RUNNING HEAD: Constructivist Curriculum Design

Constructivist Curriculum Design for Professional Development:

A Review of the Literature

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The leading professional association for corporate trainers (American Society for Training & Development) in conjunction with the National Governors Association has recently commissioned a task force to examine and respond to the effects technological change is having on the requirements for adult learning. (Hodgins, 2000) As Hodgins states, "The relentless demand for new skills created by the use of information technology in work has reinforced the demand for effective and measurable – in terms of performance improvement and return-on-investment – education and training."

Kaufman et al (1997, pp. 1-2) made similar comments about the need for employees to perform "Faster! Better! Cheaper!" due to the "world…constantly changing" a few short years before. A need for personal and organizational performance improvement has been recognized. Going back to 1970, Malcolm Knowles (quoted in Carlson, n.d,) commented on the need for better learning strategies for adult learners due to the rapidity of change.

In fact the United States Department of Labor (n.d.) has observed a 50-year trend in increased demand for higher-skilled employees. Along with new types of jobs, the Department of Labor recognizes that historically non-technological jobs will increasingly require technology skills as new ways of performing old tasks better and faster.

Retention, understanding, and active use of knowledge and skills continue to be difficult goals to reach as Perkins (1991) records. However, Brooks and Brooks (1999) report an ongoing interest in constructivism, which among other things, promises to help learners become thinkers who grasp and apply concepts.

The focus of this article will be on what implications constructivist theory has for the design of technology-related professional development curricula. Literature related to

constructivism, adult learning, professional development, and curriculum design will be reviewed.

Constructivism

Constructivism is regarded by some (Bruner, 1996) as a philosophy which cuts across multiple disciplines (e.g., arts, sciences, and cognition), while others view it as a learning theory (Brooks, 1984) or a model for learning (Howard et al, 2000), and constructivism is also considered a branch of cognitive psychology (Ornstein and Hunkins, 1998). Regardless of its classification, constructivism is concerned with how personal understanding or knowledge is formed.

Because of constructivism's focus on knowledge construction, this theory is of interest to anyone concerned with learning and teaching. Wilson (1996) draws parallels from one's view of knowledge with one's view of instruction. He suggests, for instance, that if knowledge is viewed as content to be transmitted, then instruction is probably seen as a product to be delivered. Similarly, if knowledge is conceptualized as a cognitive state, then instruction is thought of as instructional strategies designed to affect one's schemas. And if knowledge is perceived as personally constructed meanings, then instruction can be recognized as a rich environment on which one might draw. Finally, if knowledge is embraced as adoption of a culture (the way a group acts), then instruction will be celebrated as participation in a group's activities.

Constructivism is typically contrasted with a transmissionist (or objectivist) model of learning. That is, instead of focusing on learning objects which are transmitted from one person to another, students and teachers are engaged in a community in which learning is the result of interactions, reflections, and experiences. (Howard et al, 2000)

Brooks and Brooks (1999) suggest that perhaps constructivism's roots can be traced all the way back through history to Socrates. However, content to look back only as far as the Enlightenment, they trace the foundations of what would become constructivism from Emmanuel Kant who concerned himself with objective and subjective ways of knowing. In the 20th century, Jean Piaget is noted as the individual who first picked up the baton and ran forward.

According to London (1988), Piaget, viewed knowledge as something which an individual constructs and re-constructs for herself. Piaget contrasted this constructivist perspective of knowledge formation with annatist and empiricist viewpoints which see knowledge as a factor of heredity or of one's experiences respectively. Perkins (1991) notes that from Piaget's development psychology, the constructivist baton was passed in two directions simultaneously, in the direction of cognitive psychologists Jerome Bruner and Ulrick Neisser and in the direction of philosopher Nelson Goodman. (In speaking of Goodman, Bruner (1986) comments that Goodman has been involved with formulating a philosophy of understanding as his contribution to constructivism.)

While constructivism addresses the meanings that individuals construct for themselves, Seymour Paper is associated with a similar sounding term with a related focus. Papert's constructionism moves beyond constructing meanings to see learners create some type of physical artifact that can be shared and discussed. Constructionism can be viewed as a specialized form of constructivism. (Jonassen, 1996)

Another contributor to the collective conceptualization of constructivism is the Russian psychologist Lev Vygotsky. Vygotsky's work (usually known as social learning theory or social constructivism) took place mainly in the 1930's but was not widely known in the West until the

1960's, many years after his death. Most recognized for the Zone of Proximal Development concept, Vygotsky laid the groundwork for learners to utilize a social support system as a kind of tutoring process whereby one can bridge the gulf (or zone) that exists between what one knows and what one needs to know. (Bruner, 1986; Social Constructivist Theory, n.d.)

