxyacetylene torch or arc welder. He also utilizes a variety of instructional practices including lecture, classroom discussion, independent study, group study, recitation, and hands on application, breaking the monotony by adding novel toys or by telling a relevant story.

Mr. Smith ultimately creates an environment in which he plays the roles of instructor, disciplinarian, and mentor, generating a setting that as one student put it, "feels like home." His ability to establish an academic atmosphere which is consistent with disciplinary methods, limits student humiliation, and creates a sense of familiarity in the local community, gives students a feeling of safety. These factors may limit the perceived threat of students regarding their instructor. Additionally, the familiarity of the instructor may reduce student anxiety associated with the transition from middle school to high school (George, 1999). Furthermore, Mr. Smith's instructional variety and focus on direct application may limit students' anxiety toward academic testing (McDonald, 2001).

I believe it is crucial for all educators to fully understand their students. This may help in establishing rapport with students as well as extending a teacher's ability to relate to students on an individual basis. Too often educators react to student behavior without fully understanding the student's perspective. This creates a situation of conflict (Jensen, 2000). Agricultural instructors have a unique opportunity to become familiar with not only their students but their students' families as well. The Supervised Agricultural Experience Program allows educators to visit the student's home, parents, place of work, and supervisory staff. This not only provides an adult community which can help a student succeed, but also exhibits an interest in the student themselves and their academic and vocational pursuits (Arends, 1994). In addition, the combination of parental and community involvement in the local FFA chapter, allows for a beneficial support system for both the agricultural teacher as well as their students.

Because of its history, the power to punish, to hurt, to demean is built into the system. Threat is pervasive, expressed in compulsory attendance, operation by the clock, the incessant giving of tests and examinations, constant use of marks or grades, awarding or withholding of approvals and permissions, on up to administrative transfer, suspension, and expulsion. (Hart, 1983, p. 133)

Creating a classroom environment which allows students to be themselves as well as speak their minds, without demeaning others, is another large factor in decreasing threat perception. If an instructor only interacts with students who are similar to himself, he proliferates an environment which openly excludes or rejects students who are different. It is often difficult for teachers to step out of their comfort zone (Mizelle, & Irvin, 2000). For instance, if a teacher is a devout Christian, they may not be comfortable dealing with students who are atheist, or who are opposed to the teacher's core values. It is important for educators to learn the skill of empathic neutrality, or the ability to show

compassion toward a situation without becoming too emotionally involved or too emotionally distant (Patton, 2002). This can eliminate the feeling of a student being judged when they trust a teacher with their feelings and opinions, allowing for individual growth. Mr. Smith used empathic neutrality to reduce the girls' anxiety when their good friend was being taken out of school as his parent was being taken to prison. To summarize, let the students know it's acceptable to be an individual and make mistakes (Sprenger, 1999).

Teaching style seems to be a large component in reducing student stress. Many educators teach in the fashion in which they were taught and become uncomfortable using other methods (Arends, 1994). However, this does not equate to better student understanding. In fact, students who are forced to learn in a manner incongruent to their learning style have increased anxiety (Sprenger, 1999). The educational connection may not be established and confusion or frustration may override higher cognition. An example of variance in teaching style and its affects on student behavior was apparent when the students in Mr. Smith's class could not fully identify the safety hazards associated with the oxyacetylene unit in the classroom. Instead, they had to be taken into the shop and be shown hazards associated with the actual unit. Jensen (2006) believes that using teaching methods which create deeper emotion and individual meaning decreases student anxiety. In addition, students must be immersed in as many practical environments as possible. Students are yearning for practical application and are tired of theoretical situations (Hart, 1983).

When new content is introduced it should be applied to knowledge that is familiar to the student. This allows the student to bridge previous knowledge with that of the unfamiliar, allowing for contextual meaning and easier knowledge transfer (Sprenger, 1999). Allowing students to work in groups reduces individual anxiety for some students (Caine & Caine, 1993). Mr. Smith allowed his students to study together for their safety exams as well as their creed presentations, this “shared anxiety” seemed to reduce the focus on individual performance. Furthermore, by distributing grades across a variety of class projects, individual assignments and practical applications, student anxiety toward an individual exam may be diminished.

Assertion Two: The physical environment of a school can influence student downshifting levels.

Throughout the semester the students were exposed to environments that may have been very unfamiliar to them. The agricultural classroom was very different than the other classrooms. The National FFA Organization is also infused in its curriculum and therefore posters of FFA members and FFA activities encase the room. Additionally, the “hands on” nature of the agricultural classroom includes many lab activities which are stacked throughout the room. Furthermore, the shop environment itself was very foreign to many of the students as it is filled with dangerous machinery and unfamiliar noises.

Classroom Environment

The classroom consists of off-white walls, FFA Banners hang from the ceiling, identifying the most recent achievements by the school's FFA chapter. Livestock posters litter the remaining wall space. The bulletin board is covered with external leadership opportunities for the students. Everything is themed with FFA memorabilia. I am reminded of a very traditional agricultural classroom, plenty of clutter with animal models in the storage areas. The artificial lighting of the classroom plays havoc with my eyes. (Observational journal, 8/15-16/06)

While I understand that FFA is an intracurricular component of the Fundamentals of Agriculture course, I can't help but think that students who are not interested in FFA and who do not come from an agricultural background would be very uncomfortable in this classroom. Additionally, I couldn't help but notice that every picture of the local FFA chapter presented on the walls consists of Caucasian students ...this could further the discomfort of students from other ethnicities. (Reflective recording, 8/15-16/06)

Today is a very difficult day, it is raining outside, I am extremely tired and I feel like my head is going to explode due to my sinus infection. The drab lights and bland colors of the room make it difficult to concentrate. It is very hard for me to be here today. There is a substitute teacher this week and students are only answering questions out of the book. I have an urge to leave, however, I know I must remain here and stay focused on the classroom setting. (Observational journal, 10/26/06)

Shop Environment

One of the things that I'm enjoying about this research is that I'm studying it in an environment that proliferates some sort of threat. In an ag mechanics shop setting there's some sort of threat because students are constantly dealing with a welding environment or flame, heat and uhh all kinds of foreign elements that they might not have used in their home life. So they are exposed to many different stimuli which can possibly pose a threat. (Reflective recording, 9/13/06)

Students differed in their opinions toward the shop environment. Some felt it was restricting or intimidating, while others enjoyed the closed settings of the welding booth. Jacob seemed to enjoy the enclosed area of the welding booth as it gave him a feeling of being independent leaving little input from the outside; Brandy seemed to mentally shut down in the same environment. When asked during our initial group interview she exclaimed, “I DON’T LIKE BEING IN SMALL PLACES!” (1st group interview, 11/06/06). Her statement coincided with her behavior in the shop.

Brandy and Abby took forever to get into the welding booth. In fact, Brandy would only step foot inside the booth she wouldn’t weld. When she was in the booth she wouldn’t shut the curtain, she wanted it left open. Abby set foot inside the booth but when she was done would move quickly to get out. (Observation journal, 9/27/06)

Brandy made several excuses to run errands for Mr. Smith today and candidly told me that she hated being in the shop. This is the second day she hasn’t been in the shop due to her excuses. I don’t think Mr. Smith understands her evasive techniques. (Reflective recording, 9/25/06)

The shop area seemed to be perceived as threatening by both of the young ladies.

Interpretation. The classroom environment itself can lead to a feeling of captivity (Jensen, 2006). The agricultural science classroom was very dingy. The poor fluorescent lighting, lack of windows, off white walls, and semi-clean desks and floor resembled components of a prison cell. I feel that students who were not accustomed to the “culture” of an agricultural classroom may have difficulty feeling at ease. The lack of cultural representation could make students of various ethnicities feel misrepresented and uncomfortable, “I couldn’t help but notice that every picture of the local FFA chapter

presented on the walls consists of Caucasian students ...this could further the discomfort of students from other ethnicities” (Reflective recording, 8/15/06). Additionally, the representation of FFA material, posters, banners and trophies, could lead to positive recruitment for some students, as well as student discomfort for other students. This was the case with Andrew, as a senior and a non-FFA member. He found the FFA chapter and its integrated curricula to be irrelevant. This lack of relevancy eventually led to a confrontation with Mr. Smith.

The shop environment created a variety of student emotion and behavior. Some students felt that the small welding booths offered a feeling of security, free from peer and instructor critique or ridicule. Corey enjoyed being inside the welding booth as he felt safe from being teased by his peers. Others felt trapped inside the booth and would not participate, as was the case with Brandy. Brandy stated that she felt almost trapped in the welding booth and was scared of the electricity, heat and molten metal. Equipment such as the oxyacetylene torch and arc welder created a perceived threat to students. This equipment generates intense heat caused by fire and electricity accompanied by explosive gasses, and many students found this to be uncomfortable.

Some students seemed to have an innate fear of the equipment in the shop setting. Their threat perception was so intense that they initiated a flight or fight response to relieve them of the situation. Brandy and Ally specifically chose not to bring proper shop apparel in addition to not completing their welds. When Brandy was pressured by Mr. Smith to weld she explained that she would rather take a lower grade than complete the weld. These are just two examples of students displaying flight behaviors. Others had less difficulty adapting to the shop environment as they were previously exposed to similar

situations. Andrew and Jacob had taken a welding course before and seemed more comfortable in the shop setting.

Agricultural science teachers need to re-evaluate the physical environment. Many teachers become conditioned to their environment and forget about its affects on their students, “[educators] are used to the classroom ... it seems invisible to those who work in it or deal with it” (Hart, 1983, p. 81). Mr. Smith’s awareness of student threat perception was different than that of his students. Educators often overlook what the students perceive as a threat, crowded conditions, fear of violence and peer retaliation, and even fluorescent lighting (Jensen, 2000). Hart (1983) explains student behavior within a captive classroom environment in the following: “Though manifestly the classroom is a grossly arbitrary, artificial setting and form of captivity, the behavior of inmates is somehow expected to be normal and compliant” (p. 81). This forces our students into a more passive role.

When students are kept in four walled rooms, required to have a hall pass to use the restroom, and constantly told what to do, they are prevented from developing judgment and taking responsibility (Hart, 1983). Additionally, student learning is restricted by time limits signified by a bell system, reminiscent of the industrial mentality (Hart, 1983). This structure forces students to learn content with time constraints. Since all students learn differently, this does not allow time for natural learning to take place (Hart, 1983).

