Conditions for Literacy Learning

The conditions of learning: Is learning natural?

Brian Cambourne

This is my final column for this department. While previous columns explored a diversity of topics, they were related by a common thread—exploring the classroom implications of what I have previously called "an educationally relevant theory of literacy learning" (Cambourne, 1995, p. 182). A premise of this theory is that complex learning can be considered *natural* because it is the result of the way humans and human societies have evolved. *Natural* in this context simply means that the complex learning that humans do in the world outside of formal educational institutions is the result of society being forced to deal with the problems, events, issues, dangers, and all the manifold threats to survival that the human species has had to address on its evolutionary journey.

In the course of this journey, the brain and the ecological settings in which it's been forced to function (and survive) have mutually shaped each other. The result of this long evolutionary process is a genetically preprogrammed organ (the brain) that is capable of very complex learning when certain ecologically constrained social conditions, which are inherent features of all human cultures (the conditions of learning), are present in the learning setting. Simply put, "learning is what the brain does. Learning is as natural for the brain as is breathing for the lungs" (Smith, 1989).

In previous publications (Cambourne, 1988, 1995), I've used one of many possible examples of nonschool, complex learning (e.g., learning how to talk) as an illustration of natural learning in action. Not only is learning how to use the language of one's culture a universal phenomenon of stunning intellectual complexity, but it's also an exemplar of how the human brain has evolved to make such complex learning possible.

Over the last quarter century, I've spent thousands of hours observing teachers who have tried to create classroom cultures that simulate (not replicate), with varying degrees of success, the social and ecologically constrained conditions that seem to support complex learning—the so-called conditions of learning. My analyses of the data from these observations have continually converged towards the same conclusion: The more teachers can simulate these conditions in their classrooms, the more effective is their students' learning.

So what? Does this mean that natural learning is a credible theory?

Does describing and supporting a theory necessarily accord it any credibility? Does the fact that I enthusiastically, sometimes vociferously, advocate this theory validate it? Not necessarily. However, my mentors in research methods taught me that one test of a theory's credibility is the degree to which its explanatory power can be transferred or applied to phenomena that occur in quite different contexts. My intent, therefore, in this final column is to explore the degree to which the learning theory at the core of the previous columns can be applied to quite different examples of real-world, complex learning.

Example 1: Explicit, systematic, mindful, contextualised (i.e., natural) learning in Liberia

Jean Lave's (1977) study of tailoring apprenticeships in Liberia provides the first example. Lave found that the apprentices are not just immersed in the culture of becoming Liberian tailors. There are many other factors.

1. The apprentices spend long hours observing masters, journeymen, and older apprentices who continually demonstrate what tailoring is and what a tailor does.
2. From the beginning, they are exposed to the whole process of garment production, as well as models of the final product (not isolated subtasks).
3. From the beginning, they concurrently practice a range of basic skills—pressing, cutting, and using the sewing machine.

4. They are given continuous feedback until they achieve an acceptable level of competence in these basic skills.
5. They are expected to apply their developing control of these skills to the entire process of making a simple garment.
6. The expectation is that these tasks will be practiced until mastered. (They are not practiced as a series of exercises that have no significance beyond the learning setting.)
7. The apprentices' products are acknowledged, valued, and celebrated, often being offered for sale, although at a lower price than the masters' work.
8. As the apprentices' skills and knowledge increase they begin to work on more complex garments, thus proceeding through a curriculum that, although graded and sequenced, always exercises component skills in the context of use.

Lave also emphasised that while there is very little direct instruction (the occasional pointing out of errors by the masters), this graded, contextually embedded practice always produces high degrees of learning. Finally, Lave observed that there is considerable self-correction because the apprentices, through immersion in the milieu and through the expectations communicated to them, have internalised criteria against which they can assess their own products.

Example 2: Learning to make music the Suzuki way

Howard Gardner (1985) described the Suzuki method of learning the violin as "an intriguing experiment" (p. 4) that makes it possible for "an individual with apparent modest genetic promise [to] make remarkable strides in a short time" (p. 35). The Suzuki Talent Education Program allows children as young as 2 years old to participate. According to Gardner (1985), it has produced thousands of children who have "mastered the essential of a stringed instrument by the time they enter school" (p. 99) and "even the less remarkable pupils will perform at a level that astonishes Western observers" (p. 375).

What is it that makes it possible for "even less remarkable" students to achieve such high degrees of complex learning? Could it be the high, almost uncanny degree of similarity between the processes, structures, and relationships inherent in the Suzuki program and those that support and nurture other natural learning such as children's acquisition of language? Here are some considerations.

