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Article

An Introduction to Constructivism and Authentic Activity

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Introduction

Most modern instruction and learning methods are premised on one of two cognitive paradigms, objectivism or constructivism (Denzin & Lincoln, 2005). Until the 'cognitive revolution' in psychology of the 60s (Voss, 1995), the dominant theory of instruction was behaviorism, which is based upon an objectivist epistemology (Kanselaar, 2002). This 'revolution' saw constructivism develop as a powerful challenge to behaviorist instructional design methodology and began a paradigm shift in educational design and practices away from 'traditional' methods (based upon behaviorist principles) toward those based upon 'constructivist' theories of learning. This paradigm shift is currently evolving in Japan as educational institutions strive toward more constructivist-based instruction (Monbusho, 2001; 2003). My own investigation of instructional methods that show promise toward facilitating learners' efficient and effective learning in such environments impelled me to review the history and structure of constructivist theory. In this article, I will provide a summary exploration of the literature of the two primary theories that make up the constructivist paradigm, focusing on the principle founding theorists and each theory's concept

of knowledge, learning, instruction, and motivation. This will be followed by a description and explanation of Authentic Activity, an important methodological construct in present day education, which evolved from constructivist design theory.

Constructivist theory

Constructivism is a theory that aims to explain what knowledge is and how it is acquired. The literature reveals that a general set of constructivist learning principles have evolved from the theory's initial development in the early 20th century to the present: a) that learning is an active process; b) that learning is a social activity; c) that learning is contextual; d) that learning consists both of constructing meaning and constructing systems of meaning; e) that prior knowledge is needed for an individual to learn; f) that learning involves language; g) that learning is a longitudinal, adaptive, recursive process; h) that the development of meaning is more important than the acquisition of a large set of concepts or skills; and, i) that motivation is essential for learning (see for example, Black, 1995; Brooks & Brooks, 1993; Brown et al., 1989; Bruner, 1966, 1978; Fosnot, 1996; Leont'ev, 1978; Newmann et al., 1995; Piaget, 1976; Resnick, 1985; Vygotsky, 1986).

The constructivist paradigm — which is made up of two major strands, *Cognitive* Constructivist Theory and *Social* Constructivist Theory, each with its own core emphases — is complex, with tightly interwoven explanations for phenomena in its many constituent parts. The literature reveals that much educational research and many variations of instructional design that make use of these constructivist principles, or that use the generalized terms *constructivist* or *constructivism* in their titles, co-opt elements from both strands of the paradigm (see Biggs, 1979; Cunningham, 1996). Table 1 below provides a summary

matrix of the two main cognitive theories.

Table 1: Summary matrix of constructivist theories

Concepts	Cognitive Constructivism	Social Constructivism
Principle Theorists	Piaget, Perry, Bruner	Vygotsky, Dewey
Concept of Knowledge	• Knowledge is actively constructed by individuals through a series of internal intellectual stages or steps.	• Knowledge is a product of social interaction (authentic tasks in meaningful, realistic settings).
Concept of Learning	• Learning is an ongoing effort to adapt to the environment through assimilation and accommodation. • Emphasis on identifying prerequisite relationships of content.	• Understandings are created by 'assembling' knowledge from diverse sources appropriate to the problem at hand. • Learners build personal, situation-specific interpretations of the world based on experiences and interactions, with the potential for development limited to the ZPD.
Instructional Strategies	• Links to prior knowledge • Explanations, demonstrations, examples • Schema Theory • Outlining & Concept Mapping • Generative Learning • Repetition • Interactivity • Corrective feedback	• Modeling • Problem-based learning • Scaffolding • Coaching • Collaborative learning
Concept of Motivation	Motivation is intrinsically driven	Motivation is intrinsically and extrinsically driven

Principle theorists

The development of present day constructivist theory is considered to originate in the work of two early 20th century contemporary epistemological theorists, Jean Piaget (1976) and Lev Vygotsky (1986), whose cognitive theories

of learning were developed as reactions to the dominant science of the time, Behaviorism. Piaget's research focused on the *cognitive* nature of constructivist learning, and Vygotsky's on its *social* nature. Numerous related learning theories and instructional methods have since evolved from their initial research (see for example, Social Learning Theory, Situated Learning, Anchored Instruction, Authentic Learning, Collaborative Learning and Inquiry- and Project-based Learning).

The Swiss biologist, philosopher, and behavioral scientist, Jean Piaget (1970; 1976), is considered the principle architect of *cognitive* constructivism, with a number of succeeding researchers offering variations on his structuralist approach to cognitive and educational psychology. Jerome Bruner's cognitive constructivist theory (1960; 1966; 1996), which closely follows Piaget's theory and which has brought many of its ideas into the working education world, continues to have considerable influence on educational research and practice since its development in the early 60s.