There are several suggestions for creating an educational environment which reduces stress and creates an atmosphere for engaging the neocortex or new brain. Hart (1983) suggests eliminating the divided classroom and content structure. In order for

students to think holistically, they must bridge educational content areas which are currently segregated. For instance, in agricultural education a student may understand how to create a square structure by measuring its diagonal dimensions. If the dimensions of the opposite diagonals are the same, the structure is square. However, in mathematics this concept is called the Pythagorean Theorem. Many students have difficulties identifying the practical application of a mathematical theory or knowledge transfer. The missing connection can cause frustration as students try to apply foreign yet identical concepts. Educators can reduce this frustration by helping students identify relationships between academic disciplines and applying educational concepts to their existing knowledge base (Jensen, 2000).

The modern agricultural classrooms are generally a drab color with little visual stimulation. Jensen proposes that educators create an environment which uses color to enhance positive emotions and relax our students. Color choice in an educational setting can have a substantial impact on student behavior as established in a study by Elliot, Maier, Moller, Friedman & Meinhardt (2007). They found that exposure to the color red before an exam impaired student performance. They described red as being designated a color of failure and one that decreases motivation.

Additionally, Jensen (2000) suggests that teachers allow as much natural lighting inside the classroom as possible. The constant flickering of fluorescent lighting can have detrimental effects on student learning. In addition, fluorescent lighting causes poor eyesight, fatigue and irritability (Jensen, 2000). Lastly, Jensen identifies the traditional classroom arrangement of desks in a line and in rows as being regimental and almost

military. Teachers need to think outside of traditions and allow for creativity, student ownership, and an enjoyable atmosphere.

I believe students should take ownership of their surroundings and be immersed in an environment that prompts student inquiry. Students need to be immersed in a non-restrictive setting which allows them to explore their inquisitiveness through practical application and instructor facilitation. This academic atmosphere need not be a classroom, but an area that allows students to come into contact with agricultural practices and procedures, including live plants and animals. In addition, students should be provided with scientific equipment utilized by agricultural scientists and practitioners. Students should be expected to care for the classroom, establishing responsibility and ownership. Assignments should be based upon creating a holistic understanding of biological cycles and technical practices associated with the “living” environment.

I believe that threat perception would be diminished in this environment as it would not physically confine the students. Additionally, it could enhance students’ knowledge base and assist in knowledge transfer as they would be surrounded by familiar objects, plants and animals.

Assertion Three: Student downshifting is enhanced by academic content and is individually based.

During the fall 2006 academic semester, three primary academic units were covered by Mr. Smith. The students spent the first four weeks understanding shop safety, identifying welding machinery, and practicing metal cutting and arc welding procedures. The second four weeks focused on the history of the National FFA Organization and

more specifically reciting the FFA Creed. The final four weeks consisted of the students participating in and understanding proper parliamentary procedure techniques. Each student explained that various parts of the curriculum caused them stress. In my interview with Mr. Smith, he was able to explain from his perspectives why the curriculum was designed in such a manner. Additionally, he highlighted the areas which might push students out of their comfort zone.

I can't document this because I do not know what the history department is covering in the junior high. I know when we used to go through the junior high you had to learn the Gettysburg Address in history class and you had several things that taxed your memory skills. And I don't think they are seeing that until they get here. So learning the FFA Creed puts them into shock. To think that they have to learn all five of the stanzas scares them to death. Umm along oh probably twenty five years ago with the assistance of our advisory board they suggested that we umm start the class out with the shop because so many of the kids like to get in, get their hands dirty, and get involved. Once we get into the [FFA] handbook and learn the creed and do the parli, that kind of puts them into a little bit of a shock I think more than anything. (Mr. Smith interview, 11/15/06)

After the students completed their shop safety exam with 100% accuracy, they were allowed to begin practicing their techniques on the oxyacetylene torch. At this time the students seemed to be a collective group, they had all worked together to pass their exams and were all on an equal plane academically. This changed dramatically when the students entered the shop, especially for Brandy.

Oxyacetylene Torch: Fear Of The Flame

One of the young ladies [Brandy] I've uhh been working with here is uhh very intimidated by the fire of the oxyacetylene torch. Every time she goes near it she has intense fear, but the intense fear at that point has also created some intense focus on what she's doing. As a result she has had some of the best cutting ... I mean she's had some of the best cuts through metal in the class. (Reflective recording, 9/11/06)

Umm the girls will purposely wear clothes non-conductive to welding, so they don't have to ... and every time they have the option to weld or cut with the torch they choose not to do so. (Reflective recording, 9/13/06)

[Brandy] is terrified of any sparks and so every time a spark would fall on her she would yell, "Ow Ow Ow!!!!" It really wouldn't be that intensive but she would hate it. She would stand behind other students when watching others use the torch. She stated that she was specifically scared of it and did not want to be that close to the flame. When she was welding she had her friend hold her hair so that she wouldn't catch fire, even though her hair is only shoulder length. (Observation journal, 9/18/06)

Arc Welding: Fear Of Confinement And Heat

The girls totally blew today off and when I asked them why, they both stated that they didn't like welding. Ally was raised on a farm and is not as scared as Brandy; however, she chooses not to weld in an indirect way. Brandy is very verbal about her fears, she would sit there staring at the welders while Mr. Smith and I were trying to have a discussion with her. When I asked her if she was going to weld she stated, "I really don't want to ... I hate being in a booth with that much flame and I just hate umm the sparks and everything else." (Observation journal, 9/25/06)

Class started and 9:50 a.m. uhh and [Brandy and Ally] didn't start welding until maybe 10:35 a.m. It took both Mr. Smith and me talking to them to get them into the booth. Again Brandy said that she doesn't like getting into a confined setting like that or a welding booth. She doesn't like the intense danger of the heat and electricity. She would rather get a grade and get out. She is totally happy with getting a "C" or below to get out of the shop. She wants no part of welding at all. Brandy never got in the booth today, in fact she watched Ally while she held the welding curtain very tight to the edge of the booth. Ally only completed one weld today and when it was time to clean up they did it as fast as they could. In their haste they didn't turn off the welder or the welding fan, that is how scared they are of this machine. (Reflective recording, 10/02/06)

Mr. Smith has really tried to mentor the girls and encourage them to continue their welds and I have too, it's just not working ...they are absolutely terrified. Umm I told Brandy that her intense focus on the last round of the torch was really good. She said, "I understand that I'm going good at this stuff, but I don't want any part of it. I don't like welding." (Reflective recording, 10/02/06)

During my initial interview with the students, I was able to gain a deeper understanding of Brandy's fear toward the welding process. I had noticed and documented her behavior, but had not been given the chance to speak with her in depth.

Me: What about the welding don't you like?

Brandy: I didn't like it ... I don't like it.

Me: Both? And what did you like, the torch or welding better?

Brandy: Neither.

Me: So do you think, Brandy, that if you were to weld all year that you would feel better about it?

Brandy: My opinion would stay the same.

Andrew: I don't agree with her, because when I was a freshman there were a couple of girls in my class that took welding and they didn't like it at first but after a while they got used to it and liked it.

Brandy: I don't think so.

Me: So if you were not in a booth and you were in an open area what would scare you?

Brandy: The stuff around me ... like if there is something flammable or something.

Me: Is it these guys watching you or is it the flammable part?

Brandy: Both

Travis: It's the blowing up part! (1st group interview, 11/06/06)

During my observations I found that it wasn't just Brandy or the females, who were having difficulty controlling their fears toward the welding process. There were a

few males who seemed to have difficulty during the welding unit, however, they both dealt with their fears in different ways.

I will begin with Corey. Corey was a very quiet individual in the beginning of class, and his peculiar behavior in the shop setting caused me to focus on him.

This is the second day that the students welded and was the first day of welding for Corey. Corey would try to write his name with the electrode on the metal by pushing first then uh pulling the rod back and forth. His friend Rick was supposed to be helping him but didn't help him as much as he needed to. When I approached him to talk he became very timid and gave me a sheepish look like, please don't make fun of my welds because this is my first day and I know I should know what I'm doing. (Reflective recording, 9/11/06)

Today Corey didn't say much ...uh he would walk around Mr. Smith and me while we were talking so we wouldn't approach him. He did a lot of maneuvers to stay away from us and not to be called out about his welding abilities in front of his peers. (Observation journal, 9/13/06)

I approached Corey today and talked to him about his welds. He was saying that this was the first lap weld he had done. When he looked at the weld he said, "Oh that's terrible I'm not gonna ... this is going to be a terrible weld." I told him that he hadn't even taken the slag off the weld, how did he know the weld was bad? He replied, "Because it's my first one and I always do terrible." Then he starts dropping his equipment again through the grates of the welding booth. This is the second time when I talked to the kid that he just keeps dropping the equipment. And he gets so nervous and has no self confidence in himself that he just keeps dropping things and totally uh dismisses any form of good that can come out of a situation. (Reflective recording, 9/18/06)

Corey stated that he doesn't mind getting a "C" for a grade today because he doesn't like welding at all. He would rather be with the torch, he felt the torch was a little better time because he wasn't going to be graded with the torch as much as he was being graded with the welder. (Reflective recording, 9/20/06)

Travis, on the other hand, took a different approach to the welding unit. Travis seems to be very aggressive in his approach to welding and his relationships toward other students. He seems to become very critical of himself as he tries to please Mr. Smith.

Umm Travis gets really frustrated with himself because his welds aren't as good as he thinks they need to be. Today was the first lap weld and he was already ... The first time I asked him how his welds were he said, "Umm it looks like ass!" He hadn't even cleared the slag to look at what the weld looked like, or the quality of the weld. (Observation journal, 9/18/06)

Travis wants to be the best of the best and he ...it's really frustrating for him when he doesn't perform as well as he thinks he should. In fact he stated that he wanted to get on Mr. Smith's good side so he would help him more. I told him that Mr. Smith was impartial to all of his students and he replied that it still doesn't hurt to get on his good side. (Observational journal, 9/20/06)

In looking back to my high school agricultural mechanics class, I can remember wanting to be better than my peers and yet having them years ahead of me because they had been welding on their family's farm. I can remember initially giving up welding because my peers had ridiculed me for having welds that wouldn't hold, in fact my first ag teacher would uh join them in teasing me. It wasn't until my second ag teacher that I began to enjoy welding again. He made it fun to learn again. (Reflective journal, 9/25/06)

Complications With Rote Memory: FFA Creed/Parliamentary Procedure

Brandy, Ally, and Corey seemed to be relieved that we were going back into the classroom and away from the shop. I personally felt disappointed that the students were no longer welding; however, this gives me a chance to identify "downshifting" within the normal classroom environment ... it seems as though the girls aren't near as intimidated in the classroom as they are in the shop. (Observation journal, 10/19/06)

FFA Creed:

As FFA is an intracurricular component of the agricultural science curricula, most students will at some point recite the FFA Creed. In addition, the first degree in the FFA organization is the Greenhand degree, usually obtained by high school freshmen and new FFA members. Mr. Smith has contributed great importance to the FFA Creed in his Fundamentals of Agricultural Science and Business class. However, it did cause some students to be pushed outside of their comfort zone.

