



Introduction

How we teach, regardless of the audience or the subject matter, must be based in the science of how people learn. Research has identified a series of principles of teaching and learning that help guide field agents and others in how they plan for and conduct educational programs. Further, research has shown clear linkages between what teachers do (their behavior) and how well the learners or clients learn. In this paper we will discuss various principles and teacher behaviors and propose how field agents and other instructional staff can build upon them to be more effective teachers and knowledge brokers.

Principles of Teaching and Learning

An extensive listing of teaching and learning principles has been identified in the work of Crunkilton and Krebs as well as Newcomb et al. The following is a condensed version of those principles, with topics to consider in preparing and conducting educational programs for local farmers and others. The principles are presented in five major categories: Organization and Structure of Subject Matter, Motivation, Reward and Reinforcement, Techniques of Instruction, and Transfer of Learning.

Organization and Structure of Subject Matter

1. When the subject matter to be learned possesses meaning, organization and structure that is clear, learning proceeds more rapidly and is retained longer.

Field agents should have a plan for the program to be delivered and a plan for instruction. Farmers and other participants will learn more and retain the information longer when they know what is expected and how the workshop will be conducted.

2. Readiness is a prerequisite for learning. Subject matter and learning experiences must be provided that begin where the learner is.

Farmers have varying backgrounds and experiences. The field agent must be familiar with the audience so that instruction draws upon those experiences but is still within the ability of the participants to comprehend the information and apply what has been learned.



Motivation

1. Learners must be motivated to learn. Learning activities should be provided that take into account the wants, needs, interests and aspirations of the learners.

Much like readiness, motivation is an important characteristic of learners. Instructors need to address the local situation of the participants and use the experiences and situations of the farmers in planning and conducting workshops.

2. Motivation (interest) is strongest when learners perceive that learning can be useful.

Teaching at the local level can be highly successful when the instructor makes clear connections between what is being taught and how the local farmers will be able to utilize this new information.

3. Learners are motivated through their involvement in setting goals and planning learning activities.

An important part of program planning is identifying the needs of the potential participants. Before any workshop is offered, the field agent should meet with the local farmers to determine (by asking them) what it is that they need to improve in their local situation. The field agent then designs the workshop based on the feedback from the local farmers.

4. Learners acquire new knowledge and skills only as far as needed to accomplish their purpose.

Once the local farmers have been engaged in planning a program and identifying topics that need to be included, they are motivated to participate and to learn. But once they believe they have the information they need, learning is no longer a goal.

5. Success is a strong motivating force.

People like to feel successful. When farmers and others are able to apply new information and find success, they are highly motivated to continue learning, to participate in additional workshops, and to try other new ideas.

6. Learners are motivated when they attempt tasks that fall in a range of challenge such that success is perceived to be possible but not certain.

In addition to readiness to learn, participants must believe that the new content they will learn is achievable for them (not beyond their personal and local possibilities) and yet will add to their knowledge rather than being on topics they already know.

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Principles of Teaching and Learning

Reward and Reinforcement

1. When learners have knowledge of their learning progress, performance will be superior to what it would have been without such knowledge.

Learners need to know that they are making progress. Periodic checks with how the farmers are implementing change help to reinforce learning and encourage additional participation in learning activities.

2. Behaviors that are reinforced (rewarded) are more likely to be learned.

Behavior can be rewarded in a variety of ways. Simply acknowledging that a participant has responded with an appropriate answer during a discussion is a form of reward. Sharing success stories among other farmers in the village also reinforces what has been learned. Farmers can learn from each other.

3. To be most effective, reward (reinforcement) must follow as immediately as possible the desired behavior and be clearly connected with that behavior which is quite effective.

Just as in the formal classroom, participants want and need immediate feedback. The sooner the field agent can acknowledge a positive change in behavior, the more the participants will be willing to learn and to attempt new techniques.

4. Opportunity for fresh, novel, stimulating experience is a kind of reward which is quite effective.

Instructors need to vary their presentations. A short lecture or discussion can be followed by a demonstration or some other activity that "breaks the monotony" and allows participants to engage in their learning in different ways. Participants feel rewarded.

5. Threat and punishment have variable and uncertain effects upon learning; punishment is not, psychologically, the reverse of reward.

Clearly, wrong answers must be corrected. However, correcting behavior should not be done in a punishing manner.

Techniques of Instruction

1. Directed learning is more effective than undirected learning.

While the field agent has more knowledge of the content being taught than the farmers, the field agent is not simply a purveyor of that knowledge. Learning is more effective when direction is provided by the instructor or field agent, as opposed to having participants study and investigate on their own.

