Constructivism in Education: An overview of contributions to the literature and to the *JPACTe* annotated bibliography

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Abstract

Constructivism in education has evolved over the past century due to the contributions of many individuals in the U. S. and abroad. This article provides an overview of the contributions of theorists, researchers, and educators most closely associated with its rise in the field of education. The article also provides an outline and guide to the annotated bibliography on constructivism in education on the *JPACTe* website.

Introduction

This article provides an overview of the development of constructivist theory in education. It traces the roots of constructivism in the areas of educational philosophy, cognitive theory, research on teaching, the "social curriculum," professional development and brain research. The article also provides an annotated bibliography aligned with these topics.

Defining Constructivism in Education

Constructivism allows us as, as educators, the conceptual tools with which to view our students and how they learn in a way that is congruent with best practice. Until recently, "best practice" has been defined by traditional behaviorist definitions focused on student academic outcomes; constructivist "best" practice is a relatively new focus of research. "Constructivist best practice" in the past has been defined by practitioners and those observing them: by teacher anecdotal evidence, clinical observation, the success of affective and social teaching, and, increasingly, the positive relationship of constructivist teaching and academic success (Zins, Weissberg, Wang, & Walberg, 2004). Constructivism requires that we understand that "(M)eaning is not given to us in our encounters, but it is given *by* us, constructed by us, each in our own way, according to how our understanding is currently organized." (Duckworth, 1987, p. 112) (emphasis

added). “Constructivism” refers to the process by which human beings actively make sense out of the world around them-- to “understand” (Wiske, 1998). “Understanding” in a constructivist universe is an individual’s learning process and goal, and it is always contextualized. “Knowledge,” as facts or items to be remembered, plays a secondary role to the understanding that is the heart of the constructivist teaching and learning endeavor (Wiggins & McTighe, 1998).

Constructivism requires that we reflect on all aspects of the teaching in which we engage; as educators, we are learners ourselves. We must examine our planning, our use of external standards, the materials we use, the environment in our classroom, our own attitudes and expectations, and especially, the needs of our students, whether they be children or teachers (Sparks, 1994).

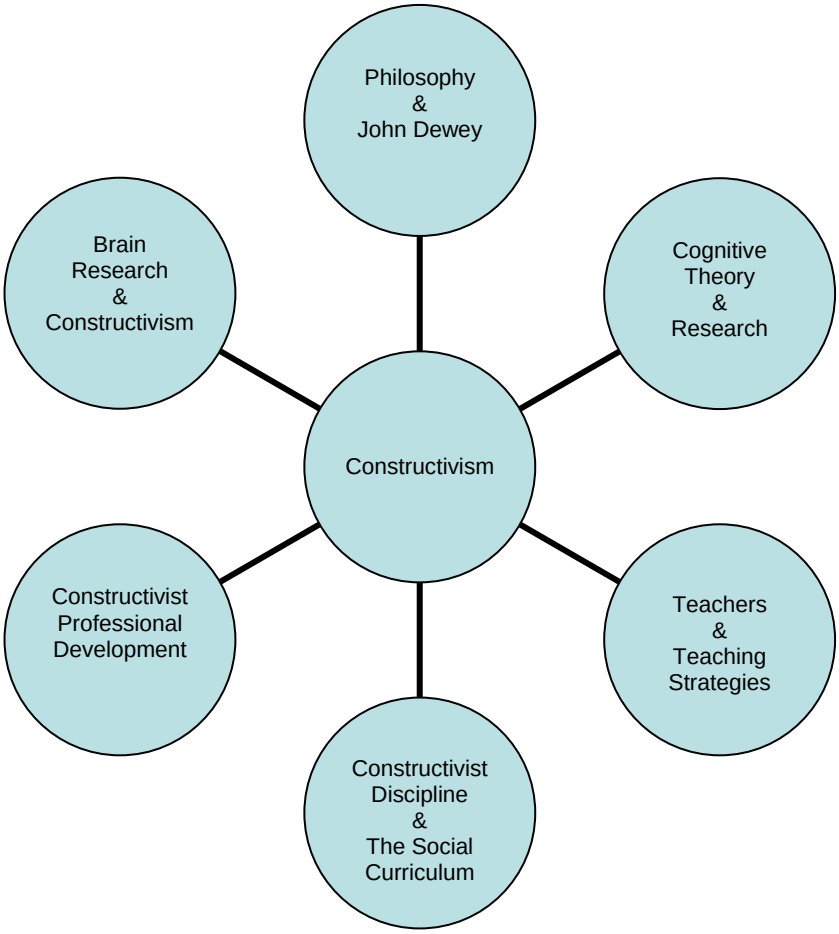
A Graphic Organizer for Constructivist Theory in Education