The students were given one week to learn the first paragraph of the FFA Creed. Upon completion of the week Mr. Smith and I videotaped them and explained to them that it would help document their progress over the next few weeks; however, they were to have an initial dry run before they were videotaped. It took the students four weeks to memorize the creed, and in those four weeks they were videotaped twice.

Brandy came into the room looking very nervous as she said, "I don't know what we're doing ...I don't know any of the creed." Travis answered that he knew his paragraph with great confidence, he then recited the first paragraph without any mistakes. Andrew threw in his two cents by adding, "I don't even know why I took this class, I won't ever learn the creed ... I don't care." At this point Mr. Smith asked the students who was going to read the first paragraph aloud in class. Jacob quickly looked down at his book as if he was rehearsing, Ally nominated Brandy, who looked terrified and Travis nominated himself. Travis stuttered heavily through the paragraph looking to Mr. Smith for help. I found this very interesting as not five minutes before he had recited it perfectly with conviction. Ally was asked to go next and only completed about half of the paragraph then Mr. Smith ripped into her, "I'm not afraid to paddle young ladies either! You two girls have talked for a whole week and have not learned a thing." Jacob nervously looked into his book. (Observation journal, 10/24/06)

Today was interesting ... as I came into class there were students freaking out because it was the first time they had been called on the spot to actually recite the creed. They were terrified, they were stuttering and uh bodily motions or unspoken language showed that they were pretty nervous ... wringing of the

hands, hands in the pockets, pacing back and forth, not looking at anyone, staring up at the ceiling, saying a lot of “ums” and “ands”. (Reflective recording, 10/24/06)

Today at the school we videotaped the kids giving the first two paragraphs of the creed. In doing so I was told by the ladies that the camera made them nervous. When I asked them why, they stated it was because they didn't like to look at themselves later. I asked them the purpose of watching themselves later. They said, “To see what we did wrong.” I explained that it was also to see what they did right. It is interesting to see how the kids interpreted that we're always going to see what we did wrong if we videotape. (Reflective recording, 10/30/06)

The video tape revealed that the kids started talking right into the camera. They chose not to look anywhere else as their focus was directly toward the camera. Most of the students had more difficulty with the camera than they did with only speaking in front of the class. I think they know the importance of getting over this fear, the fear of speaking in public, the fear of possibly getting ridiculed by others. (Reflective recording, 10/30/06)

When Jacob was called to recite the entire creed he blew out air and said that when he started memorizing the fifth paragraph he forgot the first and second. Flushed, Jacob went to the front of the classroom and began to recite the creed. He stared at Mr. Smith the whole time looking for assistance with key words. He continually played with the pen in his pocket, and his breathing was short and sporadic. Jacob seems to be having the hardest time with the creed. (Observation journal, 11/13/06)

Today was the second videotape day for students reciting the creed. While most of the students gave lackluster performance, Travis and Jacob showed substantial effort to give a flawless performance. I took them both into the room by themselves for their final taping. As confident as Travis seemed to be he could never get through the creed without forgetting several words. As I have said before, I believe that Travis wants to be the best of many things to gain the respect of Mr. Smith and his desire to be perfect often causes him to downshift. However, what excited me the most was the fact that Jacob, who had struggled the most, continued taping until he gave his best performance. Both students

really wanted to see improvement from the first videotaping. (Observation Journal 11/15/06)

While most of the students were concerned with their performance in reciting the creed, the senior student, Andrew, was more concerned about the relevancy of the activity. It seemed as though Andrew found no merit in completing the task.

We have a certain student named Andrew who broke down today and stated that he finds no relevance in speaking the creed. He is an older student who argued with Mr. Smith about the relevancy of speaking the creed as he is no longer an FFA member. In fact, he was trying to find academic loopholes associated with not doing the creed. Eventually he stated that he was trying all he could to get out of it because he didn't want to memorize five paragraphs. This is understandable because a student his age in a fundamentals of agriculture class would be frustrated the whole time. Andrew felt that memorizing an FFA creed would not help him after high school and strongly resisted to learn it, which led to a decent argument between him and Mr. Smith. (Reflective recording, 10/30/06)

The students were able to add deeper insight regarding their experience with reciting the creed and clarify their behavior during the first and second interviews.

Me: When we were going through the creed, how did you feel about the creed?

Travis: I just couldn't understand it and it was complicated to memorize.

Me: Why? What made it complicated?

Ally: Because you had to stand up in front of people.

Travis: Well I like standing up in front of people and everything... it's just ...

Brandy: The way it was done.

Travis: Yeah, it was the way it was said.

Corey: It was like something Shakespeare would say.

Ally: Yeah, like old English.

Ally: I think if they would make it under a newer day English, people would understand it more and they would say it easier.

Me: So what made it difficult is the vocabulary used?

All: Yeah.

Brandy: Well that was kind of it but memorizing it was hard. (2nd group interview 12/13/06)

Me: Is it the speaking in public or is it the memorization that intimidates you?

Jacob: I don't know I think it's just the speaking in public and trying to remember it all.

Travis: I'd rather just rewrite this [creed] in my own words and leave it at that.

Andrew: I would rather just not do it and get a grade some other way.

Andrew: Even if it ... even if it wasn't welding. Even if it was like homework that we'd do once a day, everyday, every other week to make up the grade for this [creed]. Even if it was about the creed, like asking questions about the creed. It would be a lot easier than memorizing the whole thing.

Me: So in your case it's relevancy?

Andrew: Right.

Me: For those of you who are FFA members, is it relevant?

Brandy and Travis: Yeah

Me: O.K. for those of you not in FFA, is there still relevance?

All: No

Andrew: In a way ... I guess it could be ... cause like Mr. Smith said it's not just about agriculture ... it's how you should pursue life. But if you read it, I mean you know it and you don't have to memorize it and say it. I mean I can memorize the whole first paragraph and know what it means and I am sure if I read the whole thing I would know what it means, but I still don't want to memorize it and read it to other people.

Me: So if you were to rewrite it in your own words, would there be more passion in it?

Andrew: I don't know about that.

Me: And would you still want to present it in front of the crew?

Andrew: Probably not.

Me: So we are still have the issue of public speaking.

All: Right. (1st group interview, 11/06/07)

Once we established that students needed to relate better to the creed, their primary concern was that of public speaking. I wanted to further explore this with our group interview.

Me: So do you think the speaking in public fear comes from ... remember back in the day when you had to read out loud in class? How many of you loved to read out loud in class?

Andrew: I did.

Me: How many of you hated reading out loud in class?

Jacob: I did.

Me: Why?

Jacob: I don't know I just didn't want to.

Me: Did people correct you?

Jacob: Yeah.

Me: Do people correct you?

Andrew: Oh yeah.

Me: Does that make you feel good?

Andrew: No, I mean it doesn't but I mean if they are trying to help you ... unless some kids are being ...

Brandy: Smartalecks

Andrew: Mean, and just say like ... make stupid jokes about it.

Travis: That's how I got into my first fight.

Me: That's how you got into your first fight? Someone was correcting you?

Travis: Yeah, but they were more like making fun of me.

Me: While you were reading?

Travis: Yeah.

Me: Really? It happens often right? Do you think years of that have kind of led us to ...

Brandy: Not want to do it?

Me: Yeah.

All: Yeah. (2nd group interview, 12/3/06)

Parliamentary Procedure:

The FFA Creed was not the only barrier which caused the students to downshift in public speaking. The National FFA Organization uses parliamentary procedure as their platform for running a meeting. As such, students take roles as officers in the ceremony; primary offices included Advisor, President, Vice President, Secretary, Reporter, Treasurer, and Sentinel. Mr. Smith spent the final four weeks of the semester focusing on parliamentary procedure as it is such a staple in the student organization. The process of memorizing each parliamentary role seemed easier for the students as they had already processed the creed, however, there were still in somewhat disarray.

Students seem lost today, they don't know where their stations are within the room, they don't know their parts and seem very unorganized. I tried to add meaning to their individual roles as they practiced but it didn't seem to work. The glossy eyed blank stare told me that the information wasn't getting to them. Jacob won't even open his mouth as he says his part. I am really frustrated because I

feel the students could care less about their assignment. I wonder what has happened to cause them to have no ambition whatsoever. (Observation journal, 11/20/06)

Students began with opening ceremonies (they are still using their FFA handbooks as crutches even though Mr. Smith told them to have it memorized last week ... Students are starting to get the flow and understanding of parliamentary procedure; however, the enthusiasm and deep understanding is questionable. (Observation journal, 12/04/06)

Students are again going over opening and closing ceremonies. Lack of enthusiasm is evident!! This is week three of opening ceremonies and the students have their parts memorized relatively well (as they should after three weeks). I remember my first time giving the advisor's part of opening ceremonies. I had only one day to memorize the part and was terrified in front of the students, I was already looked at as the sub-teacher, but that gave me deeper anxiety and ambition to know the part, these students could care less. (Observation journal, 12.11/06)

A substitute instructor was teaching during the beginning of the last week of parliamentary procedure. His methods of motivating the students impacted student downshifting very differently than that of Mr. Smith.

While Jacob recited his role as Secretary, many of us could barely understand him. While I understood the history behind Jacob's fear of public speaking and his dedication to overcoming it, the substitute instructor did not. This was vividly apparent as the substitute blurted, "He could be a dang ventriloquist couldn't he? Do it again." after Jacob had finished his part. (Observation journal, 12/11/06)

This form of motivation seemed to only increase Jacob's anxiety as he performed more poorly the second time.

Interpretation. The teaching and learning of the secondary curricula observed throughout this study consisted of two primary student outcomes. The first outcome

consisted of learning and applying shop safety and general welding and torch cutting methods. The second outcome consisted largely of rote memorization of the FFA Creed and methods of utilizing parliamentary procedure. Both outcomes caused downshifting behavior in the students.

