Teaching and learning is a three-legged approach according to Steve J. Thien, Department of Agronomy, Kansas State University. We as instructors must learn how to teach then teach to learn. The student must learn how to learn.
The Mission

These four functions are the core mission areas of the Soil Survey Division:

1. Make an inventory of the soil resources of the United States;
2. Keep the soil survey relevant to ever-changing needs;
3. Interpret the information and make it available in a useful form; and
4. Promote the soil survey and provide technical assistance in its use for a wide range of community planning and resource development issues related to nonfarm and farm uses.

The soil survey mission is accomplished with two basic functional roles of soil scientists. The first of these is performed by the soil scientists in the MLRA Soil Survey Offices who are involved in updating, database management, correlation, data quality control and assurance, and in some cases the initial inventory. The second is performed by the soil scientists involved in technical soil services as assistance to NRCS area and field offices. With the emergence of geospatial applications and tools, an important additional functional role performed by soil scientists is as GIS specialists focused on soil survey activities.

The demands on soil scientists will drive the need for an organizational and technical infrastructure consisting of soil scientists who have the tools they need, are technically competent in their discipline and are proficient at relating soils to landscapes. These soil scientists must understand the role of soils in ecosystems and must also understand legal processes and public policy decision making, understand soil responses to human impacts, participate in a broader range of professional venues, and be able to communicate effectively with both agricultural and nonagricultural audiences.

The Soil Survey Division Long-Range Plan recognizes training as an important aspect of a strategy to achieve these goals. The Training Long-Range Plan supports the Soil Survey Division’s goals and initiatives with regard to training activities.

The Methods

The Soil Survey Division’s training efforts will use a mixture of the following methods to enhance the ability of NCSS participants to carry out the soil survey mission.

**Technology transfer** is the integrated use of training, education, development, job aids, and other activities and techniques that provide our NRCS and partner employees with the most up-to-date knowledge, skills, and abilities necessary to conduct their assigned tasks. These can be defined as follows:

**Training** is typically short-term learning that is intended to establish or improve a match between present job requirements and individual knowledge, skills, and abilities. Training helps people to meet minimally acceptable job requirements or to refine,
upgrade, and improve what they do. **When employees complete a training activity, they should be able to apply the new learning immediately to their jobs.**

**Education** focuses on the broader and more long-term job of increasing the knowledge base of employees. Examples of educational activities are self-directed study and graduate education.

**Development** is learning that is usually focused on stimulating new ideas or providing awareness for future reference.

**A job aid** is, simply put, something that can be used on the job to improve performance. Examples include modules developed for specific tasks (estimating rock fragments, for example), training plans for new employees, proficiency models, and any kind of how-to manual.

In reviewing our training needs in the Soil Survey Division (SSD), we consider all four of the above methods in providing technology transfer in conjunction with professional development workshops and on-the-job training. Training will be the main focus, but we should consider whether an objective we develop is suited to traditional classroom training; distance learning (instructor led or self-paced); national, regional, MO, or state developmental workshops; or a job aid. In particular, we want to keep our minds open to the use of any distance learning activities, whether Web-based training or some type of electronic job aid posted where it can be accessed and used.

**Prerequisites** are what a learner has to be able to do to qualify for a course. Other requirements may include access to tools, hardware, or software that the student will need to apply the training after the course or an office work setting where a supervisor allows the learner to apply what is learned. It occasionally happens that a learner attends a course too early in his or her career, without the background necessary to grasp the training that is being provided. We will address the subject of prerequisites for each of our courses.

**Blended learning** refers to using multiple methods of delivery in conjunction with traditional classroom teaching. In particular, adding Web-based training (**distance learning**) as a supplement to training course attendance. Activities or exercises, both in the classroom and in the field, in conjunction with classroom teaching, are examples. Blended learning also includes assignments both before and after the course.

