How Is Constructivism Being Applied in Career and Vocational Education? (Applications)

Traditionally, vocational education has prepared its students to be able to “do,” to apply knowledge to practice. With a constructivist perspective, however, vocational educators must extend that emphasis to knowing under what circumstances and in what way knowledge is to be applied. This focus is congruent with the demands of today’s society.

Workplace settings are now global in nature and are located anywhere, including the home. Work activities are customer focused and involve teamwork, cooperation, and collaboration among people who are diverse in culture, language, age, life experience, work history, knowledge, and skill level. For learners to be able to transfer knowledge to the complex and diverse environments in which it is to be applied, they must be able to learn in similar settings. Transferring knowledge from one situation to another is difficult, especially when the circumstances or conditions of practice in the transfer setting are remote (e.g., from the vocational classroom to the workplace) (Billett 1997). Thus, in keeping with a constructivist viewpoint, the essential role of vocational education is to “facilitate construction of knowledge through experiential, contextual, and social methods in real-world environments” (Lynch 1997, p. 27). “The end product is self-directed learners who make connections to workplaces and other environments based on personal and social experiences” (ibid.).

In vocational education, there are a variety of ways constructivism can be articulated. Some of these include the development of learning environments that incorporate learner-centered teaching practices, problem-based learning, contextual teaching and learning experiences, integrated academic and vocational curriculum, and authentic assessments. The following section describes how the common elements of constructivist theory can be incorporated into these practices and also suggests strategies for their application in teaching and learning.
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Learner-Centered Teaching Practices

In the traditional classroom, the focus is on teaching; in the constructivist-based classroom, the focus is on learning. This paradigm shift brings attention to the learner and to individual ways of learning. In the learner-centered classroom, learners work in collaboration with others, including the teacher; they and their teachers share the responsibility for learning, and everyone engages in teamwork. The teacher must be cognizant of different learning styles, cultural experiences, and learning needs of the learners, and of the different social environments from which learners come (McWhorter et al. 1996).

The goal of learner-centered teaching is to empower the learner. A study of two sixth-grade classrooms in Hawaii revealed that students in the learner-centered classroom reaped decided benefits. They were more likely than their counterparts in the traditional classroom to feel positive about their ability to learn, about learning through a variety of experiences, and about taking the initiative to engage in reading (Maaka and Lipka 1997).

Learner-centered practices place the teacher in the role of facilitator, one who assists students in their knowledge and skill development by modeling (demonstrating), scaffolding (supporting), fading (gradually decreasing assistance) and coaching (suggesting, challenging) the learner. Kerka (1997a) summarizes the vocational teacher’s role as follows:

The vocational teacher’s role is not to set tasks, but to organize experiences that allow learners to develop their own knowledge and understanding. Using the methods of cognitive apprenticeship, the teacher is a coach who provides guidance that gradually decreases as learners become more proficient, and who models, mediates, diagnoses, and scaffolds. The learning environment should reproduce the key aspects of communities of practice: authentic activities sequenced in complexity, multiple experiences and examples of knowledge application, access to experts, and a social context in which learners collaborate on knowledge construction.

Examples of constructivist practices include the following: (1) when students reach an impasse during an electronics lab,
the teacher plays a logic game as a scaffold until students can articulate the logic of the electronic circuit for themselves (Rahn 1996); (2) an electronics student is matched with a repair shop where she accomplishes her school tasks through regular repairs assigned by the shop owner (Schell and Babich 1993); and (3) agriscience students are asked to learn why swine on a nearby farm are not reproducing successfully, a problem where more than one answer may be correct (ibid.). (p. 2)

Problem-Based Learning

Problem-based learning is considered to be “one of the best exemplars of a constructivist learning environment” (Savery and Duffy 1995, p. 31). It has a constructivist framework in that it supports the values of collaboration, personal autonomy, reflection, active involvement, and personal relevance. Learning activities and approaches that are rich implementations of problem-based learning include cases, simulations, progressive problem-solving, anchored instruction, and action research (Pierce and Jones 1998). Brown (1998e) summarizes the four critical features of problem-based learning identified by Stepieen and Gallagher (1993) as follows:

1. The problematic situation always opens the investigation. It raises concepts and principles relevant to the subject matter content. It addresses real issues that connect to the students’ personal world.
2. The problem is ill structured. It lacks critical information at the onset; it often changes as more information is found; it defies solution by a fixed formula or strategy; it requires careful consideration of the problem/solution fit; and it has no one “right” answer. It requires exploration to define and refine the questions and ideas surrounding the problem.
3. Students are the problem solvers who generate solutions. Students “own” the problem; they engage in observation, inquiry, and investigation of an hypothesis; they have major responsibility for shaping their own thinking and formulating solutions.
4. Assessment is used as a structure for reflection. Assessments focus on the complexity of both the reasoning process and the subject matter concepts. They must provide standards to act as benchmarks for thinking, not directives for what must be thought.
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In describing the teacher’s role in implementing problem-based learning, Brown (1998e) emphasizes the importance of having good interpersonal and group dynamic skills. She highlights the need for teachers to adopt instructional strategies, resources, and activities that promote students’ development of social as well as basic and thinking skills.