The principle architect of *social* constructivism is the Soviet psychologist, Lev Vygotsky. Vygotsky (1986) and his colleagues formulated a *Sociohistorical Theory of Psychological Development*, which argues that social interaction plays a fundamental role in the development of cognition (Cole, 1978; Engeström et al., 1999; Wertsch, 1985). As with Piaget, numerous subsequent researchers have developed theories that represent variations on Vygotsky's sociohistorical approach (see for example, Bandura, 1986; Engeström et al., 1999; Lave & Wenger, 1991; Leont'ev, 1978; van Lier, 2000). It is widely recognized that much of the American psychologist and philosopher John Dewey's (1933; 1944) early 20th century progressive educational reform work, which presaged many of Vygotsky's theoretical principles, paved the way for the

widespread acceptance of Vygotsky's works upon their introduction to the West in the early 60s (Huitt, 2004; Vanderstraeten, 1998).

Cognitive and social constructivist principles

Cognitive constructivism is a *structuralist* learning theory that explains how a learner develops knowledge of his or her world through staged, mental adaptation (Bruner, 1960; Piaget, 1970; 1976). It argues that optimal learning environments are those that provide dynamic interaction between instructors and learners, and that have sequenced, recursive tasks that allow opportunities for learners to build a mastery of knowledge and skills through a process of stepped reflective interpretation (Gruber, 1995).

Social constructivism, in contrast, is a cognitive theory of learning that argues that learning is a *situated*, social, and collaborative activity in which learners are responsible for constructing their own knowledge (Vygotsky, 1986). It asserts that optimal learning environments are those in which a dynamic interaction between instructors, learners and tasks provide opportunities for learners to construct their own knowledge through social interaction with others. Excepting the specifically social aspect of learning, social constructivism shares many similarities and overlaps with cognitive constructivism.

Concept of knowledge

Piaget's cognitive constructivism asserts that knowledge is a result of a mechanism of self-construction that processes existing mental representations to obtain an equilibrium between the existing mental representations and new environment (Huitt, 2004). Knowledge is seen as something that individuals actively construct through a series of intellectual stages or steps (Bruner, 1960; Piaget, 1970) or positions (Perry, 1968) based on their existing cognitive structures rather than as something passively absorbed. Learners use such factors as

their existing knowledge, their particular stage of cognitive development, cultural background and personal history, to interpret new information or experience and adapt it to their existing mental representations (Bruner, 1960; Piaget, 1976). In Bruner's (1991; 1990; 1986) more recent work, he has expanded his theoretical framework to encompass the social and cultural aspects of learning, bringing his theory closer to social constructivism.

Social constructivist theory, in contrast, maintains that knowledge is structurally and internally formulated by learners in response to interactions with their environment. Social constructivist theory maintains that because language and culture are the frameworks through which humans experience, communicate, and understand reality cognitive structures must be explained as products of social interaction (Vygotsky, 1986).

Concept of the learning process

Piaget (1970; 1976) believes that individuals learn by finding, organizing, and assimilating knowledge into the information they already have. His theory asserts that individuals posses a innate mechanism driven by biological impulse that allows them to interact with, and *adapt* to, the environment, and that this adaptation is a continuous activity of self-construction. For Piaget, the adaptation occurs through the processes of assimilation and accommodation. As a person interacts with the environment, knowledge is formed into mental structures. When differences between existing mental structures and the environment occur, one of two things can happen: 1) the perception of the environment can be changed to match existing mental structures (*assimilation*), or 2) the mental structures themselves can change (*accommodation*). In either case, the individual adapts to the environment through the interaction and knowledge develops through the adaptation and organization of mental representations (Driscoll,

1994; Huitt, 2004). Piaget believes that this active ongoing adaptation produces increasingly complex mental organization, which results in the formation of the adult mind (Huitt, 2004).

In contrast to cognitive constructivist theory, in which learning is considered to be the internal assimilation and accommodation of information, social constructivist theory uses social interaction as the framework for all learning and development. According to Vygotsky (1986):

> Every function in the child's cultural development appears twice: first, on the social level and, later on, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals. (57)

Vygotsky asserts that two levels of mental functions exist, elementary functions, such as sensing, with which we are born, and higher functions, which include self-generated stimulations such as memory, attention, abstraction, and language (Cole, 1978). The transition from elementary to higher mental functions is accomplished through the individual's use of cultural tools, which Vygotsky claims are semiotic in nature (Wertsch, 1991). Such tools are not inherited genetically, but are instead developed and preserved in our culture as signs, symbols, numbers, musical notation, writing, pictures and, the most universal of all tools, language (Galina, 2004). Children initially develop these tools to serve solely as social functions, ways to communicate needs. Vygotsky believes, however, that it is their continual internalization that leads to higher thinking skills. In summary, Vygotsky's social constructivist theory is based upon the view that humans create culture through the use of tools, and culture, in turn, dictates what is valuable to learn and how it is learned. In this view, society (culture)

becomes the driving force behind cognitive development. Cognitive development is the internalization of culture (social functions) and the conversion of those social functions into (higher) mental functions.