**Follow-up to training** can measure the effectiveness of a course, i.e., whether the student applies the learning after the training. Is it being applied? If not, why not? Are there performance barriers, was there a problem in the instruction, was the learner not ready yet for that level of activity, or was the training inappropriate for the learner’s current role? Capturing this information is not an easy task. The SSD will strive to utilize methods that are efficient and effective.
Future Challenges and Opportunities

The Soil Survey Program has achieved success for over 100 years by adopting new technologies and adapting to society’s changing needs while maintaining a strong foundation in on-the-ground soil science. For continued success, we must anticipate future changes and begin now to provide the necessary skills for our employees to meet these challenges and take advantage of new opportunities in meeting the Soil Survey Division’s mission. Some anticipated challenges and opportunities are:

- We will see greater balance among our four mission areas.
- There will be less emphasis on initial mapping and more on updating existing surveys on a MLRA basis.
- Developing proficiency in understanding soil-landform relationships while on the job will be increasingly rare as we transition from initial to update soil survey work, thus requiring more formal efforts to teach this skill.
- There will be more emphasis on interpreting, marketing, and providing technical support.
- There will be greater reliance on GIS and remote sensing tools.
- Skills in data evaluation, summary, and interpretation will be needed to build on and improve existing data.
- There will be increased use of electronic forms of data delivery.
- Greater accessibility of soil surveys will result in exposure of omissions, errors, and conflicts in our database.
- We expect to need more kinds of interpretations with more local tailoring.
- Single-soil interpretations will be increasingly inadequate. We will see demand for interpretations over landforms and even landscapes (linking pedons and other data sets).
- There will be increased emphasis on soil functions. We will need to show links between human impacts and soil performance.
- We will have more Resource Soil Scientists who are increasingly well trained.
- We will have a greater need for interdisciplinary approaches to interpretations.
- There will be a growing niche for the private sector to take our data and repackage it for clients because we cannot meet all demands for formatting and presentation of the data. This will be an important client base.
- We need to be better attuned to public policy and legal processes to be effective in demonstrating the relevancy of soil survey to society.
- We will need to be able to provide a quick response in adapting soil survey information to crisis situations.
Matrix of Knowledge, Skills, and Abilities for Soil Scientists.

A matrix of knowledge, skills, and abilities (KSAs) has been developed for this long-range plan. This matrix is dynamic but captures the main needs of our soil scientists to be functional in all aspects of the job to be done. The KSA levels were evaluated in the context of the mission areas and basic functional roles. Also considered was the point in the soil scientist’s career when the KSAs need to be obtained. Existing training courses have been evaluated to ensure that they meet the KSA level needs, and the courses that need to be updated have been identified. The matrix also identified several new training needs for future soil scientists.
Goals and Objectives

Long-Range Plan objectives define the desired state, desired condition, or direction to take for each of the three following goals, which address the four mission areas of the Soil Survey Division. Plan initiatives are broadly defined emphasis areas that are necessary to accomplish the objectives. Each objective has a baseline, or current condition, from which performance can be measured. The plan initiatives serve as a guide to NSSC business plans for providing training.

Goal 1; Enhance course content, develop new courses where necessary, and provide training that includes emphasis on updating and inventory of our soil resources and data, interpretations, new technologies, USDA programs, law and public policy, and other aspects of a well balanced soil survey program.

Objective 1: SSD training courses utilize a mixture of delivery methods (blended learning), so that they are highly effective in improving the skills of our employees.

Baseline

*Blended learning means using a combination of delivery methods, such as classroom and Web-based training. The Harvard Business School has reported that students learn more and show increased student interaction and satisfaction with the use of blended learning, which provides more classroom time for exercises and activities by placing pre-work and post-work online. Blended learning has been utilized during the past 3 years, but more effort is still needed. Also, some NCSS cooperators currently do not have access to AgLearn, where the bulk of our Web-based learning will reside. This issue needs to be addressed.*

Initiatives

1. Continue use of hands-on exercises and other activities in training to increase retention of learning in all courses.
2. Utilize instructor-led distance learning as appropriate
3. Utilize AgLearn and other means of providing self-paced training
4. Utilize some of the discussion tools (polls, chat) and breakout session capabilities of Adobe Connect Pro (currently used in delivery of Internet-based training) in the classroom environment to enhance participation and delivery
5. Work with NEDC to ensure that cooperators have access to AgLearn and other of our distance learning efforts

Objective 2: All NEDC-sponsored SSD courses adequately reflect current technology, policy and procedures, and they address the skills required by soil scientists to accomplish the SSD mission into the foreseeable future.
Baseline
Policy, procedures, and especially technology change over time. Training must remain relevant to current standards and utilize the most current technology adopted by the SSD and NCSS. Because of the investment of time, effort, and budget to training, learners should be accountable for successful completion of training and measured through test scores and other means of assessment. These results should be made available to State Soil Scientists and supervisors.