Against this historical backdrop, as constructivism has grown in popularity to become one of the most significant trends in education (Lunenberg, 1998), the literature referencing constructivist ideas has greatly increased. Along with the philosophical and psychological discussions, there is now also an emphasis on implementation of constructivist ideas in classrooms and other learning environments.

Jonassen et al (1999) note the implications that implementing constructivism has on the role of teacher and student. Specifically, students must wrestle with the responsibility that comes from being truly in charge of one's own learning. While some students are somewhat reticent to assume this responsibility, when given the opportunity most enthusiastically share their constructs with those of other students, often engaging in lively discussions (and further developed conceptualizations). Teachers, meanwhile, shift to a more facilitative role rather than serving as information dispensers as they help students compare the students' personally constructed meanings with those of a larger community of experts.

In the revised edition of their earlier work, Brooks and Brooks (1999) synthesize five principles to guide teachers in implementing constructivist ideas in classroom settings. First, teachers should pose problems of emerging relevance to students. (The phrase emerging relevance is used because the teacher may need to facilitate the students' perception of relevance.) Second, learning should be structured around primary concepts (what Brooks and Brooks call "the quest for essence") rather than disparate facts. Third, teachers should seek and

value students' points of view. Fourth, curriculum should be adapted to address students' suppositions. Fifth, student learning should be assessed in the context of teaching. Meaning, assessment should be "authentic." As Wiggins and McTighe (1999) point out, if a concept is to be understood deeply by students, then the assessment should be as contextualized and project-oriented as the learning activities are.

Honebein (1996) suggests seven goals for teachers to use in implementing constructivist ideas. Although worded a bit more broadly, all but one of these seven goals parallel the five principles summarized above. Honebein additionally encourages the use of "multiple modes of representation" (i.e., video, audio, photographs, etc.) instead of relying on oral and written communication.

As all of these principles are pursued, the classroom learning environment takes on a decidedly constructivist orientation. In fact, Wilson (1996, p.5) proposes a definition for such a constructivist learning environment: "a place where learners may work together and support each other as they use a variety of tools and information resources in their guided pursuit of learning goals and problem-solving activities." More detailed descriptions of these tools and information resources can be found in Perkins (1991) who proposes five facets of a learning environment: sources of information (information banks), means of expression through writing or other symbols (symbol pads), means of expression through manipulation of pre-existing objects (construction kits), authentic as possible areas for trying out concepts (phenomenaria), and means for undertaking and receiving feedback on specific learning tasks (task managers). Perkins suggests that these five facets can be found in any learning environment, but that construction kits and phenomenaria are de-emphasized in environments which are not centered on learners.

Black and McClintock (1996) and Strommen (1992) also provide frameworks for constructivist learning environments, but their focus is on processes to be followed rather than resources to be used. (It should be noted, however, that Black and McClintock take exception to the phrase "learning environment," preferring instead "Study Support Environment.") There are seven phases for students to follow in Black and McClintock's Interpretation Construction (ICON) Design Model and four phases in Strommen's Child-Driven Learning Environment (CDLE). In both cases, these phases are not inconsistent with the resources suggested by Perkins previously. Also, the process involved in following the ICON phases is reminiscent of traversing Vygotsky's zone of proximal development.

Because of similarities between the two models, only the ICON model will be discussed here. The first five ICON phases are: observation (observe authentic artifacts in authentic situations), interpretation construction (construct interpretations of their observations and justify), contextualization (get background info to aid interpretation or argumentation), cognitive apprenticeship (apprentice under teacher in refining the first three phases), collaboration (collaborate with teacher in the first three phases as an extension of apprenticeship). The last two elements of the ICON model are less phases than they are descriptions of the types of outcomes one might expect from the above phases. They are: multiple interpretations (cognitive flexibility through exposure to other interpretations) and multiple manifestations (transferability through exposure to multiple manifestations of the same interpretations).

It could be argued that not all groups of students would use the five types of resources in the same way and that not all constructivist teachers would utilize all the phases of the ICON model. Perhaps it would be helpful to differentiate between two orientations of constructivism as Perkins (1991) does. There is a difference between those environments in which teachers first

present concepts followed by students working through their understandings and those environments where there is no presentation (or a delayed presentation) of concepts. Perkins calls the former BIG (beyond the information given) constructivism and the latter WIG (without the information given) constructivism.

