Pedagogy Applied to Nonformal Education

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Nonformal education has often lacked a framework for how teaching is conducted and how learning takes place for youth in recreational environments. The application of pedagogy–teaching in a formal environment–to a nonformal education goes against some of the principles of a self-directed learner. This paper explores teaching models and learning theories that help us better understand the nonformal settings where leadership is under the guidance of a caring adult. A fundamental belief is that youth take responsibility for what and how they want to learn (youth-driven model).

The role of volunteer leaders, guides, and teachers of nonformal education programs is to help youth process information on a deeper level and develop strategies for lifelong learning. Individuals can do this by asking questions and encouraging reflection in a safe environment. For example, a leader in an archery project would match youth to their equipment, follow the safety rules, ensure individual needs are being met, and take time to discuss or praise performances.

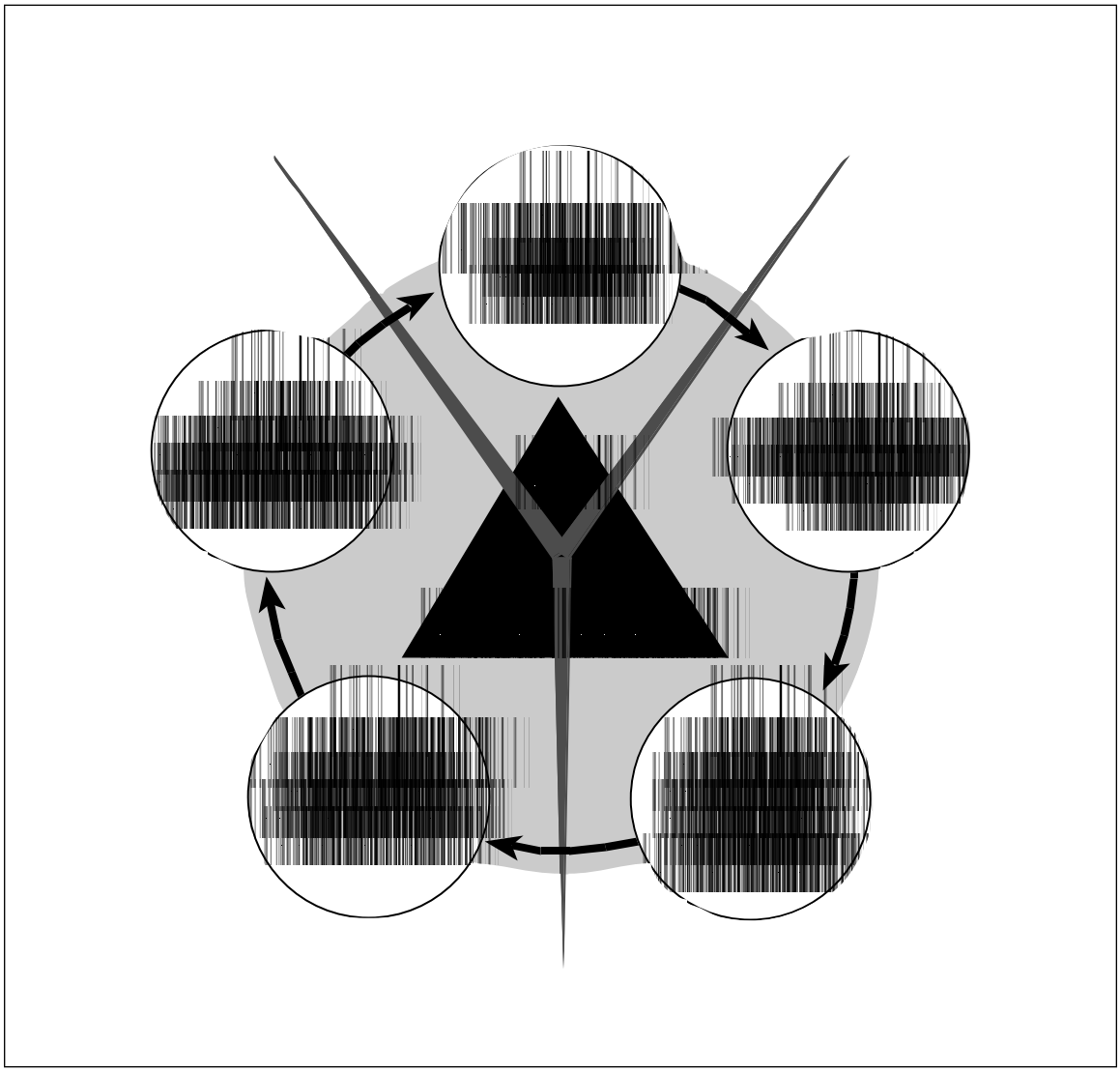
Nonformal education allows learners to control the objectives of their own learning, which in turn presents opportunities to construct their own knowledge. Effective leaders can stimulate youth to embrace lifelong learning. Leaders must also be skilled in structuring the intellectual and social climate of the group so youth discuss, reflect on, and make sense of their learning (Clements & Battista, 1990). The model of experiential learning engages youth and encourages learning by doing.

