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Constructivism in health education programs

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Abstract

Constructivism is an educational philosophy, strategy, and methodology that has gained a foothold in mainstream educational literature. It has been applied to an androgogical population in higher education. Current educational trends are focused not so much on evaluation as they are on developing criticism within learners. Higher education is beginning to promote a refocus on knowledge construction. Constructivism promotes an understanding of the learner in the context of the learning environment where the learner is an active participating member that is constructing, reconstructing, and deconstructing knowledge constantly. With this in mind, constructivism seeks to find the balance between the learners' and the instructors' responsibility for designing, implementing, and evaluating the learning 'experience' where knowledge emerges. There is a lot of discussion in educational literature of the health professions today regarding the use of clinical reasoning, problem-based learning, or the plethora of other curriculum design strategies that seek to develop the intuitive mind of the clinicians (Boelen, 1990; Jacobs, Aja, Hermenau, 1994; Lindsey, Pinnix Cox, 1994; Pope-Davis, Prieto, Whitaker, Pope-Davis, 1993). Effective and efficient evaluation of these various strategies requires the use of a philosophical kaleidoscope through which various strategies can be viewed. This article will provide the reader with an introduction to the constructivist kaleidoscope.

Introduction

The intuitive mind is a sacred gift and the rational mind is a faithful servant. We have created a society that honors the servant and has forgotten the gift." (Einstein, 1995).

There is a lot of discussion in educational literature of the health professions today regarding the use of clinical reasoning, problem-based learning, or the plethora of other curriculum design strategies that seek to develop the intuitive mind of the clinicians (Boelen, 1990; Jacobs, Aja, Hermenau, 1994; Lindsey, Pinnix Cox, 1994; Pope-Davis, Prieto, Whitaker, Pope-Davis, 1993).. Effective and efficient evaluation of these various strategies requires the use of a philosophical kaleidoscope through which various strategies can be viewed. This article will provide the reader with an introduction to the constructivist kaleidoscope. The objective of this article is to provide the reader with the knowledge required to view a curriculum design from a constructivist perspective.

Constructivism has been variously defined as a philosophy, a model, a strategy. In reality, it can be any one of these. In this article, it will be reviewed as a philosophy, methodology, and instructional design strategy. A philosophy is the cement that binds the ideas that will later become curriculum design and instructional strategies (Guba, 1990; Paulson, 1993; Reed, 1992).

Constructivism's tenets

There is a groundswell of reaction to this convention based on the notion that perhaps knowledge is not merely transferred[. In the health sciences, the debate of an epistemological or ontological view of knowledge continues (Boelen, 1990). There is a recognition that knowledge must be experienced before it can be constructed and consequently known. This *ontological* view of knowledge suggests that what we come to know must be experienced and constructed (Aldridge, et al, 1994; Noori, 1993; Phillips, 1995) . Knowledge is not transferable, but is constructed, deconstructed, or reconstructed both intra and interpersonally. Perhaps the best example that can be used here is that of teaching anatomy. Established philosophical approaches suggest that knowledge of anatomy exists in the external world. It then becomes the charge of the instructor to 'teach' the anatomy, which in this case means to bring it out and present it to the learner. The learner then has the obligation to 'learn' the anatomy by committing it to memory. Such a banal strategy often means that anatomy is stored in short term memory but not committed to long term memory and therefore easily forgotten.

There are five principal tenets which are critical to gaining an understanding of constructivism. A principal tenet of constructivism is that knowledge is constructed from experience (Presine, 1994; Seels, 1995). This is antithetical to the origins of knowledge of many established curriculum designs. Convention seems to suggests that knowledge is not constructed but rather already exists already for the learner to grasp from the external environment (Aldridge, Eddowes, Ewing, Kuby, 1994). This convention implies that knowledge need only be transferred from the external environment by the teacher to the learner (Seels, 1995). This *epistemological* view of knowledge has led to the creation of competency based education systems where outcomes are generated based on a learner's ability to reproduce knowledge and skills taught through didactic instruction (Boelen, 1990; Paulson, 1993). Student assessment techniques, such as multiple choice examinations, are then used as a form of learner assessment to determine if the knowledge has been transferred to the learner.

A constructivist approach assumes that anatomy must be experienced and the knowledge must be constructed by each learner. This approach requires the instructor to design anatomy sessions so that a learner may

dissect a cadaver, manipulate screens on an anatomy computer program, utilize skeletons to study, or come to know their own anatomical features and therefore develop an experiential knowledge of anatomy. According to the constructivist perspective, at this point the learner constructs the knowledge of, for example, the brachial plexus or other anatomical features that are studied. The learner 'knows' the anatomy of the brachial plexus because they come to know it by using the knowledge provided to them by the instructor, by the media used to portray anatomy, and the psychological experience of the anatomy taught. Anatomy is a subject where a knowledge of the holistic must be maintained. Knowing structure according to region or system is critical depending on how the knowledge is to be used.