The development of constructivism in field of education can be visualized with the graphic organizer found in Figure 1. It was designed by a team of three researchers at the 2005 Annual Constructivist Design Conference held at St. Lawrence University in Canton, NY. (Ahad, Brockhuis, & Richardson, 2005)

Figure 1,

A Graphic Organizer for Constructivism in Education

(Ahad, Brockhuis, & Richardson, 2005)



The contributions of various theorists, researchers, and educators to the development of constructivism are presented below, aligned with the graphic organizer in Figure 1. In each case, references to their works are aligned with the Annotated Bibliography that appears as a companion piece to this article.

Constructivist Philosophy – the Contributions of John Dewey

While constructivist research is still evolving and has yet to be completely accepted by educators and the public alike, constructivist *theory* has a rich history, most famously initiated by John Dewey (Dewey, 1916, 1933, 1938) in his progressive model for teaching and learning. At the beginning of the 20th century, Dewey created defensible theory for progressive (ie. learning-centered) education based on pragmatic philosophy, on the writings of Rousseau, and on the best psychological knowledge of the time. He saw the need for public schools to be communities and to teach the skills for community in an increasingly industrial, urban, disaffected society. He also had insight into how children learn "best" derived from his own experience as an educator, and from his interactions with outstanding teachers of the day. Best teaching, for Dewey, included physical activity as a necessary but not sufficient part of learning. "Internal freedom" and self-control were his goals to be aided by "external freedom." Dewey did not step away from acknowledging the ethical nature of public schooling. The following quote from Butchart & McEwan (1998) might well illustrate a current interpretation of Dewey's allegiance to the ethical and democratic mandate of the public schools:

> The question is never, "What works?" – all manner of barbarity works, if the end is orderliness alone. The question is, what works to assure the sorts of civility and dignity that is essential in the short term for effective learning, and vital in the long run for democratic life? (page 3)

Dewey identified human learning as a process identical with the scientific process, thus requiring teachers and students to view education as an active learning process, in a "minds-on" sense as well as a "hands-on" sense. In this scientific approach to learning, he supported rigorous academic pursuit. While Dewey promoted a kind of schooling that included emotional and social elements, it is of utmost importance to us today, to heed Dewey's argument for progressive (and constructivist) educators, to pursue academic excellence as avidly as did the traditionalists of his day (Dewey, 1938). Dewey saw teachers as experts in subject matter, and, as the most experienced person

in a classroom, deeply committed to designing authentic tasks to promote meaningful learning. For Dewey, and for us, best teaching must support student engagement, and promote students' increasing complexity and integration of subject matter at the same time as it promotes their growth in respect for self and others, in self-control, and in responsibility. Particularly in our age of accountability, if constructivism is to demonstrate its quality, we must not lose sight of cognition and academic growth as integral parts of constructivism itself.

Cognitive Theory and Constructivism

Compared to constructivist theory, constructivist *research* has posed unique challenges to those who would study the finer points of human cognitive, social and emotional life. In the early 20th century, science supported what was then part of the "progressive" development of "objective" and normative tests in order to measure each child's intelligence and aptitudes. While originally worthy attempts to pay attention to the individual learner, these tests led to the development of standardized tests designed by experts in the disciplines. The test format also shaped much of the research on human activities in the 20th century fueling empirical, positivist science embraced by behavioral psychologists, and thus, by educators.