Experiential Model

For 20 years, nonformal education programs such as 4-H have promoted an experiential approach to learning (Joplin, 1995). Based on work by Pfeiffer & Jones (1981), the experiential model evolved. The model encouraged leaders to facilitate while youth experience an activity and then process the experience through questioning. Through the experiential model, youth:

- **experience**–do the activity
- **share**–communicate results and observations
- **process**–analyze and reflect on the experience
- **generalize**–relate the experience to a real-world example
- **apply**–use what was learned in a similar or different situation.

Experiential learning requires both active cooperation of the learner and guidance from the leader. Teaching becomes a cooperative enterprise that awakens the learner's curiosity and intelligence. Providing an experience alone does not create experiential learning (Dewey, 1938). Experiences lead to learning if the individual understands what happened, sees that patterns of observation emerge, draws generalizations from those observations, and understands how to use the generalizations



Experiential Learning Model

again in a new situation. The activity comes first; the learning follows from the thoughts and ideas created through leader facilitation (Pfeiffer & Jones, 1981). Critical to this model is the use of questions to enrich the learning environment.

Questioning

Questions help people process information. Unless people are explicitly questioned, they do not process as much information as many cognition researchers once thought (Abele, 1985). The best questions are open-ended, allowing for more than one correct answer. These types of questions spur more exploration and new hypotheses. When youth are ready to propose explanations, questions help clarify and justify their responses. Questions such as "Did anything you discovered surprise you?" and "What do you think of Harold's answer?" help youth form theories and explanations. Concluding questions such as "How could you learn more about this topic?" stimulate youth to act on what they have learned.

Questioning also invites learners to become more involved. Piaget's equilibrium theory illustrates how questions involve learners. People have an innate need for a state of balance. Searching for equilibrium involves testing our understanding against the real world. When that

understanding explains experiences, the world makes sense and there is equilibrium. When we can't explain what we observe or experience on the basis of understanding, disequilibrium occurs, and the search for new understanding begins (Piaget, 1952, 1959). An aerospace project leader may ask about water in the bottle rocket, "Will it increase or decrease flight?" Learning occurs when students are encouraged to both explain their ideas in ways their peers will understand and defend their viewpoints. Questions can provoke and acknowledge that a better understanding is needed to start youth on a new discovery. Learning is the outcome.

Learning

Caine and Caine (1991) argue that learning is based on the ability to build relationships or connections in order to have understanding. Patterns are built to make connections in the child's mind. The brain processes the experience to make meaning. The more lifelike or relevant the experience, the greater the mental engagement. Through self-reflection, the brain has the ability to self-correct and learn from the experience. The engaged learner has a higher degree of self-motivation and an inexhaustible capacity to create. This learner integrates vast amounts of information and is totally involved. Theories of cognitive psychology can explain how learning takes place in nonformal education settings such as 4-H. The theories support the idea that youth learn best when they have control of their learning environment.