A second tenet of constructivism is that learning is collaborative. Glasser and Strauss (1966) put forth the notion that reality is a socially construction. All knowledge is a constructed representation of reality[. In this light, knowledge becomes a mediation process between previously constructed information received from our environment, our past experiences, and our predictions for future situations (Aldridge, et al, 1994; Markel, 1993; Seels, 1995). Using this tenet as a guiding tool means that any particular subject matter must pass through a social medium before it can be called knowledge (Bereiter, 1994; Bhola, 1991; Markel, 1993; Seels, 1995). The term collaboration is intended to focus on the interchange between two or more people in an educational occurrence where one is attempting to share knowledge. Staying with the previous example, anatomy is a knowledge that must be experienced by the instructor before it can be translated into knowledge by the learner.

If knowledge has an element of construction that is psychological in nature, and an element that is socially constructed, it follows that knowledge must be embedded in a context (Bhola, 1991; Guba, 1990). When knowledge is removed from that context, the knowledge fails to exist. It can be inferred, or related, to another context, but it remains unconnected to the new context until applied. Using the anatomy example, there is a difference between memorizing anatomy and knowing anatomy. The former is to commit the words and symbols for the various parts of the body to memory. To know, and ultimately understand, anatomy is to know the words and symbols, but to also understand the relationship between the parts, and how all the parts form systems that aggregate into a whole body.

That is to ‘know’ anatomy. Part of this knowing comes from seeing, feeling, touching, and otherwise ‘experiencing’ anatomy while another part is learning to think anatomically so that the parts are not separate entities, but rather part of a larger whole.

The third tenet to be discussed here is the situational character of learning (Seels, 1995). In this tenet learning as knowledge created in the context in which it is naturally embedded. To know anatomy, at the very least, the learner must be able to visualize an anatomical part and understand its placement and function. Teaching biomechanics or kinesiology is dependent on learners ‘knowing’ anatomy. This supports the concepts of early lab experiences, the necessity for early clinical experiences that are integrated into the curriculum, and need for situated learner assessment protocols.

Once a learner has come to ‘know’ a subject matter, and the context within which it is embedded, the next step is to be able to extrapolate that knowledge from its context, and apply it to other situations. If a learner commits a subject matter to memory the application to new contexts becomes difficult because the memorization process means pulling a phenomena out of context and remembering the phenomena in isolation. At that very moment, knowledge as reality experienced is lost. This experience occurs when learners learn to categorize information according to subject matter (Hood, Hutchings, 1996). Later, when the learner is asked to recall the information in an unfamiliar context, there is resistance or inability displayed by the learner. For example, applying an orthopedic principle in a neurological case may be difficult for learners to do if they are taught ‘orthopedics’ as a course, and ‘neurological disorders’ in another. In order to develop expertise, this ability called reflection is required. Reflection is the ability of a learner to extract a phenomenon from its context as remembered, apply it to a present context, and project into the future (Dutton, 1995). Reflection is the prerequisite to clinical reasoning and problem-solving behavior (Schoen, 1985).

The last two tenets are oriented to principles of design because of the macro tenets presented previously. The first such tenet is that learner assessment should be based on multiple perspectives (Bereiter, 1994; Hood, et al, 1996; Seels, 1995). Providing multiple perspectives on a learner’s learning yields a rich harvest of information that is useful in developing

valid and reliable instructional designs. Different assessment methods provide for viewing different levels of integration at cognitive, affective, and psychomotor levels.

In direct opposition to established competency based educational methods, a constructivist philosophy embraces the notion that learners should participate in establishing goals, objectives, tasks, methods of instruction, and assessment (Beck, 1994; Bey, Homes, 1990; Carlson, 1996). In other words, learners should be empowered with some ability to make decisions regarding the learning environment within which they are embedded. An example concerns curricula oriented to traditional aged learners. Mature learners may be at a different level of learning that should be accommodated if the goal of the program is to help the learner achieve a maximum potential in a field of endeavor. On the other hand, established programs may strive to mediocrity by challenging learners to meet only the minimum standard required for the profession. An occupational therapy program that follows a constructivist philosophy might require the minimum competency but also have different levels of course objectives that are contracted with individual learners.

The participation of learners also helps to foster a sense of community within the program which then brings the affective dimension of the learner into the conscious fold of the educational environment[. The professional deportment of learners, their maturation process, and the professional socialization process all become legitimate educational issues within the context of community. Holding community meetings, allowing learners to develop responsibility for a curriculum, and other social and academic activities are all critical to the success of building an effective community within the occupational therapy program.

Toward a constructivist methodology

Reifying a constructivist philosophy can be achieved through the implementation of various methodologies intended to entitle learners to 'know' a subject matter. A primary principle in developing a constructivist methodology is to ensure that a holistic perspective is maintained (Bereiter, 1994; Conley, 1993; Feldman, 1995). That is, there needs to be a holistic curriculum perspective that is shared consensually by faculty and learners. There also needs to be a holistic perspective of each

learner that encompasses past experiences, current experiences, and anticipated experiences. Learners and faculty, as end users of the educational product, should be involved in the design and re-design of curricular materials (Seels, 1995). The ways and means that this can be achieved are many. For instance, in the context of an occupational therapy program, this may mean that the curriculum review process should include data collection techniques such as the use of learner focus groups and ethnographic diaries.