An essential tenet of Vygotsky's (1986) theory is the assertion that each person has an individual range for potential cognitive development known as is the "zone of proximal development" (ZPD). In social-constructivist thought, the goal of educators is to promote work that falls within the learner's ZPD and that extends the learner's area of self-regulation by drawing them into challenging but attainable areas of problem solving (Cole, 1978; van Lier, 2000). Wood, Bruner, and Ross (1976), in their elaboration of the role of tutoring on problem-solving behavior, developed a supportive instructional mechanism known as *scaffolding*, arguing that the social context of tutoring goes beyond modeling and imitation and "…involves a kid of "scaffolding" process that enables a child or novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts" (90) (see Figure 1). Since the mid-80s, the concept of scaffolding has been adapted to any number of processes whereby a teacher moves students to independent use of skills and concepts while gradually fading his or her assistance. Donato (1994) offers a succinct working definition of the term:

> Scaffolding is a mechanism whereby in social interaction a knowledgeable participant can create, by means of speech, supportive conditions in which a novice can participate in, and extend, current skills and knowledge to higher levels of competence. (40)

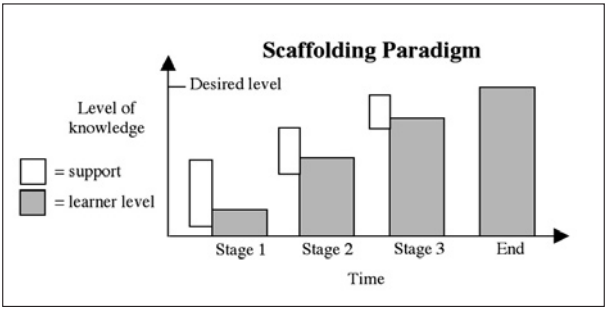

Figure 1: Scaffolding paradigm

Duffy and Cunningham (1996: 183) report that some critics of the scaffolding metaphor claim that its rigid use of structure is 'objectivist' in nature and therefore conflicts with constructivism in general. The critics claim that with scaffolding the instructor chooses and arranges the environment to help the learner acquire prespecified knowledge. Duffy and Cunningham (ibid) have responded that scaffolding is not a teaching environment in which knowledge is transmitted, but rather is a *learning* environment in which knowledge is learned through the process of mediated and collaborative participation.

Aside from the basic background on the concept of scaffolding provided above, literature related to it consists of an extensive range of interpretations of how the concept has been applied to various learning and instructional situations, an exhaustive listing of which is outside the scope of this summary review. Because the concept of scaffolding has become a fundamental element of the constructivist paradigm, most literature devoted to applications of core constructivist principles in instructional or learning processes include as part of their explanation a treatment of the concept. For a representative sampling of literature concerned with scaffolding as it has been applied to various instructional domains, see for example Hogan and Pressley's (1998) comprehensive

guide to the development of instructional approaches that utilize scaffolding, Wenger's (1998) explanation of scaffolding's role in communities of practice, Lantolf's, (2000) discussion of the role of scaffolding in sociocultural theory and L2 learning, Turner & Berkowitz's (2006) application of scaffolding to the instruction of moral development and character education, Azevedo, et al., (2004) and Puntambekar & Hubscher's (2005) recent work on scaffolding's role in hypermedia applications, and Donato's (1994), DeGuerrero & Villamil (2000) and Cotterall's (2003) research on the use of scaffolding in L2 contexts.

Concept of instruction

A key element of cognitivist instruction strategies is an emphasis on the formation of connections between new and prior knowledge (Piaget, 1976). As learners are believed to 'construct' their own knowledge, constructivist teaching methods should present a hands-on environment that encourages exploration while facilitating learners' adaptation of new information into existing knowledge (Fosnot, 1989; Huitt, 2004; Resnick, 1986; Sigel, 1978). To do this, instructors must first take into account their learners' knowledge levels, and then use this information to determine how to present, sequence and structure new learning material and tasks (Fosnot, 1989, 1996; Resnick, 1986).

Social constructivist theory, in contrast to cognitive constructivism, maintains that language and culture are the frameworks through which humans experience, communicate, and understand reality. Instructional strategies that support this are based upon a minimal number of characteristics or guidelines: a) that cognitive development is situated in a social context; b) that language plays a central role in cognitive development; c) that instruction provides experiences that are in advance of a learner's independent functioning but still within his/her ZPD; and d) that instructors encourage and create opportunities for collabora-

tion and problem solving (Brooks & Brooks, 1993; Brown et al., 1989; CTGV, 1993; Fosnot, 1989; Vygotsky, 1986).

Concept of motivation

Throughout their works, cognitive constructivists Piaget, Bruner, and others (see for example, Kegan, 1982; Perry, 1968) continually stress that learning requires significant personal investment on the part of the learners because it is an ongoing process of active discovery in which the learner is continually setting new goals and modifying or abandoning existing cognitive structures. Such personal investment is thought by them to be driven by intrinsic motivation as external rewards and punishments such as grades are considered to be to be insufficient motivators to effectively maintain such activity.

Social constructivism, in contrast, sees motivation as both extrinsically *and* intrinsically driven. Social constructivism asserts that because learning is a social phenomenon, learners are partially motivated by the extrinsic rewards provided by the knowledge community into which they are being integrated; however, because knowledge is actively constructed by the learner, learning depends to a significant extent on the learner's internal drive (intrinsic) to understand and promote the learning process. Furthermore, Deci & Ryan (2001; 1985; 2002; 1999) report that external motivators, which initially lay outside a learner's 'locus of control' (deCharms, 1981), may become internalized or co-opted into a learner's intrinsic motivation schema depending upon various personal and cultural factors.