Brandy seemed to exhibit the most observable behavior regarding her fear of the welding and shop environment. She used every opportunity to remove herself from the situation she feared. It seemed as though her fear was very innate. The perceived threat of the welders and the welding shop was so intense that she chose to receive lower grades as well as suffer through peer ridicule in order to evade her fear. She verbally expressed her fear and purposely wore inappropriate clothes to avoid welding each day.

Corey did not show the same behaviors as Brandy. Corey took a more subtle approach to coping with his fear. He always seemed to be out of site from those he felt would critique or ridicule his welding ability.

Travis took an altogether different approach. Travis seemed to fear failure. Nothing Travis accomplished was good enough and he wanted the ultimate acknowledgement from Mr. Smith as being the best. He seemed to exhibit a very macho personality toward his peers and often came across as aggressive.

Students who may have excelled in the shop setting had difficulty in the classroom setting, specifically with rote memorization. While most of the students had difficulty formally reciting a memorized speech in public, Jacob seemed to have the most difficulty. Jacob was very proficient in the shop. However, he was terrified of speaking in public. He disliked performing in front of his peers and even though he understood the importance of overcoming his fear, he did not have the resources or tools to overcome it.

Andrew seemed to downshift not only with public speaking but also with topic relevancy. As a senior, he did not see the relevance in memorizing a creed that was part of an organization in which he was not a member, nor did he feel it was a skill that would help him upon graduation. Andrew's feelings became evident during his confrontation with Mr. Smith as well as during the group interviews.

I found it very interesting that many students experienced a form of downshifting. However, downshifting came from very different academic tasks. In all cases the students were forced, through grades and teacher expectations, to perform in content areas for which they were uncomfortable. The students seemed to feel pressured into completing the expected task and either refused to complete the task or did so with reservation. Many of their behaviors support theories established in chapter two. In their own way, each of the students feared peer and instructor ridicule supporting the theory of social anxiety (Haynie & Osgood, 2005). Social anxiety is defined as individuals who focus intensively on their social status and fear having their status reduced (Haynie & Osgood, 2005). Andrew showed signs of social anxiety when he established his social dominancy over his freshmen classmates, he did not want to be a peer to freshmen. In concert with their anxiety toward their peers was their anxiety toward performing, supporting the theory of performance anxiety (Ayers, 1990). Individuals who fear persecution from others while performing a task suffer from performance anxiety (Ayers, 1990). Jacob exhibited signs of performance anxiety as he "froze" in place trying to recite the FFA creed; he was terrified of peer ridicule. Brandy was unique in that she dealt with the stereotypical labels of females in the shop setting which is in agreement with the stereotype threat anxiety established by Aronson (2004). Aronson and Steele (2005) identify stereotypical threat as

a feeling of not belonging to a dominant peer group or being different than the social norm.

It is evident that all of the students showed some level of fear toward rote memorization and public speaking or recitation. They felt that being on display in front of unknown peers and formally speaking was intimidating. However, they did not feel the same fears in a more relaxed social setting such as a mall or student party.

It is difficult for students to overcome such intense fears in a three week or even a six week period. During this time the instructor was managing the classroom, demonstrating procedures, grading papers, grading welds, and grading individual progress in public speaking. This did not allow for much individual mentoring time assisting students in overcoming their fears. Additionally, student fears were perceived as normal by Mr. Smith and as something they would overcome with time.

Assertion Four: Behavioral responses and coping strategies differ according to gender, previous experiences and perceived social hierarchy.

Throughout the semester students gave examples of the perceived threat of peer influence. While they did not specifically identify individual students as a threat, they did identify classroom situations where their peers were threatening. Their behavior varied according to each threat. For the purposes of this study peer threat or social anxiety is viewed by gender and social hierarchy. Additionally, students who had previous experience in both content and social interaction seemed to show fewer signs of downshifting.

Gender Differences and Social Hierarchy

The young men in the class seemed to have different methods of coping with their anxiety during the welding component.

The gentlemen are more quiet in the class um they seem to walk around like they know what they are doing and I don't think they have a clue. So there's this personified confidence that is there but it is not true confidence. They personify it because that's the "manly" thing to do. The younger students don't interact with the two older students and resist asking for peer help. (Reflective recording, 10/20/06)

The [young ladies] always hide on the other end of the shop trying not to get noticed and thrown into a welding booth. Uh when they're welding they do it as fast as they can because they want to get through it without getting hurt or burned ... they wear more than the suggested amount of protective clothing. However, Ally seems to do more welding as she has been exposed to welding on her parent's farm. Mr. Smith has seen her work with her dad a few times on the farm welding. (Observation journal, 10/27/06)

The guys will tease each other uh it's a competition ... you are in my booth. There is a territorial factor to it ... don't mess with my welding rods ... even though there are ample rods and ample booths. It really doesn't matter where they are there is a teasing mechanism there, a feeling of, "I'm doing better than you!" (Reflective recording, 10/04/06)

The students confirmed this "competition" during my first interview with them and were able to identify specific situation in which it occurred. Additionally, they were able to vocalize their true feelings toward gender equality.

Jacob: [Being in a welding booth] makes you feel like you're by yourself. Just like when I first started cutting out there, I didn't like it because everybody was standing around watching me cut, and if you didn't cut a straight line or you didn't cut through the first time they ...

Brandy: They would all laugh at you.

Jacob: Yeah.

Travis: I would laugh at you anyway.

Me: Why would you laugh?

Travis: Oh I'm just playin.

Jacob: What about the time you welded the vice grips?

Travis: I thought it was funny.

Me: Yeah, but you didn't feel uncomfortable?

Travis: No (nervous laugh)

Me: No? You didn't feel like you were being ridiculed by your friends?

Travis: No, (nervous laugh) I thought it was quite funny.

Jacob: Whatever dude, you welded the vice grips (laughing)

Travis: Yeah, they were in my way (laughing).

Group: Laughter. (1st student interview, 11/06/06)

Andrew: When I was a freshmen and I first started welding with all the seniors and juniors, I felt embarrassed when I showed them all my welds, but about a week or two after doing that and you get good at it ... it doesn't take long.

Me: Do you think that you feel differently than [Brandy] does?

Andrew: Yeah, cause she's a girl and girls don't want to weld.

Me: Why?

Brandy: I don't like it.

Me: Is it part of being a woman?

Brandy: No ... it's just ...

Andrew: Probably.

Travis: Imagine that (sarcasm)

Andrew: I think it's all in their head.

Brandy: I don't like to weld but I can go and get dirty and stuff. I can go and do like nasty things like clean up crap or something. I can do that and most girls can't. I can not weld.

Me: Well let's reverse the roles; we're in a what do you call it? a food and family science class. So if we reverse the roles, would you feel uncomfortable having to sew with a bunch of girls around?

Andrew: Yes.

Travis: I wouldn't.

Me: No? You would go for it huh?

Travis: I would too.

Andrew: I would go for it, but I would still feel uncomfortable know that all of their sews would be better than mine.

Me: Right. So it's a similar situation?

Andrew: Yeah

Me: How would you feel Jacob?

Jacob: I don't know ... probably feel the same way she does toward welding.

Jacob: [Women] don't get frustrated as easy.

Travis: I got frustrated all the time.

Me: You did, you got frustrated all the time ... why?

Travis: Because I knew I could do better.

Me: How do you know you could do better?

Travis: Because I just know that I can, it's just one of those things. (1st group interview, 11/06/06)

Peer Influence in Public Speaking

The anxiety associated with peer ridicule was not specific to the welding component of the course. Students also had difficulty reciting in front of their peers. During a class discussion I spoke to the students about their anxiety toward public speaking.

Me: Do you all like speaking in class?

Travis: I don't like to speak, but I like being in front of people ... I like making a fool of myself.

Brandy: I don't like it ... I don't like people watching me... I don't like speaking in front of people I know.

Andrew: I don't like it but I will if I have to. It's hard to mess up in front of others because they'll laugh at you. (Observation journal, 11/06/06)

Formal Public Speaking Versus Casual Social Speaking

Brandy identified a distinction between formal speaking in public and casual social speaking. During an interview with the students she and her cohorts were able to clarify what she meant by this.

Me: Because like you say, if you go to the mall or if you go out shopping with your friends, you aren't scared to talk to anybody because you're not ever going to see them again. That was your answer right? (Speaking to Brandy)

Brandy: Yeah.

Me: And you aren't scared to speak in a setting like that?

Andrew: Right

Me: Even with new people? If there was an FFA group that came to visit would you be scared to speak with them?

Jacob: No, because that's just talking, it's not memorizing something ... you're just talking to them. (1st group interview, 11/06/06)

I was able to relate to the students. I, too, learn better in more social settings where the threat of peer ridicule is lessened.

As I think about what Brandy and the other students said about being in the mall versus the classroom I have to say I agree with them. I think it is much easier to talk to someone new or familiar when you are surrounded by people you know and trust. Uh I think it is much more difficult to talk or recite when the wording is not your own and you can't use slang ... I also think that even though you may be confident in your memorization skills it is easy to be shaken with a smart alec remark or someone giving you flack. (Reflective recording, 11/06/06)

Interpretation. As we enter the 21st Century I find distinct differences in social and gender behavior. In the shop setting the girls seemed to group together in an effort to cope with a common fear of the shop and welding practices. In direct contrast, the boys seemed to exhibit forms of individuality and a façade of confidence. The boys identified working as a group or asking for help as a sign of weakness. Their behaviors are identified in the excerpt below:

The gentlemen are more quiet in the class um they seem to walk around like they know what they are doing and I don't think they have a clue. So there's this personified confidence that is there but it is not true confidence. They personify it because that's the "manly" thing to do. The younger students don't interact with the two older students and resist asking for peer help. (Reflective recording, 10/20/06)

The girls seemed to be more comfortable in vocalizing their fears as well. They felt no shame in identifying and elaborating on their fear perceptions; the boys spoke up only when the upperclassmen spoke first or a peer admitted his weakness first. This male competition was revealed in the shop environment as well. Many of the male students showed territorial behavior over their chosen welding booths. Additionally, there was direct competition on the quality of welds; a behavior only exhibited by the freshmen and

sophomore students, the senior male did not display competitive behavior. I believe that the male students, as a group, showed signs of an established social hierarchy. This was evident in my reflection:

The guys will tease each other uh it's a competition ... you are in my booth. There is a territorial factor to it ... don't mess with my welding rods ... even though there are ample rods and ample booths. It really doesn't matter where they are there is a teasing mechanism there, a feeling of, "I'm doing better than you!"
(Reflective recording, 10/04/06)

Many of the behaviors exhibited by the students can be explained by understanding the role of the R-complex. This area of the brain is responsible for the most primitive behavior and was first identified by MacLean (1978). It is understood that in order for these behaviors to be displayed by the students there needs to be a perceived threat. In many cases it was their fellow students, or fellow student's ability. Andrew identified his anxiety toward peer ridicule during a class discussion, "It's hard to mess up in front of others because they'll laugh at you" (Observation journal, 11/06/06).