Although Piaget and Vygotsky were well known in the latter part of the 20th century, the empiricist/behaviorist paradigm for the study of human beings held on in the U.S. far longer than in Europe. The result was that along with the reification of standardized tests, the early studies of teacher behavior were predictably designed to determine what teacher behaviors could be linked to student success on standard measures. This research identified effective teaching as teacher-centered and authoritarian (Brophy & Good, 1986).

Cognition was the first aspect of active meaning-making to be studied rigorously, most famously by Jean Piaget, in experiments that identified malleable and developmental

aspects of human thought processes. Later research on *cognition* focused on the structural development of the growing brain of childhood, and became associated with information-processing models, or conceptual schema, and how children's learning in different disciplines occurs.

During the 1960s, 1970s, and 1980s, a new understanding of the nature of scientific inquiry caused a radical paradigm shift within the academy. First, this shift was recognized in the reconceptualization of the structures of the disciplines (Kuhn, 1962). The heretofore unquestioned scientific process was challenged, and the very nature of positivist inquiry questioned.

Researchers in mathematics and science education sought to identify problems learners had in understanding their content, and in doing so, came to acknowledge diversity in the ways in which humans create knowledge. Difficulties in understanding were no longer seen as incorrect as much as they were understood to be incomplete and incorrect knowledge that worked for the learner in his or her everyday world. Educators were then in the position not of traditional pedagogues but of academics interested in learning how to present knowledge in ways students could understand and learn meaningfully. Although early work on cognitive learning came from the sciences, the fields related to English/Language Arts also became radically re-focused during the 1970s and 80s on individual meaning-making in reading, speaking, and writing through Whole Language. Social Studies also became increasingly focused on learner engagement with primary documents, and curriculum designed around meaningful learning.

Motivation, interest, engagement, deeper understanding of fewer examples, increased ownership of knowledge, acceptance of students' prior knowledge, and the sharing of knowledge all came to be understood as structures that support construction of meaningful learning. Rote learning, recitation, and memorization were subsumed under

the overarching process of meaning-making; they were not forgotten or eliminated, but rather subsumed in service to the greater educational purpose within each discipline and for each learner.

The following researchers and theorists, each of whom has made significant contributions to the development of constructivist theory, are referenced in the bibliography section on Cognitive Theory and Research:

- Albert Bandura
- Frederic Bartlett
- Jerome Bruner
- William Clancey
- Eliot Eisner
- Kenneth Gergen
- Barbara Jowarski
- Maria Montessori
- Joseph Novak and D.Bob Gowan
- Jean Piaget
- Barbara Rogoff
- Lev Vygotsky
- William Widmaier

The bibliography contains annotations and related writing about each of these authors.

Constructivist Research on Teachers

In the 1950s and 1960s, specialists and educational leaders believed that once accurate academic curriculum had been written by experts in the discipline, there should be no problem with implementation. Since they had little to go on as far as evidence to the contrary, and since many of the curricula were specifically designed to be “teacher-proof,” implementation of an innovative curriculum seemed foolproof. Jerome Bruner, in his *Process of Education* (1960), argued that the structure of the

disciplines themselves was enough to guide K-12 education, and that is what should be taught to teachers, and designed into curricula to guide teachers. Fortunately, or unfortunately, many innovations were not teacher proof. Hord and Hall (1987) identify a typical event:

> We really thought the new elementary math curriculum was top notch! It was carefully designed to meet the needs of our students. The materials were delivered to teachers last August, and they were provided 3 days of pre-school in-service focused on the new program. Here we are in April, and the math coordinator reports that teachers don't seem to be using the program the way it was intended. How can that be? It's been in their classrooms for nearly a whole school year! (page 61)

What to do? In this scenario, it is clear that the authors believe the teachers must be at fault in some way. However, that insight led nowhere as a guide to better practice. The next question to be asked was: "What has to be done to make teachers *do it right*?" Than answer was that more teacher-proofing might solve the problem. This option is still being found to be inadequate today (Hall, 1981; personal communication) as variations in implementation continue to be identified even as implementers assume they are satisfactorily implementing the same innovation.