Contrasting methods of instruction

As was mentioned at the outset of this article, most modern instruction and learning methods are premised on one of two cognitive paradigms, objectiv-

ism or constructivism (Denzin & Lincoln, 2005). The foundations of modern day constructivism can be found in the learning theories of Piaget, Vygotsky and Dewey, but the influence of these theories on instruction did not become widespread until after the 'cognitive revolution' in psychology of the 60s was well under way (Voss, 1995). This 'revolution' saw constructivism develop as a powerful challenge to the dominant theory of behaviorism, which is based upon an objectivist epistemology (Kanselaar, 2002). Educational psychologist Lauren Resnick's (1988) 1987 address to the American Educational Research Association, in which she outlined the major criticisms of 'traditional' education in America, marks a signal point in a paradigm shift in educational design and practices away from 'traditional' methods toward those based upon 'constructivist' theories of learning. Important in effecting this paradigm shift was Barr and Tagg's (1995) celebrated "Learning Paradigm" article, which began,

> A paradigm shift is taking hold in American higher education. In its briefest form, the paradigm that has governed our colleges is this: A college is an institution that exists to provide instruction. Subtly but profoundly we are shifting to a new paradigm: A college is an institution that exists to produce learning. This shift changes everything. It is both needed and wanted. (13)

In this article, the authors define the general state of higher education in America and offer their speculation about how such a pedagogical paradigm shift might play out in shaping future educational design, practices and outcomes. Fear (2003, p. 152) writes that although there was already a longstanding, deep, and diverse literature about learner- and learning-centered education at the time of their publication, Barr & Tagg's article is credited with establishing a widely accepted label and image of a constructivist "learning paradigm." In their contrast of the constructivist *learning* paradigm with the traditional *instructional* paradigm, Barr & Tagg succinctly summarized the central ideas at

work in both paradigms and offered an easy-to-read, systematic framework and proposal for how to proceed with the transition to learner-centered and learning-centered education. The impact that such critical literature (see also, Biggs, 1996; Herrington & Oliver, 2000; Herrington et al., 2002; Jonassen, 1996a; Jonassen, 2004; Resnick, 1988; von Glasersfeld, 1989) effected is evident in the present state and direction of constructivist educational design in the West, influences of which are now being felt in the Japanese educational environment (Monbusho, 2003). As 'traditional' and 'constructivist' instructional design and methods are central to an overall discussion of constructivism, I will provide summary definitions and matrixes of both approaches below.

Traditional

Traditional instructional methods appear throughout the literature under a number of different labels; for example, *the behaviourist model of instruction*, the *transmission method*, *the quantitative method*, *teacher-fronted teaching or learning*, *teacher-centered teaching or learning* (e.g., Bigge & Shermis, 1999; Tynjala, 1999). Though these approaches to teaching and learning vary, they share a common foundation in objectivist educational principles. In traditional approaches, instructors assume an overall responsibility for the activities and information content that the learners engage in within the classroom. The instructor's responsibility is to package the knowledge as carefully as possible so as to ensure the efficient digestion of the content by the learners. In general, the students' role is restricted to passively absorbing the knowledge offered by the instructor. In such approaches, the *locus of control* (deCharms, 1981) and the manner in which knowledge is processed lies with the instructor, with learners attempting to reproduce *correct* answers based upon the knowledge transmitted by the instructor (e.g., Brooks & Brooks, 1993; Cuban, 1983; Schuh, 2004).

Constructivist

As was discussed earlier, 'constructivist' is a generalized term that indicates that a pedagogy is grounded in either cognitive or social constructivist theory, or a hybridized form of them. Constructivist methods of instruction and learning are variously labeled in the literature as *student-centered, authentic, problem- or project-based, cooperative, collaborative, inquiry-based, transformative, generative, situated, anchored* (e.g., Brooks & Brooks, 1993; Fosnot, 1996; Gagné, 2005; Tynjala, 1999). Although these methods express a diversity of approaches to instruction and learning, they share a common foundation in constructivist educational principles that assert that learning is a situated, social, and collaborative activity in which learners are responsible for constructing their own knowledge by testing concepts based on their prior knowledge and experience (Bruner, 1996; Collins et al., 1989). In contrast with traditional approaches, constructivist approaches place the locus of control and the manner in which knowledge is processed with the learner, who is encouraged to generate self-relevant knowledge through critical, interactive and collaborative inquiry. To illustrate key differences between the paradigms, I provide an outline by Jonassen et al. (1999) that illustrates the fundamental differences between traditional and constructivist views of learning and instruction through a contrast of their attributes of knowledge, reality, meaning, symbols, learning and instruction (see Table 2 below).