Initiatives

1. With release of ArcGIS 9.4, complete a redevelopment of the Digital Soil Survey Editing and Data Management course and drop the data management component. This will result in a course titled Digital Soil Survey Data Editing (currently Part 1).
2. With release of ArcGIS 9.4, complete a redesign and development of a course titled Digital Soil Survey Data Management (currently Part 2).
3. Work with instructors to incorporate new adopted technology, policy, and procedures in all training efforts as needed.
4. With release of NASIS 6.0, provide refresher training to those with NASIS experience and new training to new users.
5. Redesign the course Soil Technology-Measurement and Data Evaluation to meet current needs.
6. Add statistical components to courses as appropriate, addressing both attribute and spatial data analysis.

Objective 3: SSD has a full complement of courses and training modules to address the needs of the Soil Survey Division’s four mission areas.

Baseline
Again, as policy, procedures, and especially technology change over time, we must address training needs to stay current. This may mean adding additional training modules or courses.

Initiatives

1. Develop, pilot, and deliver the course Using Comparison Studies to Inventory Soil Change.
2. Develop guidance and training as needed directed at the Carbon assessment effort to be conducted by NRCS.
3. Develop and provide training specific to use of the spectrometer, which will be distributed to all MOs in 2010.
4. Develop and provide training specific to use of the active carbon kit, which will be distributed in 2010.
5. Address the need for mapping and map unit design experience through training. Propose that the Soil Survey Division organize a working group to explore this issue and recommend alternatives for meeting this need.

6. Address the need for expertise at the inventory stage for ecological sites, ecological site descriptions, and state and transition models from a soil scientist perspective through workshops, training, OJT, and job aids.

7. Encourage training for all MLRA SSO soil scientists in terrain analysis through Spatial Analyst or other means.

8. Provide training in use of landscape modeling components (such as curvature analysis and wetness index), data mining, and supervised versus unsupervised classification techniques (GIS). Could be done with a follow-up course to Spatial Analyst to help people apply the data once it is developed.

9. Upon release of the national spatial Geodatabase, we will need to develop and provide applicable training for its use.

Objective 4: SSD assists MLRA Offices, States, and NTSC’s to provide professional development workshops as a method of technology transfer.

Baseline
Regional workshops are an excellent method of technology transfer of training and developmental topics, especially for topics that are regionally oriented. Workshops have been held sporadically across the country in recent years, consistently in some parts of the country, not at all in others. The NTSCs are currently encouraged to utilize workshops for the Technical Soil Services staffs in their regions.

Initiatives

1. Promote workshop concept to all SSS/MOLs and NTSC Regional Soil Scientists as means of providing training and developmental material.

2. Encourage workshop hosts to share agendas and workshop materials with others in the NCSS through the SSD training coordinator. The soils.usda.gov Web site should be utilized to accomplish this action.

Objective 5: This long-range training plan has an effective impact throughout NRCS and the NCSS program.

Baseline
Some of the changes proposed for training within the SSD will require a cultural change. To accomplish this change, it is imperative that the SSD work with the Centers, States, MLRA Soil Survey Offices, and cooperators to ensure acceptance. Then, it will be necessary to ensure that the plan’s implementation is maintained in
the following years.

Initiatives

1. SSD Training Coordinator will seek out ways to communicate with SSS and Center directors to secure support for training activities, on an ongoing basis.
2. SSD Training Coordinator will work with SSD leadership to link this long-range training plan to the SSD Long-Range Plan and the part of that plan that addresses training needs.

Objective 6: Both the Soil Science and Soil Geomorphology Institutes are conducted on a recurring basis so that all NCSS soil scientists have an opportunity to receive this important training.

Baseline

The Institutes are integral in refreshing or providing the educational aspect of technology transfer for NCSS soil scientists. Funding has become an issue, and all efforts should be made to keep funds available. In recent years, there has been emphasis on the Institute for Geomorphology. It is now appropriate to change to a rotation of the two institutes.

