Implementing constructivism in the middle school classroom

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Implementing Constructivism In The Middle School Classroom

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Dissertation submitted to the Faculty of
West Virginia University
in partial fulfillment of the requirements for the degree of

Doctor of Education
in
Curriculum and Instruction

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Abstract

This study defines the components of a middle school history curriculum based on a theory of learning consistent with the use of cognitive tools and the tenets of constructivism. Utilizing a comparative analysis of learning theories encompassing developmental and constructivist beliefs and their influence on appropriate instructional design, the research addresses the necessary pairing of instructional planning and learning theory. Additionally, an examination of linguistic tools and their relationship to cultural development and distinctive kinds of comprehension, as well as specifics of the various learning stages, preferences, and skills are used to provide a rationale. This analysis is employed in the development of a middle school history/social studies curriculum premised upon the ideology that students employ intellectual tools at different stages of maturation that support specific types of understanding. The resulting instructional design for students, grade six through eight, contains the fundamental elements of constructivism, how these elements manifest themselves in a curriculum, appropriate activities, projects, and methods for evaluation. The study concludes in a discussion concerning the implications of coupling constructivist theory with linguistic strengths, and the impact this union has on curriculum design.
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This document is dedicated to my mother and my conscience, Dr. Rogers McAvoy. Without the support of the former I would have been unable to devote the amount of time needed to accomplish this feat. She provided the necessary confidence when mine waned. To Dr. McAvoy, never has a mentor accomplished so much by badgering and challenging. I have become so accustomed to his hand in my work and life, he guides me even in his absence. What I wanted was a degree, what I received from Rogers was an education.
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Chapter 1

Background of Study

Introduction

Adolescence is a time of vivid and intense emotions as well as a span of ennui and despair. Contemporary curriculum is frequently ineffective when dealing with early adolescent students. The imparting of information that worked so well in earlier years does not captivate the middle school child, and the push for vocational readying does not yet have a decisive direction. The curriculum fails to inspire and the results often are evident in students’ attitudes toward their instructors and formal education. Many of the current methods and theories in adolescent education fall short of addressing the evolving needs of today’s youth.

Lee Manning (1996) reports in *Learners at Risk: Three Issues for Educators* that educators need to be aware that all adolescent learners at some period are at risk. As youth pass through various developmental stages, they face numerous challenges and tasks resulting in conditions which at best undermine their education and at worst result in withdrawal from school. Issues ranging from peer pressure, depression, low self-esteem, to poverty, substance abuse and suicide must be acknowledged.

Educators must determine when their educational practices result in problems for learners and take appropriate action. Several steps might be necessary to accomplish this goal. Educators will need to recognize that carefully planned educational experiences might actually place students in academic or some other
jeopardy; understand that there is a fine line between appropriate and inappropriate practices and accept the fact that practices that contribute to the success of some students might be devastating to another; understand individual students, how they learn, their goals and frustrations and what educational practices contribute to their academic and overall success (Manning, 1996).

The current model for instructional design in the American school system is based largely on the work of Piaget. This standard assumes a basic process of psychological development programmed genetically such that when students interact with their environment it will develop spontaneously. While Piaget’s theory sufficiently explores the developmental capabilities of humans, it fails to consider how sociocultural circumstances, along with psychological and logical constraints, form the development of types of understanding. Piaget’s explanation covers only logico-mathematical tools. The affective characteristics common to adolescents are unaccounted for in Piaget’s theory.

In assessing the current curriculum, one must also scrutinize educational aims. Presently three conflicting theories drive the curriculum: indoctrinate youth to the conventions and norms of the adult world; impart what is known to be true and real about the world; develop the individual potential of each student. Educational arguments throughout the century have dealt largely with which aim should be more highly valued. Few instructors subscribe to one position at the exclusion of the others. Typically, educators seek a balance of the three aims allowing each view enough scope to undermine the others. A debate continues among critics of school performance. Each camp claims that if one of these aims were elevated above the others, society’s ills would be corrected.
Ineffectual compromise has been the result, and it moves in response to society’s current focus.

The response to inadequacies in education and in the curriculum in particular has been to add to existing theories excluding various elements as they are proven to be inappropriate or ineffective. Eventually the instructional design becomes so distanced from the learning theory on which it was founded that content and strategies have no foundation upon which to reflect. Carroll and Campbell (1988) contend that one’s theory of learning is operative in one’s design. One therefore can understand another’s theory of learning from analysis of instructional design. Abstracting strategies and concepts from their theoretical foundation robs them of their meaning. Because theoretical concepts develop in light of specific epistemological assumptions which support the theory, strategies and concepts from those theories need to be consistent with the underlying epistemological assumptions. Methods cannot be separated from the theories that spawned them. The method derives meaning from the epistemology in explicit implementation and holistically.

Ideally, educational practices should engage students, draw upon sociocultural and genetic circumstances, be consistent in their aims, and have a theoretical foundation of learning to maintain consistency (Duffy & Jonesson, 1992). My study provides a rationale, methodology, and curriculum on which to better understand and instruct the adolescent learner. Using the theories of Lev Vygotsky and Kieran Egan, intellectual development is viewed in terms of intellectual tools (Luria, 1976). Egan specifies three specific areas pertinent to educators that are generated from a linguistically based set of intellectual tools. Unlike Piaget, Egan contends that in development each type of
understanding does not fade away in a linear kind of advancement. Rather, each sphere of development coalesces with its predecessor, creating a continuity that reduces the complete loss of various developmental strengths (Egan, 1997).

Cognitive tools theory proposes educational practices that facilitate the attainment of educational basics based upon the mediating tools used by children to understand their environment. Individual development parallels evolutionary development linguistically. Just as cultural development historically has accumulated cognitive tools, not discarded them, later modes of linguistic understanding incorporate their earlier kinds. Children are more likely to have the fullest use of their cognitive tools when they are nurtured in the early years. Instruction, then should appeal to students on a level on which each has the greatest interest and in a mode in which each is linguistically suited (Egan, 1997).

Purpose of the study

This project will feature the elements of a middle school history and social studies curriculum based on constructivism and cognitive tools theory. The main educational goal is to create a curriculum that motivates and inspires. It will identify and draw upon the intellectual tools students deploy at various stages of development that sustain specific kinds of understanding.

The study will address the following research questions:

1. In what way is Piaget’s theory inadequate as a model for contemporary instructional design based on linguistically-oriented cognitive tools?
2. What are the various intellectual tools that students employ to support distinctive types of understanding?
3. Why must curriculum design be grounded in a theory of learning and why is 
constructivism an adequate model for today's students?

4. How can the acquisition of knowledge be facilitated during an individual's education 
as determined by the type of understanding most vigorously being stimulated and 
developed?

5. What elements would a middle school history curriculum contain based on 
constructivist design coupled with an intellectual tools theory.

**Rationale**

Much of contemporary instructional design is based on the work of Piaget who 
founded the school of thought referred to as genetic epistemology. The following 
questions are addressed by this school: what is knowledge? where does it come from? 
what are the conditions that make it possible? Piaget held that structures of the mind are 
constructed in the process of development through improving systems by which one acts 
upon and modifies the environment and one’s own mind. As one progresses through the 
stages one becomes increasingly more consistent and coherent. The developmental stages 
are fundamental sheddings of preceding stages. One who possesses mechanisms and 
structures postulated by Piaget could develop logic and thought. However, if one 
develops a profile of an individual’s capacity for metaphor, one finds that it does not 
follow the pattern of progressive intellectual development (Pinker, 1994). Ellen Winner 
(1997) performed a comparative test in 1988 and discovered that in recognizing 
appropriate metaphors, the greatest number was attained by pre-school children, 
exceeding even college students. This is in opposition to Piaget’s theory and has 
implications for the support of metaphoric fluency in a child’s early education, an activity
not associated with the concrete activities so often prescribed by Piaget for young children. Further abilities such as imaginative thinking and binary structuring are also neglected in the current curriculum which focuses on the activities children manage the least well such as logico-mathematical and computational skills (Egan, 1997).

Vygotsky (1962) contended individuals understand their surroundings by using intellectual tools that, in turn, impact the type of interpretation they make. Intellectual development, therefore, cannot be entirely understood in terms of psychological stages like Piaget’s.

Constructivist theory and its subsequent influence on curriculum design has its roots in Piaget’s theory of learning. Discovery learning has value; students are encouraged to explore by way of manipulatives and museums; group interaction is recommended through the use of projects and discussion. Curriculum and instruction adjust to reflect the findings of research based upon students’ development, learning, and motivation. When subscribing to a learning theory, such as constructivism, one must maintain consistency with the epistemological assumptions that underlie the theory.

Just as instructional designers draw on their past learning experiences to choose or develop a method for presenting materials, educators should reflect on prior knowledge to develop lessons. Ideally, these models do not reflect only behavioral activity. An integration of what it means to learn, as well as to understand and instruct, is required. Theories are supported by a philosophical set of assumptions that create a domain or a frame of reference from which its concepts are defined. These concepts only have meaning within this frame of reference and may conflict with the same concepts as defined within another frame of reference. Concepts, therefore, have meaning only within
the frame of reference that defines them and these frames and references are set and limited by the basic assumptions which it holds to be true (McAvoy & Paparozzi, 1996).

Creation and arrangement of instructional design components need to be generated out of a theoretical frame of reference. The theory of constructivism coupled with that of cognitive tool use provides a foundation on which instructional design can develop. In addition, an analysis of how mediating intellectual tools produce successive types of comprehension provides an adequate base for arranging and evaluating learning.

Egan and Vygotsky propose that particular types of understanding occur as a result of an individual’s learning to employ intellectual tools in societies that sustain and support the growth of these tools (Egan, 1997). Piaget’s theory, however, implies that the curriculum must conform to the developmental process he describes if it is to be meaningful to students. There is nothing in his theory addressing the possibility of sociocultural contingencies in combination with psychological and logical constraints shaping the development of types of understanding.

The notion that individuals organize their world by means of intellectual tools as opposed to being genetically determined is neither new nor novel. Constructivist beliefs dating back to the late nineteenth century support this claim (Perkins, 1992). Contemporary theory, however, does chart new territory by differentiating the kinds of understanding, how they correlate linguistically to evolutionary development, and when the various stages of understanding occur in an individual’s life. For one to design a curriculum that coordinates with the various periods, one must explore the tools used and the manner in which they assist understanding. Through this process educators can foster
students’ capacities and focus pedagogical attention on areas where these students are predisposed to swift and effective learning (Fodor, 1983; Pinker, 1994).

Paralleling knowledge to an individual’s linguistic strengths increases the likelihood of rapid and powerful growth. Egan (1997) proposes many educational theories draw from the inventions and discoveries that have collected though time. Some theories of recapitulation go as far as to suggest an exact causal connection between past cultural advancement and current educational development. Egan examines recapitulation in terms of mediating intellectual tools and the types of understanding they foster. The present day child, by attaining specific intellectual tools, produces comparable kinds of comprehension as existed for people using those tools long ago. Egan delineates the varying degrees of linguistic sophistication and how these stages effect the manner in which one interprets one’s world. Specific kinds of knowledge, therefore, are more valuable during certain periods of an individual’s education based on the kind of understanding currently being stimulated and developed.

The early period of adolescence reveals itself to be a time of Romantic understanding in Egan’s philosophy (Egan, 1997). Characterized as being captivated by extremes in experience and confines of reality, supreme human qualities and personalization of knowledge, adolescents are best stimulated and nurtured by a curriculum that reflects Romantic understanding. Ultimate achievements, devastating defeats, and exotic experiences are the stimuli for the middle school child. Lessons are initially presented as intensive views into the fantastic. Students can then explore their particular fascinations in a method unique to the age group: hobbies, collecting and group methods of inquiry.
Content exposing the personal battles of historical figures draws students into the arena of history. Their transcendent human characteristics illuminate qualities such as courage, genius, perseverance and hope. Subjects inspiring awe and wonder provide fodder for additional investigation. Detailed coverage is discarded for a plan that develops knowledge bit by bit, with presentations focusing on the unusual, delightful, and alluring. Emotionally accessible topics highlight conceptions of causality, as adolescents view human behavior and emotions to be the basis of causality.

Instructional design can draw upon how students use cognitive tools. The theory of the use of linguistic cognitive tools and how these tools shape an individual’s understanding lends itself to instructional design. The selection of curriculum content requires reflection on the cultural forms common to oral language users and a focus on the direction educators want their students to take. Romantic understanding typifies the early adolescent years (Egan, 1997).

Extremes of experience, limits of reality, association with transcendent human qualities, and the personalizing of knowledge are elements of Romantic understanding. When one witnesses the world through the mediation of these tools, what curriculum comes to the forefront? Initially a transition year from the past Mythic stage, the stage exhibiting pre-adolescent linguistic skills, should usher in the Romantic adolescent. Egan refers to the most likely choice for the early teen as curriculum rich in mega ergon or the great achievements. Exotic humans, wondrous experiences, and terrible disasters can all provide content and potential for further exploration. The desire to collect and a fascination with hobbies open the child up to comprehensive learning experiences.
draw and interest in other humans lures students into asking additional questions concerning the nature of humanity, the natural world, and the man made environment.

A curriculum that draws upon the interests and strengths of adolescents offers students a world rich with complex, varied, and intense experiences that coordinate with their own emotional lives. Just as students exemplify elements of Romantic understanding, they must be romanced into developing understanding.

Methodology

This study intends to define the components of a middle school history curriculum based on a theory of learning consistent with the use of cognitive tools and the tenets of constructivism. The resulting instructional design assists educators in two ways: in selection of curriculum content that reflects on the cultural framework shared by language users, and the direction in which one wants the curriculum to lead students.

The first phase of this study is a review of literature. It begins with a comparative analysis of learning theories encompassing developmental and constructivist beliefs and their influence on appropriate instructional design. This research covers the necessary pairing of instructional planning and learning theory, providing a proposal for possible effective curriculum design. An examination of linguistic tools and their relationship to cultural development and distinctive kinds of comprehension provides a rationale for the resulting curriculum. Finally, specifics of the various learning stages, preferences, and skills conclude the literature review.

The second phase of this study uses the resulting information from the review to develop a middle school history/social studies curriculum founded on the ideology that students employ intellectual tools at different stages of maturation that support specific
kinds of understanding. The resulting instructional design for students, grade six through
eight, will contain the fundamental elements of constructivism, how these elements
manifest themselves in a curriculum, and appropriate activities, projects, and methods for
evaluation. The conclusion discusses the implications of constructivism in the curriculum
coupled with instruction to match cognitive and linguistic strengths, and the impact these
methods might have on curriculum design.