Table 2: Traditional and constructivist differences *(from Jonassen, et al., 1999)*

Attributes	Traditional	Constructivist
Knowledge	Transmitted, external to knower, objective, stable, fixed, decontextualized.	Constructed, emergent, situated in action or experience, distributed.
Reality	External to the knower.	Product of mind.
Meaning	Reflects external world.	Reflect perceptions and understanding of experiences.
Symbols	Represents word.	Tools for constructing reality.
Learning	Knowledge transmission, reflecting what teacher knows, well-structured, abstract-symbolic, encoding-retention-retrieval, product-oriented.	Knowledge construction, interpreting word, constructing meaning, ill-structured, authentic-experiential, articulation-reflection, process oriented.
Instruction	Simplify knowledge, abstract rules, basics first, top-down, deductive, application of symbols (rules, principles), lecturing, tutoring, instructor derived and controlled, individual competitive.	Reflecting multiple perspectives, increasing complexity, diversity, bottom-up, inductive, apprenticeship, modeling, coaching, exploration, learner-generated.

Moursund (2003) provides more detailed comparisons between traditional and constructivist teaching and learning environments, showing the differences in terms of educational components in three areas of learning and instruction: curriculum (Table 3), instruction (Table 4), and assessment (Table 5).

Table 3: Traditional and constructivist differences: Curriculum

Educational Component	Traditional Curriculum	Constructivist- based Curriculum
Concept of knowledge	Facts. Memorization. Discipline specific. Lower-order thinking skills.	Relationship. Inquiry and Invention. Higher-order thinking skills. Solve complex problems, drawing on multiple resources over an extended period of time.
IT as content	Taught in specific time blocks or courses that focus on IT.	Integrated into all content areas as well as being a content area in its own right.
Information sources	Teacher, textbooks, traditional reference booksand CD-ROMs, use of a limited library, controlled access to others information.	All previously available information sources. Access to people and information through the Internet and Word Wide Web.
Information-Processing aids	Paper, pencil, and ruler. Mind.	All previously available aids to information processing. Calculator, computer.
Time schedule	Careful adherence to prescribed amount of time each day on specific disciplines.	Time scheduling is flexible, making possible extended blocks of time to spend on a project.
Problem-solving, higher-order thinking skills	Students work alone on problems presented in textbooks. Problems are usually of limited scope. Modest emphasis on higher-order thinking skills.	Students work individually and collaboratively on multidisciplinary problems. Problems are typically broad in scope, and students pose or help pose the problems. Substantial emphasis on higher-order thinking skills.
Curriculum	Focus on specific discipline and a specific, precharted pathway through the curriculum.	Curriculum is usually interdisciplinary, without a precharted pathway. Different students study different curriculum.

(Moursund, 1999, pp. 20-21)

Table 4: Traditional and constructivist differences: Instruction

Educational Component	Traditional Instruction	Constructivist-based Instruction
Classroom activity	Teacher-centered. Teacher driven. Teacher is responsible for "covering" a set of curriculum.	Learner-centered (student center). Cooperative. Interactive. Student has increased responsibility.
Teacher role	Dispenser of knowledge. Expert. Fully in charge.	Collaborator, facilitator, learner.
Teacher-student instruction	Teacher lectures and ask questions, student recite.	Teacher works with groups.
Instruction	Lecture/demonstration with quick recall and student recitation of facts. Seatwork, quizzes, and exams. Single-discipline oriented. "Sage on the stage".	"Guide on the side". Mentoring. Discovery-based learning. Peer instruction & collaboration. Interdisciplinary orientation.
Technology Use	Computer-assisted learning (drill and practice, tutorial, simulations). Tools used for amplification.	Communication, collaboration, information access, information processing, multimedia documents and presentations.
Physical layout of classrooms	Chairs arranged in rows in a fixed format. Chairs may be bolted to the floor.	Movable furniture to facilitate easy regroupings of furniture and students.

(Moursund, 1999, p. 21)

Table 5: Traditional and constructivist differences: Assessment

Educational Component	Traditional Assessment	Constructivist-based Assessment
Student role as a learner	Listener (often passive). Quiet, well behaved. Raises hand when prepared to respond to a teacher's question. Studies directed toward passing tests and completing required work.	Collaborator, teacher, peer evaluator, sometimes expert. Actively engaged. Active learning. Problem poser. Active seeker after knowledge. Students learn as they help each other learn.
Demonstration of success	Quantity and speed of recall.	Quality of understanding.
Use of technology during assessment	Allow simple tools, such as paper, pencil, and private, shared only with the teacher. Occasional oral presentation.	Students assessed in environment in which they learn.
Student work-products	Most student work-products are written and private, shared only with the teacher. Occasional oral presentation.	Most student work-products are public, subject to review by teachers, peers, parents, and others. Multiple forms of products.
Assessment	Norm referenced. Objective and short answer. Focus on memorization of facts. Discipline specific. Lower-order thinking skills.	Criterion referenced. Authentic assessment of products, performances, and presentations. Portfolio. Self-assessment. Peer assessment.