Initiatives

1. Conduct each Institute in rotation over the next 3 to 5 years. Reassess the needs again after that period of time.
2. Use NRCS Request for Proposal (RFP) for competitive selection of hosts for the Soil Science Institute.

Objective 7: Soil scientists and their supervisors have effective tools and resources to maintain their Individual Development Plan (IDP) to indicate education and training needed to do their job.

Baseline

The SSD, in part through implementation of this long-range plan, provides training to help all soil scientists develop the knowledge, skills, and abilities needed in their current positions. Education beyond the Soil Science Institutes is available through the USDA Graduate Program on a competitive basis and through colleges and universities through the personal efforts of the individual. Often, though, soil scientists are not located within commuting range of colleges and universities. Distance learning may be an answer to that problem.
Initiatives

1. Encourage soil scientists and management to utilize other educational opportunities within and outside the agency.
2. Encourage participation in the NRCS Mentoring program.
3. Foster developing an informal network of providing guidance to people needing “mentoring” in regards to a particular topic.
4. The SSD should continue to administratively support (admin. leave to attend classes for example) education by the individual, if that education supports the needs of the agency. This should be done on an ongoing basis.
5. Encourage all soil scientists to utilize the content of the training Web pages at soils.usda.gov as they develop their IDP.
6. Maintain and provide the listing of undergraduate and graduate level distance learning opportunities available at the various universities.

Goal 2; Develop the teaching skills of those providing training

Objective 1: Course instructors have the tools and skills they need to be effective instructors

Baseline

Effective instructors are essential to successful learning. Instructors must understand how adults learn, know how to prepare effective training materials, and know how to effectively present those materials. Without effective instructors, learning is diminished. Recognize that all instructors are taking time out from their assigned duties to develop and present the training material.

Initiatives

1. Provide “Train the Trainer” training to all future instructor cadre members through whatever means possible, on an as-needed basis.
2. Training Coordinator will work with SSD leadership to identify instructors who are interested in receiving training to enroll in the NEDC course Training Skills Workshop. Investigate the possibility of NSSC paying costs of attending for selected and interested instructor cadre members from outside NSSC.
3. Encourage use of the existing set of guidelines for instructors located on the training Web pages of soils.usda.gov that include guidance, tips, and tools relevant to training instruction within the SSD.
4. Training Coordinator will work with MLRA Office Leaders, State Soil Scientists, center directors, and national leaders to identify and encourage our best potential instructors to become instructors.
5. The SSD will utilize the current incentive awards program for providing awards or certificates, as appropriate, to instructors to thank them and encourage them to remain with the instructor cadres.

6. States, MO’s, Centers, etc. will be recognized for committing staff resources to training activities.

Objective 2: Supervisory soil scientists and others who provide On-the-Job Training (OJT) have ready access to the guidance and tools they need to effectively do that job.

Baseline

On-the-Job-Training (OJT) is often the most effective training. It can address local conditions versus a national perspective received at nationally led training courses. It can provide the repetition necessary for learning to be retained. It is one-on-one training. Those providing OJT have probably never received guidance in delivery, tools, tips, etc for effective OJT. This lack of guidance may result in inconsistent and even inadequate OJT delivery across the agency.

Initiatives

1. Encourage those who provide OJT to utilize the “How to provide OJT” material on the Web site
2. Develop a syllabus of learning to be utilized by those who provide OJT to help them become good trainers for their staff. Incorporate existing materials and promote mentoring.
3. The Training Coordinator will assess the level of interest and provide OJT Train the Trainer training via distance learning workshops.
4. The Training Coordinator will develop a list of possible mentors for assistance in providing OJT.

Goal 3: Make appropriate job aids and OJT (On-the-Job-Training) modules available to all within the NCSS

Objective 1: A clearinghouse with a full collection of job aids and OJT modules is readily available and can be shared with others.

Baseline

The effort to develop a job aid when the same or a similar aid already exists somewhere else is wasted effort. Many “job aids” exist within the NCSS. People within the SSD need to be willing and able to share these with others. Also, providing OJT modules at the national level will enhance consistency of OJT across the Soil Survey Division.
**Initiatives**

1. Continue to address the list of training aids and OJT modules proposed for development. Add to these lists as needs arise.

2. Develop a “clearinghouse” on the soils.usda.gov training Web pages for GIS digitizing data editing and management scripts and models to be shared across the country.