The territorial behaviors displayed by the males of the class were very primitive. Caine and Caine (1993) explain territorial behavior in the following: "We defend our property both in the physical and abstract sense of ownership, as evidenced by the terms "my house," "my chair", "my room" (p. 60). In this case it was "my welder", "my welding booth", and "my tools."

Additionally, the competitive behavior shown by the male students is also a result of students downshifting to their more primitive brain. There is an innate desire for many students to rise to the top of the social hierarchy. I see this often with class separation, everyone anticipates being a senior. In this case, the males want to compete in all of the

performance and academic tasks, “the dominance derives from such factors as perceived biological, intellectual, social, and physical superiority” (Caine & Caine, 1993, p. 60).

The female behaviors of staying together and mimicking each other are also explained as behaviors exhibited through the R-complex. The girls needed an identity separate of the males and therefore created their own group. If Brandy did not dress for welding then Ally would not dress for welding. This was also the case with the physical act of welding, if Brandy refused to weld Ally would refuse to weld. This type of behavior is identified as isopraxic behavior (Caine & Caine, 1993; MacLean, 1978). These behaviors are those where two or more members communicate by doing the same thing, imitating each other to maintain identity (Caine & Caine, 1993). The girls grouped together to cope with their fear of the welding booth and welders themselves.

Previous experiences seemed to influence student levels of downshifting. This was specifically observed in Ally. Ally had been exposed to shop equipment and shop environments before. Therefore, her level of anxiety toward the welding process, while still high, was less than that of Brandy. Additionally, Andrew and Jacob had been in previous welding courses allowing them to be more acclimated to the environment. This may be a form of habituation in the shop environment, decreasing their anxiety levels (Behnke & Sawyer, 2004).

CHAPTER 5: SUMMARY, RECOMMENDATIONS AND IMPLICATIONS

Summary

The purpose of this dissertation was to take an in-depth look at the phenomenon of downshifting in its implied environment, specifically the agricultural science secondary classroom. This study focused on two distinct objectives. The first objective was to gain a holistic perspective of downshifting from the participants as well as myself. For the second objective, I was able to gain a deeper understanding of the phenomenon in question utilizing my personal and professional history in addition to the immersion process by implementing the heuristic inquiry method. It is my hope that this study will add to the current knowledge base and assist in creating a foundation for educational theory. The research questions for which this study was based upon were:

1. What current pedagogical practices influence student downshifting in high school agricultural science programs?
2. What behaviors are exhibited when students perceive themselves to be in a threatening situation?
3. What factors, in addition to threat, induce student downshifting?

A review of literature was conducted, providing a holistic understanding of the biological processes of learning and emotion. Connections were established between current and traditional educational theories, brain development, human threat perception,

and the theory of downshifting. The progression of educational philosophies was discussed while identifying the professional merit of traditional pedagogical approaches. Human brain development was analyzed and neurological studies were examined for their relevance to human learning. Biological components of emotion were identified and related to human learning and behavior. Finally, psychological studies regarding human perceptions of fear and anxiety were acknowledged, giving further understanding to the theory of downshifting as defined by Hart (1983).

The connections provided, highlight a variety of philosophical beliefs toward the biological learning and emotional processes of humans. It is understood that many of these links are still forthcoming as interdisciplinary research continues and medical technology advances.

Using the qualitative framework of heuristic inquiry; I was able to observe seven secondary students and one veteran teacher in a Fundamentals of Agricultural Science and Business classroom for the fall academic semester. The students were of different ages and genders, including one sophomore male and one senior male. The agricultural science program was very traditional and located in a rural environment in a Midwestern state.

The heuristic process requires a rigorous practice of reflection, observation, and analysis. This method was accomplished by progressing through the six steps of inquiry as defined by Moustakas (1990). Heuristic inquiry allowed me to explore the downshifting phenomenon as both an individual, using reflections of my personal and professional life, as well as a participant observer in the classroom.

Data were collected using an observation journal, reflective recordings, group interviews, interview with the instructor, video tape and classroom artifacts. Data was analyzed using triangulation. Triangulation strengthens a study by combining several forms of data for analysis (Patton, 2002). While examining the data the following assertions developed:

1. The instructor has an impact on the extent of student downshifting.
2. The physical environment of a school can influence student downshifting levels.
3. Student downshifting is enhanced by academic content and is individually based.
4. Behavioral responses and coping strategies differ according to gender, previous experiences and perceived social hierarchy.

Chapter four provided an explanation of the initial engagement process. This component highlighted methods of identifying my research questions and deepening my understanding of downshifting. In my creative analysis, I presented four assertions derived from the data. The assertions were supported by a combination of themes, represented by data clips from student interviews and conversations, instructor interviews, observational journal entries and reflective recording clips. This chapter provides a review of the findings, an explanation of the conclusions drawn from these findings, and a list of proposed implications.

Recommendations

Agriculture instructors can diminish the potential for student threat perception by implementing specific practices. When exploring new topics, it must be applied to the student's current knowledge base establishing a bridge for knowledge transfer. The importance placed on specific tasks needs to be diluted by allowing for alternative projects, individual assignments, group work and practical application. This may reduce student anxiety toward individual exams.

Agricultural educators have a great opportunity to enhance the classroom environment. Agriculture teachers deal with plants and animals on a daily basis and yet rarely have them inside the classroom. The classroom should allow for students to be fully immersed in their content, allowing them to see, smell, and touch their subjects. Various plant and animal stations can be strategically set up around and within the classroom to create curiosity in each student. This can also create a feeling of trust and responsibility with the students as they care for the living classroom.

Students should take ownership of their classroom by painting it to meet the collective personality of the class. Wall space could be divided between each academic class to create a feeling of title to their room. Seating options should be made available as well.

It is recommended that teachers who identify primal and emotional student behaviors early, address the behaviors and encourage the students. The students should feel free to ask questions without fear of peer or instructor ridicule. The opportunities for constructive leadership and peer support should be explored and if peer ridicule continues

it must be addressed through the established discipline. Teachers should explain to their students that it is acceptable to be novice and explain the strengths of trial and error.

Finally, communication between the parents, instructor and student needs to be established to create an environment that allows for a learning community.

Implications for Further Research

This study sought to identify pedagogical practices which influence student downshifting. However, after immersing myself into this area of research many additional ideas for further research materialized:

1. There needs to be replication studies done in both agriculture and other academic area classrooms to see if similar results occur. This may depend on multiple facets of educational practice including school design, teaching methods, career stage of the instructor, content, and the way in which students are assessed.
2. I found that downshifting behaviors can be blatantly obvious, making it easier to document, and they can also be hidden. These covert behaviors become very difficult to document utilizing the research methodologies in this study. A study identifying these more subdued behaviors would be very beneficial to this line of inquiry.
3. Research that identifies student coping mechanisms associated with the fears described would be very beneficial to pedagogical practice.

4. Experimental research which identifies the biological brain components associated with perceived threat downshifting would assist in solidifying the theory of downshifting.
5. There is a continuum of behavioral responses associated with downshifting. Identifying this continuum and establishing a model would be very beneficial to the broader knowledge.
6. A study which establishes whether student habituation, or repetition toward stimuli, can decrease downshifting levels could add to the broader understanding of Hart's theory.

Concluding Remarks

It seems as though downshifting is enacted upon a continuum. The intensity of perceived threat ranges from no perception of threat at all, to a flight or fight response, or severe perception of threat. It is within this continuum that educators must focus their energy. If we are to increase the amount of time students spend in a higher cognitive state, we must give substantial effort toward decreasing negative stressors.

Throughout this study students were able to explain their perceived fears in the classroom environment. They identified areas in which the educational system failed them in overcoming their fears. Often, practicing teachers are not taught how to deal with psychological issues associated with the classroom. Many times they have difficulty understanding and coping with their own fears. They learn their own survival skill while on the job.

Agricultural educators spend many hours with their students and take on many societal roles including mentor, teacher, friend, disciplinarian and role model. They deal with conflict in the form of students, parents, and even other teachers. All of these impact student behavior. Teachers are armed with only a basic understanding of human learning. They complete their formal educational training with a toolbox full of content application and the traditional teaching methods, but lack the tools to identify and reduce student downshifting.

LIST OF REFERENCES

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- Adolphs, R., & Damasio, A. R. (2000). Neurobiology of emotions at a system level. In J. C. Borod (Ed.), *The neuropsychology of emotion* (pp. 194-213). New York, NY: Oxford Press.
- Arends, R. I. (1994). *Learning to teach*. New York, NY: McGraw-Hill.
- Aronson, J. (2004). The threat of stereotype. *Educational Leadership*, 62(3), 16-19.
- Aronson, J., & Good, C. (2002). The development and consequences of stereotype vulnerability in adolescents. In F. Pajares & T. Urdan (Eds.), *Adolescence and education, Vol 2: Academic motivation of adolescents* (pp. 299-330). Greenwich, CT: Information Age Publishing.
- Aronson, J., Lustina, M. J., Good, C., Keough, K., Steele, C. M., & Brown, J. (1999). When white men can't do math. *Journal of Experimental Social Psychology*, 35, 29-46.
- Aronson, J. & Steele, C. M. (2005). Stereotypes and the fragility of human competence, motivation, and self-concept. In C. Dweck & E. Elliot (Eds.), *Handbook of competence and motivation* (pp. 436-460). New York, NY: Guilford.
- Ayers, J. (1990, October). Situational factors and audience anxiety. *Communication Education*, 39(4), 283-291.
- Behnke, R. R., & Sawyer, C. R. (2004, April). Public speaking anxiety as a function of sensitization and habituation process. *Communication Education*. 53(2), 164-173.
- Bloom, B. S. (1984). *Taxonomy of educational objectives*. Boston, MA: Allyn and Bacon.
- Brown, B. B. (1990). Peer groups and peer cultures. In S. S. Feldman & G. R. Elliott (Eds.), *At the threshold: The developing adolescent* (pp. 171-196). Cambridge, MA: Harvard University Press.
- Brown, B. L. (1998). Applying constructivism in vocational and career education. *Proceedings of the Information Series NO. 378*. ERIC Clearinghouse on Adult, Career, and Vocational Education, Center on Education and Training for Employment, the Ohio State University. Columbus, OH.