(Moursund, 1999, p. 22)

The Authentic-Constructivist connection

The term 'authentic,' as it is relevant to educational psychology and instructional practices, appears in the literature with two distinct definitions and uses. In L2 instruction, though not restricted to it, 'authentic' is commonly used as a synonym for classroom *realia* — any material not specifically designed for instruction (e.g., newspapers, movies, song lyrics) (see for example, Candlin et al., 1982; Nunan, 1993; Porter & Roberts, 1981). With regard to literature on constructivist instructional design, the term 'authentic' has a more compli-

cated meaning, history and use. This is due largely to its neologistic origins in Cognitive Apprenticeship Theory (Brown et al., 1989), a construct that emanated from both strands of the constructivist paradigm.

Literature concerned with the constructivist concept 'authentic' or 'authenticity' covers many different fields of learning. I will first provide a graphic (see Figure 2) that broadly illustrates the theoretical lineage of the concept of

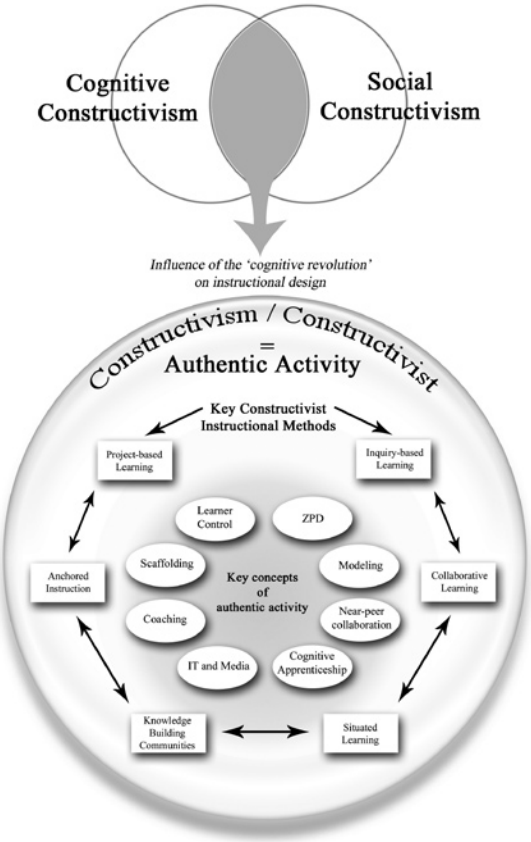

Figure 2: Authentic Activity

'Authentic Activity' including key instructional methods and activity concepts associated with it. This will be followed by an historical overview of the literature that reveals the origins and definition of the concept as well as that which illustrates the fields which served to bring it into widespread use and acceptance as a constructivist instructional design concept. Finally, I provide a 10-point concept-and-source summary framework that synthesizes characteristics of authentic activities and learning environments that currently serve to guide to instructional designers and educators (see Table 6).

The literature reveals that the late 1980s produced a watershed of development in cognitive research. Drawing on the wave of late 80s research into cognition as it is manifested in everyday activity (e.g., Lave, 1988; Palinscar & Brown, 1984; Resnick, 1988; Rogoff & Lave, 1984; Slavin, 1983; von Glasersfeld, 1989), educational researchers, Brown et al. (1989), proposed a constructivist approach to instruction called *cognitive apprenticeship* as an alternative to conventional educational practices based on the transmission paradigm of instruction. The authors argued that their theory of cognitive apprenticeship marked the beginning of a new theoretical perspective for successful learning, one they claim cognitive theorists had, to date, been unable to adequately explain. In clarifying terminology for their theory, they codified "authentic" as those activities that are situated in a social framework and whose coherence, meaning, and purpose are "…socially constructed through negotiations among present and past members" (34). This is the earliest appearance in constructivist literature for the neologism, *authentic*. The term has since developed widespread use and extended meaning with regards to instructional design premised on elements from both strands of the constructivist paradigm.

Proponents of cognitive apprenticeship theory assert that masters of a skill often

fail to take into account the implicit processes involved in performing skills when teaching them to novice learners (see for example, Brown et al., 1989; Collins et al., 1987; Lave & Wenger, 1991). To confront this tendency, they assert that 'cognitive apprenticeship' is designed to bring such tacit "…processes into the open, where students can observe, enact, and practice them with help from the teacher…" (Collins et al., 1989, p. 456). As with traditional apprenticeships in which the apprentice learns by working under a master, 'cognitive apprenticeship' allows the instructor (master) to model behaviors in a real-world context by means of cognitive modeling (Bandura, 1977). By following the instructor's explanation as the learner looks at the model, s/he can identify relevant behaviors and develop a conceptual model of the component processes involved. The learner then attempts to imitate those behaviors with the instructor observing, and if needed, offering 'coaching.' Coaching includes additional modeling as necessary, corrective feedback, and reminders, all intended to bring the learner's performance as close to the instructor's as possible. The coaching technique provides assistance at the most critical point in the learning process, the ZPD — the skill level just beyond what the novice learner could accomplish by him/herself (Cole, 1978). As the learner becomes more skilled through the repetition of this process, the instructor 'fades' the coaching until the learner is, ideally, independently performing the skill at a level approximating that of the instructor (Bandura, 1977). Modeling and coaching techniques share many similarities with Bruner (1975) and Wood et al.'s, (1976) process of *scaffolding* and the function of *near peers*. Brown et al. (1989) claim that with the contextualization of learning that occurs in cognitive apprenticeships "…situations might be said to co-produce knowledge through activity…[because]…learning and cognition…are fundamentally situated" (32). The conveyance of the success of this early research dealing with constructivist learning situations in the literature was instrumental in further directing cognitive and educational research

away from traditional, decontextualized instruction and learning practices and into the realm of authentic learning (Oxford, 1997).