Making teachers "do it right" seemingly could not be accomplished through curricular prescription, even in conjunction with strong research support and administrative admonition. What did teachers need to do it right? Note that we have shifted here to take notice of teachers' needs, although there is the continuing assumption that the innovation is presumed to be right. However, this little shift in perspective led to a huge shift in understanding, as teachers became important (not yet valued) participants in change. Jerome Bruner followed his *Process of Education* with *The Process of Education Revisited* (1971). He identifies the many ways in which the earlier presumptions about teaching and learning were lacking and inadequate.

In the 1970s and 1980s, educational researchers were forced to reconceptualize their task from the study of “effective” strategies as defined by classroom control and academic success. Their research questions and methodologies had to be redesigned to include a paradigm that acknowledged that subject matter is a changing phenomenon, that students’ vary in skills and understanding, that teachers are potential (expert) allies, and that the importance of information technology has grown dramatically. More in-depth study of excellence in teaching needed to be undertaken, and, finally, the thoughts and feelings teachers came to be included as part of their classroom expertise. The transition to more constructivist study and more qualitative methodologies was a difficult one since science was founded on the “objective” endeavor, concerning itself with what could be observed and quantified.

A new paradigm in the study of education examined the question “Why?” as opposed to the “Who?,” What?,” “Where?,” or even “How?” of positivist research. Traditional research needed demonstrable facts and behaviors, and the subtleties of meaning making – thought and feeling, and the complexities of social interactions – were overlooked or trivialized by the juggernaut of numerical “truth.” The study of human beings – and therefore the educational endeavor of teaching and learning – required a new paradigm in scientific thinking, and new strategies to record the more qualitative aspects of learning. Educational research needed to be contextualized - to include information about researcher, those being studied, and the context (the classroom, the community, the school, etc., in educational research). Strategies such as narrative, script analysis, interview, and document or artifact analysis became the research tools of a *constructivist* research paradigm focused on meaningful knowledge acquisition.

New strategies for instruction and assessment of student learning grew out of the change in paradigm for teaching based on constructivism. The annotated bibliography incorporates the following sections:

- The Study of Teachers

- Learning Centered Teaching Strategies
- Collaborative Learning and Teaching
- Constructivist Assessment Strategies
- Constructivist Strategies for Specific Academic Disciplines

Each section contains annotations about the work of many authors who have made significant contributions to the development of constructivist theory in the past 50 years.

Constructivism and the "Social Curriculum" of Classrooms

To return to our first definition of "constructivism":

> Constructivism" refers to the process by which human beings actively make sense out of the world around them- to "understand. (Wiske, 1998).

and therefore:

> Constructivism requires that we reflect on all aspects of the teaching in which we engage; as educators, we are learners ourselves. We must examine our planning, our use of external standards, the materials we use, the environment in our classroom, our own attitudes and expectations, and especially, the needs of our students, whether they be children or teachers. (Sparks, 1994).

If a teacher accepts a constructivist academic learning model for her students, there is one insight that might naturally follow. As a lifelong learner, the teacher would realize the necessity of self-reflective practice as key to professional growth, the logical necessity for her too teach her students to become reflective learners with regard to the academic disciplines. However, there is a commonly found reality that teachers who may be well-versed and highly adept at constructivist teaching within the academic curriculum often resort to traditional, passive learning models for their social curriculum. If a teacher is familiar with the work of Vygotsky (1934, 1978) however, consideration of the social curriculum in one's classroom would dictate that teachers consider the social

aspects of the lives of his/her students in their classrooms. In identifying the social nature of human learning, Vygotsky made it clear to educators that a classroom focused on academic organization by itself will not assure a safe and caring environment for all children. Academic learning is constructed within the *social* environment of a classroom and school.

