- Higher order learning outcomes are achieved through engaging student-centered activities, not teacher-centered activities (i.e. "It's not you, it's them!")
- The transition from lower order to higher order learning is paralleled by a transition from using domain-specific to domain-independent learning processes (i.e. "Knowledge is what remains when what has been learned has been forgotten.")
- Authentic assessments of learning outcomes must replace convenient but flawed assessments of learning   (We've been barking up(at?) the wrong tree)
- Students should be involved in constructing their learning environment by developing curriculums, assessments, and learning activities   ("Nothing about them without them!")
- Continual reflection and iterative feedback by both students and teachers is essential to learning and teaching   (Apply, lather, rinse, repeat)
- Motivation occurs when a pressing need is established for higher order learning   (What gets used gets learned.)

Biggs, J. (1999). What the student does: teaching for enhanced learning. *Higher education research & development*, *18*(1), 57-75.

Biggs summarizes previous pedagogical research, suggesting that student learning outcomes must be achieved through aligned learning activities and assessments that evaluate the quality of learning (i.e. use of higher order thinking where students theories, reflect, generate, and apply) rather than surrogate measures which are convenient and common practice (e.g. multiple choice examinations). Should orient education around student learning activities where meaning is *created* rather than *transmitted* . Need to close the gap between students learning at "deep" and "surface" levels by requiring all students to engage in higher order thinking activities through active rather than passive learning. Guidelines on creating such activities are included and the criterion-referenced assessment is prescribed as a grading framework. Instructors are encouraged to reflect in order to enhance their teaching processes iteratively. The importance of motivation via creating a perceived need for higher order understanding is emphasized. Finally, problem-based learning (aka PBL, where theoretical knowledge is applied towards solving cases) and the learning portfolio (where students create and justify assessments of their own learning) are outlined as alternative models of learning assessment and learning activity.

Jones, C. (2007). Creating the reasonable adventurer: the co-evolution of student and learning environment. *Journal of Small Business and Enterprise Development*, *14*(2), 228-240.

The focus of educational research should be on how demanded skills can actually be *developed* rather than simply *formulated and prescribed*. Heath's six attributes for student ability to create satisfaction by becoming a reasonable adventurer are described (i.e. intellectuality, close friendships, independence in value judgments, tolerance of ambiguity, breadth of interest, sense of humour) and are suggested as the foundation upon which all other student skills are built upon. Self development: the ability to criticize and interpret information based on students' own experiences and self-reflection. Finally, the concept of niche construction is elaborated upon where a student is able to be influenced by their learning environment and to modify the learning environment through a group iterative process of trial and natural selection, referred to as 'evolution'. This skill set is useful for/similar to post-graduate work, where learning environments constantly change and must be both navigated and constructed by the

student. A learner-centered perspective and the use of criterion-referenced assessments is prescribed in place of convenient but less rigorous evaluations. Student freedom to self-direct the learning process is considered essential as are both summative (indicator of performance) and formative (insights for improvement) types of feedback through authentic assessments of learning, rather than convenient grading schemes that evaluate surrogate outcomes of learning. A word on "the creative adventure" as an important motivator for learning is also mentioned.

Ryan, B. J. (2013). Flipping Over: Student-Centred Learning and Assessment. *Journal of Perspectives in Applied Academic Practice*, *1*(2).

Students were engaged in their education through learning and assessments that are "flipped", where both aspects are directed by students. The teacher acts as a facilitator rather than an instructor. Emphasizes the importance of continual student reflection on the learning process, what students learned throughout the term, and how the tasks they performed assisted them in achieving learning outcomes. Concept maps were developed in student groups throughout an academic term where multiple opportunities for class feedback were given and learning occurred iteratively. Other activities included games, puzzles, role-play, discussion forums, and peer-review. Feedback showed that such activities, initially thought of as trivial, were essential in learning class concepts. As well, the newfound freedom of flipped learning was noted by students as initially overwhelming and directionless but was later described as a challenging, high quality learning experience. Dialogue allowed collaboration, knowledge transfer, and the development of ideas between students. Results were observed increased confidence, interpersonal skills, and deeper understanding of material. The processes used in flipped learning and flipped assessment allowed for higher order cognitive thinking that began with declarative knowledge and evolved to analysis, synthesis, and evaluation of knowledge. Finally, the article encourages instructors to reflect iteratively on the teaching and learning process and to provide students clear examples.

Shuell, T. J. (1986). Cognitive conceptions of learning. *Review of educational research*, *56*(4), 411-436.

Outlines the differences between cognitive and behavioural views of learning and the implications for teaching and learning. The main difference between the two views is the emphasis on the acquisition of knowledge (which occurs mainly through internal cognitive processes) versus emphasis on the acquisition of behaviour (response to an environmental stimulus). The cognitive approach to learning identifies strategies for obtaining feedback and the behavioural approach identifies strategies for reinforcing behaviour. Cognitive constructs include active learning, use of higher level processes, the cumulative nature of learning, the organization of knowledge in memory, and internal cognitive processes used in performing various tasks. Views learning as a goal-oriented process that is informed by prior knowledge. Novice and expert learners solve problems in cognitively different ways, explained by the difference between domain-specific (novice) and domain-independent (expert) learning strategies. Understanding the nature of the difference between novice and expert learning and the process of transition from novice to expert level learning is essential for improving educational strategies. A discussion on declarative knowledge (facts) and procedural knowledge (rules which organize or process facts) is conducted through the illustration of the workings of the ACT computer program. Sternberg's variables which affect the cognitive processes of learning are described with an elaboration on the concept of contiguity. Finally, learning should be centered on student activities.