Characteristics of Constructivist Learning & Teaching
http://www.cdli.ca/~elmurphy/emurphy/cle3.html

Moving from constructivist philosophy, psychology and epistemology to the characterization of constructivist learning environments presents the challenge of synthesizing a large spectrum of somewhat disparate concepts. An appropriate analogy for the way in which constructivist concepts have evolved is that of a prism with many facets. While the facets reflect the same light and form one part of a whole, they nonetheless each present distinct and finely delineated boundaries.

The presentation of characteristics in this section aims to remain true to this analogy in that it recognizes and attempts to represent the variety of ways in which constructivism is articulated in the literature. Situated cognition, anchored instruction, apprenticeship learning, problem-based learning, generative learning, constructionism, exploratory learning: these approaches to learning are grounded in and derived from constructivist epistemology. Each approach articulates the way in which the concepts are operationalized for learning. The researchers and theorists whose perspectives are listed below suggest links between constructivist theory and practice. They provide the beginnings of an orienting framework for a constructivist approach to design, teaching or learning.

Jonassen (1991) notes that many educators and cognitive psychologists have applied constructivism to the development of learning environments. From these applications, he has isolated a number of design principles:

1. Create real-world environments that employ the context in which learning is relevant;
2. Focus on realistic approaches to solving real-world problems;
3. The instructor is a coach and analyzer of the strategies used to solve these problems;
4. Stress conceptual interrelatedness, providing multiple representations or perspectives on the content;
5. Instructional goals and objectives should be negotiated and not imposed;
6. Evaluation should serve as a self-analysis tool;

7. Provide tools and environments that help learners interpret the multiple perspectives of the world;
8. Learning should be internally controlled and mediated by the learner (pp.11-12).

Jonassen (1994) summarizes what he refers to as "the implications of constructivism for instructional design". The following principles illustrate how knowledge construction can be facilitated:

1. Provide multiple representations of reality;
2. Represent the natural complexity of the real world;
3. Focus on knowledge construction, not reproduction;
4. Present authentic tasks (contextualizing rather than abstracting instruction);
5. Provide real-world, case-based learning environments, rather than pre-determined instructional sequences;
6. Foster reflective practice;
7. Enable context-and content dependent knowledge construction;
8. Support collaborative construction of knowledge through social negotiation (p.35).

Wilson & Cole (1991) provide a description of cognitive teaching models which "embody" constructivist concepts. From these descriptions, we can isolate some concepts central to constructivist design, teaching and learning:

1. Embed learning in a rich authentic problem-solving environment;
2. Provide for authentic versus academic contexts for learning;
3. Provide for learner control;
4. Use errors as a mechanism to provide feedback on learners' understanding (pp.59-61).

Paul Ernest (1995) in his description of the many schools of thought of constructivism suggests the following implications of constructivism which derive from both the radical and social perspectives:

1. sensitivity toward and attentiveness to the learner's previous constructions;

2. diagnostic teaching attempting to remedy learner errors and misconceptions;
3. attention to metacognition and strategic self-regulation by learners;
4. the use of multiple representations of mathematical concepts;
5. awareness of the importance of goals for the learner, and the dichotomy between learner and teacher goals;
6. awareness of the importance of social contexts, such as the difference between folk or street mathematics and school mathematics (and an attempt to exploit the former for the latter) (p.485).

Honebein (1996) describes seven goals for the design of constructivist learning environments:

1. Provide experience with the knowledge construction process;
2. Provide experience in and appreciation for multiple perspectives;
3. Embed learning in realistic and relevant contexts;
4. Encourage ownership and voice in the learning process;
5. Embed learning in social experience;
6. Encourage the use of multiple modes of representation;
7. Encourage self-awareness in the knowledge construction process (p.11).

An important concept for social constructivists is that of scaffolding which is a process of guiding the learner from what is presently known to what is to be known. According to Vygotsky (1978), students' problem solving skills fall into three categories:

1. skills which the student cannot perform
2. skills which the student may be able to perform
3. skills that the student can perform with help

Scaffolding allows students to perform tasks that would normally be slightly beyond their ability without that assistance and guidance from the teacher. Appropriate teacher support can allow students to function at the cutting edge of their individual development. Scaffolding is therefore an important characteristic of constructivist learning and teaching.

Multiple perspectives, authentic activities, real-world environments these are just some of the themes that are frequently associated with constructivist learning and teaching. There were many similarities between the perspectives of different researchers in this brief review of the literature. The following section presents a synthesis and summary of the characteristics of constructivist learning and teaching as presented by the above review and as suggested by the previous section on constructivist theory. These are not presented in a hierarchical order.

1. Multiple perspectives and representations of concepts and content are presented and encouraged.

2. Goals and objectives are derived by the student or in negotiation with the teacher or system.

3. Teachers serve in the role of guides, monitors, coaches, tutors and facilitators.

4. Activities, opportunities, tools and environments are provided to encourage metacognition, self-analysis -regulation, -reflection & -awareness.

5. The student plays a central role in mediating and controlling learning.

6. Learning situations, environments, skills, content and tasks are relevant, realistic, authentic and represent the natural complexities of the 'real world'.

7. Primary sources of data are used in order to ensure authenticity and real-world complexity.

8. Knowledge construction and not reproduction is emphasized.

9. This construction takes place in individual contexts and through social negotiation, collaboration and experience.

10. The learner's previous knowledge constructions, beliefs and attitudes are considered in the knowledge construction process.

11. Problem-solving, higher-order thinking skills and deep understanding are emphasized.

12. Errors provide the opportunity for insight into students' previous knowledge constructions.

13. Exploration is a favoured approach in order to encourage students to seek knowledge independently and to manage the pursuit of their goals.

14. Learners are provided with the opportunity for apprenticeship learning in which there is an increasing complexity of tasks, skills and knowledge acquisition.

15. Knowledge complexity is reflected in an emphasis on conceptual interrelatedness and interdisciplinary learning.

16. Collaborative and cooperative learning are favoured in order to expose the learner to alternative viewpoints.

17. Scaffolding is facilitated to help students perform just beyond the limits of their ability.

18. Assessment is authentic and interwoven with teaching.