- Bruer, J. T. (1997, November). Education and the brain: A bridge too far. *Educational Researcher*, 26(8), 4-16.
- Bruer, J. T. (1999). In search of ...brain-based education. *Phi Delta Kappan*, 80(9), 648-652.
- Buck, R. W. (2000). The epistemology of reason and affect. In J. C. Borod (Ed.), *The neuropsychology of emotion* (pp. 31-55) New York, NY: Oxford University Press.
- Burns, R. B. (2000). *Introduction to research methods*. Thousand Oaks, CA: Sage.
- Caine, R. N., & Caine, G. (1993). *Making connections: Teaching and the human brain*. Parsippany, NJ: Dale Seymour Publications.
- Caine, R. N., & Caine, G. (2001). *The brain, education, and the competitive edge*. Lanham, MD: The Scarecrow Press.
- Cannon, W. B. (1915). *Bodily changes in pain, hunger, fear, and rage: An account of recent researches into the function of emotional excitement*. New York, New York: Appleton.
- Cardiff University (2006). *Parental conflict can affect school performance*. Retrieved March, 2007 from <http://www.cardiff.ac.uk/newsevents/13399.html>.
- Cassaday, J. C. (2004, December). The influence of cognitive test anxiety across the learning testing cycle. *Learning and Instruction*, 14(6), 569-592.
- Chapman, P. L., & Mullis, R. L. (1999). Adolescent coping strategies and self-esteem. *Child Study Journal*, 29(1), 69-77.
- Chickering, A. W. (1993). *Education and identity*. San Francisco, CA: Jossey-Bass.
- Chugani, H. T., Hovda, D. A., Villablanca, J. R., Phelps, M. E., & Xu, W. F. (1991). Metabolic maturation of the brain: A study of local cerebral glucose utilization in the cat. *Journal of Cerebral Blood Flow and Metabolism*, 11, 35-47.
- Chugani, H. T., & Phelps, M. E. (1986, February). Maturation changes of cerebral functions in the infant determined by FDG positron emission tomography. *Science*, 231, 840-843.
- Chugani, H. T., Phelps, M. E., & Mazziotta, J. C. (1987). Positron emission tomography study of brain functional development. *Annals of Neurology*, 22, 487-497.
- Coles, G. (2004, January). Danger in the classroom: 'Brain glitch' research and learning to read. *Phi Delta Kappan*, 85(5), 344-351.

- Denzin, N. K. (1978). *The research act: A theoretical introduction to sociological methods* (3rd ed.). New York, NY: McGraw Hill.
- DeVries, R. (2002). *Developing constructivist early childhood curriculum: Practical principles and activities*. New York, NY: Teachers College Press.
- DeVries, A. C., Glasper, E. R., & Detillion, C. E. (2003). Social modulation of stress responses. *Psychology and Behavior*, 79, 399-407.
- Douglass, B. G. & Moustakas, C. (1985). Heuristic inquiry: The internal search to know. *Journal of Humanistic Psychology*, 25, 39-55.
- Drevets, W. C., Raichle, M. E., (1998). Reciprocal suppression of regional cerebral blood flow during emotional versus higher cognitive processes: Implications for interactions between emotion and cognition. *Cognition and Emotion*, 12(3), 353-385.
- Dungan, D. E., (2002, May), Five days of stress and coping in the lives of college students. *Dissertation Abstracts International: Section B: The Sciences and Engineering*. 62 (10-B), 4827.
- Eccles, P. J., Midgely, C., & Adler, T. F. (1984). Grade-related changes in the school environment: Effects on achievement motivation. In J. G. Nicholls (Ed.), *Advances in motivation and achievement* (pp. 283-331). Greenwich, CT: JAI Press.
- Elliot, A. J., Maier, M. A., Moller, A. C., Friedman, R., & Meinhardt, J. (2007, February). Color and psychological functioning: The effect of red on performance attainment. *Journal of Experimental Psychology* 136(1), 154-168.
- Erikson, E. H. (1978). *Adulthood*. New York, NY: Norton
- Ferguson, R. F. (1998). Teacher's perceptions and expectations and the black-white test score gap. In C. Jencks & M. Phillips (Eds.), *The black-white test score gap* (pp. 273-317). Washington D.C: Brookings Institution Press.
- Fink, G. R., Halligan, P. W., Marshall, J. C., Frith, C. D., Frackowiak, R. S. J., & Dolan, R. (1997). Neural mechanisms involved in the process of global and local aspects of hierarchically organized visual stimuli. *Brain*, 120, 1779-1791.
- Frydenberg, E. (1997). Adolescent coping: Theoretical and research perspectives. Adolescent and society series. *Dissertation Manuscript Routledge, Distribution Center*. Florence, KY.

- Fuchs, E., & Flügge, G. (2003). Chronic social stress: Effects on limbic brain structures. *Physiology and Behavior*, 79, 417-427.
- Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Educational research: An introduction* (7th ed.). Boston, MA: A&B.
- Gardner, H. (1993). *Frames of mind: The theory of multiple intelligences*. (2nd ed.). New York, NY: Basic Books.
- George, P. S. (1999, Fall). A middle school-If you can keep it: Part II. *Midpoints Occasional Papers*. National Middle School Association, Columbus, OH.
- George, P. S. & McEwin, K. C. (1999, April). High schools for a new century: Why is the high school changing? *NASSP Bulletin*, 8 (606), 10-24.
- Greene, J. P., & Winters, M. A. (2005, February). Public high school graduation and college-readiness rates: 1991-2001, *Education Working Paper Manhattan Institute for Policy Research*, 8. Retrieved April 19, 2006 from http://www.manhattan-institute.org/html/ewp_08.htm
- Greenough, W. T., Black, J. E., & Wallace, C. S. (1987, June). Experience and brain development. *Child Development*, 58(3), 539-559.
- Gutman, D. A., Nemeroff, C. B. (2003). Persistent central nervous system effects of an adverse early environment: Clinical and preclinical studies. *Physiology & Behavior*, 79(3), 471-478.
- Hart, L. A., (1975). *How the brain works: A new understanding of human learning, emotions, and thinking*. New York, NY: Basic Books.
- Hart, L. A. (1983). *Human brain and human learning*. Villiage of Oak Creek, AZ: Books for Educators.
- Haynie, D. L. & Osgood, W. D. (2005, December). Reconsidering peers and delinquency: How do peers matter? *Social Forces*, 84(2), 1109-1130.
- Hertzog, J. C., & Morgan, L. P. (1999, January). Making the transition from middle level to high school. *High School Magazine*. 6(4), 10-14.
- Hipple, J. (1997). Music performance anxiety: An overview of technological advances in therapy, psychopharmacology & bio-feedback. *Proceeding of the International Conference on Counseling in the 21st Century*, Beijing, China.

- Indiana Department of Education (2004). *Adequate yearly progress fact sheet*. Retrieved April 19, 2006 from <http://www.doe.state.in.us/ayp/2004/AYPFactSheet-I060805.pdf>
- Jacobs, B., Chugani, H. T., Allada, V., Chen, S., Phelps, M. E., Pollack, D. B., & Ralieggh, M. J. (1995). Metabolic brain development in rhesus macaques and vervet monkeys: A positron emission tomography study. *Cerebral Cortex*, 3, 222-233.
- Jensen, E. (2000). *Brain-based learning: The new science of teaching and training*. San Diego, CA: The Brain Store.
- Jensen, E. (2005). Brain-based learning: Where's the proof? Retrieved December 1, 2005 from <http://www.jlcbrain.com/truth.html>.
- Jensen, E. (2006). *Enriching the brain*. San Francisco, CA: Jossey-Bass.
- Jorgenson, O. (2003, Summer). Brain scam? Why educators should be careful about embracing 'brain research'. *The Educational Forum*, 67(4), 364-369.
- Kamp Dush, C. M., Cohan, C. L. & Amato, P. R. (2003, August). The relationship between cohabitation and marital quality and stability: Change across cohorts? *Journal of Marriage and Family*, 65, 539-549.
- Katzir, T., & Paré-Bleagoev, J. (2006, Winter). Applying cognitive neuroscience research to education: The case of literacy. *Educational Psychologist*, 41(1), 53-74.
- Kemeny, M. E. (2003, August). The psychobiology of stress. *Current directions in psychological science*. 12(4), 124-129.
- Kilgard, M. P., Pritesh, P. K., Vazquez, J., Gehi, A., Schreiner, C. E., & Merzenich, M. M. (January, 2001). Sensory input directs spatial and temporal plasticity in primary auditory cortex. *Journal of Neurophysiology*, 86, 326-338.
- Kleining, G., & Witt, H. (January, 2000). The qualitative heuristic approach: A methodology for discovery in psychology and social sciences. Rediscovering the method of introspection as an example. *Forum: Qualitative Social Research*, 1 (1). Retrieved 04/04/07 from <http://qualitative-research.net/fqs>
- L'Amour, L. (1978). *The haunted mesa*. New York, NY: Bantam.
- LeBlanc, A., Jin, Y. C., Obert, M. & Siivola, C. (1997, Autumn). Effect of audience on music performance anxiety. *Journal of Research in Music Education*, 45(3), 480-496.

- LeDoux, J. (1996 a). *Bridging the gap between neuroscience and education: Summary of a workshop cosponsored by the Education Commission of the States and the Charles A. Dana Foundation* (Denver: Education Commission of the States, 1996).
- LeDoux, J. (1996 b). *The emotional brain: The mysterious underpinnings of emotional life*. New York, NY: Simon and Schuster.
- LeDoux, J. (1994). Cognitive-emotional interaction in the brain. In P. Ekman & R.J. Davidson (Eds.), *The nature of emotion: Fundamental questions* (pp. 216-223). New York, NY: Oxford University Press.
- Lundberg, U. (1993). On the psychobiology of stress and health. In Svenson, O. & Maule, J. A. (Eds.). *Time pressure and stress in human judgment and decision making* (pp. 41-53). New York, NY: Plenum.
- MacLean, P. D. (1978). A mind of three minds: educating the triune brain. In J. Chall & A. Mirsky (Eds.) *Education and the brain*. (pp. 308-342). Chicago, IL: University of Chicago Press.
- MacLean, P. D. (1990). *The triune brain in evolution: Role in paleocerebral functions*. New York: Plenum Press.
- Marcia, J. E. (1966). Development and validation of ego identity status. *Journal of Personality and Social Psychology*, 5, 551-558.
- Marshall R. D., Garakani, A. (2002, June) Psychobiology of the acute stress response and its relationship to the psychobiology of post-traumatic stress disorder. *Psychiatric Clinics of North America*. 25(2), 385-395.
- McDonald, A. S. (2001). The prevalence and effects of test anxiety in school children. *Educational Psychology*, 21(1), 89-101.
- McMillan, J. H., & Schumacher, S. (2001). *Research in education: A conceptual introduction* (5th ed.). New York, NY: Longman.
- Mizelle, N. B., & Irvin, J. L. (2000, May). Transition from middle school into high school. *Middle School Journal*, 31(5), 57-61.
- Moustakas, C. (1990). *Heuristic research: Design, methodology and applications*. Thousand Oaks, CA: Sage.
- Moore, D. S., McCabe, G. P. (2006). *Introduction to the practice of statistics*. (5th ed.). New York, NY: W.H. Freeman and Company.