The Cognition and Technology Group at Vanderbilt (CTGV) (1993), under the direction of John Bransford (1990), continued research into the situated nature of authentic learning environments (ALEs) with the development of *anchored instruction* techniques for media-based learning materials. Anchored instruction is formulated upon both Lave and Wenger's (1991) theory of situated learning, which emphasizes learning in situated contexts, and Spiro et al.'s (1992) cognitive flexibility theory, which emphasizes the spontaneous restructuring of knowledge in adaptive response to radically changing situational demands. Bransford's (1990; CTGV, 1993) 'anchors' consisted of stories, placed on interactive videodiscs, that encouraged learners to explore complex problem-solving scenarios that were 'situated' in interesting, realistic contexts (i.e., authentic) as a means to promote the active construction of knowledge. Anchored instruction has been found to be an effective instructional design because of its context-dependency and stress on the importance of giving learners opportunities to construct their own knowledge from the presentation of information from multiple perspectives.

With the continuing proliferation and growing ubiquity of information and communication technology in both educational and industrial learning environments in recent years, the research literature has been dominated by issues concerned with how best to contextualize, or 'situate' learning in media-based problem-solving (Jonassen, 1996b). An overview of this literature reveals that there are a number of major themes concerning researchers and educators as they attempt to further understand the interplay between authenticity and the learning environments and materials that make use of emerging technologies (e.g., interactive

software and videoware, web-based intelligent tutoring, elearning applications); in addition, within these themes research covers a wide range of topics. Primary themes include media-based problem-solving instructional design methodology (Jonassen, 2000; 2003a; 2003b), issues concerning cognitive load and achievement levels in such environments (Mayer, 2001; Slavin, 2006), the design and implementation of IT-based constructivist problem-solving learning environments (see for example, Herrington & Oliver, 2000; Herrington et al., 2002; Oliver, 1999; Reeves et al., 2002; Reeves, 1996), educational technology and knowledge-building communities (see for example, Cathcart & Samovar, 1992; Hirokawa, 1992; Scardamalia, 1994; Scardamalia, 2002; Scardamalia et al., 1989), values inherent in authentic IT-based learning environments (Gulikers et al., 2005) and lastly, the efficacy of online inquiry-based mechanisms (e.g., WebQuests) for self-regulated learning (Dodge, 1997; Marzano, 1992). The literature also reveals that concerns exist about the manner in which the term 'authentic' is being used in such learning environments (Gillespie, 1998; Petraglia, 1998). Petraglia (1998) focuses the argument as such:

> Constructivist educational technologists have been guided by the implicit (and increasingly explicit) desire to create "authentic" environments for learning: environments that correspond to the real world….I argue that technologists have tended to paper over the critical epistemological dimension of constructivism by "pre-authenticating" learning environments: creating environments that are predetermined to reflect the real world even though constructivist theory contraindicates precisely this. (1)

Kupritz and McDaniel (1999) counter this concern by claiming that such generalizations confuse the contextual role of information resources (e.g., the Internet and the World Wide Web) with the contextual level of instruction needed to communicate meaning. They state that "…the question is not just the real world context that students have ready access to, but also, in what social and physical

context is learning being delivered" (120).

Research literature concerning authentic *non*-technology-based classroom instructional design is as equally broad as that of technology-based literature as constructivist pedagogies continue to diffuse into various educational domains. Though more than 10 years have passed since its publication, Oxford's (1997) *Constructivism: Shape-Shifting, Substance, and Teacher Education Practices* still provides perhaps the most comprehensive overview of issues related to authentic *non*-technology-based instructional design and practices, focusing primarily on questions of epistemological interpretation within constructivist theories, and the great many variations of constructivist instructional practices that have proliferated. In addition, the work of Resnick (1986; 1989; 1991), Brooks (1993), Newmann (1996; 1996; 1995), Moll and Greenburg (1990), Wiggins (1993), and Nicaise (2000) amply serve to illustrate the major themes in the literature, broadly focusing on the development of authentic curriculum design, assessment, and learner and instructor perceptions of ALEs.

As constructivist-authentic practices have diversified, developed and matured, the literature (most notably, Brooks & Brooks, 1993; Herrington & Oliver, 2000; Newmann et al., 1996; Reeves et al., 2002) has begun to reveal a catalog of defining characteristics for ALEs. I have synthesized this catalog of characteristics into a 10-point concept-and-source matrix, elements of which have informed the present study (see Table 6 below).