Limitations to the Study

The limitations of the study are:

1. Proposed instructional design is limited to the subjects of history/social studies
   and specified grade levels of sixth, seventh, and eighth.

2. Although constructivism has been accepted as a viable learning theory, the
   ideology and methods of Kieran Egan have not undergone intensive scrutiny by
   scholars. Reviews of Egan’s work are limited to literature reviews of his book,
   *The Educated Mind*.

Definition of Terms

1. Binary structuring- Dualisms or oppositions.

2. Cognitive tools- Tools such as language, that one accumulates as one develops in
   society and that mediate the type of understanding one can construct or form.

3. Mythic understanding- A type of understanding during which weakening genetic
   influences join with the increasing deployment of one’s undifferentiated learning
   capacity; learning thus ceases to be effortless and starts to require deliberate work (Egan,
   1997).
4. Philosophic understanding- A type of understanding that requires systematic theoretic thinking and an insistent belief that Truth can only be expressed in its terms (Egan, 1997).

5. Romantic understanding- A type of understanding that represents crucial elements of rationality developing along with persisting features of myth (Egan, 1997).

Overview of Study

The purpose of Chapter One has been to provide the background for this study. The introduction, purpose of the study, rationale, methodology, limitations, key terms and an overview of the entire paper were provided. Chapter Two will review literature on Piaget and instructional design, cognitive tools used for understanding, constructivist theory and curriculum design, and the types of knowledge most appropriate at the various levels of linguistic cognitive development. Chapter Three explores the impact Kieran Egan’s theory coupled with constructivism has upon curriculum development. Chapter Four clarifies the major elements of constructivism and explains how constructivism might be manifested in the middle school history curriculum. Lastly, chapter five closes with a summary of the study, implications for educators, and recommendations for further research.
Chapter 2

Review of Literature

Constructivist Theory Verses Objectivism and Constructivist Curriculum Design

Assumptions made about learning processes and the learner are necessary for instructional design. Although instructional design in the United States emerged from a tradition of objectivism or positivism, constructivism has provided an alternative epistemological perspective. The constructivist and the objectivist model reflect an underlying conceptualization of how learning occurs and the ramifications for instruction. The definition of knowledge, learning and instructional strategies all differ for the constructivist and the objectivist (see Appendix 1).

What stance do these epistemological perspectives take when considering the domain of knowledge? The constructivist and the objectivist both agree that reality exists, and then they radically part company.

In the realm of knowledge, constructivism separates itself from positivism and its mentor empiricism. It does not deny the outside world; it merely holds that the only world one can know is the world of his/her experience. Individuals do not have access to the external world.

The origins of constructivism are in the Piagetian and Kantian theories of the mind. According to Piaget, it is through interaction with one’s environment that an individual constructs knowledge (Piaget, 1969/1970). The phenomenon of learning requires internalization of perceived information, the assigning of order and meaning to our thoughts and thus a reconstruction of an understanding of the subject.
Piaget is most frequently presented in child development and educational psychology texts as the theorist who identified various stages of cognitive development. In addition, however, “Piaget’s theory of learning and his explanations of three kinds of knowledge are at the core of his educational contributions. The application of his theory to education lies not in the stages he found but in constructivism, his theory about how human beings acquire knowledge” (Kamii, 1991, pp. 17-18). Constructivist theory and its subsequent influence on curriculum design has its roots in Piaget’s theory of learning.

According to Piaget’s theoretical framework, knowledge is not internalized from the outside in by the learner as a passive recipient, but rather by interaction with the environment, constructing knowledge from the inside out (Piaget, 1969/1970). The phenomena of learning demands internalization of the information learners perceive, assigning order and meaning to thoughts thus reconstructing understanding of a subject.

The three types of knowledge Piaget includes in his theory of constructivism are physical knowledge, social knowledge, and logico-mathematical knowledge. Physical knowledge of objects in the external world (shapes, color, texture, weight) can be empirically observed. Social knowledge consists of the conventions (ethics, policies, and morals) made by society through a consensus of acceptable social interaction. Ethics, policies and morals are considered social knowledge because without social interaction they would not be known. Logico-mathematical knowledge involves relationships created by the learner. Since abstractions cannot be observed outside of the mind, they are an internal construction by the individual (Kamii, 1991).

Piaget’s theory of constructivism is realized through his principles of cognitive development, which he refers to as functional invariants because they operate at all levels.
of cognitive growth. The functional invariants include *schema*, an organization of all one knows about his/her environment; *adaptation* to additional information by *assimilation* (the fitting of new information into one’s existing knowledge) and by *accommodation* (coping with the additional knowledge through change); and *equilibration*, striving for a state of equal balance between the individual, the outside environment and the new information (Papalia & Olds, 1992).

Piaget’s stages or levels are reformulations of reconstructions of the former way of acting on the environment and validating knowledge. Each level is more consistent and coherent than the preceding way. Piaget’s theory is one of competence. If an individual possess the structures and mechanisms postulated, then that individual could advance in logic and thought. This linear type of development has drawn criticism.

Vygotsky, for instance, argued that individuals interpret their environment by using intellectual tools that then profoundly impact the type of interpretation they make. Intellectual development, therefore, cannot entirely be understood in terms of psychological stages like Piaget’s. In order to understand intellectual development, according to Vygotsky, one must have an understanding of the part played by the intellectual tools present in the environment in which the individual grows (Vygotsky, 1962).

Constructivists are committed to the belief that knowledge is personally and socially constructed. Kant argues that imagination draws one beyond what is accessible to the senses. Something is signified by the concepts developed and although one can grasp toward them, one cannot grasp them.
Constructivism is a post-positive philosophy of science. It is a belief only in that one has constructed a model and it has been found to be the most adequate one thus far developed. Einstein stated in “Physics and Reality” that object concepts are free creations of the human mind. This statement supports the constructivist tenet that science to a large extent consists of relational concepts that are a result of abstractions that have their origins in sensory motor experience and our own mental operations (Duffy & Jonesson, 1992). Old theories are not proven to be wrong, they merely turn out to be inadequate in an expanded domain of experience or in the pursuit of new goals. Scientific predictions that are valid are said by the constructivist to have derived from knowledge that proved viable under the particular circumstances of the case. There is no way to check if a model or theory corresponds to an ontological reality (Spiro, 1988).

Truth for the constructivist is considered a viable construct. Validity is a form of consensual domain. The experiential world belongs to humans, but through social interaction these worlds become adapted to one another to form consensual domains: these are areas where the interactors’ mutual expectations are more or less regularly realized. Constructivism is similar to pragmatism in that it is searching for what matters; in this sense there is accountability. However, there is no truth for the constructivist, only viability. (McAvoy & Paparozzi, 1996).

Positivism maintains several contradictory tenets. The positivist maintains that there is a possibility of knowledge freed from theoretical assumptions. The mind ideally can be the mirror of nature. Objects of perception are sense impressions generated from the material objects themselves.
The roots of objectivism are in empiricism. Statements can be taken as truthful when they can be empirically verified. When one comes to “know,” it is a discovery of a pre-existing world independent of the knower and the knower’s mind. Knowledge, therefore, is passively received. For the objectivist there is an absolute reality, and scientific knowledge provides a picture of the world that corresponds to that absolute reality. The goal of learners is to have their impressions reflect the essence of the object.

Unlike the constructivist, truth exists for the positivist. It consists of describing absolute reality. Coming to know is a discovery of a world independent of the individual’s mind or beliefs.

Learning is a necessary measure when evaluating the appropriateness of instructional design. The learning paradigm proposed by objectivism has guided American education for decades (Urban, 1996). Recently, because of an increasing emphasis on problem solving, constructivist beliefs have influenced the implementation and adoption of instructional design. The two views contrast when considering the topic of how learning occurs.

Learning is student centered for the constructivist, an activity that the individual must perform. As an active processor of information, the learner creates meaning and once given information, the learner must interpret and often elaborate on it. For this reason, the constructivist teacher must accept that students are not coming to them as blank slates. The student has already discovered viable ways of dealing with the environment, and to have maximum impact, new information is best related to the current body the individual accepts (Duffy & Jonesson, 1992).
Problem solving is considered learning for the constructivist. Unique and unexpected processes to solutions are considered viable. Assessment is done by observing and judging how students conceptualize and attack problems. The approach is more important than a particular solution. Methods that work are kept by the individual as long as they produce desired results.

Individuals acquire knowledge by constructing it internally in interaction with their environment. It is often built up by combining and recombining available concepts or by experimenting with new conceptual relationships. When knowledge is attained, it is always the result of a constructive activity.

Learning is not centered on the student for the positivist; it is centered on the knowledge being transmitted. As opposed to constructivist who believes learning occurs internally, the positivist believes learning occurs by internalizing information from the outside. Learning for the positivist is accomplished by transmitting knowledge to a passive learner. Behaviorally structured learning environments typify the objectivist’s stance. Learning is marked by a change in behavior and assessment focuses on observable verifiable facts.

It is in the realm of teaching that one notices the significant difference in the two perspectives: the constructivist focuses on the individual’s relationship with the information while the positivist concentrates on the information being transferred.

Taking into consideration the importance of an interplay between learner and information, the constructivist maintains that teachers who want to modify student’s concepts must try to devise a model in the particular student’s own thinking. Construction of meaning and understanding are negotiated.
Constructivist instructors provide content for learning that supports students’ autonomy and relates to prior constructed knowledge. Teachers must reframe from encouraging a “right” path. The goal is to develop a student’s ability to think and problem solve. Students are encouraged to test their own methods however unconventional. Assessment is based on the ability to use the content domain in authentic tasks.

Learning takes place in a social setting for constructivist. Students must verbalize how they see a problem because reflection requires an awareness of what one is thinking and doing. Support of one’s answers provides the instructor with additional information on how the individual learns. Errors are seen as a means to further exploration and understanding. Thinking takes precedence over correct answers (Novak & Gowin, 1984).

Since constructivists cannot maintain that what they are teaching is true, they justify the information by introducing students to the consensual domain which governs the particular discipline at the time. Information is tentative; therefore, the process of construction takes precedence over current facts.

Constructivism is pragmatic in that the emphasis is on what works. Inadequate answers are explained in light of their inadequacy by the instructor. A teacher’s role in educating by way of constructivism consists of creating, synthesizing, and interpreting information. Information is presented in a way of coordinating and ordering experience that is both consistent and useful at a particular time (Novak & Gowin, 1984).

Conversely, teaching in the objectivist model concerns itself with the transmission of knowledge. New information is presented to students with the assumption that it will be added to what they previously internalized. Teaching is done in terms of sensory input provided by the instructor. Though a social setting might be utilized to facilitate the
acquisition of information, the pathways to learning are secondary to arriving at the correct answer. Errors are the failure to successfully internalize the information presented. They are viewed as the inability to produce “right” answers in a qualitative assessment of performance.

The positivist teacher’s role consists of providing information to pour into passively learning individuals. Successful schooling often depends upon the amount of information retained by the learner as opposed to problem-solving processes.

In conclusion, while constructivism maintains that there is a real world that one can experience, meaning is imposed on the world by the individual. There are multiple ways to construct one’s environment as well as equally varied perspectives for any concept or event. There is not one correct meaning for which to strive. Objectivism maintains the world is correctly and completely structured in terms of relations, entities, and properties. Experience should not play an important role in structuring one’s world.

The implications for instruction in the constructivist paradigm effect all aspects of instructional design. Objectives for the learner, the desired outcome goals, and methods for evaluation all take on a different focus when understanding is constructed.

Constructivism calls into question the traditional positivistic model for learning by claiming that more meaning is created for the learner when the material is relevant to what the learner already knows. Because there must be this necessary connection, content cannot be prespecified. The instructor presents a domain of knowledge for the specific discipline, and the student should call upon additional knowledge domains that might be relevant. Constructivists see these connections as a more realistic way of viewing relationships in the world. Whereas, the positivists have separated their disciplines in the
past, the constructivists believe alternative environments and data sources, as well as a non-segregated approach to knowledge, will produce learning which transfers from the classroom to the world.

Facts in isolation are unacceptable to the constructivists. Instead of building on a body of facts in divided disciplines, learners should perform what actual people do in the various disciplines. The goal of this philosophy is to foster a student into the knowledge domain. Once there, they work with the information to perform the functions of that discipline. One does not learn about history necessarily, as much as one learns to think like a historian. The implications for instructional design then become questions like what tasks are associated with being a historian or an archeologist? An instructor should organize tasks from elementary to sophisticated, adapting them as the learner becomes more proficient with the particular knowledge domain. This view gives the student freedom to identify, construct, and interpret situations in their own unique manner. The constructivist claims that neither authentic activity nor meaningful construction can occur if all information is prespecified for the learner.

For learners, the following is true in constructivist philosophy. Unlike traditional instructional design, constructivism does not attempt to identify the deficiencies of the student. Constructivists also do not have as a goal the memorization of facts. It is the ability to use information in alternative situations that illustrates competency. Emphasis is on the process of the construction of knowledge and the reflexive awareness of that process. Developing alternative systems, using imagination and metaphorical generalization, and manipulating one’s own constructive processes are all aims of the constructivist design model.
Constructivists believe the following about learning objectives. Constructivists do not have learning and performance objectives as considered in the traditional sense. Rather, the content domain is composed of authentic learning tasks that allow for the emergence of specific objectives when they are appropriate to the individual’s real world task.

While the sequence of instruction in a traditional model is based on dependencies in the specific domain of knowledge and a hierarchical arrangement of instruction, the constructivist model adopts a view that is completely contrary. At the core for the constructivist is the development of an environment for the learner that contributes to the construction of understanding from many perspectives. Predetermined sequencing cannot be utilized (Lakof, 1987).

Again, it is important to take into consideration the ability to generalize to the real world. Information that is separated from this context is not consistent with constructivist philosophy. Techniques that can be utilized are the following: thinking in real world scenarios, teaching through apprenticeship, and the development of multiple perspectives.