The social component of problem-based learning in the context of constructivism is discussed by Stage et al. (1998). These authors contend that “meaningful social exchanges between individuals are the primary sources of cognitive growth and the construction of knowledge” (p. 38). They explain that such teaching practices as problem-based learning require this type of interaction and interdependence among students.

Contextual Teaching and Learning Experiences

Contextual learning is a strategy for helping students to construct knowledge and meaning from new information through the complex interactions of teaching methods, content, situations, and timing (National School-to-Work Opportunities Office 1996). The term is widely used in the recent tech prep and school-to-work efforts. In contextual learning, “knowledge is socially shared, thinking is shaped by engagement with tools, learning is engaged with objects and events, and learning is situation specific” (Weinbaum and Rogers 1995, p. 5). Learning is connected to the family, community, and workplace as well as to in-school purposes. The emphasis is on application of knowledge and skills in the context of real-life experiences, problems, and events. Teaching emphasizes higher-order thinking, real-world application of knowledge, and the collection, analysis, and synthesis of information from multiple sources.

Pierce and Jones (1998) note that, at the low end of the contextual continuum, learners may use the tools or materials of a trade, but never experience the higher-level thinking processes required to solve ill-structured problems of the real world. The authors offer a continuum of activities defined by degrees of contextualization and problem-based learning elements. These activities are presented in Table 1. The activities and teaching approaches noted in Quadrant A on Table 1 reflect rich implementations of problem-based and contextual learning. Two other quadrants on Table 1 list activities that are rated high for either contextual learning (Quadrant C) or

See related learning activities 1, 2, 4, 5, and 7 following page 51.
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Problem-based learning (Quadrant B) and low for the other. Quadrant D on Table 1 lists activities having a low degree of both contextual and problem-based learning elements. Of advantage to the learner are activities with high problem-based and high contextual elements.

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<th>Quadrant B: Hi PBL and Lo C</th>
<th>Quadrant A: Hi PBL and Hi C</th>
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<th>Quadrant D: Lo PBL and Lo C</th>
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(Pierce and Jones 1998)

Four contextual teaching and learning practices are described next: situated learning, cognitive apprenticeships, service learning, and work-based learning. Each of these practices shares some of the assumptions of constructivism, although it is possible to have one without the other. Each acknowledges that knowledge and skills are best taught in contexts that reflect how they will be applied in real-life situations.

**Situated Learning**

Situated learning involves the acquisition of knowledge and skills in the situations in which they will be used. Stein (1998) identifies four major tenets associated with situated learning: “(1) learning is grounded in the actions of everyday situations (cognition); (2) knowledge is acquired situationally and transfers only to similar situations (context); (3) learning is the result of social process en-
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compassing ways of thinking, perceiving, problem solving, and interacting in addition to declarative and procedural knowledge (participation); and (4) learning is not separated from the world of action but exists in robust, complex, social environments made up of actors, actions, and situations (community)” (p. 1).

The main elements of situated cognition—content, context, community, and participation—offer a number of opportunities to engage learners in meaningful learning. Cooperative and participatory teaching methods are prime ways of helping students acquire knowledge, as “knowledge is created or negotiated through the interactions of the learner with others and the environment. Subject matter emerges from the cues provided by the environment and from the dialogue among the learning community. The structure of the learning is implicit in the experience rather than in the subject matter structured by the instructor” (ibid.).

Cognitive Apprenticeships

Cognitive apprenticeships use the “traditional concept of craft or trade apprenticeship as a prevailing metaphor for teaching authentic activities through guided experience by focusing on the teaching of symbolic mental skills” (Black and Schell 1995, p. 3). In addition to providing meaningful and authentic tasks, cognitive apprenticeships require reflection, articulation, collaboration, and multiple practice (Farquhar et al. 1996). In cognitive apprenticeships, learners are placed in authentic settings where they observe the work of others and practice, acquire, develop, and refine their skills using cognitive tools. Student teaching is an example of cognitive apprenticeship in that it enables learning to occur in an authentic setting where the learner can experience the cultural and interpersonal aspects of work in the profession (Lankard 1995). In this capacity, the student teacher (learner) observes the modeling behavior of the instructor, receives guidance in performing instructional activities, and gradually assumes more and more of the teaching responsibilities relinquished by the instructor.