Finally, apart from processes, resources, and orientations, Lin et al (1996) introduce the dynamics that constitute a learning community. Although learning communities are certainly utilized and advocated by people other than constructivists, constructivist environments should certainly be learning communities. Learning communities are typically informal and learner directed. Use is made of "distributed expertise," drawing on specializations of other learners in a social context. The authors provide a summary of what they consider to be efficient learning communities. Students should have the opportunity to plan, organize, monitor, and revise their own research and problem solving. Students should also work collaboratively and take advantage of distributed expertise from the community to allow diversity, creativity, and flexibility in learning. Students in learning communities should learn self-selected topics and identify their own issues that are related to the problem-based anchors and then identify relevant resources. Students should use various technologies to build their own knowledge rather than using the technologies as "knowledge tellers." Students' thinking should be made visible so that they can revise their own thoughts, assumptions, and arguments.

Along these same lines, Jonassen et al (1999) present the idea of "scaffolding conversations in structured computer conferences." The teacher or any student can pose a question or a conjecture which can be addressed by anyone from the larger community. Conversations may be public or private.

Lunenberg (1998) and Brooks (1984) propose that children think and learn differently from adults and that this is why constructivism (at least in its Piagetian strain) was developed. Interestingly, there seem to be a number of parallels between constructivism and the needs of adult learners that can be drawn from the literature.

Adult Learners

Hodgins (2000, p.12) defines adults as "people who are in or about to enter the workforce" as contrasted with people who are of traditional school-going age (and, therefore, not in the workforce). In the 20th century, first Eduard Lindeman and later Malcolm Knowles concerned themselves with studying how adults learn. Lindeman emphasized the importance of experience to adult learners, going so far as to put experience on the same level as textbooks used by traditional school-aged students. (Conner, 2000a)

Carlson (n.d.) relates Knowles' seven step process for working with adult learners: cooperative learning climate, mechanisms for mutual planning, diagnosis of learner needs and interests, formulation of learning objectives based on the diagnosed needs and interests, sequential activities for achieving the objectives, selection of methods, materials, and resources, and evaluation of learning. Although there is more than a little behaviorist influence in these steps, the process is remarkably progressive for its time.

Knowles adapted the word andragogy to refer to the art and science of helping adults learn in contrast to pedagogy, which strictly defined denotes the art and science of teaching children. In practice, pedagogy has become synonymous with teaching or with teacher-centered models, while andragogy has been broadened by some people to include any learner-focused models.

Conner (2000a) summarizes the following principles to use with an andragogical model. First, learners should be informed why something is important to learn. Second, learners should be shown how to direct themselves through information. Third, the topic being presented should be related to the learners' experiences. Fourth, people will not learn until they are ready and motivated. Fifth, learners may need help overcoming inhibitions, behaviors and beliefs about learning.

Conner (2000b) suggests that children and adult learners do have some fundamental neurological differences related to learning. While children have few experiences, their brains are able to create new neurological structures when learning occurs. In contrast, adults tend to have existing neurological structures already due to their vast experiences. New learning for adults, then, tends to require new connections between existing neurological structures. For this to occur, higher-order brain functions must take place.

Personal relevance of the content, involvement of the learner in the process, and deeper understanding of underlying concepts are some of the favorable intersections between emphases in constructivism and adult learning principles. In contrast, Hodgins (2000) and Kaufman et al (1997) both emphasize the importance of fast learning in the workplace while Howard et al (2000) draw parallels between constructivism and the "gradual" acquisition of knowledge (consistent with a naïve epistemology).

With this in mind, it is prudent to consider that Harapnuik (1998) proposes a hybrid learning approach, which he labels Inquisivism, as an alternative for adult learners. Inquisitivism is presented as a synthesis of constructivism, discovery learning, active learning, functional context, and minimalism. The ten key concepts of this approach reflect this synthesis. They are: fear removal, stimulation of inquisitiveness, using the system to learn the system, getting started

fast, discovery learning, modules can be completed in any order, supporting error recognition and recovery, forum for discussions and exploiting prior knowledge, real world assignments, and developing optimal training designs.

At this time, Inquisitivism appears to be little more than the result of cutting and pasting attributes of several learning strategies and theories. However, it is included here to underscore the fact that there may be emphases within the K-16 constructivist literature that do not meet the needs of adult learners. Hopefully, options can be found for adult learners which are based in sound theory.