- Mulvenon, S. W., Stegman, C. E. & Ritter, G. (2005). Test anxiety: A multifaceted study on the perceptions of teachers, principals, counselors, students, and parents. *International Journal of Testing*, 5(1), 57-61.
- Munson, M. L. & Sutton, P. D. (2006). *Births, marriages, divorces, and deaths: Provisional data for 2005*. (National Vital Statistics Reports, 54(20)). Hyattsville, MD: National Center for Health Statistics.
- National Research Council (1999). Mind and Brain. In J. Bransford, A. Brown, & R. Cocking (Eds.), *How people learn: Brain, mind, experience, and school* Washington D.C.: National Academy Press. Retrieved December, 2006 from <http://www.nap.edu/html/>
- Ormrod, J. E. (1998). *Educational psychology: Developing learners*. (2nd ed.). Upper Saddle River, NJ: Prentice Hall.
- Osher, D., Dwyer, K., & Jimerson, S. R. (2006). Safe, supportive, and effective schools: Promoting school success to reduce school violence. In Jimerson & Furlong (Eds.) *Handbook of school violence and school safety: From research to Practice* (pp. 51-71). Mahwah, NJ: Erlbaum.
- Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.
- Percaccio, C. R., Engineer, N. D., Pruette, A. L., Pritesh, P. K., Moucha, R., Rathbun, D. L., & Kilgard, M. (2005, August). Environmental enrichment increases paired-pulse depression in rat auditory cortex. *Journal of Neurophysiology*, 94, 3590-3600.
- Phenomenology Center. (2006, June). Husserl's Page. Retrieved June 29, 2006 from <http://www.husserlpage.com/>.
- Phillips, M. L., Drevets, W. C., Rauch, S.L., & Lane, R. (2003). Neurobiology of emotion perception I: The neural basis of normal emotion. *Biological Psychiatry*, 54, 504-514.
- Piaget, J. (1928). *The child's conception of the world*. London: Routledge and Kegan Paul.
- Piaget, J. (1970). Piaget's theory. In P. Mussen (Ed.), *Carmichael's manual of child psychology* (pp. 703-732). New York, NY: Wiley.

- Platel, H., Price, C., Baron, J., Wise, R., Lambert, J., Frackowiak, R. S. J., Lechevalier, B., & Eustache, F. (1997). The structural components of music perception: A functional anatomical study. *Brain*, *120*, 229-243.
- Polanyi, M. (1967). *The tacit dimension*. Reprinted 1983. Magnolia, MA: Peter Smith.
- Prins, P. J., Groot, M. J. & Hanewald, G. J. (1994). Cognition in test-anxious children: The role of on-task and coping cognition reconsidered. *Journal of Counseling and Clinical Psychology*, *62*(2), 404-409.
- Raichle, M. (2003). Social neuroscience: A role for brain imaging. *Political Psychology*, *24* (4), 759-764.
- Rathunde, K., & Csikszentmihalyi, M. (2005, May). Middle school student' motivation and quality of experience: A comparison of Montessori and traditional school environments. *American Journal of Education*. *111*, 341-371.
- Renner, M. J., & Rosenzweig, M. R. (1987). *Enriched and impoverished environments: effects on brain and behavior*. New York, NY: Springer-Verlag.
- Sawyer, T. P., & Hollis-Sawyer, L. A. (2005). Predicting stereotype threat, test anxiety, and cognitive ability test performance: An examination of three models. *International Journal of Testing*, *5*(3), 225-246.
- Schunk, D. H. (1996). *Learning theories: An educational perspective* (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.
- Scott, S., & Wise, R. (2003). Functioning imaging and language: A critical guide to methodology and analysis. *Speech Communications*, *41*(1), 7-21.
- Seinfeld, J. (2007). Jerry Seinfeld Quotes. Retrieved on June, 2007 from http://thinkexist.com/quotes/Jerry_Seinfeld/.
- Seligman, Ollendick, L. D., Langley, T. H., Baldacci, A. K., Bechtoldt, H. (2004, August). The utility of measures of child and adolescent anxiety: A meta-analytic review of the revised children's manifest anxiety scale, the state? Trait anxiety inventory for children, and the child behavior checklist. *Journal of Clinical Child and Adolescent Psychology*, *33*(3), 557-565.
- Skinner, B. F. (1953). *Science and human behavior*. New York, NY: Free Press
- Skinner, B. F. (1938). *The behavior of organisms*. New York, NY: Appleton-Century Crofts.
- Sousa, D. A. (2001). *How the brain learns: A classroom teachers guide*. (2nd ed.). Thousand Oaks, CA: Corwin Press.

- Sperry, R. W. (1974). Lateral specialization in the surgically separated hemispheres. In F. Schmitt and F. Worden (Eds). *Neurosciences third study program* (pp. 5-19). Cambridge, MA: MIT Press.
- Sprenger, M. (1999). *Learning and memory: The brain in action*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Stasz, C. & Bodilly, S. (2004). Efforts to improve the quality of vocational education in secondary school: Impact of Federal and State policies (National Assessment of Vocational Education, U.S. Department of Education No. ED-00-C0-002), Santa Monica, CA: Rand.
- Steele, C. M. (1997, June). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist*, 52(6), 613-629.
- Stein, D. J., Harvey, B. H., Uys, J. & Daniels, W. (2005, August). Suffer the children: The psychobiology of early adversity. *CNS Spectrums*, 10(8), 612-615.
- Strauss, A. L., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.
- Strauss, W. (2005). Talking about their generations: Making sense of a school environment made up of Gen-Xers and Millenials. *School Administrator*, 62(8), 10-14.
- Talbert, B. A., Vaughn, R., & Croom, D. B. (2005). *Foundations of agricultural education*. Catlin, IL: Professional Education Publications Inc.
- Tucker, D. M., Derryberry, D., & Luu, P. (2000). Anatomy and physiology of human emotion: Vertical integration of brain stem, limbic and cortical systems. In J. C. Barod (Ed.), *The neuropsychology of emotion* (pp. 62-78). New York, NY: Oxford University Press.
- United States Department of Education. National Center for Education Statistics. Dropout Rates in the United States: 1999. NCES 2001-022, by Phillip Kaufman, Jin Y. Kwon, Steve Klein, and Christopher D. Chapman. Washington, DC: 2000.
- United States Department of Education School Dropout and Prevention Program (2007) Retrieved 1/20/07 from <http://www.ed.gov/programs/dropout/dropoutprogram.html>
- Vandewater, E. A. & Lansford, J. E. (1998, October). Influences of family structure and parental conflict on children's well being. *Family Relations*, 47(4), 323-330.
- van Praag, H., Kempermann, G., & Gage, F. H., (2000). Neural consequences of environmental enrichment. *Nature Reviews Neuroscience*, 1, 191-198.

- Vygotsky, L. S. (1992). *Educational psychology*. (R. Silverman, Trans.). Florida: St. Lucie Press. (Original work published 1926).
- Vygotsky, L. (1962). *Thought and language*. Cambridge, MA: MIT Press
- Watson, J. B. (1924). *Behaviorism*. New York, NY: Norton.
- Wood, D. (1998). *How children think and learn* (2nd ed.). Oxford, CT: Blackwell Publishers Ltd.
- Wood, J. (2006, May). Effect of anxiety reduction on children's school performance and social adjustment. *Developmental Psychology*, 42(2), 345-349.

APPENDICES

Appendix A

HIGH SCHOOL CAREER-TECHNICAL COURSES AGRICULTURAL SCIENCE AND BUSINESS COURSES

FUNDAMENTALS OF AGRICULTURAL SCIENCE AND BUSINESS

5056

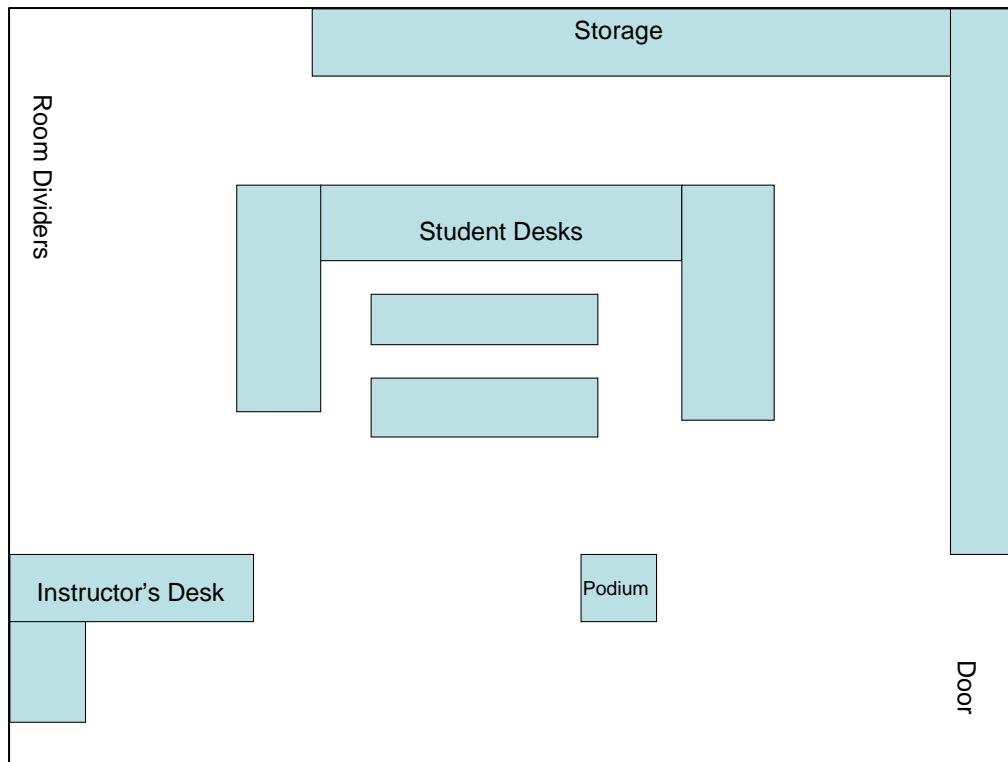
CIP Code: 01.0101

Fundamentals of Agricultural Science and Business is a yearlong course that is highly recommended as a prerequisite and foundation for all other agricultural classes. The nature of this course is to provide students with an introduction to careers and the fundamentals of agricultural science and business. Areas to be covered include: agricultural literacy, its importance and career opportunities, plant and soil science, environmental science, horticulture and landscape management, agricultural biotechnology, agricultural science and business tools and equipment, basic principles of and employability in the agricultural/horticultural industry, basic agribusiness principles and skills, developing leadership skills in agriculture, and supervised experience in agriculture/horticulture purposes and procedures. Student learning objectives are defined. Instruction includes not only agriculture education standards but many academic standards are included through the use of “hands-on” problem-solving individual and team activities.