Situational cognition, thinking in real world scenarios, relates the task to a larger context rather than an isolated event. Projects can be developed or environments can be created that allow the adolescent to view the problem as relevant in a larger context. In addition, the reason for solving the problem must be authentic to the situation in which learning is applied. The environment is a central consideration when using situational cognition. In order for the transformation of school learning to be affective, the complexity of the real world environment must be maintained (Salomon & Perkins,
This will assist the adolescent in comprehending the concepts within the particular complex environment. In the traditional model, the problem is often divorced from the real world environment in which it will eventually be embedded later in the learner’s life. However, the complexity of the learning environment should be in sync with the sophistication of the adolescent. The situation should become increasingly complex as the learner becomes more familiar with the material of the domain. Situational cognition requires that learning of the content be united with the use of that content. An example of this might be to give students a battle situation. In the scenario, they must discuss how different resources should be allocated and used; as the dialogue becomes more sophisticated, learners are introduced to more complex and increasing unfamiliar considerations. Reading materials can also become part of the constructivist design by having the reading embedded in the task so that an authentic context is provided for the adolescent in which to develop his/her skills.

Cognitive apprenticeship is a modeling process: first, the teacher performs the process to be learned and then the students, with coaching from the teacher, work toward becoming competent at the process. Like other aspects of constructivism, the teacher’s role must not be scripted, but rather flexible so as to adjust to the learning dynamic of the student. An example of this modeling strategy in the discipline of social studies might be for a student to bring in a current event dilemma. The teacher would take the problem and work through the necessary process out loud to solve the situation. A discussion would follow to examine method, information, strategies, and the conceptual process the teacher used. Students initially have the opportunity to vicariously experience how errors naturally occur when one is using alternative methods to solve a problem.
The use of multiple perspectives is one of the tenets of constructivist design. Students must be able to understand other viewpoints and be capable of defending the different vantage points. At the highest level students evaluate the various perspectives and adopt one based on their assessment of positive and negative qualities. The multiple perspective focus of constructivism is somewhat in tune with the current trend toward collaborative learning. It is through working with others that students are able to experience alternate views. The goal is to develop, compare and contrast, and appreciate multiple perspectives concerning a particular subject. The exercise is not a mere sharing experience, nor is it a debate where one view will eventually dominate. Students must be able to develop, evaluate, and support their arguments (Duffy & Jonesson, 1992).

Evaluation takes on a different light in the constructivist design. While traditional models in education focus on goals and objectives, the constructivists focus on the ability to solve authentic tasks using the content domain. Assessment for constructivists is not an indication of a system’s effectiveness, it is an evaluation of an adolescent's thinking process. Expert understanding is tied intimately to the understanding of the content domain. Evaluation blends content and process. A student might be given an activity that requires use of the content domain and justification of their decisions in solving the problem. Another possible evaluation might ask the student to defend their perspective concerning an issue within a certain domain (Salomon & Perkins, 1989). Constructivist evaluation is pragmatic in nature in the sense that a student must develop an affective strategy for dealing with issues. Has the constructed knowledge enabled the adolescent to effectively function and problem solve in the particular discipline? Can the student use reasoning to arrive at a viable solution?
Because learners must defend their views, constructivist evaluation techniques foster reasoning in a philosophical sense. Reflexive thinking implies an awareness of the development of one’s thinking as well as the ability to translate that thinking process to others. Both processes require an understanding of the content domain and one’s ability to utilize it (Duffy & Jonesson, 1992).
Linguistic Tools and Kinds of Comprehension

Understanding, according to Kieran Egan, occurs from the development of specific intellectual tools that one receives from the society in which one grows (Egan, 1997). His focus is chiefly on those tools associated with language. The exploration of what is referred to as Mythic understanding concerns itself with oral-language users; Romantic understanding reviews the implications for growing literacy; Philosophic understanding implies the individual’s interacting with the community and its theoretical abstractions (see Appendix 3). Mediational means are described as tools in the process of shaping the kind of sense one makes of society. Vygotsky understood intellectual development in terms of tools, like language, that one accumulates as one develops in society. These tools mediate the type of understanding one can construct or form (Vygotsky, 1962). Egan wishes to show by focusing on these tools as opposed to psychological processes or forms of knowledge one can construct a new idea of education.

Egan specifically aims at minimizing the loses experienced in education as one grows in our present system. Typically, each gain results in leaving behind the skill of another era in a human’s development. For example, when one becomes literate one commonly loses some of the understanding that is associated with being a oral language user (Egan, 1997). Educators must be aware of the potential losses if they intend to minimize them.

On a general level, all theories of education have some elements of recapitulation. It is through the study of language that Egan draws upon recapitulation as one way of understanding the kinds of linguistic tools children use when making sense of their world.
The theory of recapitulation attempts to parallel the history of man’s linguistic development with the linguistic development of individuals. Oral language users parallel primitive cultures of years ago as well as contemporary oral language cultures. Those children achieving early literacy are analogous to societies that having newly attained literacy were fascinated by the fantastic writings of Herodotus. Older students of today show similarities to those who attempted to make sense of their world through examination and discourse during the enlightenment.

Since Vygotsky argues that individuals make sense of their world through the use of mediating intellectual tools and these tools profoundly influence the type of sense one makes, understanding intellectual development cannot be adequately understood in terms of the knowledge one accumulates or psychological stages. Comprehending intellectual development requires an understanding of the part played by the cognitive tools available within the society in which one develops (Vygotsky, 1962).

Cognitive tools like oral language are internalized by children as they develop. This internalization of culturally determined and historically organized means of interacting with stimuli results in the social nature of people and comes to be part of their psychological nature also (Luria, 1979). In a larger context, the sign system one internalizes from interaction with particular communities or cultural groups impacts the type of understanding of the world one is capable of constructing. Egan maintains that oral language used as a mediating tool is a kind of recapitulation theory. He suggests that educators should consider educational as well as cultural development as connected to the tools that produce common types of comprehension in both arenas. It is Egan’s exploration of the degrees of culturally accumulated complexity in the area of language
beginning with simple oral language, progressing to literacy, and culminating in the
development of abstract and theoretic linguistic forms that forms the basis for a new
curriculum.

Mythic understanding typifies the period when genetic influences are diminishing
and there is an increase in learning capacity. During this period, learning is identified as
requiring deliberate work. The distinctive characteristics of mythic understanding are
binary structuring, fantasy, abstract thinking, metaphor, rhythm and narrative, images, and
stories and their meaning. By drawing on the kinds of tools young children are adept at
using, education will have its greatest impact. The Mythic period occurs typically
between the ages of two and six. It is the result of language development.

Binary structuring is common to all human groups. These opposites are set up for
conceptual purposes to orient individuals to complex phenomena. The evidence that
young children grasp this concept exists in their comprehension of stories like Peter
Rabbit. The notion of security and fear exists in the story. While the child does not
explicitly understand the notion of opposites, they understand the concepts. Educators can
use this understanding to introduce in story form other binary opposites like freedom and
oppression. Children will understand the concept and there is no need to introduce them,
at this time, to the structure. The goal is to use a child’s inherent understanding of binary
opposites to help them comprehend material, not to teach binary opposites.

Young children delight in fantasy. It is yet another way in which they gain
linguistic and conceptual control of the variety of stimuli they experience. It is the further
inclusion of binary opposites in an ever increasing realm of information. Talking
animals, mermaids, and ghosts delineate the imaginary from the real. Using fantasy as
opposed to the current expanding horizons methods draws upon the interests and tendencies of young children (Hayek,1970).

Recent research concludes that abstract thinking, contrary to Piagetian notions, does not grow from an acknowledgment of concrete objects, but rather abstractions make concrete objects recognizable. Concrete particulars arise out of abstractions. The known for young children lies in binary abstractions and the unknown is anything that can be tied to them. Therefore, in teaching or telling children something, it makes sense to start with the binary abstractions.

Constructivists have used the role of metaphor as one which when used as a key tool aids in flexible and productive learning. Developing earlier and easier than logic, metaphor is sometimes stronger in young children than in adults (Pinker, 1994). In the sense of metaphor children’s abilities peak at age four and are typically superior to those of adults. Metaphor is one of the cognitive tools which aids one in seeing the world through multiple perspectives and interacting with the world in a pliable way.

The strength of a child’s ties to rhythm are evidenced through such programming as *Sesame Street*. The goal of education should be to match these rhythms to everyday life, resulting in the larger form of narrative. Narratives are the emotional rhythms that powerfully engage all types of knowledge. In the context of history through narrative, students better understand their place in the human history. An understanding of the self and the environment develops from the sets of relationships that spring out of rhythm and narrative. The current trend of exploring only the immediate environment can lead one to later only focus locally resulting in provincialism, ignorance and inflexibility.
The use of imagery in a child’s early education incorporates the world into the child’s experience as opposed to simply learning facts about the world. Pretending to imagine oneself as an earthworm slithering through the soil leads students to feel connected to their environment and possibly inspires future inquiry into other realms.

Finally, the use of stories and their meanings accomplishes two tasks. It assists in memorization and orients the listener’s emotions to the contents of the story (Malinowski, 1954). Cautionary tales shape the behavior of youth, self-improvement and social tolerance are taught through video, family stories reinforce identity. Educators of young children, through the use of storytelling, can bring curricular material to life by embedding it in the adventures, drama, and profiles of those in whose lives those disciplines played a major role. Subject matter becomes re-embedded in its proper human context for affective as well as cognitive meaning.

Mythic understanding ushers young minds eventually into the Romantic realm. Between the ages of five and ten, children’s abstract concepts, like temperature, become more sophisticated in their definition. Romantic understanding exhibits crucial elements of rationality maturing along with persisting characteristics of myth. Just as this occurred culturally with the Greeks, it also is present in education today. The Romantic mind is characterized as being fascinated with the extremes of experience, the limits of reality, and the context of peoples’ lives. The notions of transcendence of humans within reality, the humanizing of knowledge, and romantic rationality engage the minds of children until the age of approximately fifteen (Egan, 1997).

By discovering the extremes of experience, teenagers are not only awed but also are assured by recognizing the real limits. A context is formed that establishes security
and reassures adolescents of their own scale and proportionate meaning. Students continue in the mythic sense from the known to the unknown but add reality to the schema. Interests in collecting and hobbies are also an attempt to define the limits of reality. The threat of an unknown and vast reality is brought under control by learning something exhaustively. While to some using the bizarre as a means to educate adolescents seems purely entertaining, learning about the extremes and the limits sets the everyday world in context and determines its meaning. It also provides motivation for an audience that is typified by ennui.

The transcendence of the hero figure is another focus during the adolescent years. The hero transcends a threatening reality and secures his/her own identity in the struggle. Sports figures, recording artists, and thespians, adolescents identify with these and other heroes. Their use to facilitate learning is a courtesy to them as opposed to mere manipulation (Egan, 1997). Through identification with heroes, young adults learn of the struggles of others and find inspiration to fight their own battles.

The trend is to continue to humanize knowledge during the Romantic period, and it finds a willing audience in adolescence. Through the realization that the emotions that underlie human acts are shared by all, the student can construct historical events through the actual participator’s thoughts, hopes, intentions, and fears. Human interest engages the student, and the actual lesson becomes more palatable as a result. Catering to the characteristics of Romantic understanding is an effective means of ensuring students attain the skills and knowledge they need to deal with their environment successfully.

The Romantic mind is distinguished from the Mythic by writing. When one has the ability to write, one can describe the world, observe it and return to match those
descriptions against the observations. Descriptions can then develop to resemble more closely the students’ sense of reality (Gombrich, 1960). The initial wonder, characteristic of Romantic understanding, provides interest for the later theoretic inquiry.

Romantic understanding eventually leads one into a period of deeper inquiry known as Philosophic understanding. This phase is characterized by systematic theoretical thinking, and a belief that the truth can be expressed only in its terms. Students at this stage analyze their actions and activities in light of rational considerations of their interests. Community plays an important role in Philosophic understanding as text can provide only so much stimulation. Those using Philosophic understanding typically crave generality, recognize themselves as social agents, are drawn to certainty, and desire general schemes (Egan, 1997).

Unlike Romantic understanding with its focus on the bizarre, the Philosophic mind is interested in constructing theories, ideologies, laws and making connections to join facts together. Construction of conceptual and linguistic tools is required for the mind to secure a hold on what the imagination has grasped. Unlike the Romantic, this person believes that individuals are the result of human psychology, social interactions, the laws of nature, history and a variety of other elements. Childish notions are placed aside as the individual becomes more aware of their part in the natural, social, and historical order.

Corresponding to the cultural period of the enlightenment, the philosophic mind develops sometime in between the ages of fifteen and early twenties. Individuals wish to believe that the truth is attainable. The truth of a general scheme is verified by the accuracy of the events and facts themselves. In failing to acknowledge that general
schemes reduce the diversity present in the world, one frequently overestimates the invulnerability of one’s general theory (Egan, 1997). It is only through interaction with new knowledge that the general theories of students will continue to evolve and avoid becoming a trap of arrogance and inappropriate certainty. General schemes are a central feature of Philosophic understanding. Once they are generated and refined, students begin to recognize and deal with their inherited conventions.

Educational development in the individual, according to Egan, begins with a myth-like creation of the world, romanticism then establishes the extent and bounds of reality, finally the philosophic mind charts the major features of the environment with organizing grids. Through the process of perceiving oneself as part of the intricate process, the philosophic mind ascertains the truth about the self (Egan, 1997).

While Egan’s theory coordinates well and draws upon constructivism, he takes issue with several aspects of Piagetian based instructional design. He traces the exclusion of the subject of history in the early years of education to Piagetian research (Egan, 1997). Piaget’s explanation of the young child as “preoperational” or “concrete operational” implies that historical information in which the child cannot actively engage cannot be beneficial. Piaget is noted as the cause of the “expanding horizons” curriculum in which students first study their immediate environment and expand outward until they finally are exposed to the world as a whole. This theory assumes young children are incapable of understanding “formal” concepts in history such as causality. While these children might not grasp historical causality, they are able to understand the causal principle. Stories like Cinderella, Hansel and Gretel, or Peter Rabbit exemplify instances of causality understood by children in the “preoperational” stage. The development and stimulation of
these early abilities is a prerequisite to a more developed notion of causality called for by the curriculum of the later years.

Egan disagrees with another of Piaget’s concepts: abstractions. It is generally accepted in Piagetian circles that young children are limited in their abilities to think in the abstract. Language, however, involves the use of abstractions.

Language creates distance between the self and the object; language generalizes creating a unique perception into a common one; language transmutes reality into abstraction (Coe, 1984).