Table 6: 10-point concept and source matrix for ALEs

Authentic Concept	Supporting authors, researchers and theorists:
1. Authentic activities have real world relevance: Activities match as nearly as possible the real world tasks of professionals in practice rather than decontextualized or classroom-based tasks.	Bandura, 1986; Bransford et al, 1990; Brooks & Brooks, 1993; Brown et al., 1989; Bruner, 1960; Collins et al, 1989; CTGV, 1993; Honebein et al, 1993; Jonassen, 1991, 2000, 2003; Lave & Wenger, 1991; Moll & Greenburg, 1990; Piaget, 1976; Newmann, 1999; Resnick, 1989; von Glasersfeld, 1989; Vygotsky, 1986.
2. Authentic activities consist of ill-defined challenges: Problems inherent in the activities are ill-defined and open to multiple interpretations. Learners must reflect and make judgments in order to define the tasks and sub-tasks needed to complete the activity.	Bransford et al, 1990; Brown et al, 1989; Chi et al, 1989; Collins et al, 1989; CTGV, 1993; Fosnot, 1996; Moll & Greenburg, 1990; Tynjala, 1999; Vygotsky, 1986; Winn, 1993; Young, 1993.
3. Authentic activities comprise complex tasks to be investigated by students over a sustained period of time: Activities are completed in days, weeks and months rather than minutes or hours. They require significant investment of time and intellectual resources.	Bandura, 1986; Brooks & Brooks, 1993; Brown et al., 1989; Bruner, 1960; CTGV, 1993; Jonassen, 1991; Moll & Greenburg, 1990; Newmann, 1999; Piaget, 1976; Vygotsky, 1986.
4. Authentic activities provide opportunities for learners to examine the task from different perspectives, using a variety of resources: The tasks afford learners opportunities to examine problems from a variety of theoretical and practical perspectives, rather than allowing a single perspective that learners must imitate to be successful. The use of a variety of resources rather than a limited number of preselected references challenges learners to detect relevant from irrelevant information.	Bandura, 1986; Bransford et al, 1990; Brooks & Brooks, 1993; Brown et al., 1989; Bruner, 1960; Collins et al, 1989; CTGV, 1993; Duffy, 1993; Fosnot, 1996, Honebein et al, 1993; Jonassen, 1991, 2000, 2003; Lave & Wenger, 1991; Moll & Greenburg, 1990; Piaget, 1976; Newmann, 1999; Resnick, 1989; Tynjala, 1999; von Glasersfeld, 1989; Vygotsky, 1986.
5. Authentic activities provide opportunities for collaboration: Collaboration is integral to the task, both within the course and the real world, rather than achievable by an individual learner.	Bandura, 1986; Boekearts, 2006; Brown et al, 1989; Bruner, 1960; Cathcart & Samovar, 1992; Chi et al, 1989; Collins et al, 1989; Johnson & Johnson, 1989; Lowyck, 2001; Moll & Greenburg, 1990; Newman, 1999; Scardamalia, 1994; Slavin, 1987, 1990; Vygotsky, 1986;
6. Authentic activities provide opportunities for reflection: Activities need to enable learners to make choices and reflect on their learning both individually and socially.	Bandura, 1986; Boekearts, 2006; Brooks & Brooks, 1993; Bruner, 1966; Chi & Van Lehn, 1991; Fosnot, 1996; Jonassen, 2000, 2003; Lave & Wenger, 1991; Newmann, 1996, 1999; Piaget, 1976; Vygotsky, 1986; Young, 1993.
7. Authentic activities encourage interdisciplinary perspectives: Task knowledge can be integrated across subject areas thus building robust expertise rather than knowledge limited to a single well-defined field or domain.	Boekearts, 2006; Dodge, 1997; Fosnot, 1996; Jonassen, 1991; Marzano, 1992; Newmann, 1999; Perkins, 1991; Scardamalia, 1994; von Glasersfeld, 1989.
8. Authentic activities are seamlessly integrated with assessment: Assessment of activities is seamlessly integrated with the major task in a manner that reflects real world assessment, rather than separate artificial assessment removed from the nature of the task.	Brooks & Brooks, 1993; Bruner, 1966; Darling-Hammond, 2000; Herrington & Herrington, 1998; Lave & Wenger, 1991; Newmann, 1995, 1999; Wiggins, 1993.
9. Authentic activities create polished products valuable in their own right rather than as preparation for something Activities culminate in the creation of a whole product rather than an exercise or sub-step in preparation for something else.	Brooks & Brooks, 1993; Bruner, 1966; Fosnot, 1996; Lave & Wenger, 1991; Newmann et al, 1996, 1999.
10. Authentic activities allow competing solutions and diversity of outcome: Activities allow a range and diversity of outcomes open to multiple solutions of an original nature, rather than a single correct response obtained by the application of rules and procedures.	Brooks & Brooks, 1993; Collins et al, 1989; Chi et al, 1989; Bransford et al, 1990; Fosnot, 1996; Johnson & Johnson, 1990; Lave & Wenger, 1991; Tynjala, 1999.

Concluding comments

The discussion of the history and structure of constructivism and authenticity presented here was intended not as an exhaustive explanation of these concepts, but rather as an introductive overview. As constructivist pedagogies continue to both diffuse into various educational domains and evolve, readers from various fields will need to make their own more detailed investigations into constructivist theoretical developments.

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