The social nature of human learning means that every classroom *already* has a "social" curriculum that needs to be identified. Constructivist theory would require that the social curriculum deserves to be taught and learned (especially for children with absent or poor role models at home) in the same (constructivist; active) manner as the academic curricula. In order to make sure beliefs about social interactions in the classroom and practice coincide, teachers need to reflect upon their own "hidden" affective and social curriculum as well as their already explicit structures. On-going reflection on personal beliefs about the teaching and learning of affective, social "subject matter" allows classroom interactions to be guided by a teacher alert to the needs, learning styles, and socialization of her students.

In one profound aspect, the subject matter of the social curriculum varies from academic content. The social curriculum can make no pretence of objectivity. In examining a social curriculum, we come face to face not with some theoretical "social" content alone (let us learn the Golden Rule), but with the whole realm of moral and ethical behavior (are we practicing the Golden Rule?). Once teachers recognize the dynamics of the social curriculum, and accept the need for the active teaching and learning of that social curriculum, they will also see that the classroom is a venue rife with ethical and moral implications. They will find themselves face to face with the necessity of examining the social curriculum of their classroom with regard to its *quality* as reflected in student understanding and internalization of ethical and virtuous attitudes and actions.

As a result of taking constructivist theory seriously educators are obliged to ask: “What is *quality* in social learning?” and “How do we integrate this quality into our less than perfect classrooms?” The first answer must come from the best models we have available: in a democracy, civic participation in service to a democratic ideal might provide a worthy goal in a classroom. The second question regarding “how to?’ is much harder to answer, but answers may be initiated within a constructivist learning model as a teacher moves from a more teacher-centered to a more student-centered classroom with the creation of self-control in students, and the teacher’s sharing and passing on of responsibility to students. The work that goes into this complex development cannot occur without teachers seeing themselves as constructivist learners who are reflective and flexible as well as well-informed about subject-matter, their students, and appropriate pedagogy. Without careful analysis of the social curriculum and critical reflection upon performance, teachers may end their thinking about discipline with (only) “what works to bring order” (Butchart, cited in Butchart & McEwan, 1998; Charney, 2002).

It is the educator’s role to “define the kind of society we have in mind” (Dewey, 1916, p. 6) leading us to reflection on the meaning of “discipline,” “order,” and “control,” “democracy,” “ethics,” “self-control,” “caring,” “appreciation of diversity,” “responsibility,” and “self-esteem based on effort rather than on rewards and punishments.” In reflecting on them, we must then, bring these concepts to the center of teacher thought, classroom dialogue, and finally, student action. The very discussion stretches the purposes of schooling to include self-knowledge, sharing of self, and relationship of self to the community. The discussion and ensuing actions empower teachers and students.

The recent literature on democratic and constructivist teaching and learning practices supports an increasingly sophisticated vision for children to grow in democratic, ethical, and caring ways with a “a critical constructivist approach to classroom relationships…” that will create “a curriculum of democratic civility.” (Buchart, 1998, 4) Discussion of the

relationship between democracy and constructivist teaching and learning has created a larger educational vision within which constructivist social curriculum finds a natural home (Apple & Beane, 1995; Hoover & Kindsvatter,1997; Noddings, 2002; Lickona, 2004; Charney, 2002).

The bibliography on the social curriculum contains two sections:

- Constructivism and the Social Curriculum – Theory
- Constructivism and the Social Curriculum – Practice

Each section contains annotations about the work of many authors who have made significant contributions regarding the social curriculum in the past 50 years.