It could be argued that since language involves the mind in using abstractions, they do not grow as a result of encountering concrete objects, but rather through using them that the concrete objects become discernible. The use of binary opposites is an example of this. Children use binary opposites as way of organizing their world. Good and evil are understood even when the child has not actually encountered evil or experienced a similar phenomena. The fear Peter Rabbit experiences in the garden is unknown to children in the concrete sense. Evil derives its possibilities through its binary opposite of safety which is known to children. Recent research is accumulating evidence that even toddlers are capable of appreciating abstract qualities in their world (Gardner, 1993). Very young children will sometimes ignore strong concrete or perceptual cues choosing abstract properties instead.

The most persuasive argument against the Piagetian notion that young children are limited to the concrete realm focuses on the limited range that Piagetian research concentrates, namely logico-mathematical thinking. The development of competency dealing with numbers has been generalized to metaphorical competence as well as

Acceptance of the Piagetian notion of “concrete” has resulted in shunning of content that involves abstractions. Children have thus been engaged in “activities” and “active doing” resulting in a learning environment lacking in intellectual richness. The focus on activities, concrete thinking, and logico-mathematical thinking has had an ill effect on early education. The strength of imaginative, metaphoric thinking has gone untapped while weakness like computational and logico-mathematical skills are emphasized. Rather than drawing on a child’s deficiencies, education should focus on capacities and build upon what is evolutionarily predisposed to expeditious and effective learning (Egan, 1997).

For the adolescent, Piagetian theories are void of the affective nature of these children and have no mediating step between concrete and formal operation into which these students might be placed. Little educational theory exists that recognizes the adolescent’s interest in the exotic and extremes. As with the young child, drawing on the natural interests of adolescents increases the likelihood of academic interest at the least and scholastic success at best (Egan, 1997).

Classification is another aspect of Piaget’s theory with inherent problems. Initial classification by the young child is seen as pre-rational leading finally to a rational classification scheme. Egan contends that children’s methods of classification are no less orderly, complex, and sophisticated than the rational forms accepted as correct. Their manner of ordering is tied to the metaphoric connections they make. A variety of methods
for classification exists depending on the qualities of the objects being sorted, and the attention to those qualities differs depending upon the culture doing the ordering.

Piaget describes a fundamental process of psychological growth that is genetically programmed into individuals such that when interacting with the right environment it will automatically develop. Egan and Vygotsky contend that particular types of understanding develop through the use of particular intellectual tools in the societies that support the development of those tools. Logical and psychological constraints coupled with sociocultural contingencies shape the development of types of understanding, according to Egan, as opposed to a theory aimed at revealing only the nature of human development (Egan, 1997).
Chapter 3

Impact on Proposed Design

Adolescence is a time of developing one’s identity. Because of this, it is possibly the best time for a teacher to have a lasting influence over students. Constructivism provides an instructional design that not only satisfies the needs of society by creating reflective individuals, and also satisfies the developmental needs of adolescents (Schurr & Thomason, 1996).

Constructivism has adolescent appeal and is appropriate for the age group. Ideally, at the adolescent level instructors will provide a context for learning that supports autonomy and relatedness. There will be a stress on dialogue, conversation, and justification in a social setting of student and teacher opinions. Students will be asked to explore their errors as opposed to merely accepting them as wrong. Learners will be allowed to struggle with problems of their own choosing. The instructor’s role will be to activate students’ minds to construct their own knowledge (McAvoy & Paparozzi, 1996).

Constructivist teaching strategies compose a facet that contributes to teacher success at the adolescent level. These methods take into consideration the emotional needs specific to teenagers. Teachers should treat students as partners in learning and provide enough structure so that success will be aided by positive behavior. In the learning environment, teens desire autonomy, recognition, appreciation, and respect for their opinions. Teaching methods based on constructivism make this environment possible. Autonomy is exercised by giving students responsibility for their learning. Learning does not consist of memorizing facts presented by an instructor. Direct
participation in the content domain and active participation in problem solving are stressed. Students feel recognized and appreciated when their views help to compose the multiple perspectives that emerged from collaborative learning. Students know their opinions are desired because they are solicited. The learning experience is a social process of meaning making based on actual experiences. Since the peer group is paramount to teenagers, the sharing and evaluating of opinions and experiences is satisfying to students socially and to their teachers academically.

The instructor of adolescents is in a unique position. Adult authority is typically unwanted; therefore, the traditional teacher is often viewed as the enemy. Constructivism provides a solution to this dilemma. The role of instructor in the constructivist classroom is one of facilitator, resource person, and agitator. Teachers activate students’ minds to construct their own meaning as opposed to transmitting information to be learned. Teachers do not justify what they teach by claiming it is true. They state that information derives from certain conventional operations that are accepted as valid within the current domain of knowledge. It is difficult for a student to resist a teacher that does not claim to know all the answers and is open to possibly new student constructions of knowledge.

Another positive aspect of being a teacher in the constructivist paradigm is that students do not have to arrive at a correct answer to be right. Since thinking takes precedence over correct answers, students can receive positive recognition even if their answer does not match a final correct answer. Student interpretation and alternative construction of knowledge are valued in the constructivist classroom. Teachers in this environment are not in a paternalistic role and thus are less likely to be viewed as a threat.
Discipline, although not traditionally thought of as an area of education, can take on a constructivist design. Discipline at the adolescent level should ideally deal less with fear and more with reason. It is a construction of meaning for social interaction and cooperation. Just as in traditional academic areas, the subject of behaviors works within a content domain. Instead of punishment, students explore various perspectives and alternatives and select a response based on their evaluation of the strengths and shortcomings of those alternatives. Adolescence is the ideal time for students to begin supporting their reasons for choosing certain behaviors. Since behavior choices are often situational, the classroom is the lab in which students can experiment. The constructivist teacher sees this time as an opportunity to foster the reflection that should proceed behavioral action.

Problem solving using real world scenarios is another aspect of constructivist design that works well with adolescents. Teenagers have a desire to be considered part of the adult world. By allowing students to choose, explore and defend their views concerning actual issues, as opposed to imagined scenarios, students are more serious in their approach. In this sense education is not what happens between 8:00 and 3:00; learning is embedded in real world issues. A typical social studies unit might consist of first tapping students’ feelings on a concept such as justice, fairness, or right and wrong. Students can then select a current event issue where one of the concepts might be applied. In small groups, learners express their beliefs and justify their thoughts. All group members must participate and eventually be able to understand the reasoning behind the decisions of others. In the final stages of the activity, individuals would be asked to select a view they feel best reflects their beliefs and values. The class should then reconvene to
discuss in what way their small group work might have affected their initial beliefs. Do they see facets of the issue they did not consider before? Is there one right answer? This lesson can be continued in a more sophisticated arena by then introducing law. What part should government and law play in the scenario? How would different types of government deal with the dilemma? When are matters best left to the individual? By progressively adding to an initially simple lesson, students become more adept at dealing with the content domain of, in this case, social studies.

The model above encompasses other aspects of constructivist design in addition to situational cognition. Small group discussion and interactive lecture support the concept of learning taking place in a social setting. A student’s defense of their ideas requires reflexive thinking. Finally, cooperation and mutual purpose is accomplished when group members have to come to support their position based on their individual beliefs and values. This model provides an opportunity for adolescents to express their opinions. It also calls upon them to take their group (society) into account when making a final decision.

Curriculum design can be divided into roughly two time periods. Prior to the middle of the nineteenth century, the focus was on moral virtues and knowledge for a small elite group of males that would prepare them for future leadership roles. The second era comprised itself of knowledge geared toward preparing the masses for productive work, moral citizenship and gratifying leisure (Urban & Wagoner, 1996). Is the goal in education to socialize, secure a reliable vision of reality, or develop the individual’s potential? Currently, the goal has been to mesh the three goals resulting in a curricula with inconsistent and competing outcomes. The alternative proposed is a design that
develops the set of linguistically oriented cognitive tools: specifically Mythic, Romantic, and Philosophic understanding. (This paper will center on the aspects which most separate it from current practice.)

The pairing of instructional planning and cognitive tools learning theory affirms that the individual must be brought up within this system to maintain integrity of instruction. Therefore, it is important to look at the various stages of linguistic use and how each might usher in the preceding stage in order to adequately prepare students. For example, Mythic understanding and its subsequent instructional design ushers in Romantic education, and it in turn prepares the student for the Philosophic period.

For Mythic understanding, the curriculum should refer to the cultural aspects common to those who use oral language and the direction in which one wants the student to develop. Stories provide a wide range of possibilities for exposing young children to history. Myths provide psychological and social functions. Stories with binary opposites such as freedom and oppression make use of historical information yet place it in a context easily understood by the Mythic mind. One can elaborate on freedom and oppression by calling upon the history of the Jews, slavery, and colonialism. Although simplification of these ideas is necessary, it provides a richer focus than the current trend to learn about one’s immediate environment. In addition, the context illustrates the struggles and accommodations within which young children find themselves part of in contemporary society.

The goal of enriching the linguistic potential of the Mythic stage lends itself to humor. Playful tongue twisters, increasing use of descriptions, and metaphoric play contribute to satisfying learning experiences and appeal to the oral mode of
communication. Awareness of language and its use through humor increases sophistication and provides an immediate reward. Knock, Knock riddles, Dr. Seuss poetry, and the writings of Lewis Carroll provide fertile ground from which language appreciation and awareness can spring.

Writing for the young mind can consist of tables, recipes, flowcharts, and lists. Science is an invitation to classify. Classification, however may take a different form for the Mythic mind than what is understood by the adult educator’s mind. It is the process that takes precedence over the product (Duffy & Jonesson, 1992). The acting out of the scientific world allows students to become a part of what surrounds them: trees growing branches and sprouting leaves, and the planets circling the sun. Math reveals itself as a delight when students are invited to manipulate and construct patterns, use number rhymes and number bases puzzles. Art is experienced through the senses and is incorporated into the other subjects. Designing instruction for Mythic understanding is a matter of selecting content within the disciplines that the mediating tools of this period makes obtainable, significant, and enticing.

Ideally, there is a transition from the Mythic period to the period when Romantic understanding is stimulated. In obliging the adolescent mind, content should be exotic in nature. The great achievements, terrible disasters, the extremes, and the limits draw the student into additional exploration. The adolescent’s interest in hobbies, particularly with collecting, encourages in-depth inquiry. Transcendent human qualities opens another avenue of discovery where students are exposed to individuals who have exhibited courage, power, genius, patience, and compassion (Egan, 1997).
Humanizing history comes easily when educators weave the stories of the specific people involved in the invention, war, or empire. Science lends itself to the fantastic, bizarre, and unusual. How do Siamese twins develop? What happens to the skin when people are burned? What happens to a person bitten by a poisonous spider? The introduction of a topic by such means opens the door for additional inquiry. While the wonder of puzzles in math persist, additional information about the lives and struggles of those who contributed to the discipline forms a Romantic association through human qualities. Literature reeks of the human qualities adolescents are drawn to read about. Any emotional attachment an educator can create through empathy increases the potential for meaning. Love, hate, adventure, and despair are elements appropriate literature might contain. Personal writing in the form of journals is a common task that develops self-awareness and encourages reflection. Finally, humor encourages metalinguistic comprehension, and can be found in the skits of Monty Python.

One may choose to think of these initial introductions as National Enquirer in nature, manipulating the adolescent into picking up a periodical or book to find the untold story behind the headline. This claim pales in comparison to those who have in their devotion to academics so dulled their adolescent students that school becomes a trial to endure (Egan, 1997).

The curriculum designed for Philosophic understanding is for the individual who has followed a systematic Mythic and Romantic study program. A necessary element to Philosophic understanding is a community that stimulates, supports and develops it. Even at the college level, one finds most students have as their aim a better job as opposed to enhanced theoretical understanding through discourse (Egan, 1997).
From the Romantic who has a focus on human qualities and the lives of others, the Philosphic mind entertains ideas and the theories of those they previously studied. A connection to the theoreticians’ lives preserves a sense of narrative and illuminates the dynamic nature of a range of theories. A move toward abstracting the theory from specific instances characterizes the transition from Romantic to Philosphic understanding. A more discipline-oriented content and progression toward developing general schemes that span across the disciplines serve as a guide for the curriculum to take (Egan, 1997). The resulting abstractions do not carry one away from concrete particularity, rather they bring into focus and under control an increased range of facts, episodes, and phenomena.

A literature curriculum develops vocabulary through the elaboration of ideas brought about through active imagination. In history, a general historical scheme is developed that encompasses in a meaningfule manner a range of concrete details. In building support or doubt for one’s general scheme, students investigate details and their significance in light of additional general meaning. Initially the search for general schemes is difficult but as students continue their studies, they become increasingly adept at developing precise and supportable claims. Science becomes involved with understanding the nature of things. The exciting, speculative, and contentious theories are taught first, abandoning the detailed studies until later when students have some context in which to better understand them.

The curriculum for Philosphic understanding begins with the most broad theoretic dimension of a discipline or study. Theoretic understanding is spurred on by the interplay between general theory and the scope of particulars it uncovers. Facts,
experiments, and events are all elements that challenge or support the general theory. The resulting outcome of this type of understanding is flexibility and competence in dealing with particulars in any area of study.

Knowledge forms the mind (Egan, 1997). Recognition that the mind is also formed by intellectual procedures formed during the act of learning will lead educators to infer that one cannot rely simply on developmental regularities to support intellectual growth. Egan proposes a curriculum based on students’ strengths and interest so that their schooling is fruitful and enjoyable.

Egan’s book, *The Educated Mind*, has received positive reviews. *The British National Association of Teachers of Further and Higher Education Journal* states Egan is creative and has successfully blended theory and practice. They cite him as having a panache that will refresh readers who are dulled by the output of recent educational theorists (Leaman, 1997). *The Library Journal* views Egan’s theories as practical and innovative. They emphasize the much needed change in instruction and curriculum. Ann Fullik (1997) writing for the *The New Scientist*, suggests that those who research or teach would find this work to be current and engaging. Finally, Dean Blobaum (1997) a reviewer for the American Educational Research Association sites *The Educated Mind* for its explanation of how mutual incompatibilities bring about conflicts in the educational process from instruction to curriculum.

Curriculum needs to be manageable or it ceases to be a welcome change from the positivistic model. My model, presented in the following pages, attempts to unite the enthusiasm created by Egan’s techniques with a certain amount of order so as to not over tax instructors. Thousands of worthwhile projects and exciting ideas exist for
implementation in the classroom. Challenges arise when educators attempt to fit these activities into pre-existing goals and objectives. Some of the obstacles are removed when one adopts constructivism since the curriculum cannot be entirely predetermined. There still exists, however, a need for order coupled with variety. Adolescents crave the unexpected, but also want the security that comes from knowing what to expect.