Service Learning

Service learning is a form of contextual learning in which real-world problems provide the basis for learning. It is a form of learning that involves learning by doing, an activity-based practice. It includes apprenticeships, experiential learning, and project-based learning; it reflects the theory of action learning (Johnson 1996).
Service learning has also been classified as a form of work-based learning in that it actively engages students in producing goods or providing services. “It differs from school-to-work transition programs in that students receive no financial reward. However, because it integrates classroom learning with community service projects, service learning shares a commitment to the same outcomes as school-to-work” (Brown 1998d, p. 1). The unique feature of service learning that separates it from voluntary community service is that it must engage learners in critical analysis of the service provided. Reflection is a key component of service learning (ibid.).

A service learning program for the professional development of preservice teachers is being piloted at the University of Louisville. This program involves prospective teachers in performing community service in the local area, either in special programs for at-risk youth or with homeless shelters. As a result of their involvement, the program participants were able to observe, many for the first time, people who live in poverty and crisis. They were able to experience the reality of problems that many of their students face in their personal, out-of-school lives and observe how the conditions of life can affect one’s disposition to learn (Brown 1998d). By analyzing their patterns and techniques for learning in unfamiliar situations, teachers become more sensitive to the needs of their students and more able to offer their administrators compelling examples of explicit classroom activities that would facilitate service learning.

Work-Based Learning

Work-based learning is another example of contextual learning. “It includes a number of different activities that can be identified along a continuum from shorter-term introductory types of experiences to longer-term, more intensive ones, including paid work experience and formal training. It is part of a three-pronged approach to school-to-work transition that also includes school-based learning and connecting activities” (Naylor 1997, p. 1). Some forms of work-based learning adopted by Michigan’s system include career exploration, career internships, and career apprenticeships (ibid.).

Work-based learning, like situated learning, differs from traditional cooperative education in that the practices also emphasize reflection, relate students’ work experience to nonvocational subjects, and in many instances, ensure that students satisfy the course requirements for admission to four-year colleges and universities.

Some common elements of work-based learning programs are re-
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ported by Naylor (1997, p. 1):

- planned programs of job training and experiences,
- paid work experience,
- workplace mentoring,
- instruction in general workplace competencies, and
- broad instruction in all aspects of industry.

From a constructivist viewpoint, work-based learning, like all contextual learning practices, must involve learners in action learning. It must provide opportunities for learners to construct their own meanings and to convey their meaning making to others. It must engage learners in interpretative interactions with others and in the act of negotiation (Gagnon and Collay 1997). “Unless work-based apprenticeships are deliberately designed for learning, they will have potentially serious holes and inefficiencies” (Berryman 1990, p. 3).

Integrated Academic and Vocational Curriculum

Curriculum integration is another strategy through which teachers can incorporate constructivist elements in their teaching/learning practices, thus making instruction more meaningful for students. Curriculum integration promotes the search for self and social meaning by integrating fragmented bits information organized by subject area and emphasizing their interrelatedness in real-world contexts. It connects the curricula of various subjects so that students are able to address in a holistic manner the problems, concerns, and issues of the environments in which they live. Brown (1998a) describes the integration of academic and vocational education as it relates to constructivist-based pedagogy and paradigms (p. 1):

In its most basic form, curriculum integration involves the infusion of academic content into vocational programs, often referred to as “enhanced academics.” The new vocationalism, however, calls for “enhanced relevance,” which is achieved when students engage in learning experiences that are situated in real-life contexts and that afford in-depth understanding and the development of higher-order thinking skills (Pisapia and Riggins 1997; Stasz 1997).
Urquiola et al. (1997) note that curricular integration reflects the process of contextualization by bringing authentic work elements to abstract academic subjects. It contributes to the development of students' critical thinking and collaborative skills as well as those that prepare them for skilled jobs. Learning in context and constructing knowledge through socially based experiences are two teaching/learning concepts that draw upon principles of curriculum integration. When these reform pedagogical approaches are incorporated in cross-disciplinary, multidisciplinary, interdisciplinary and work-related integration models, they not only help students to see the connections between subject areas, but enable them to recognize the interrelated aspects of all learning and life experiences (Brown and Pritz, in press).

The concept of curriculum integration offered by Beane (1998) illustrates the potential for academic and vocational education to connect students to all aspects of the workplace: “As it is meant to be, curriculum integration involves four major aspects: the integration of experiences, social integration, the integration of knowledge, and integration as a curriculum design” (p. 5). In Beane’s explanation, integration as a curriculum design has several features: problems and issues of personal and social significance guide curriculum; learning experiences are designed to integrate knowledge in context of its use; knowledge is developed and used to address relevant issues, not in preparation for future tests; and learning activities involve the application of knowledge in real-life settings where students can experience problem solving and the intricacies of social interaction.