It may also mean that the role of the advisor changes to that of a mentor role (Bey, Howard, 1992). This faculty person then becomes more responsible for the holistic perspective of the learner from admission to graduation. The transition from advisor to mentor is depicted in the graph in Figure 1 (adapted from Bey and Howard, 1992). This represents a transition from advisor to mentor based on the varying degrees of commitment by teacher and learner and the comprehensiveness of influence on the learner. The term coach/supervisor involves cycles of supervision during the educational event. These 'cycles of supervision' include various forms of assistance that include demonstration, feedback, and observation. The term Quasi-mentor refers to the ability of the teacher to understand and guide the learner from the learner's perspective as the learner constructs situated knowledge. The term mentor implies a mutuality of experience for the teacher and learner alike and implies a more mature relationship.

Within the curriculum there are essentially two methodologies that fall under the rubrick of a constructivist philosophy. *Fast track* models are intended to provide learners with the opportunity to experience knowledge quickly through exposure to others that can help them construct knowledge by presenting their own constructs to learners. The utilization of self-study materials such as on-line computer programs will promote the experience of knowledge that can be constructed on a psychological level, while the use of small group collaborative experiences build on the notion of the social construction of reality (Markel, 1995). Providing pre-constructed notions to learners, and providing a collaborative context within which they can use this to construct their own individual constructions would seem to lend itself well to a constructivist philosophy. Without collaboration and opportunity for construction, the ability to connect phenomena within forms

of reality

becomes difficult. In the context of health education, the need to uphold goals of moving from one context to the other, to recognize anomalies, and to uphold a holistic framework is as old as the health movement itself.

Layers of of need models promote the scaffolding of learning experiences from basic to most advanced (Feldman, 1995). In this model, the learner progresses from one layer to the next in an ontogenetic fashion on the required in order to embed future knowledge in the present experience.[1] The utilization of Bloom's taxonomy is useful in developing curricular materials that promote learner opportunities to experience and construct knowledge at various 'layers of need' (Feldman, 1995; Seels, 1995). Bloom's taxonomy includes a scaffolding process for cognitive, psychomotor, and affective levels. In each of these categories, the knowledge de/re/construction process takes on a new dimension. To be truly effective, one needs to maintain a holistic posture, by ensuring that no one dimension becomes the focus at the expense of the other(s). Staying with the application of anatomy, it is assumed in this model that knowing anatomy occurs ontogenetically, from book knowledge, to applied knowledge, to conceptualization and application to different contexts. It becomes critical to know the 'normal' and the anomalies which deviate from that position.

Lastly, *rapid prototyping* techniques can be used to engender professional behaviors, clinical skills, and clinical reasoning through the development of research skills. These techniques requiring strong faculty models that are consciously developed within areas of expertise. These techniques can also be used in the fieldwork to develop critical paths to the development of expertise in a particular field. There are two types of techniques that are most appropriate for fieldwork situations. Linear prototyping techniques require basic skills and are most appropriate for

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[1] Bloom's taxonomy was developed with an 'epistemological' direction in mind. In this paper, 'ontogenetic' is used to suggest that the further one progresses 'up the taxonomic ladder' the more complex constructed reality becomes, and the greater the necessity to form clearer and more refined constructs of reality. At the lowest, reality is simply 'being there', and perhaps at the higher levels of synthesis or integration, one is actively engaged in constructing, deconstructing, and reconstructing reality as a dynamic, fluid, moment-in-time process.

introductory clinical work, while system-oriented skills are most appropriate for more senior clinical situations. Linear prototyping involves the direct linkage of two or more phenomena together. For instance, linking a clinical observation with a diagnostically relevant phenomena is a form of linear prototyping. It is called prototyping because learners are asked to replicate the connection between the observed and the thought as they are taught. System oriented prototyping is more global and requires the ability to perform multiple linkages in a variety of contexts. This process is linked to the development of practical wisdom in the mature clinician.

Summary

Constructivism is an educational philosophy, strategy, and methodology that has gained a foothold in mainstream educational literature. It has enjoyed extensive use in the primary and secondary school systems, especially in the math and science arenas. It has been applied to an androgogical population in higher education. All this has been in response to a cultural shift to a belief in the totality of the individual brought on by the pluralistic society we now live in. Current educational trends are focused not so much on evaluation as they are on developing criticism within learners. As a result of this process, higher education is beginning to promote a refocus on knowledge construction. This may be a reaction to the positivism of the 1960's when competency based education (CBE) emerged as a rational model of educational training in the health field. The downside of CBE was its secondary effect of training to mediocrity. Constructivism is an outgrowth of this current trend. It promotes an understanding of the learner in the context of the learning environment where the learner is an active participating member that is constructing, reconstructing, and deconstructing knowledge constantly. With this in mind, constructivism seeks to find the balance between the learners' and the instructors' responsibility for designing, implementing, and evaluating the learning 'experience' where knowledge emerges.

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