Constructivism accepts the notion that certain aspects of a content domain having been socially negotiated are viable. Students need to have a foundation, and the content domain provides that foundation. This aspect provides students with a secure foundation. It is beyond this point, however, that curriculum must allow for individuals to construct meaning, interpret phenomena, and elaborate on information. By attaching prior knowledge, students build knowledge that expands their present capabilities. The construction of knowledge and ability to apply new knowledge to unique situations provide educators with the opportunity to evaluate.

The elements of constructivism give rise to curricular design. The following study attempts to explain components present in a curriculum consistent with constructivism in nature. Examples of possible activities engage the methods proposed by Egan that draw upon age-appropriate cognitive tools as a means of maximizing interest and motivation.
Chapter 4

Constructivism in the Curriculum

The greatest challenge in presenting a curriculum based on constructivism and mediating intellectual tools lies in the difficulty many educators have in overcoming their own traditional education. Teachers and administrators lament that implementing constructivism implies no goals or lesson plans and might actually result in an individualized education for every student (Dick, 1992). These are some of the common misinterpretations of constructivism. Since constructivism shares the practicability espoused by pragmatism, workability is paramount.

This chapter is an attempt to clarify some of the major elements of constructivism. By providing a definition, the challenges involved and solutions to those concerns, the reader of this document will have a better understanding of how constructivism coupled with an understanding of linguistic cognitive tools is a viable method of presenting information in a scholastic setting. The remaining part of the chapter will illustrate constructivism in a middle school history curriculum. This second segment will also define the concepts and provide examples, based upon the theories of Kieran Egan, for their execution in the classroom.

Elements of Constructivism

The notion of learning how to walk before one runs applies to modifying and ultimately changing one’s style of teaching. The objectivist teacher does not, nor should not, attempt to make the switch to constructivist methods all at once. First, students must be eased into this design model. Modifying learners from a passive to an active role is a
gradual process that should gently guide students so as to insure success and thus increase confidence and competence. Just as the purpose of education has changed over centuries in an attempt to meet the needs of society, expecting students to switch from well-mannered listeners to autonomous thinkers and processors will take time. Second, constructivism has its own content domain. Educators, just as others who are introduced to a new content domain, should become familiar with the new style over time, building their skills as they practice them and adding more sophisticated knowledge as they progress.

There are six elements of constructivism with which the new practitioner should become familiar. Many of the terms and concepts sound familiar; it is the combination that makes them unique. Once internalized these concepts weave a philosophical foundation in which the relationship between student and teacher changes. Responsibility does not need to be coerced, discipline ceases to be an issue. Students feel that they have a hand in their education. After the initial introduction, students begin to assume control, expect results and experience success. However, control, results, and success are redefined from the traditional sense. Control implies making decisions that ultimately affect one’s own performance. Results do not necessarily occur at the end, results are the outcomes of each step toward a goal. It is the process as opposed to the product that concerns the constructivist educator. Success is not the opposite of losing; it is the participation in the learning process. There are no losers when students participate. Constructivism centers on the student, involves problem solving, requires the student to interpret and elaborate, recognizes the student as having prior knowledge, encourages interaction socially and with the environment, and views errors as opportunities to learn.
These six tenets present a manageable way to begin understanding and incorporating constructivist philosophy into one’s classroom (see Appendix 2).

**Student centered.** Meaning is indexed and rooted in experience. Experience, coupled with an idea and the environment from which that idea sprang, becomes the meaning of that idea. The experience from which the idea came is paramount to the student’s understanding and ability to utilize that idea. Therefore, it is the experience one must examine to determine the learning that occurred. The traditional objectivist hopes that through lecture the student will vicariously learn the ideas and have the capabilities of transferring those ideas to the real world eventually. The constructivist, conversely, believes that situating cognitive experiences in actual activities will improve transfer of skills. Student centered implies that the individual must have the experience because the understanding constructed by each student is unique. This understanding allows each to negotiate their environment. Since the constructivist believes there is no ultimate, shared reality, it is the student’s own experiences that allow him/her to construct new understandings and representations that aid in the physical and social negotiation of his/her world.

The challenge many educators face when adopting the view that students must be at the center of their learning is many students choose to remain passive in their role as learners. To actively engage requires energy, and often students do not want to put forth the effort required by the constructivist model. Constructivist instruction asks students to accept more of the task management role because students must be capable of managing their own learning if they hope to become autonomous thinkers. The picture of
unprepared students being thrust into management roles is familiar; too often a portion of the class sinks while the overachievers persevere undaunted by a lack of support.

Several solutions exist to assist in self management and ultimately autonomous thinking and learning. It is, again, a walk before one runs scenario. Responsibility in the classroom for many middle school students is a novel idea. Typically, a few students exhibit teacher’s helpers capabilities and the others would rather do as little as possible. One method of starting a program of autonomy for all consists of using the most elementary of tasks, and one might find that by mid-year students have a desire to actively engage in activities with each other minus the teacher’s lead. These minor tasks might include passing up papers in their rows in order: students must make sure they have submitted their papers correctly, and the person in the front of the row assumes the responsibility for checking to make sure they are in order. By asking a student at the beginning of class time to pass the papers back to the rows, one can use the same paper throughout the week for a short beginning chalkboard assignment. The papers, having been correctly turned in, are easy to distribute because they are in order. It takes several weeks to master this task, but once mastered it becomes the first in a management task that all students perceive they are instrumental at implementing.

Because middle school students enjoy the company of their peer group, class games are yet another chance to build up task autonomy in preparation for independent thinking. Vocabulary plays an important role in the history curriculum. By writing the definitions on the front of index cards with the words on the back, the class can be divided into teams and can operate their own game of Vocabulary Trivia. Students take turns reading the definitions, choosing people to answer, keeping score, and even
deciding if a point was fairly won or lost. As the year progresses, students decide how they want the teams to be divided and which past vocabulary cards would be good to review, and making any other modifications that add spice to what in previous years had been a dreaded part of the curriculum. After a month of vocabulary review, one might notice that students who previously did not involve themselves in activities now want to read the cards, choose people to answer, or keep score. They want to be a part of the fun. They usually choose to try what they will be successful at doing. These first steps into successful participation can be a spring board for students to take chances. Eventually, students who were initially too shy to operate the game can be encouraged by the instructor and the class to give it a try. The students, remembering how they might have felt nervous before, often reassure and support their timid peers.

Encouraging students to take their rightful place at the center of learning starts with assuming small classroom tasks, increases to include classroom management, and culminates in the expression of their ideas and opinions. The final phase is accomplished when the teacher creates an environment of support where the initial focus is on activities children of that age group have an interest and talent. The collection of vocabulary cards that accumulate over the year gives students a sense of limits. They can be encouraged to research and develop their own set of cards covering an area of history that interests them. In a five minute period at the end of class, one might begin the development of a mini-card library of sports heroes, world disasters, famous doctors, crime and punishment, pioneers of industry or automobiles. Students can become the experts of their own historical research topic.
The opportunities to foster individual exploration are endless. The steps the teacher takes in preparing students to assume responsibility will determine the success of the investigation. Modeling and successive incremental steps that create a secure environment contribute to this particular example.

Problem solving. When students construct concepts and apply them to problematic situations, by either going beyond given information or developing their own ideas, they are said to be problem solving. The more closely the situations represent the world outside the classroom, the more likely students will shift their ability to other problem solving situations. Retention, understanding, and active use of what was learned in problem solving situations is necessary to function successfully in today’s world.

The issue of assessment in the area of problem solving has caused great concern among instructors, administrators, and scholars (Jonesson, 1991). What should be assessed? Typically the focus would be on what the learner has constructed or gained over the period of a learning situation, but what is constructed will differ from individual to individual. How would one objectively assess different constructions?

Several levels exist in evaluating problem solving activities. First, in every subject there exists a content domain of what is generally accepted as viable in light of the present information (McAvoy & Paparozzi, 1996). An understanding of the content domain can be evaluated in the traditional sense; however, for constructivists the assessment process does not stop there. Additional evaluation encompasses the thinking process. Encouraging the middle school student to problem solve first calls upon the educator to choose topics of interest to that age group. For example, after explaining the various techniques used by inquisitors during the Spanish Inquisition, students might be
asked to explain what they would do if suspected of heresy at the time. Students would be asked to defend their decisions or note the process they went through when constructing their view using their expertise in the content domain. Once students begin to take an interest in expressing themselves and having their responses taken seriously, they will more readily accept additional problem solving situations for the inherent challenge.

In the constructivist paradigm, the final solution ranks below the process. The fact that individual students arrive at different conclusions does not mean one is wrong and one is right. Just as adults experience in the real world, different paths can result in success even if the outcomes differ. The agent, their views, talents and resources all come into play when considering a method to employ in a problem solving situation. The argument for objective testing belies constructivism in that preparation for life in our schools should not be a rehearsal, it should involve students in situations they might actually encounter. It is through the process of not simply action and assessment but also reassessment and adjustment that most adults problem solve. Giving students one shot that requires one path falls short of what they will experience in life (Jonesson, 1991).

**Learners interpret and elaborate.** The active learner component is emphasized in constructivism (Perkins, 1992). An active learner is one who, in addition to being an active processor of information, interprets and elaborates upon the information. This occurs either through discovery, without the information given, or through direct instruction with the understanding that the student must go beyond the information given. The student focuses on the phenomena of the task as opposed to amassing an information bank of experiences. Even learning processes that are judged to be straightforward, such as learning a new language are encompassed by the student developing preliminary
mental structures, elaborating on them, and testing them until a firm and satisfactory structure emerges (Perkins, 1992). Evaluation of an active learner can take the form of persuasion, extrapolation or explanation.

One challenge that surfaces when one attempts to actively engage all learners is student-teacher ratio. The supportive, intimate learning environment that is called for by constructivists requires a coach-like interaction which serves the learner, but presents difficulties for school systems that cannot afford the staff to deliver such instruction. Some options exist. Information banks, symbol pads, construction kits, phenomenaria, and task managers have all been elements of the traditional classroom for active engagement. The teacher and texts for sources of information; worksheets and notebooks for manipulation of information; kits for assembly and manipulation like legos and chemistry sets; a place for presenting a specific phenomena like terrariums and aquariums; the task manager that proposes activities and monitors those undertaking the assignment. While these elements of the traditional classroom have proven their worth, there is yet another component that assists in coaching students in their quest as active learners. While it does not literally diminish the gap between student-teacher ratio, it does provide the necessary attention to individual exploration that constructivism advocates. Information processing technologies allow for more of the one-on-one coaching so prized by constructivism. One such program for American history is the Oregon Train II software that invites students to venture into active engagement. It allows them the freedom to explore, encourages development of talent in decision making, and provides the feedback necessary to reassess and adjust choices. This simulation game takes students on a trail as pioneers in the 1800’s. The virtual travelers must make decisions
concerning supplies, routes, and potential impediments. Conclusions made by students ultimately end up in a successful or failed journey along the Oregon Trail. A more modern version entitled Cross-country USA lets students pilot a big rig across the country. Students must select commodities they will need along the trip. Map reading, economics, politics, and geography add up to problem solving that equates to real life scenarios. An invitation to historical fact, a venture into virtual reality, and an exercise in autonomy- computer simulations like these necessitate active learning.

Learner is recognized as having prior knowledge. Constructivism claims that meaning is created by the learner when the material is relevant to what the learner already knows. The instructor presents a domain of knowledge for a specific discipline then students call upon their own knowledge domains to make relevant connections. Constructivists see these connections as a more realistic manner in which to view relationships in the world. The constructivist believes alternative environments and data sources, as well as a non-segregated approach to learning, will produce knowledge that transfers from the classroom to the world (Duffy and Jonesson, 1992).

Taking into consideration the importance of an interplay between learner and information, the constructivist maintains that teachers who want to modify a student’s concepts must try to devise a model in the particular student's own thinking. Recognizing that a student does not arrive in the classroom as a blank slate, an educator must focus on what prior knowledge that student possesses. Construction of meaning and understanding are negotiations between new information and a student’s existing knowledge.

The challenge for a constructivist in trying to discern a student’s knowledge base and where to begin the process of meaning making exists in the traditional curriculum as
well. Discovering the level of expertise and using that information as a springboard to learning is not a new issue. Many solutions to this circumstance exist, several drawing upon the students themselves.

Evaluating prior knowledge differs little from assessing in the constructivist mode after instruction. Examining the thinking process in a particular realm presents one method. Students might be asked to approach a problem in a particular domain. Through writing that tracks their thought processes, educators can assess what the student has prior knowledge of and how well it is weaved into an overall understanding of the subject. Students might be asked to describe to a peer a particular element of the domain on which the class plans to embark. Teachers might elicit responses by proposing students write to younger students explaining the future subject of study. Finally, by drawing upon past experiences that might initially appear to have a remote connection to the topic of study, meaning making can be fostered. By drawing upon what students have found to be important in their past, educators encourage involvement by illustrating respect for students’ interests.

Interaction Socially and in the Environment. Constructivism stresses the social negotiation of understanding and meaning. Central to this is collaboration as a means of evaluating alternative views and testing ideas (Bendar & Duffy, 1992). In addition, the environment where learning takes place must eventually match the complexity of the environment where students will be expected to transfer their knowledge from the classroom (Salomon & Perkins, 1989).

The arena of social interaction as a means of clarifying ideas and fleshing out one’s beliefs by way of defense and explanation has become popular in today’s
classroom. Cooperative learning, projects performed in coordination with the community, and peer tutoring all encourage social interaction of students. The transfer of skills to the environment from the classroom presents somewhat of a concern for those who have witnessed a lack of transfer of skills by students. Skeptics sometimes doubt constructivist claims concerning the improved transfer of skills from the classroom to the environment (Spiro, 1988).

To promote transfer, educators are encouraged by constructivist thinkers to maintain the complexity of the environment in which students hope to transfer their skills. Lack of transfer often results from the school environment being so different from the nonschool environment (Spiro, 1988). If the complexity of the environment is maintained and students are assisted in understanding the existing concepts in those environments, authentic transfer can occur (Perkins, 1989). Just as the world of jurisprudence is viewed in a less complex manner by the average citizen than by one who operates daily in that environment, the proposed authenticity and complexity of the scholastically created environment should fall in a proximal range of the student’s knowledge. Another issue that relates directly to successful transfer deals with learning the content while using it. While traditional curriculum separates the learning of the content from its use, functional context stresses having students discuss, diagnose or explain various phenomena after they have been provided with instruction on the authentic task. Starting from less complex and increasing in difficulty with mounting competency, content and tasks blend and provide a context which is authentic and allows the student to acquire integrated skills.
In the realm of history, multiple presentations provide students with variations that often exist in reality. Content is taught in a number of ways with different purposes in mind. While the search for patterns might be the initial focus, another lesson might ask for students to detect nuances that produced unexpected outcomes to various historical episodes. While the first teaches generalizations, the second protects against overgeneralizing and misinterpretation. Again, it is a move from the less to the more complex, calling upon students to build on the skills they acquire and use them in their future analysis.