1. The child is exposed daily during the first year of life to recordings of great performances. He or she is immersed in the medium that has to be learned.
2. The mother is crucial to the learning. She is given a small violin similar to one that the child will later be given, and she begins to perform each day. If she does not know how to play she takes lessons, and the child is constantly exposed to her practising. Thus, the child is expected to engage with the demonstrations and models of someone to whom he or she is bonded.
3. Towards the end of the first year of life the child begins to hear, on a regular basis, the 20 short songs of the repertoire to be mastered once study with the instrument begins.
4. Six months before beginning lessons, perhaps at the age of 2, the child begins to attend group lessons. Gardner (1985) explained,

   > These lessons which last perhaps an hour and a half, bring together children of different ages and different levels of performance, covering a total age span of perhaps two or three years. The children attend with their mothers, who participate with the children in a group of games and exercises. The lessons themselves are divided between general exercises in which all children participate and from which all children are expected to benefit, and short performances by each of the students of the pieces on which they have been working. (p. 374)

5. Thus, the intending students are given the opportunity to listen, engage, and participate at levels commensurate with their ability. At these sessions they see the big picture; they see what it means to be a violin player.
6. The emphasis always falls on individual performance, never on competition with other learners.
7. As these children wait with mounting excitement to get their own violins, the immersion, demonstrations, expectations, and engagement continue as the mothers practise and learn at home each day.
8. Finally, the aim of the program is not to produce violinists or musicians. The aim, said Gardner (1985), is to produce an individual with a "strong, positive, attractive character" (p. 375). Becoming proficient on the violin is a mere by-product of the process, just as learning to talk is a by-product of living with language.

Example 3: Learning to control the complexities of computer gaming

Last year, I was privileged to participate in a series of seminars conducted by James Gee. At the Centre for Expansion of Language and Thinking Rejuvenation Conference in Chicago, Illinois, USA (August 2001), he presented some compelling and convincing arguments about the cultural relevance and importance of video games. He made the following points:

1. Thousands of people spend billions of dollars and devote millions of hours of their waking time each year deeply engaged in video games, especially those that allow them to create worlds (e.g., The Sims).
2. This activity entails learning and mastering some extremely complex conceptual systems, abstract ideas, ways of thinking and knowing, and then applying what's been learned to solve a range of complex problems.
3. For such complex learning, knowing, and problem solving to occur, such games, Gee argued, must be based on an extremely powerful theory of learning and knowledge construction.

Gee's (2001) learning principles and definitions

1. Psychosocial Moratorium Principle	Learners take risks in domain where real-world consequences are lowered (low cost of failure, high reward for success).
2. Committed Learning Principle	Learners' engagement is an extension of self or identity in a world to which they feel they have a commitment.
3. Identity Principle	Learning involves taking on and playing with identities where the learner has real choices and ample opportunity to meditate on the relationship between new identities and old.
4. Practice Principle	The learner gets lots of practice at all levels in a context where the practice is not boring (lots of time on task).
5. Insider Principle	The learner is an insider, teacher, and producer (not just a consumer) and is able to customise the learning experience and domain/game from the beginning and throughout.
6. Ongoing Learning Principle	The distinction between learner and master is vague because players learn at higher and higher levels all the time. They must often undo their routinised mastery to adapt to new or changed conditions. There are cycles of new learning, automatisation, undoing automatisation, and new reorganised automatisation.
7. Subset Principle	The learning domain is a (simplified) subset of the real domain.
8. Incremental Principle	Learning situations are ordered so that earlier cases lead to generalisations that are fruitful for later cases (no garden paths).
9. Concentrated Sample Principle	The learner sees, especially in the training and early in the domain/game, many more instances of signs, symbols, and tasks than would be the case in a less controlled sample of the domain.
10. Explicit Information On Demand and Just In Time Principle	The learner is given explicit information on demand when needed or just at the point.
11. Interactive Principle	Learning is a cycle of probing (doing something), getting feedback, assessing whether the learner likes the result, and probing again.
12. Amplification of Input Principle	For a little input, the learner gets a lot of output (e.g., driving a car): Give a little, get a lot.
13. Achievement Principle	For learners of all levels there are intrinsic rewards (i.e., rewards in the domain/game world) from the beginning. They are customized to the learner's level, effort, and growing mastery and signal the learner's ongoing achievements.
14. Multiple Routes Principle	In the domain/game there are multiple routes. This allows learners to make choices and rely on their own strengths and style of problem solving, while also exploring alternative styles.
15. Regime of Competence Principle	The domain/game always operates within, but at the outer limits of the learner's resources so that each point is challenging but never impossible.

(continued)

Gee's ideas created huge intellectual unrest in me. How could such complex learning be possible under the conditions inherent in the typical video-game setting? The players do not take special classes or specific instruction in how to play these complex games. Had their designers intuitively developed a set of powerful teaching and learning principles, which they somehow built into the playing environment merely as a by-product of trying to capture and expand a profitable market? Or were they just more street smart when it came to complex learning than those of us who work in academe? Whatever the explanation, it became obvious that identifying the learning principles inherent in such games would be a worthwhile enterprise.

Gee shared a set of 29 overlapping Learning Principles that emerged from his analysis of video games. He suggested that each principle was inherent in the architecture of video games and, in turn, spilled over into the context in which they were typically played. He suggested that it was the subtle juxtapositioning of these principles that made it possible for learners of all ages and ability levels to learn how to play. His list (see Sidebar) is worth studying.