- Suggested Grade Levels: 9 or by permission of teacher.
- Recommended Prerequisite: None
- A two-credit/two semester course. May be offered as year long course to 8th graders for high school credit.
- A Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diploma elective and directed elective course.
- A Career Academic Sequence, Career-Technical program, or Flex Credit course.
- Standards and learning activities defined.
- This course is included as a component of the Agriculture, Food and Natural Resources career cluster and may also be included as a component of the Building & Construction; Business, Management & Finance; Arts, A/V Technology & Communications; Health Services; and Science, Engineering & Information Technology career clusters.

Appendix B

Observational Classroom Layout



Classroom consists of off-white walls, FFA Banners identifying past achievements, livestock posters.

Appendix C

Research Project Number 0609004442

RESEARCH PARTICIPANT CONSENT FORM
 The Dilemma of Student Downshifting:
 Educational Practices Which Influence
 Downshifting in High School Agricultural Science and
 Business Classrooms

Mark A. Balschweid, Associate Professor
 Bryan J. Hains, Graduate Research Assistant
 Purdue University
 Youth Development and Agricultural Education

Purpose of Research

The purpose of this study is to identify components of classroom structure which influence student downshifting. Downshifting is a behavioral response, resulting in a biological exchange between the neocortex, the limbic system and R-complex within the student's brain. It is the purpose of this study to identify the characteristics which induce this phenomenon within a Midwestern agricultural science and business classroom.

Specific Procedures to be Used

Your child will be observed throughout the fall 2006 semester within his/her agriculture classroom. In addition, your child may be asked to participate in a series of informal interviews throughout the academic semester. The interviews will be face-to-face, and will be tape recorded for accuracy. Additionally, your child may be video taped within the classroom to aid the researcher in identifying student behavior. Both the audio and video tapes will be erased/destroyed within one week of the final analysis. The observations and interviews will be conducted by a Purdue University Graduate Student.

Duration of Participation

Observations will last throughout the fall 2006 semester. Each interview may last a total of 15-20 minutes and will be conducted during the observed class.

Risks to the Individual

The risks are no more than the participant would encounter in everyday life.

Benefits to the Individual or Others

There are no direct benefits to your child by participating in this study.

Confidentiality

The purpose of this research project is to provide a better understanding of the downshifting phenomenon within a Midwestern agricultural science and business classroom. The answers your child will provide will be kept confidential and special precautions have been established to protect the confidentiality of responses. No names will be used in any data summaries or publications. Your child may refuse to answer questions, or stop participating in this research at any time. The data will be transcribed and the transcriptions, audio tapes and video tapes will be stored in the principle investigator's office at Purdue University. Data will be destroyed up to ten years after the data has been collected.

Voluntary Nature of Participation

Your child does not have to participate in this research project. If your child agrees to participate, your child can withdraw his/her participation at any time without penalty. In addition, if your child chooses not to participate they will not be video taped during the classroom sessions. If your child chooses not to participate and is somehow captured on video; appropriate technology will be used to "blur" your child as to not be recognized. Furthermore, your child will not be asked to participate in the informal interviews.

Appendix C

Research Project Number 060900 4442Contact Information:

If you have any questions about this research project, you can contact Dr. Mark A. Balschweid at 765-494-8423. If you have concerns about the treatment of research participants, you can contact the Committee on the Use of Human Research Subjects at Purdue University, 610 Purdue Mall, Hovde Hall Room 307, West Lafayette, IN 47907-2040. The phone number for the Committee's secretary is (765) 494-5942. The email address is irb@purdue.edu.

I HAVE HAD THE OPPORTUNITY TO READ THIS CONSENT FORM, ASK QUESTIONS ABOUT THE RESEARCH PROJECT AND AM PREPARED TO PARTICIPATE IN THIS PROJECT.

Participant's Signature_____
Date_____
Participant's Name_____
Researcher's Signature_____
Date

Appendix D

Researcher Designed Observational Journal

<u>Student Alias</u>	<u>Stimulus or Event</u> Voluntarily Chosen Stimulus or Externally Imposed Threat?	<u>Behavioral Response</u> Primal, Emotional, Cognitive	<u>Length of Response</u> Time of Student Response	<u>Coping Strategy</u>
<u>Researcher Rationale and Notes</u>				

Appendix E

Informal Interview Guide

The Dilemma of Student Downshifting: Educational Practices Which Influence Downshifting in High School Agricultural Science and Business Classrooms

Mark A. Balschweid, Associate Professor
Bryan J. Hains, Ph.D. Candidate

The following is an informal interview guide. The listed questions will serve as a guide to represent key components of the downshifting phenomenon. Interviews will be informally conducted throughout the observation period. Exact wording is flexible according to the context of the interviews.

Research Outline:

Qualitative:

In depth interviews with 6 students
Direct student observation and journal
Researcher Journals
Video taped classroom sessions
In depth interviews with the instructor

Guiding Research Questions:

1. How much experience have you previously had with this topic?
-Background information regarding the course content being taught
2. Describe your feelings before you began this (lab, project, assignment).
3. Describe your feelings after you finished this (lab, project, assignment)
4. What was your immediate reaction when a stimulus happened? How did you react?
5. How have your feelings toward this content changed throughout the semester?
6. How do your friends influence your feelings toward course content?
7. How does the course instructor influence your feelings toward the course content?
8. How does the classroom environment influence your feelings toward the content?

Appendix F

Classroom Management Plan**Mr. Striebeck****Attendance:**

Attendance will be taken at the beginning of each class period and recorded in the grade book as well as the computer. Any student that is more than ten minutes late will be counted as absent. Upon returning from an absence the student is responsible for finding out the assignments they missed and getting them turned in within the same amount of time he/she was absent. This means that a student will be allowed one day for every day missed to complete make-up assignments as long as the absence was excused. If the student fails to comply with school policy they will receive a failing grade for that assignment.

Tardies:

A tardy will be assessed if the student is not in the classroom before the bell rings to begin the period. Students will be informed when they receive a tardy and these will be recorded in the teachers grade book and the computer. Referrals will be made to the assistant principal according to the student handbook.

Expected Behavior:

1. All students will be in the classroom, prepared for class with the correct materials and ready to begin class when the bell rings to start the beginning of the period.
2. Students will not leave the classroom unless they are dismissed by the teacher.
3. All students will bring all materials needed to class with them. These include pencils, papers, pens, and other materials the teacher may require.
4. Running, pushing, or any other type of horseplay will not be tolerated at any time in the classroom or the hallway outside the classroom.
5. Medication of any type is forbidden. Medicine, even aspirin, is to be kept with the school nurse and you must have a pass from her to be released from class.
6. Profanity will not be tolerated at any time.
7. Proper clothing will be worn as per instruction.
8. Report all personal accidents or broken equipment immediately.
9. Coats and other items are not to be brought to class, unless required by the instructor.

Lab Classes:

10. All students will be required to demonstrate proficiency in the proper use and care of all equipment in the shop, before they are allowed to use it.
11. Students will at no time operate or handle any equipment which the teacher has not approved them for and/or when the teacher is not in the area.

Classroom Management Plan

If a student does not conduct him/herself according to the guidelines above, the following will occur.

1st Offense – Student will be verbally warned and corrected until behavior is changed.

2nd Offense – Student will have the option of shop discipline or an office referral.

I have read the behavioral expectations for _____ and understand the rules. I realize that I am responsible for myself and my actions.

Print Name _____ Legal Signature _____

Appendix G

The FFA Creed



I believe in the future of agriculture, with a faith born not of words but of deeds - achievements won by the present and past generations of agriculturists; in the promise of better days through better ways, even as the better things we now enjoy have come to us from the struggles of former years.

I believe that to live and work on a good farm, or to be engaged in other agricultural pursuits, is pleasant as well as challenging; for I know the joys and discomforts of agricultural life and hold an inborn fondness for those associations which, even in hours of discouragement, I cannot deny.

I believe in leadership from ourselves and respect from others. I believe in my own ability to work efficiently and think clearly, with such knowledge and skill as I can secure, and in the ability of progressive agriculturists to serve our own and the public interest in producing and marketing the product of our toil.

I believe in less dependence on begging and more power in bargaining; in the life abundant and enough honest wealth to help make it so--for others as well as myself; in less need for charity and more of it when needed; in being happy myself and playing square with those whose happiness depends upon me.

I believe that American agriculture can and will hold true to the best traditions of our national life and that I can exert an influence in my home and community which will stand solid for my part in that inspiring task.

The creed was written by E. M. Tiffany, and adopted at the 3rd National Convention of the FFA. It was revised at the 38th Convention and the 63rd Convention.

VITA

VITA

Bryan Jason Hains was born in Denver, Colorado. He attended urban public schools until he was in high school, when he moved to a very rural town on the Eastern Plains of Colorado. Upon graduating from high school in Bennett, Colorado, he attended Colorado State University where he received both a Bachelor of Science in Agricultural Education in 1999 as well as a Master of Agriculture in Integrated Resource Management in 2000. Bryan then left Colorado and became the agricultural science and business instructor at Western High School in Russiaville, Indiana where he taught for three years. In the fall of 2004 Bryan left teaching to pursue a Ph.D. in Agricultural Education at Purdue University. He completed his degree in August of 2007.