Analysis can take many forms in the history curriculum; being the historian, might call on students to take their newly acquired knowledge of archeology and apply it to a cultural dig in the trash. Identifying items, their use, and what it might tell one about a certain culture are the skills of an archeologist. Instead of stopping with familiarity with the content domain, students extend and perform archeological work.

After students have been exposed to artistic accomplishments by famous historical figures, they might be asked to try their hand at those same endeavors, first finding out the rudimentary skills and then practicing them. An appreciation for Michelangelo can be acquired by many students who have the opportunity to spend one class period painting the ceiling of their classroom with culturally important scenes.

The interaction with others socially, with those in the content domain, and with the environment where skills can be experienced authentically all assist in taking what are frequently independent, abstract entities, and transferring them to authentic functional skills.
Errors are opportunities. Errors are defined as having an incorrect understanding or perceiving wrongly. In traditional positivistic classrooms, errors translate into bad grades. One of the largest discrepancies between constructivism and a traditional positivistic approach to education exists in the sphere of errors. Many students have approached their education by trying to match what is generally accepted as true. In traditional classrooms, failure to jibe with that particular truth frequently translates to poor grades and disappointment. Since constructivism maintains that the relationship between the learner and the information takes precedence, instructors can utilize mistakes as a tool to understand a student’s thinking. Errors are viewed as an opportunity for further exploration. If a particular answer does not work, the investigation into why it does not work provides a student with a chance to become more intimately involved with the process and ultimately to correct a pathway of inquiry that was unsuccessful. The process of learning is the goal because it is the learning process that the constructivist hopes will continue to grow as opposed to a bank of information.

The difficulty with switching the focus from errors as inappropriate responses to one of errors as an opportunity to further learning comes with evaluation. The recent focus on school accountability has placed a high premium on assessment and scores. How can one assess if mistakes cannot be counted as a failure to understand? Constructivism sounds more like educational intervention than instruction (Dick, 1992). How can educators assess learning if the process is to be assessed as opposed to outcomes? Should individual students have their own learning objectives?

While the constructivist view of errors might be the most troubling for traditional educators, it promises to be a welcome relief to students who have a sincere desire to
learn but find themselves discouraged by grades that fail to reflect that eagerness. Mistakes are an indication that the desired process has not been understood. To teach, test, and fail a student appears to be an indication that the teaching/learning process has not been successful. It could be the inadequacies of the teacher or the student, but one will never know if the process stops there. While assessment is necessary, it is learning that is fundamental to enriching and preparing children for life. Assessment is a means to see if learning has occurred. It serves as a tool to use in deciding how to proceed. Possibly, children who fail need to have the opportunity to experience material in alternate ways, or perhaps instructional methods need to be modified; these are the issues answered by assessment.

In response to those who feel constructivism sounds more like intervention than instruction, intervention is one type of instruction when the initial manner of instruction fails. Students often take different paths in their quest for learning and frequently one method of instruction does not reach all students. Various methods of instruction, presentation, and exploration assists in helping every student build an understanding of what works.

For those who worry that an error-free atmosphere makes assessment difficult, the following suggestions are made as to what can be assessed and in what manner. The constructivist centers on what has been constructed or gained by the individual learner as opposed to mastering a specific set of skills that have been predetermined. Given relevant tasks and tools to work on a problem, the child can be assessed on how well the process of solving the task was performed. Mistakes give rise to additional personal objectives on which the child and educator can concentrate. Since it is the personal gain of the child
that is assessed, mistakes actually provide an additional opportunity to improve. A successful pattern of assessing, adjusting, and amending one’s own errors for future improved performance without the onus that accompanies failure hopefully will create adults that accept challenges knowing mistakes are nothing more than additional opportunities to improve.
Manifestation of Constructivism in the Curriculum

The remaining part of this chapter is dedicated to understanding how constructivism is manifested in the curriculum. This section will define eight key concepts and provide examples for their execution in the classroom. Integrated curriculum, entering the consensual domain, a non-prespecified curriculum, understanding multiple perspectives, cognitive flexibility, apprenticeship, real-world scenarios, and evaluation as a process of explanation, performance and effective planning all add up to assist educators in implementing constructivism in their classroom (see Appendix 2).

Integrated curriculum. Integrating is a curricular approach that intentionally applies language and methodology from several disciplines to examine a problem, issue, theme or topic. Numerous advantages exist to support the use of integration: information is reinforced and connected; activities call for higher order thinking; students engage in drawing connections among subjects; students tend to see the entire context of what they are studying (Schurr, Thomason & Thomason, 1996).

Authenticity is a key word in constructivism. The ability to generalize what one has learned to future problematic situations is an indication one has learned. The notion of integrating the curriculum is in keeping with authenticity. If one only focuses on the critical aspects of a concept, one develops a narrow, textbook understanding. In this scenario, one fails to maintain the complexity of the environment and take notice of the complex relationships that exist. Choosing successful strategies hinges upon understanding the interrelationships present in the environment. An integrated curriculum
raises the awareness of students as to how a complex environment impacts the type of choices one makes in problem solving situations (Fogelin, 1987).

Several methods exist for implementing curriculum integration. Engaging students in finding the parallels across subjects for the current topic of study allows students to bring their past knowledge of the subject to the classroom. In this way integration invites students to let the teacher in on their perceptions, concerns, or interests. A recent art lesson focused on Michelangelo’s Sistine Chapel ceiling. In integrating the unit students not only learned about the famous artists work, they explored what culturally typified this century; studying scale, students developed their own Sistine Chapel ceiling with a drawing of the rain forest, a subject they thought typified man’s contemporary concerns; to draw upon their interest in the human condition, students painted their ceiling to gain an appreciation of Michelangelo’s masterpiece. In science, students wanted to understand what stress, such as they experienced, did to Michelangelo’s body over a four-year period.

Video production is another manner in which to integrate the curriculum. While studying the Greeks in history, students decided to become their heroes and portray them for posterity’s sake. Investigations ensued into mythology, math, science, philosophy and acting. Instruction was desired in the various art forms of videography, scenery, costume, and time management. In true constructivist form, students followed their interests after they had been introduced to the content domain. Skills were learned by all, with everyone having just enough freedom to follow their passion. Students who were more familiar with certain art forms helped their counterparts. The instructor acted as a facilitator after the initial instruction in the content domain.
Entering the consensual domain. For constructivists truth is a viable construct, and viability is a form of consensual domain. Experiential worlds belong to individuals, but through social interaction these worlds become adapted to one another to form consensual domains: areas where the interactors mutual expectations are more or less regularly realized. (McAvoy & Paparozzi, 1996). While constructivists maintain content cannot be prespecified, this core knowledge domain may be. Instructors then encourage students to search for additional knowledge domains that have relevance to the topic. One can and should define a core body of information; however, one cannot delineate the parameter of what might be relevant.

The importance of the censensual domain occurs at the onset of knowledge acquisition. At this point, students often have little directly transferable prior information about a content or skill. In this beginning stage of schema construction and integration, it serves the learner for the domain to be somewhat well structured, skill based, and literal (Jonassen, 1992).

Activities for the introduction of the content domain should move from fairly well defined to increasingly complex to avoid oversimplification of material by students at the later stages of knowledge construction. The following are suggestions on how to introduce essential elements of the consensual domain. Vocabulary familiarization constitutes a large part of a history curriculum and can assist students in initial meaning making. One method of vocabulary instruction involves the entire class. After students have been introduced to the vocabulary, the words are placed on the board. Students brainstorm for visual pictures that will aid them in remembering the definitions and then the pictures are drawn next to the words. Charlemagne, medieval king of the Franks, had
a personified hot dog wearing a crown by his name: Charlemagne, king of the Franks. Christendom, a spiritual kingdom on earth, had the globe with a crucifix situated on top. Pepin the Short, father of Charlemagne, was drawn as a stick figure holding the hand of the King of the Franks visual of a hot dog with a crown. These student-generated manufactured connections serve several purposes: camaraderie is created by peers working together to accomplish the goal of meaning making; the integration of art with vocabulary, however simple that art might be, allows students to play with language and witness the potential of interconnectedness among subjects; students take the helm of their learning and assume responsibility for creating meaning as opposed to the teacher dictating how the information should be retained.

Constructivists believe learning is tied to content and context. Facts in themselves are of little use. Instead, constructivism focuses on what actual people do when in the domain of knowledge for that subject. The goal is to move the learner into the domain using the information as an expert would (Resnick, 1987). What would a geographer or cartographer do with geographic principles and facts? Simplified tasks would initiate the student into the realm followed by authentic work when the student had sufficient knowledge. The focus is always on portraying the task as opposed to merely learning what is required to achieve the task.

To aid construction of meaning, educators must leave learning situations open. Correct answers should not prespecified ahead of time. Just as geographers bring their own perspective to situations, so should the student have the opportunity for interpretation and unique understanding.
Actually being the historian offers students the experience of authenticity. After an initial introduction into the content of a particular historic period, students delve deeper as historians to research topics. For instance, students select a historical figure—Henry VIII: Darling or Demon—and using original documentation, research the various perspectives by way of deeds, policies, and decisions. Their initial knowledge of the time period provides a backdrop for the figure. The instructor acts as a coach asking questions or giving tips on how to proceed. The resulting perspective the students attain is evaluated as opposed to an amassed bank of facts.

An Archeological Dig in a Bag offers students another possibility for authentic involvement in the content domain as well. After an initial introduction to archeology, small groups of students are given large bags of dirt with various buried items. Some of the items are easily identified, some are not. After extracting the items, students brainstorm to identify the item, what it might have been used for, and what it tells them about the culture from which it came. Each member of the group, as a member of the archeological team, has a function: digger, scribe, reporter, and task master. The teams report their findings to the class after the exercise is complete. Although simplistic, this activity allows students to participate in history. The instructor acts as a guide by asking questions and circulating. No answers are given, and creative interpretation is encouraged and welcomed. Evaluation in this case hinges on participation in the content domain. Assessment of what the student does with the information is paramount as opposed to simply learning a body of knowledge.

These activities satisfy the constructivist criteria in the following manner: there is little to no prespecified content; learners construct their own experience, either
individually or through social negotiation with a group; students authentically perform in the content domain and assume control for what is performed and why; instructors serve as guides and models.

The curriculum is not prespecified. Of all the curricular concerns of constructivism, the issue of content not being prespecified is the most troubling (Lakoff, 1987). What do constructivists mean when they state the curriculum cannot be prespecified? Ideally, students must construct a viewpoint or understanding and are encouraged to explore other domains of knowledge that have relevance. While this construction cannot be prespecified, core knowledge can be prespecified: a knowledge base accepted as viable by those functioning in the domain. Instructors have an obligation to define a body of core information, but they should not attempt to define the parameter of what might be relevant. Students should be encouraged to bring fresh perspectives and data to core knowledge. It is the segregation of the domains of knowledge that often contributes to knowledge that cannot be applied outside of the classroom situation.

Similarly, constructivist have a difficult time with learning objectives. If, for example, one is encouraging students to think like historians, the goal is not to teach a version of history, but to create tasks authentic to the domain and allow specific objectives to be actualized as they are germane to the student in solving the authentic tasks. In this scenario, tasks can be identified as emergent relevant goals but not in the sense that educators have come to understand prespecification.

Goal-free evaluation is offered as a means for those who have previously relied on the accomplishment of outcome goals for evaluation. It is believed that the prespecification of goals prior to the learning process biases the process as well as
evaluation. The goals of learning influence the instructional process and control the activities by which students learn. Criterion-referenced evaluation as well as instruction are inconsistent with constructivist learning methodologies. Evaluative methodologies must gibe with the philosophical foundation implied by constructivism. Authentic tasks, knowledge construction, experiential constructions, context driven evaluation, multiple perspectives, and multimodal evaluation exists as methods to evaluate from a constructivist perspective (Jonesson, 1991).

The pursuit of authentic tasks is being suggested as a means of improving generalizability from the class to the world. With real world utility and relevance, integration of tasks across the curriculum add the necessary complexity so that students may construct their unique path based on their own level of sophistication. Evaluation is based on the selection of tasks that are appropriate to the particular learner and situation.

Evaluation of knowledge construction reflects the process of construction as opposed to reproduction of knowledge. This higher order expectation is reflected in the synthesis level of Bloom’s taxonomy, and Gagne’s cognitive strategy level. Solving relevant problems and defending one’s position are recommended as evaluative techniques. Originality is stressed as especially pertinent in evaluating knowledge construction.

Experiential constructions refer to the constructivist preference for evaluating process as opposed to product. Assessment must be integrated into instruction if one is subscribing to the notion that the mental activity, the construction of knowledge, should take precedence over the resulting process. As students attain knowledge, evaluation measures should be available so that all involved in the learning process can understand
how the student is progressing. This allows students to have multiple opportunities to demonstrate their intellectual prowess.

Context-driven appraisal refers to situations in which the learner demonstrates knowledge other than during formal instruction. This is ultimately what the constructivist is hoping will develop when they refer to generalizability. Can and will the student take the formal learning situation and use it appropriately outside of the classroom? The evaluative measures in this case are best defined by the case itself. For example, in attempting to negotiate a truce between warring factions (two children in a fight on the playground) how well does the mediator fare within the limits of time, the severity of the battle, and the fallout afterwards? If instructors hope to convince their subject has real world relevance, credit must be given when students attempt to apply their knowledge in environments outside the classroom.

Multiple perspectives surface as a key concept in constructivism. In the evaluative sense, they become their own knowledge domain. Evaluation can be subjective; therefore, to provide a more complete appraisal of performance several evaluators are needed. Novices as well as experts assist in assessing performance, with the novice often providing the fresher perspective. This follows constructivist beliefs in that since there is no objective reality, assessment of one such reality is impossible. Rather, a wide variety of evaluative responses, or multiple perspectives, better suits the acceptable variety of learner interpretations.