Although Gee's work in this particular domain is new to me, I find it affirming because it resonates in quite definite ways with the theory that's been evolving in my head for many years. I can see how many of his principles are embedded within the broader learning scenarios involving complex cultural learning that have caught my attention in the past. Furthermore, I agree with Gee's (2001) assertion that "if all of these principles aren't part of the learning settings we create in schools they should be."

Pulling some threads together

Examples 1 to 3 share three common features that, in my opinion, explain their success as learning enterprises.

- They involve socially shared intellectual work that is organised around joint accomplishment of tasks. This allows elements of whatever skills are involved to take on meaning in the context of the whole.

- All of them have inherent elements of the traditional apprenticeship process. For example, they make explicit much of the covert invisible know-how that has to be acquired; they encourage student observation and commentary; and they allow skill to build up bit by bit, yet permit participation even for the relatively unskilled, often as a result of the social sharing of tasks.
- They are organised around particular bodies of knowledge and interpretation (e.g., tailoring, music, gaming). This subject matter is structured and presented so that students can engage in processes of meaning construction and interpretation (i.e., complex learning).

These three features reflect a complex mix of social and ecological factors that seem to fit best with the way the brain has evolved to learn. There is nothing new or revolutionary about them. We've known about them for thousands of years. The same principles are embedded in Zukav's (1980) following definition of a Wu Li Master teacher of the ancient practice of tai chi.

> He begins from the centre and not from the fringe. He imparts an understanding of the basic principles of the art before going on to the meticulous detail, and he refuses to break down the tai-chi movements into a 1-2-3 drill so as to make the student into a robot. The traditional way is to teach by rote, and give the impression that long periods of boredom are the most essential part of training. In that way a student may go on for years and years without ever getting the feel of what he is doing.... A Wu Li Master teaches essence. When the essence is perceived he teaches what is necessary to expand the perception. (pp. 8–9)

The Wu Li Master does not teach in ways that alienate or bore his students. He dances with them. Perhaps because he knows that this is how the universe dances with itself.

Gee's (2001) learning principles and definitions (continued)

16. Bottom-up Basic Skills Principle	Basic skills are not learnt in isolation or out of context; rather, what counts as a basic skill is discovered from the bottom up by playing more of the game. Basic skills are genre elements of a given type of domain/game.
17. Multimodal Principle	Meaning or knowledge built up through various modalities (e.g., images, texts, symbols, interactions, abstract design, sound).
18. Situated Meaning Principle	Meanings of actions, signs, symbols, and texts are situated in embodied experience of the domain/game. Meanings are not general or decontextualised. Whatever generality meanings come to have is discovered from the bottom up.
19. Text Principle	Text in and connected to the domain/game (e.g., manuals, walkthroughs, guides) are not understood purely verbally (in terms of only textual and intertextual connections), but are understood in terms of embodied experience of the domain/game. More purely verbal understanding comes only when the learner has enough textual and domain/game experience to read intertextually.
20. Intertextual Principle	The learner understands texts connected to the domain/game as a family of related texts and understands any such text in relation to others in the family (but only after having achieved situated understanding of some texts).
21. Material Intelligence Principle	Knowledge is often achieved by using materials and is linked to the materials and to actions one can do with them. It is not purely conceptual.
22. Intuitive Knowledge Principle	Intuitive or tacit knowledge built up in repeated practice and experience counts a great deal and is honoured in the domain/game (even if it does not always work). It is not just verbal and conscious knowledge that is rewarded.
23. Environment Scaffold Principle	Meaning/knowledge is stored not just in the head but in the environment as well. What is stored in the environment does not need to be stored in the head.
24. Distributed Principle	Meaning/knowledge is distributed across the learner, objects, tools, symbols, technologies, and the environment.
25. Dispersed Principle	Meaning/knowledge is dispersed in the sense that the learner shares it with others outside the domain/game (e.g., chat rooms, forums, game sites, and other players).
26. Affinity Group Principle	Learners constitute an affinity group that is bonded primarily through shared practices and goals, not through race, gender, nation, ethnicity, or culture.
27. Design Principle	Learning about and coming to appreciate design and design principles is core to the learning experience.
28. Systems Principle	Learning about and coming to appreciate interrelations within a complex system is core to the learning experience.
29. Semiotic Principle	The domain/game is graphic, material, and visual, but the learner must learn to understand and appreciate the game semiotically.

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The editor welcomes reader comments on this department. **E-mail: brian_cambourne@uow.edu.au. Mail: Brian Cambourne, Faculty of Education, University of Wollongong, Northfields Avenue, Wollongong, NSW 2522, Australia.**

Waiting for the call

Kari S. Kunkle

Because the words don't move me,
my pencil and my pen
lie still across the paper,
not knowing where to begin.

Thinking back to all the times
when ideas flowed so free.
It seemed so very easy then
to everyone but me.

The call is something that used to come
so frequently and clear.
Now it is a distant friend
who is needed to reappear.

Sitting in the empty room,
waiting for the call,
is the most lonely feeling
of a writer who has felt it all.

Someday the spark will return
and fill the pages through.
For now I wait for that special time,
when my words return anew.

Kunkle teaches fourth grade at Cherokee School in Lake Forest, Illinois, USA.