Constructivism in Modern Professional Development for Teachers

As a direct outgrowth of the constructivist research on teaching, K-12 professional development programs for teachers today are often grounded in constructivist epistemology with one purpose being the educating of teachers to teach in constructivist ways. Constructivist research and practice on teaching, augmented more recently by brain research, provides a foundation on which much of current professional development has flourished, where teachers themselves are at the heart of meaningful change. In particular, scholarship and the publication of journals and texts supported by ASCD and NSDC have successfully addressed the human aspects of professional development, often modeling constructivist theory and practice without necessarily identifying the constructivist roots of their research and practical suggestions.

Much of effective professional development today is distinctly constructivist in nature, supporting engagement, ownership, and assessment of teacher-learners with attention paid to developmental levels, teaching skills, feelings/concerns of individual teacher-learners, and including reflection as part of the learning process. Study groups, action research, becoming a teacher-leader, curriculum development, and peer coaching all require active engagement and reflection by staff developers, teacher leaders, and

mentors, as well as by teacher learners. On-going support for integration of new teaching strategies, formative assessment, personal goal-setting, mentoring, conference attendance, in-service days, may also serve to support meaningful teacher growth.

According to Sparks (1994) and Guskey (1997), perhaps the most successful constructivist method of encouraging teacher participation in change is *procedurally embedded professional development*. Embedded professional development is characterized as occurring within the professional context, and requires that educators share what they have learned from their teaching experiences by "reflecting on the experience, and then generating and sharing new insights" (Wood & McQuarrie, 1999). This kind of activity is valued because of its context; it engenders shared learning experiences and creative thought focused on what is known to be of most importance within that context. Embedded professional development is highly regarded as being efficacious in ensuring meaningful integration of knowledge and skills.

The bibliography contains annotations about the work of many authors who have made significant contributions to the professional development of teachers regarding constructivism in the past 50 years.

Constructivism and Brain Research

Ironically, but necessarily, the most persuasive support for constructivist teaching and learning finally comes from deep within the traditional scientific paradigm. Recent brain research (clearly still in its infancy), seems to be validating constructivist beliefs about how learning occurs. Increasingly sophisticated neurological technologies have allowed study of brain structure and processes. The physiological evidence for increased or decreased molecular, electrical, and neuronal activity in different parts of the brain may be observed as the brain responds to different kinds of mental and emotional activity. Pictures of brain activity from PET and MRI scans of the physiological activities occurring in the brain during learning indicate that there is increased meaningful,

remembered learning when learners are actively and interactively engaged, when they are comfortable socially and emotionally, when they are intellectually challenged, and when they are in enriched learning environments.

From this research educators may extrapolate that best practices might include teacher design of environments that not only challenge students intellectually, but also involve learners in their own learning, require reflection, support and promote positive social growth, and require the development and use of positive emotional skills (Caine & Caine, 1994). These best teaching practices can already be found operating in the classrooms of some outstanding teachers who teach for understanding, as well as social and emotional growth. These educators are also often found in self-study/research including action research, collaborative study groups, peer coaching, mentoring activities, and staff developer.

The bibliography contains annotations about the work of many authors who have made significant contributions regarding brain research and its relationship to constructivist theory in the past 50 years.

Conclusion and links to an Annotated Bibliography

This article has sought to describe the components of constructivist theory in education and its applications, offering information to underscore its basic goal – to establish that constructivism is the predominant theory active in education today. An understanding of constructivist teaching and learning and the theory that supports it can help teachers to defend those important aspects of classroom life not directly affected by the state tests. Because the theory of constructivism is being supported in many ways by research in laboratory and practical situations, it is incumbent on educators, researchers, and theorists to embrace its constructs and put them into practice throughout the field of education. The annotated bibliography represents a useful tool to assist them in doing so.

References Cited

Editor's Note: The annotated bibliography that is the subject of this article is available as a separate link on the JPACTe website menu. All references cited in this article are listed in the annotated bibliography on the JPACTe website, with the exception of the following:

Ahad, S., Blokhuis, J., & Richardson, M. (2005) *Codifying Constructivist Literature.* Unpublished powerpoint document. Niagara Falls, NY: Niagara University College of Education.