**Authentic Assessments**

The emphasis on authentic assessment reflects not only the influence of constructivist pedagogy, but also the traditional vocational education requirement for knowledge and skill demonstration through performance. Allenspach et al. (1996) describe authentic assessments as those that “engage students in applying knowledge and skills in the same way they are used in the real world outside of school. They are performance-based and require a student to demonstrate significant worthwhile knowledge and understanding through a product, performance, or exhibition” (p. 8). However, only when authentic assessments lead to in-depth understanding and knowledge construction that is meaningful to the learner do they reflect constructivism.

See related learning activities following page 51: 11 (portfolios); 4, 9 (journals); 3, 5, 7 (peer review); 2, 6, 8, 10, 12 (self-assessment).
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“A lthough they raise concerns about subjectivity, authentic assessments allow multiple human judgments of learning. Teachers, peer reviewers, and community members may all be involved in various performance ratings, and—a critical element—learners evaluate and monitor themselves. Alternative assessments can accommodate varied learning styles and serve the purposes of instruction, not other reasons for evaluating students (comparing individuals, comparing programs, demonstrating accountability, etc.)” (Kerka 1995, p. 1). Examples of alternative assessments include portfolios, journal keeping, peer reviews, and self-assessments facilitated by the use of rubrics.

The new emphasis that state education agencies are placing on standards-based and performance-based assessments does not mean that alternative assessments, such as portfolios, lack value. Rather, as noted by Pierce and Jones (1998), the best assessment models incorporate such constructivist practices as co-learning, investigation, contextual performances, and other demonstrations of constructivist thinking. In keeping with the promotion of engaged learning, learners should be involved in the planning, evaluating, and selecting of assessment forms, including alternative forms of assessment (Jones et al. 1996).

Summary

Most applications of constructivism in academic and vocational education focus on ways to help learners construct knowledge that is meaningful to them and that reflects social representation, experiences, contexts, and authentic tasks (Pierce and Jones 1998). Drawing upon the social nature of learning, constructivist teaching and learning strategies involve interactive investigations, discussions, negotiations, strategizing activities, and so forth. They require a connection with not only the educators and other learners who share their learning perspective, but also with the community in which society-related as well as work-related problems must be solved. Their practices reflect “a way of looking at the world that is broad enough to allow for multiple interpretations and yet, defined sufficiently to allow for a perspective that can explain complex and abstract phenomena and which can guide our actions” (Murphy 1997d).

Murphy (1997d) presents a checklist of constructivist characteristics for educators to use in comparing the “variety of ways in which constructivism could be both interpreted and translated into
practice." Although not all of these characteristics may be present in every application of constructivist theory, they should form the basis for activities, roles and relationships, resources, and types of thinking involved in the effort. The degree to which characteristics are evident cannot be determined by using this checklist. However, knowledge construction should be a key component and collaboration a common project feature (ibid). The checklist compiled by Murphy (1997c) is provided on page 50. It offers a succinct way to guide teachers in their efforts to incorporate constructivist characteristics in their teaching and learning efforts.
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### Terms

**Authentic assessments**
- Forms of assessment that measure learning that is meaningful to the learner and can be applied in real world situations outside the classroom walls.

**Cognitive apprenticeship**
- An instructional model that draws upon authentic classroom activities and guided experiences that enable the development of mental skills through reflection, articulation, collaboration, and practice, and that are situated in authentic contexts.

**Contextual learning**
- Learning that occurs in the context or situation in which knowledge is to be applied.

**Learner-centered teaching**
- Instruction that focuses on the learner's goals for learning as well as the teacher's drawing attention to the unique qualities each learner brings to the learning environment.

**Problem-based learning**
- Learning that occurs as individuals strive to solve problems for which there is no set answer, often by working together in small teams.

**Service learning**
- A form of contextual learning that involves learning by doing and engages the learner in critical analysis through workplace experiences and reflective practice in a service or nonpaid capacity.

**Situated learning**
- A form of contextual learning in which learning is grounded in real-world actions and situations, and that involves the social processing of information within a community environment.

**Work-based learning**
- A form of contextual learning in which learning is centered in the workplace and that includes a planned program of formal training and/or mentoring and paid work experience.
Questions for Reflection and Discussion

1. What is the common theme in all applications of constructivism?

2. In what way does a learner-centered classroom differ from the traditional teacher-centered, lecture dominated classroom?

3. What value does problem-based learning offer for lifelong learning?

4. What are the distinguishing features of situated learning, cognitive apprenticeship, service learning, and work-based learning?

5. In what ways does the theory of constructivism move the integration of academic and vocational education beyond the blending of subject area content?

6. How could standards-based assessment be considered authentic?

7. What value do school-to-work and tech prep programs have from a constructivist perspective?
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