Professional Development

Brooks (1984) describes the Cognitive Levels Matching (CLM) project in which staff development for professional teachers focuses on the integration of constructivist practices into their classrooms. Ironically, although the content of this staff development is constructivism, the context appears to be a traditional, instructor-centered format.

In contrast to the CLM project, Howard et al (2000) detail a study in which professional teachers experienced a constructivist learning environment while learning about constructivist theory. As a result of these constructivist experiences, changes in the participants' personal epistemologies were documented. Some of the characteristics of this study are worth highlighting as they provide examples of some of the constructivist principles discussed earlier.

The facilitators introduced the participants to the possibilities of how certain software tools could be utilized in constructivist environments. The teachers in the project were then engaged in creating artifacts using technology tools. The participants were provided all the resources necessary to adapt the technologies for their own use (such as, time, software and hardware, and access to experts in technology and the various subject areas). The technology was

"learned" as it was incorporated into the teacher's projects. The project explicitly set out to foster a community of learners among the participants and their facilitators. Each participant took a turn being a "lab manager," responsible for tutoring the other participants from their own unique perspectives. High levels of discussion and peer-to-peer tutoring were reported, and "teacher-to-teacher encounters" was cited as a powerful factor in the outcome of the study.

Kerka (1997) draws a distinction between the emphases of vocational and academic education. While the former focuses on procedural knowledge (or know-how) to the exclusion of propositional knowledge (know-what), the latter has the exact opposite bias. Kerka advocates instead what she refers to as "key aspects of communities of practice" such as authentic activities, knowledge application, access to experts, and a "social context in which learners collaborate on knowledge construction."

Bruner (1996) makes the point that what he calls "distribution" or a kind of communal sharing of intelligence is a skill (in a cultural sense). He cautions against denigrating skills or know-how as being somehow hierarchically lower than other types of knowledge. Hodgins (2000) argues that what he calls "know-why" is more important than know-how or know-what since know-why is a deeper knowledge that underlies a discipline or practice. However, Hodgins also makes a case that all three types of knowledge, (know-why, know-how, and know-what), are important and will be even more robust in the future.

Curriculum Development

When working with children, it has been suggested that competency-based models of curriculum development often produce written guidelines that may not line up with where students actually "are" developmentally. Teacher reflection and mediation are considered to be

important factors in bringing about this matching. The teacher functions as a developer and deliverer of curriculum. (Brooks, 1987)

Jadallah (1996) facilitated a constructivist process of preparation with several of his pre-service teachers. Reflective thinking strategies were encouraged as these pre-service teachers made curriculum and instructional decisions in actual school settings. Jadallah found that the pre-service teachers engaged in reflection were more mindful of their teacher mediation in their school settings and more insightful about their decisions than the pre-service teachers who were not engaged in the reflective process.

With competing forces such as a push for basics in the curriculum, higher standards for achievement, and the value placed on the more robust understanding facilitated by constructivism, deciding who should select instructional objectives becomes difficult. Ediger (1999) suggests that from a constructivist perspective learners should be heavily involved (with teacher assistance) in determining objectives, learning opportunities, and evaluation procedures.

None of the literature reviewed truly addressed an explicit set of principles for developing technology-related curricula for adults. However, from some of the previously discussed articles (Howard et al, 2000; Ediger, 1999; and Perkins, 1991) some guidelines can be inferred.

Conclusion

Despite the fact that constructivist theory was originally developed with children in mind, there are some points of intersection between constructivism and adult learning characteristics. However, adult learners tend to want to learn skills quickly without entering into the kinds of reflection and elaboration brought about in a constructivist learning environment. Perhaps Perkins' (1991) idea of BIG constructivism (in which content is still presented to

learners prior to learner manipulation and knowledge construction) provides a constructivist approach for adults. Regardless of what type of hybridization occurs, learners (or a representative sampling of potential learners) should be involved in establishing learning objectives. It also seems likely (from Howard et al, 2000) that the epistemology of the professional development curriculum designers and instructors may be important.

No literature was found that focused on constructivist approaches to professional development outside of the context of formal education settings. Perhaps this is because corporate training primarily utilizes an objectivist model for learning (or a naïve epistemology) (Howard et al, 2000). Or perhaps trainers and educators are using different terminology for similar concepts. It is suggested that these issues be addressed in new contributions to the literature.

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