A final option that exists for those worried that a lack of prespecification translates to an inability to assess is multimodal assessment. By its own definition, multimodal suggests using a wide array of evaluative methods. Portfolios and multiple
products provide a clearer picture of student knowledge construction than a single product. The process is also more documented by assessing an activity or paper that has developed over a span of time.

**Understanding multiple perspectives.** Constructivism has as one goal the construction of plausible interpretations of events through collaboration. Plausible implies the entertainment of different interpretations or alternative perspectives because one cannot presume there is only one correct interpretation or perspective (Cunningham, 1987).

The ability to comprehend multiple perspectives gives students the diversity to construct situation-specific understandings. Social negotiation provides the measure for usability. With usability as the goal, students with a wide repertoire of understanding can apply those that best fit the situation. These constructed understandings, as well as their use, fluctuate just as social negotiation of viable views change with new information.

Educators emphasize the construction of multiple perspectives by encouraging students to view an issue from different vantage points. A well-supported, sincere understanding of each perspective is encouraged. Students should note advantages and disadvantages of the various views and ultimately adopt the most relevant and useful perspective for a particular scenario.

Collaboration exists as a tool for the development of multiple perspectives. Collaboration for this purpose goes beyond sharing and consensus building, however. Constructivism advocates researching and assessing the evidence for a particular viewpoint. The gathering of evidence and development of arguments exists as a
cooperative effort with group members assisting each other in their understanding of the various perspectives.

The use of examples is an important strategy for acquiring multiple perspectives. In the social studies curriculum the use of examples and non-examples prevails as a method to assist in understanding. As opposed to these clear cut examples, slice-of-life examples are preferred by the constructivist educator. Instead of showing the correct manner in which to teach through decontextualized positive and negative clips, students watch an entire lesson being taught. Assessment of the various methods follows, accompanied by discussion concerning the positive and negative aspects of each method used and how they might be appropriate or inappropriate to certain situations. Teaching, in this case, is authentically in context. Students have viewed the concept during actual instruction as opposed to witnessing it divorced from its real world setting. Developing and evaluating alternative views in authentic situations is the goal.

Egan suggests that the middle school history curriculum might include heroes of the past. To entertain multiple perspectives, students choose their hero, his/her dilemma, and path chosen by that individual. Group members can search for other possible courses of action that figures in history could have taken. What would have been the benefits? Would there have been draw backs? Using the gathered information and their assessments, students defend a particular perspective to the class. Through this lesson students experience exposure to historical figures, events and periods in history as well as multiple perspectives (Egan, 1997).

Cognitive flexibility. In traditional curricular design, an identified pool of learners progress toward learning goals defined by the average conditions and range in which
systems traditionally function. Students find themselves placed through pretesting and join the group that exhibits their level of knowledge. Constructivists also will identify the skills of the learner, but not with the hope of identifying deficiencies. Flexibility, not remembering, is the goal. Cognitive flexibility refers one’s ability to appropriately construct and manipulate knowledge for various scenarios.

A central theme of cognitive flexibility is that by revisiting material in different contexts, at various times, and for a variety of purposes students will increase the likelihood of transfer. Material must be covered in a multitude of ways because simple explanations of complex problems potentially miss aspects which might prove important in another context (Spiro, 1988). The psychological demands on learners in dealing with ill-structured domains becomes more manageable when students have had the opportunity to witness multiple knowledge representations and how knowledge components interact.

Cognitive flexibility differs from teach/reteach methods. Revisiting material creates lasting memories of perhaps the content domain; when dealing with the ill-structured domain of problem solving more is required. For example, comparisons of scenarios create the opportunity for students to revisit issues but with added insight. While they initially understood both scenarios, a comparison requires the additional investigation of similarities and differences. In the history curriculum, war strategy lends itself to these types of comparisons. One must first be introduced to the content domain then the additional step of comparing strategies, conditions, and technology can be explored. This experience of manipulating knowledge provides practice for problem solving situations students will encounter in the real world.
One of the common aspects of advanced learning failure is oversimplification by way of interpreting a concept through a single perspective. The adoption of a single perspective in an ill-structured domain risks missing crucial aspects of conceptual understanding which could mislead and does not provide for variability in the manner knowledge should be applied in distinct cases (Spiro, 1988).

Educators who opt to use knowledge in a wide number of ways must be organized and information must be mentally represented in a variety of ways. Instruction should prepare students for the various uses of ill-structured knowledge. Criss-crossing the conceptual landscape exists as a possibility. Students in this case are given multiple examples of the concept in use. The learner witnesses a range of applications close together as opposed to relying on sporadic encounters. Variability can be easily investigated in this way. Another method involves the exploration of various interpretations of one historical figure. Once a character and time period has been studied, a conceptual theme of the character is chosen. Students research the literature that supports and illustrates that theme. Subsequently, another theme, perhaps even a contrasting one, is chosen and explored in the same manner making an additional case for the historical figure. Ivan the Terrible: Evil Embodied or a Product of His Time? In supporting multiple interpretations that combine and interact, students face complexity and familiarize themselves with the process of cognitive flexibility.

Apprenticeship. Apprenticeship exists as an instructional strategy that is suitable for providing authentic experiences. It bridges the gap between in school learning and out of school learning, reducing the lack of transfer that results from decontextualization (Resnick, 1987).
The thrust toward apprenticeship springs from the notion of plans. Current instruction often guides learners by providing them with plans of action. Experts frequently try to share their successful plans, having faith that if others follow those same plans success will occur. Plans can technically be described as introspective or projective accounts of operation. When a student approaches a situation with a plan in mind, an essential aspect of performance is the capacity to react to situational constraints. Ideally, one should be able to develop or construct new plans to meet the evolving demands and circumstances of the situation (Suchman, 1987). If one chooses to accept plans as procedures to teach, then it follows they are not to be specific theories of action or explanations set in stone. Educators should focus on helping the learner develop the skills necessary to construct plans in response to situational or circumstantial demands and opportunities. The ability to develop plans aids students in their attempts to make sense of the environment. Coaching in the form of apprenticeship provides contexts and assistance to accomplish such a goal.

Educators can coach and model processes for students that will lead to expert performance. One important aspect of apprenticeship is spontaneity. Teacher’s responses cannot be scripted. Modeling should be authentic if it is to be effective. The notion of a perfectly prepared plan that directly leads one to an efficient outcome is not realistic. Students should witness teachers going through the process of plan development, construction, and reconstruction (Collins, Brown, & Newman, 1988). Familiarity with the idea that set-backs and errors in thinking are normal assists students when they later attempt to transfer their plan-making strategy to the real world.
Brain teasers are one way teachers can model problem solving behavior that students can later emulate. Students understand the process of planning by watching and listening to an instructor approach a problem, assess the situation, entertain a variety of solutions and embark on a plan of action. As the teacher thinks aloud, students begin to grasp the idea that planning, projective accounts of action, must be dynamic in order to meet the dynamics of problematic situations.

**Real world scenarios.** An example of a real world scenario that also encompasses integration might be an exploration into how history and science are related through research. For instance, one class studied the find of a prehistoric man found in the Alps of Italy. Students wondered how botanists were able to target the man’s original homeland by studying the grass that provided insulation in his leather boots. The instructor took this opportunity to create a real world experience. Students went out into fields surrounding the school to gather grass as well as requesting grass from relatives who live in areas with dissimilar vegetation. Students used microscopes to study the plant structure of the glasses then compared them to those in texts to identify the them. Evaluation of the activity included resourcefulness while researching the grasses, and students were later given a new species and asked to identify where one might find that specimen on the globe. Being in the field of study, experiencing integration of the curriculum, problem solving, and evaluation based on the ability to apply new knowledge to a different situation, all contribute to creating a constructivist environment.

**Evaluation is a process of explanation, performance, and effective planning.** One of the greatest concerns educators have when considering the implementation of constructivism in their classroom deals with evaluation (Jonassen, 1991). How are
individually constructed learning outcomes evaluated? How should one assess in a meaningful manner in authentic environments? What standards should be used? The following basics are offered as a beginning point for those establishing a constructivist environment in their classroom (see Appendix 4).

Evaluation is socially negotiated meaning. Evaluation, like the construction of meaning, should be performed in an arena of negotiation. By this the constructivist means that, although construction of knowledge is done as an individual endeavor, enough meaning must be shared so that communication, discourse, and speculation can take place. It follows then that negotiation should exist in evaluation. Goal setting, analysis, and performance evaluation should be shared by the individual and the instructor as well as other learners potentially. This creates that real world scenario previously discussed in that evaluation of one’s actions in society need to be self monitored; the individual’s self control in addition to the laws that guide society create a harmonious situation. Evaluation has too often been used as a punitive means of keeping students focused on goals set by forces outside of themselves. If society hopes for self-guided members, the skills and tasks associated with self-evaluation of one’s actions need to be practiced before adulthood. With the learner taking part in the assessment process, metacognition and self-analysis are fostered. Students guide and judge their own construction of knowledge with guidance and assistance from instructors (Jonassen, 1991).

Multiple perspectives and products should be considered. As mentioned before, the importance of entertaining multiple perspectives in constructivism prevails because no one shared reality exists for constructivists. Several paths might lead one to a solution, and there is a possibility that improved paths might be found when students are given the
freedom to construct their own solutions to problem solving as opposed to memorizing current axiomatic theories.

Because people construct knowledge in a subjective manner, according to constructivism, evaluation needs to be assessed by several individuals in order to be fair to a student who also maintains a unique construction of meaning. A group of reviewers has the potential to appreciate different facets of the learner’s construction. Experts bring their particular insight, and novices provide the fresh perspective the student might be experiencing. Instead of one set of goals, a multitude of skills are assessed and appreciated by the separate perspectives represented (Jonesson, 1992).

When educators must evaluate products in addition to process, several products as opposed to one should be assessed. In keeping with the theory that few authentic tasks have a single product or outcome, students should be given the benefit of exhibiting their construction of knowledge through several avenues. A more accurate assessment is acquired through multiple products representing multiple dimensions, viewpoints, and techniques. A mix of experts and novices should comprise the evaluating group.

Evaluation is goal-free. Goal-free evaluation exists as one of the most foreign ideas to the traditional teachers. Instructional goals and objectives continue to drive the curriculum in several school districts with teachers being held responsible for assessing the acquisition of those skills in their students. Constructivists argue that evaluation is biased by projected goals. If an evaluator is informed in advance of the learning goal, then the goals of learning drive the curriculum. The result is criterion-referenced instruction, an objectivist construct inconsistent with the methodologies of a constructivist environment. Methods used to evaluate constructivist instruction must be
consistent with the cognitive sophistication suggested by constructivism. This is not to imply goals do not exist, just to indicate that assessment hinges on evaluating goals that emerge from an individual’s knowledge construction not prior to instruction. The focus of a goal-free environment is to guard against a goal driven curriculum that limits the ability for individuals to construct their own knowledge and isolates tasks which often results in a loss of transfer of skills.

Are goals ever an effective means of assessment in a constructivist curriculum? Initially when students enter the content domain which is highly skill-based and literal, objectivist methods assist in the practice and feedback mode necessary to develop a foundation. However, when students begin the transition to more complex activities that require for example cognitive flexibility, assessment must take on an equal amount of complexity so as to evaluate all the facets of an individual’s knowledge construction (Spiro, 1988).

Authentic tasks with knowledge construction, as opposed to reproduction, is the aim. Once students have been exposed to the content domain, constructivism advocates they engage in authentic tasks that call upon them to relate their knowledge to the real world, use the information they have acquired and integrate proficiency across the curriculum. Authentic tasks require educators to provide environments of appropriate complexity for the learner. Within these settings, individuals become familiar with the necessary involvement or expertise required to meet the needs of the job. It should be noted that the focus should not be on having a predetermined idea of how students should sequence their learning, but rather choosing settings that are meaningful because they provide opportunities for constructivistic applications.
Knowledge construction implies that the learner is building knowledge as an intellectual process. Higher-order thinking skills are used because one takes what has become familiar in the content domain and applies it, reconstructs it, or tailors it to problematic situations. This notion, like Bloom’s level of synthesis, requires learners to create new aims and procedures for learning when problem solving. Two aspects evaluators might note in assessing knowledge construction is originality and the ability to defend a particular position.

The emphasis is on process verses product. Ongoing assessment captures the process students go through on their path to problem solving. The advantage of process assessment is the guidance one can provide while the student progresses. No longer will students find themselves at a solution that long before should have been questioned. Constructivist evaluation encourages educators to explain why the answer is wrong, the most advantageous implementation of this practice would be to point out errors as they occur. Ongoing assessment also requires that students have a reflexive awareness of their thought process so as to defend their ideas and choices. Reflexive awareness calls upon the learner to focus on the construction of their knowledge (Bendar & Duffy, 1992).

Just as oversimplified environments are an inappropriate setting for learning, constructivists maintain that evaluation should reflect the complexity and the requirements of the environment where learning has been applied. Evaluation in this aspect is content-driven. Student assessment consists of how appropriately the process of knowledge construction and application fits the environment. This satisfies the constructivists’ desire for real world contexts, higher order thinking skills, and authenticity of tasks (Jonesson, 1991).
Ideally a learning environment based on constructivism should involve students in applicable and significant construction of knowledge. Evaluation techniques for this type of learning must be discerning enough to perceive the types of higher-order thinking constructivism attempts to foster. Assessment should represent knowledge construction and multiple perspectives, and occur in authentic environments with meaningful learning tasks.
Chapter 5
Implications For Constructivists

For constructivists, reality is in the mind of the knower, and the knower constructs and interprets that reality based on experiences. They concern themselves with the construction of knowledge, and each construction has validity since one’s reality is not true to the exclusion of all others. Educators must accept varied interpretations about the external world because individuals uniquely perceive based upon their experiences. If this view of reality is to be accepted, it follows that instruction should focus on the individual’s ability to construct, defend, and use their knowledge as opposed to merely mirroring the reality of another’s theory, ideology, or program.

Education is perceived by those advocating cognitive tools theory as the use of cultural items such as language and literacy as a means of shaping one’s understanding of the world. Successive types of understanding are generated, and educators should draw upon the strengths evident at particular periods in a child’s development to maximize interest and impact. Kieran Egan suggests the stages include a myth-like structure of the world, followed by a romantically interpreted picture that attempts to establish limits and the extent of reality, and culminating educationally in a Philosophic period with a focus on mapping and organization of the world (Egan, 1997).