The field of cognitive psychology is concerned with how messages are received and processed in the brain. Cognition is the mental process or faculty by which knowledge is acquired (Webster, 1970). Cognitive processes are operations performed on incoming information–looking at certain aspects, drawing inferences, storing information, retrieving it when needed, identifying a plan of action, and implementing plans (Hewes & Planalp, 1987). Cognition depends on one's prior knowledge, what is on one's mind at the time of the activity, the amount of time one has to think about the topic, and whether the experience stimulates memories of similar information.

Learning is based on cognitive processes that include previous knowledge, the nature of the instruction, situational events, the stimuli, and mental engagement (Gagne, 1985). How, then, does cognition work?

Schema Theory

Cognitive psychology suggests that people construct functional systems, called schema or schemata, that allow them to store information about their environment (Bartlett, 1932). Schemata are bits of information that include stored knowledge, stored organizers, and rules by which one functions. Schemata give meaning. They tell the observer what to expect, what to select, and how to deal with incoming information. As the individual moves through the environment, these schemata constantly change to accommodate new material. For example, a child's animal schema that comes only from books will change after the child's first trip to a

Photo by Deborah Curry, Iowa State University Extension

Questions help people process information and enrich the learning environment.

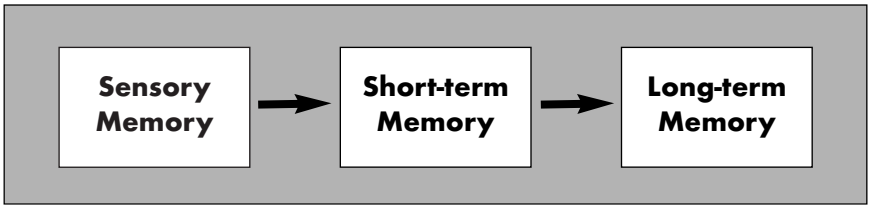
farm. Incoming information or stimuli are coded and then given meaning by referring to existing schemata. Animals will look the same as they were in books but now the smell, movement, sounds, and total environment will add to or modify existing bits of knowledge.

Schema theory has become widespread in psychological research, and schemata have been called the building blocks of cognition (Mandler, 1984). Knowledge about a subject, event, personality trait, or social norm are combined into a network of stored information. Schemata are activated by experiences that function according to schematic principles (Mandler, 1984). When a schema is not available, the individual cannot understand the specific behavior or information (Gibson, 1969). For instance, when a leader talks about the horse's frog and how important it is to clean it daily, a youth with no experience or schemata for the term may think only of small green amphibians squished under the foot of a horse.

But schemata are only bits of stored knowledge. How are schemata retrieved from memory, moved, and changed? The theory of information processing has evolved over the last 20 years to help answer this question.

Information Processing Theory

Cognitive psychology and the theory of information processing evolved when behavioral psychology failed to address how people think and process information (Broadbent, 1957). With the development of computers, a comparison could be made between computers and the brain. This helped explain how memory and learning worked. Both the brain and computer interpret symbols fed into them and perform the operations those symbols specify (Ashcraft, 1989). Information is organized and stored in memory and made available for recall. This analogy of humans as computers, first presented in 1958 by Newell and Simon, provided not only the framework, but also the jargon for mental processing, for example, input, output, storage, and retrieval (Ashcraft, 1989). Atkinson and Schiffrin (1968) are credited with the first linear model of human memory, which included the idea of three different memories: sensory, short-term, and long-term.