2. Learning is an active rather than a passive process.

Participants learn more when they are actively engaged in their own learning. Instructors must utilize active learning strategies to help make learning an active process for the participants.

3. To maximize learning, learners should "inquire into" rather than be "instructed in" the subject matter. Problem-oriented approaches to teaching improve learning.

While teaching must be directed by the field agent or instructor, participants will learn more when they delve into a problem situation, gather information and seek solutions. Problem solving is an effective teaching technique that allows learners to inquire into the situation rather than simply be told the answer.

4. Learners think (formulate and test possible solutions to problems) when they encounter an obstacle, difficulty or challenge in a situation that interests them.

An extension of what we know about motivation is that learning occurs when the participants are interested in the problem and see a need for learning more about the issue. Instructors must be familiar with the local situation so that teaching addresses the local context and issues.

5. Learners learn what they practice.

A major advantage of teaching in an extension system at the local level is that there are ample opportunities to work closely with local farmers as they apply what they have learned. From demonstration sites to individual farms, participants in an extension program can apply immediately what they have learned. They apply and practice the new skills they have achieved.

6. Supervised practice that is most effective occurs in a functional educational experience.

Similar to the above principle, the extension agent can "supervise" the application of what was taught to the farmers. Additional instruction and re-instruction can occur in the local farmer's setting.

7. Repetition without indications of improvement is a poor way to attempt to learn.

Simply doing the same task over again does not improve learning. Farmers need to receive feedback on their practices to continue to improve their abilities in production and marketing of their products.

8. The best way to help learners form a general concept is to present the concept in numerous and varied specific situations.

Teaching by example can be very effective. The field agent needs to provide an array of examples to help reinforce learning.

Transfer of Learning

1. Learning is most likely to be used (transferred) if it is learned in a situation as much like that in which it is to be used as possible and immediately preceding the time when it is needed.

Teaching at the local level enhances the opportunity for learners to apply what they have learned within their own situations. The closer the instruction is to the actual experiences and needs of the farmers, the more the farmers will be able to learn.

2. Transfer of learning is more likely to take place when that which is to be transferred is a generalization, a general rule or a formula.

Having farmers memorize specific facts is only useful when those facts are with the broader context of their situation. The facts may change over time, but the general concepts tend to be more stable and therefore more useful over time.

3. Learners can learn to transfer learning; therefore, teachers must teach for transfer.

While teaching at the local level is highly successful, not all participants have exactly the same needs. However, field agents can teach concepts that any farmer can apply in his or her own situation.

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Principles of Teaching and Learning

Teacher Behavior and Student Achievement

A major meta-analysis of research studies that addressed teacher behaviors and student learning was conducted by Rosenshine and Furst. Additional studies have verified the results of the meta-analysis. The researchers identified 11 major areas of teacher behavior. For five of those variables, as teachers exhibit these behaviors more, student learning generally will increase.

1. **Clarity** - Cognitive clarity of a teacher's presentation

- * the presentation is clear to the learners,
- * points the teacher makes are clear and easy to understand,
- * the teacher explains concepts clearly,
- * questions are answered intelligently,
- * instruction is organization.

2. **Variability** - Teacher's use of variety or variability

- * variety of instructional materials,
- * variety of teaching strategies,
- * variety of types of tests and assessments,
- * variety of level of discourse (discussion, question/answer) and of student tasks (easier/more challenging).

3. **Enthusiasm** - Teacher's enthusiasm

- * movement, gestures and voice inflections,
- * teacher questions, especially questions calling for interpretation of facts.

4. **Task-Oriented and/or Businesslike Behaviors** - Degree to which a teacher is task-oriented, achievement-oriented, and/or businesslike

- * teacher is concerned that participant learn something rather than simply enjoy themselves (but it is okay to have some fun on occasion),
- * teacher encourages learners to work hard and to do independent and creative work.

5. **Student Opportunity to Learn Criterion Material**

- * correlations between measures of opportunity to learn and achievement are positive, significant and consistent; not "wasting time" provides more opportunity for learning,
- * relationship between the content taught in the course and learner achievement on the criterion test is positive.

Summary

These principles of teaching and learning and teacher behaviors are important considerations for any instructor to consider in planning for, delivering and assessing teaching and learning. The application of these principles and research findings will make learning more achievable and teaching more enjoyable for all.

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This Technical Note is the first in a series on Effective Teaching and Learning. Modernizing an extension and advisory services system in any location requires competent field agents and others who know and/or have access to content needed at the local level and are able to teach that content using proven teaching strategies and methodology. These technical papers should be utilized by anyone involved in the training of extension professionals, local farmers and others in order to increase farm level production and profitability.



Modernizing Extension and Advisory Services