The difficulty of advocating a curriculum based upon constructivist beliefs and cognitive tools theory arises out of a lack of evidence that either theory will be a significant improvement over traditional objectivist methods. Critics site the lack of evidence as a reason not to push forward. For constructivists and theorists like Egan, the
methods cannot be adequately studied until students, teachers, and learning situations as a whole reflect the tenets of each theory minus the empirical assumptions of objectivism. While educators have dabbled with these ideas, to truly study the impact of either theory a major shift would have to occur in the educational setting.

The shift necessary for constructivism and cognitive tools theory to be successfully implemented and thus provide empirical research into their use and impact requires a change of roles and relationships in education. The role of the teacher and the students must transform, and the relationship with information, learning, evaluation, problems, and other humans must be modified.

In this new paradigm for education the role of the teacher transforms from that of expert and authority figure to one of partner, mentor, and model. Teachers become assistants in the learning process. By appealing to cognitive strengths and accepting that students bring valuable insight to the school environment, educators might be perceived by students as truly those who are there to help as opposed to those who point out shortcomings. Especially in the adolescent years, teachers often become the focus of disdain for those teens who are attempting to establish their autonomy. Students sometimes resent being told their ideas are incorrect, but a constructivist educator would not contend that a student’s ideas were wrong, rather they would ask the student to explain those ideas and demonstrate how they work. The focus falls on the ideas and not the students themselves, it ceases to be a personal issue in this manner.

Students in these theories experience a revision of roles also. Instead of receiving information and having the retention of facts as a goal, students must actively engage in the production of knowledge through construction, discourse, and reorganization.
Students participate in the process and evaluation of their learning, directing and cooperating in classroom tasks and management. Students begin taking the first steps in understanding what it means to be a member of society: they work together to negotiate meaning with others, appreciate the relevancy of alternative views, and understand the responsibility of membership within a community.

Changing relationships constitute another shift when one moves from objectivism to constructivism. Information, learning, evaluation, problems, and other humans can be reinterpreted through the lens of constructivism capitalizing on the use of cognitive tools.

A crucial change in the realm of information deals with subject matter and the environment. Subject matter is chosen for its relevance in the various stages of development. Educators call upon students to relate to information that they are inclined to be interested in developmentally. Middle school children might find themselves drawn to research the bizarre or unusual, thus setting limits on reality or possibly performing an exhaustive investigation of a breed, sport, or extraordinary happening. The environment in which the information is covered is authentic or as close to the actual environment as possible. The more the school environment mirrors the real world scenario the better, because transfer exists as a goal of constructivism.

Another relationship that is transformed exists between students and the process of learning. The phrase life-long learners serves as a goal for many learning institutions. For those students who experience little success in school, the idea of enduring a lifetime of it might be unbearable. Learning in the objectivist view is mirroring an accepted reality. One who fails to learn the facts of that reality receives a poor evaluation. Learning for constructivist calls upon the student to construct knowledge. Constructivism supports
the premise that mistakes in and of themselves are not bad, rather they are an opportunity to learn. The construction, planning, and reorganization of thoughts and knowledge constitute learning. Room exists in this paradigm for unconventional paths and unique perspectives. Originality is prized. Success in learning translates to the ability work with information intellectually and physically. The need to reassess or modify one’s initial path does not result in punitive measures, but is realized as further evidence of learning and problem solving capabilities. Learning becomes a reward in itself. This alteration of the relationship between students and learning might be one of the most important changes for it is the desire to learn that will serve individuals as well as society. The desire can only be maintained if students experience some type of reward. Learning and the process of problem solving, not the external evaluation of an outcome, must be a reward in itself.

Evaluation is another facet of the curriculum that experiences a changed relationship with the learner. Evaluation in this paradigm is not predetermined by goals and objectives, it rises out of the environment in which learning is taking place. Because it is ongoing and concerns itself with the construction of knowledge not its reproduction, evaluation has the potential to be viewed as assisting or guiding the student toward success. Since the student partakes in the evaluation process, its punitive aspect is reduced. It is no longer an activity apart from the learner used to judge a final outcome. Evaluation opportunities exist throughout the learning process and draw upon multiple perspectives including that of the learner. This also orients students to the nonschool environment of their future because often as adults they will be the only evaluator of their choices and actions. The relationship between evaluation and students takes on real world authenticity with constructivism.
Are problems a facet of learning or a fact of life? Problems are often equated with something being wrong. In traditional education, problems exist when something is out of sync with reality. For the constructivist, problem solving constitutes a large part of the learning process. An attempt is made to connect problem solving opportunities to the real world, authentically embedded in activities. Problem solving should not be a ten minute activity at the end of a class period. Problems are a part of life. They become good or bad only in their interpretation by humans. Typically those who have little skill in solving problems tend to view them more negatively than those who have had substantial experience, guidance, and success with them. If constructivism can provide students with the necessary practice that encourages them to view problem solving as a chance to showcase their competency, it might possibly change the manner in which those students look at life as a whole. Problems are an opportunity for success for those who have the experience and skills to deal with them.

Constructivism changes the relationship between students and other human beings. Much like the move from the Ptolemy’s geocentrism to a heliocentric theory, constructivism moves away from the objectivist stance. There is no one ultimate reality that individuals should share. Rather, people act within the confines of the consensual domain changing their approaches as new information comes available. One human cannot advocate a single approach for all others to follow. Acting within this environment, students come to be more accepting of others theories and constructs of reality. Through the development of multiple perspectives, an appreciation for diverse philosophies is fostered. This changing relationship comes at a time when it is important to understand and appreciate cultural diversity. How different the outcome of political
strife between countries would be if those involved had a true understanding of the philosophies of the parties involved. Practicing the art of discourse, defending and explaining one’s beliefs, and coming to an understanding of the elements involved in one’s choices prepares one for human interaction both socially and vocationally.

While constructivism is well known as a theory of how we come to know, little has been done to document it as a theory of teaching (Jonesson, 1992). For constructivism to gain popularity, methods and instructional strategies need to be developed that assist those who have come from an objectivist tradition to switch. Three general principles should be kept in mind for those willing to try the transformation into constructivist methods of instruction. First, learners move from concrete exploration in a meaningful context to representations of those behaviors and then on to abstract models (Karmiloff-Smith & Inhelder, 1974). Second, learning is a matter of building from and with assimilatory structures. It is through dealing with these initial structures by way of filling gaps and settling inconsistencies that students reflectively abstract and accommodate. Finally, conceptual understanding, understanding capable of being deepened as models and ideas are extended to new situations, must be an aim. This varies from the conceptual understanding that is considered mastered because it is a dynamic notion which grows and changes with new information and experiences.

Constructivism coupled with the use of linguistic cognitive strengths in the curriculum transforms the roles and changes relationships for students and teachers. Teachers will have to reorient their instructional methods from the tradition of objectivism in which most developed. Several issues merit further research. Many having to do with the changes brought about by considering such a shift.
How will school systems, so accustomed to behavioral objectives and goals, cope with evaluative techniques that cannot be measured behaviorally. Even though it looks as if constructivism more closely resembles the nonschool environment than objectivism, what type of instruction would be necessary to convince school systems to adopt and implement it? How would these systems prove that they rated well against others in the race for high achievement test scores if there are no achievement scores? Are parents ready for their children to assume more autonomy at school and then perhaps expecting that same opportunity at home?

In the same vein, what type of setting could be developed that would allow for the study of constructivistic instructional techniques and their long term impact on students? Egan mentions that for a proper perspective students would have to begin in such an environment. Is the home environment so overwhelmingly permeated with traditional notions of education that beginning a program such as this would have to start with children before the development of language?

Of the school systems that have adopted constructivism, what problematic situations have they encountered? Are these districts experiencing similar difficulties? Do the problems stem from educators, parents, administrators, or the students? How have these systems gone about training their teachers and administrators. What research is necessary to determine the best way to foster in constructivism?

Additional research is necessary to have a full understanding of how school personnel, parents, and students feel about a proposed change in curriculum. Once there is an understanding of the perceptions concerning constructivism coupled with the use of
cognitive linguistic tools to assist in instruction, programs need to be developed that specifically address common concerns, misconceptions, and gaps in understanding. Further research and development should occur in the area of instructional design, calling upon constructivism and cognitive tools theory to bridge the space that exists for students who are introduced to these ideas for the first time in secondary education. The success or failure to reorient all the parties involved in such a major paradigm shift could lead to adoption or abandonment. Research into past communication of new educational theories, both those that have experienced success and those that have failed, might aid those interested in implementing constructivism.
**Appendix 1**

Comparing Constructivism and Objectivism

<table>
<thead>
<tr>
<th>Constructivism</th>
<th>Objectivism</th>
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</thead>
<tbody>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
</tr>
<tr>
<td>1. Separates itself from positivism and empiricism.</td>
<td>1. Impartial knowledge is possible.</td>
</tr>
<tr>
<td>2. Reality exists.</td>
<td>2. Material objects generate sense impressions thus creating objects of perception.</td>
</tr>
<tr>
<td>3. Origins are in the Piagetian theory of the mind.</td>
<td>3. Rooted in empiricist epistemology.</td>
</tr>
<tr>
<td>4. A post positive philosophy of science.</td>
<td>4. Scientific knowledge provides a picture of the world that corresponds to an absolute reality.</td>
</tr>
<tr>
<td>5. Knowledge is personally and socially constructed.</td>
<td>5. Knowledge is how well what one sees reflects the nature or essence of the object.</td>
</tr>
<tr>
<td>6. Science as knowledge is an intellectual construct.</td>
<td>6. Knowledge is passively received.</td>
</tr>
<tr>
<td>7. The laws of nature are the result of human activity.</td>
<td>7. Cognition is the discovery of an ontological reality.</td>
</tr>
<tr>
<td>8. Although the external world is assumed to exist, one does not have access to it.</td>
<td>8. Coming to know is a discovery of an independent, pre-existing world outside the mind of the knower.</td>
</tr>
<tr>
<td>9. Science as public knowledge is a carefully checked construction not a discovery.</td>
<td>9. Knowledge is independent of anyone’s beliefs or disposition to assert, assert, or act.</td>
</tr>
</tbody>
</table>
10. Truth is a viable construct, truth is viability. Viability is a form of consensual domain.
11. Knowledge is constructed through experiences and is an invention of the human mind.

10. Truth is describing absolute reality.
11. Knowledge is a discovery of external reality.

Comparing Constructivism and Objectivism

<table>
<thead>
<tr>
<th>Constructivism</th>
<th>Objectivism</th>
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<tbody>
<tr>
<td><strong>Learning</strong></td>
<td></td>
</tr>
<tr>
<td>1. Learning is a constructive activity that students themselves must carry out.</td>
<td>1. Children acquire knowledge by internalizing it from the outside.</td>
</tr>
<tr>
<td>2. Meaning is created by the learner as an active processor of information.</td>
<td>2. Learning is transmitting knowledge to a passive learner.</td>
</tr>
<tr>
<td>3. Learners elaborate upon and interpret given information.</td>
<td>3. Learning is a change in behavior.</td>
</tr>
<tr>
<td>4. Learning for students is how to problem solve and taking unconventional and unexpected paths to a solution is quite viable.</td>
<td>4. Learning is adopting the accepted predetermined path which results in the final correct answer</td>
</tr>
<tr>
<td>5. Students acquire knowledge by constructing it from the inside in interaction with their environment. Knowledge is always a result of a constructed activity.</td>
<td>5. Students acquire knowledge by internalizing it from the outside environment.</td>
</tr>
</tbody>
</table>

## Comparing Constructivism and Objectivism

<table>
<thead>
<tr>
<th>Constructivism</th>
<th>Objectivism</th>
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</thead>
<tbody>
<tr>
<td><strong>Teaching</strong></td>
<td></td>
</tr>
<tr>
<td>1. Negotiating the construction of meaning and understanding.</td>
<td>1. The instructor transmits the information to the learner.</td>
</tr>
<tr>
<td>2. Providing content for learning that supports both autonomy and relatedness.</td>
<td>2. Teaching is done in terms of sensory input provided by the instructor.</td>
</tr>
<tr>
<td>3. A social setting where the stress is on dialogue, conversation, argument, and justification of student and teacher opinions in a social setting.</td>
<td>3. Students passively receive information provided by the instructor.</td>
</tr>
<tr>
<td>4. Students are encouraged to strategically explore their errors as they apply and manipulate knowledge.</td>
<td>4. Assessment is based upon producing right answers. The method used is secondary to the final correct answer.</td>
</tr>
<tr>
<td>5. Students choose problems to solve.</td>
<td>5. Problem solving activities are predetermined.</td>
</tr>
<tr>
<td>6. The emphasis is on what matters rather than what is right and wrong.</td>
<td>6. The emphasis is on mirroring what is accepted as true.</td>
</tr>
<tr>
<td>7. Content is justified only on the grounds that it is currently accepted in the consensual domain. Facts are tentative.</td>
<td>7. Content is accepted as describing absolute reality.</td>
</tr>
<tr>
<td>8. Teachers are present to aid in the creation, synthesis, and interpretation of information.</td>
<td>8. Teachers impart the information to the learner</td>
</tr>
</tbody>
</table>

Appendix 2

Elements and Manifestation of Constructivism in the Curriculum

Elements

1. Student centered.
2. Problem Solving.
3. Learner interprets and Elaborates.
4. Learner is recognized as having Prior knowledge.
5. Interaction socially and with the environment.
6. Errors are Opportunities.

Manifestation

1. Integrated curriculum.
2. Entering the consensual domain.
3. Curriculum is not specified ahead of time.
4. Understanding multiple perspectives.
6. Apprenticeship.
7. Real world scenarios.
8. Evaluation is a process of explanation, performance, and effective planning.


Hillsdale, New Jersey: Lawrence Erlbaum Associates.
Appendix 3

Manifestation of Cognitive Tools in Development

<table>
<thead>
<tr>
<th>Mythic Period</th>
<th>Romantic Period</th>
<th>Philosophic Period</th>
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</thead>
<tbody>
<tr>
<td>5. Narrative</td>
<td>5. Transcendence of man</td>
<td>5. Social agents</td>
</tr>
<tr>
<td>7. Stories</td>
<td>7. Collecting</td>
<td>7. General schemes</td>
</tr>
</tbody>
</table>

Appendix 4

Evaluative Methods in a Constructivist Environment

1. Socially negotiated meaning.

2. Multiple perspectives and products.

3. Goal-free evaluation.

4. Authentic tasks and knowledge construction.

5. Process verses product.

References