First linear model of human memory. Atkinson and Schiffrin (1968)

Newell and Simon (1972) added the concept of limited capacity for mental processing in any given channel. Derived from telephone communication engineers, the limited-capacity concept implies that the brain has built-in limits to receiving and processing information. In the short-term memory, also called working memory, information can be processed through two or more channels. An example would be reading the newspaper, watching TV, and talking to a friend all at once. Miller (1956) found that the limited capacity for mental processing is six units of information, plus or minus two. However, Kahneman (1973) adds that when an individual becomes mentally engaged in an activity such as reading a book, he or she has unlimited mental capacity, expends little effort, and has high information recall. A leader, through reflection and discussion, engages youth to work on records by encouraging them to tell their own story in the medium of their choice: pictures, drawings, video, tape recording, writing, or some combination.

Information processing theory provides the basis for understanding how stimuli (use of

questions) move through different memory stages–from sensory memory to the short-term memory, stored in and retrieved from the long-term memory, then back to the short-term memory. It supports the notion that learning is based on previous knowledge, new stimuli, and the nature of the instruction, which help its transfer into long-term memory (Gagne, 1985). When youth become engaged for extended periods of time, they access long-term memory and unlimited mental capacity. As they construct new meaning (flow) they lose track of time and discover that learning is fun.

Constructivism Model

In the past, traditional education has been based on a transmission or absorption model of teaching and learning. In this model, youth passively absorb structures invented by others and recorded in texts or told to them by authoritative adults. Constructivism is in sharp contrast to the absorption/transmission model of teaching and learning. Constructs, like schemata, help the learner understand what to expect as well as how to select and process incoming information. The application of constructivism to education is based on five basic tenets: invention, reflection, interpretation, social processing, and sense-making of knowledge (Clements & Battista, 1990).

A constructivist perspective implies two major outcomes for nonformal learning. First, youth develop knowledge structures that are more complex, abstract, and powerful than the ones they currently possess, so they are increasingly capable of applying that knowledge to their daily lives. Second, youth become independent and self-motivated in their activities. Constructivists believe that youth do not get knowledge from others as much as from their own explorations, thinking, and participation in discussions. Constructivism shifts the emphasis from a youth's replication of what the leader does, to the successful organization of the youth's own experiences (Driver & Leach, 1993). This is what happens when youth choose what they want to learn and how to learn it. A leader creates the environment where exploration and

Checklist for Good Learning

The environment

- ✓ Is there shared learning between adults and youth?
- ✓ Is the setting nonevaluative?
- ✓ Is the learning taking place as a social process?
- ✓ Do youth feel in control by making their own choices?
- ✓ Are youth engaged in hands-on, minds-on activities?

The learning

- ✓ Is it fun?
- ✓ Are youth learning by doing?
- ✓ Are youth inventing their own way of thinking about the world?
- ✓ Are youth engaged in self-discovery?
- ✓ Are youth relating learning to real-world experiences?
- ✓ Are youth taking responsibility for their own learning?

Facilitating

- ✓ Are questions used to encourage youth?
- ✓ Does the experience allow opportunity for reflection?
- ✓ Are ideas or concepts broken down into small, understandable parts (six or less)?
- ✓ Is the content adapted to meet the interests, knowledge, and abilities of participants?
- ✓ Am I an active listener and learner?
- ✓ Are strategies being discussed to simulate lifelong learning?

discovery can take place and youth are safe to construct new meaning and knowledge.

Understanding how teaching and learning can be encouraged with experiential education, schemata and information processing theories, and constructivism helps in building a successful learning environment for youth. By recognizing the components that influence learning and by asking questions, we help youth gain new insights. New insights provide youth with multiple perspectives and job skills for workforce preparation. New insights also feed the insatiable need to know, and give youth a sense of fulfillment and satisfaction in their ability to learn.

A checklist for good learning, on the previous page, can help volunteer leaders and curriculum developers formulate ideas on the issues discussed in both this paper and Carlson's paper elsewhere in this issue, "Learning by Doing and the Youth-Driven Model."

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