Teaching or Instructional Methods

Stephen Petrina

General models and families of <mark>teaching or instructional methods</mark> are guides for designing educational activities, environments and experiences. They help to specify methods of teaching and patterns for these methods. Instructional strategies, or teaching methods, depend on a number of factors such as the developmental level of students, goals, intent and objectives of the teacher, content, and environment including time, physical setting and resources. Imagine a course that challenges teachers to meet a number of objectives. A single method cannot meet all of our goals nor can a single method accommodate all learning styles at once. For example, demonstrations or projects are effective for meeting some goals but ineffective for meeting others. So we need a toolbox of methods, not merely a single tool.

In the most general terms, there are four or five different models of instructional strategies or teaching methods. Having spent years in schools, you will recognize each and probably have strong preferences for one or two models.

- · Didactic- Direct teaching; Verbal and typically in the form of a lecture or presentation.
- · Modeling- Direct teaching; Visual and typically in the form of demonstration and practice.
- · Managerial- Indirect or Interactive teaching; Facilitation, individualization and group management.
- · Dialogic- Indirect Interactive teaching; Socratic Technique of dialogue, questions and thought provocations.

In the **Direct Instruction** models, the teacher imparts knowledge or demonstrates a skill. In the **Indirect Instruction** models, the teacher sets up strategies, but does not teach directly; the students make meaning for themselves. In the **Interactive Instruction** models, the students interact with each other and with the information and materials; the teacher is organizer and facilitator. **Experiential Learning** models mean that the students experience and feel; they are actively involved. In **Independent Study** models, the students interact with the content more or less exclusive of external control of the teacher. Some theorists prefer to reduce these to three general methods: Transmissive, transactive and transformative teaching. **Transmissive teaching**, or direct instruction, means that the teacher delivers *status quo* content *via* some method such as lecturing or demonstrating. **Transactive teaching**, or indirect instruction, means that the teacher and students arrive at *status quo* content to be learned though transactions and dialogue. **Transformative teaching**, or a combination of direct and indirect instruction, means that the teacher and students reject status *quo content* and focus on a transformation of themselves or their world.

These general models help us to classify teaching methods and simplify our discourse for conversing about them. We also group methods by their "family" affiliations. Some methods lend themselves to encouragement of social interaction in students. Other methods encourage information processing and some facilitate behavioral modification. Still others support intrapersonal and interpersonal development. Each of these families offers different approaches to teaching, respond to different objectives and goals, and yield different results in students.

Families of Teaching Methods
(Adapted from Joyce & Weil, 1980, 1996)

· **Social Interaction Family**- Emphasizes the relationship of the individual to society or to other persons. Gives priority to the individual's ability to relate to others.
  o Partner and Group Collaboration
  o Role Playing
  o Jurisprudential Inquiry

· **Information Processing Family**- Emphasizes the information processing capability of students. Gives priority to the ways students handle stimuli from their environment, organize data, generate concepts and solve problems.
  o Inductive Investigation & Inquiry
  o Deductive Investigation & Inquiry
  o Memorization
  o Synectics (Techniques for Creativity)
  o Design and Problem-solving
  o Projects & Reports

· **Personal Family**- Emphasizes the development of individuals, their emotional life and selfhood. Gives priority to self-awareness.
  o Indirect Teaching
  o Awareness Training & Values Clarification
  o Role Modeling
  o Self-Reflection

· **Behavioral Modification Family**- Emphasizes the development of efficient systems for sequencing learning tasks and shaping behavior. Gives priority to the observable behavior of students.
  o Direct Instruction (Demonstrations & Presentations)
  o Anxiety Reduction
  o Programmed Instruction
  o Simulations

The following list provides definitions for a variety of different methods, including most of those listed above (Cruikshank, Bainer & Metcalf, 1999). Every method has advantages and disadvantages. For example, cooperative learning allows for the participation of everyone, but the groups often get side tracked. Role playing introduces a dramatic problem situation, but some students are too self-conscious to project themselves into the situation. Large group discussions pool ideas and experiences from the group, but a few students may dominate. Values clarification allows students to clarify their values in a safe environment, but some students may not be honest in this environment. Projects allow for self-directed problem-solving and creativity and take advantage of intrinsic purposes, but too much focus is placed on the product and too little on the process. There is a pedagogy (art and science of teaching) to each method that is beyond the scope of this book. In the first chapter, we explained the pedagogy of demonstrations and presentations. In the next chapter, we will address problem-solving and design briefs. Chapters six and nine will deal with activities, projects and units. Think about your teaching methods and the range that you use. Practice a variety, if only to make your practice interesting.

Teaching Methods
(adapted from Cruikshank, Bainer & Metcalf, 1999)

1. **Academic games or competition**- Learners compete with each other one to-one or team-to-team to determine which individual or group is superior at a given task such as "spelldowns," anagrams, technology trivia, Odyssey of the Mind, or project competition. Commercially available, academic computer games are also very popular (see gaming).

2. **Activity**- a general teaching method (e.g., problem-solving, design challenge, field trips, role playing) based on planned, purposeful involvement of students.

3. **Brainstorming**- order to generate creative ideas, learners are asked to withhold judgment or criticism and produce a very large number of ways to do something, such as resolve a problem. For example, learners may be asked to think of as many they can for eliminating world hunger. Once a large number of ideas have been generated, they are subjected to inspection regarding their feasibility.

4. **Case study**- A detailed analysis is made of some specific, usually compelling event or series of related events so that learners will better understand its nature and what might be done about it. For example, learners in a technology lab might investigate the wear and tear of skate boarding on public works. Another class might look at cases of digital technologies and privacy.

5. **Centers of interest and displays**- Collections and displays of materials are used to interest learners in themes or topics. For example, children may bring to school and display family belongings that reflect their ethnic heritage. The intention may be to interest the class in the notion of culture. Or, the teacher might arrange a display of different devices used in measurement to prompt interest in that topic.

6. **Colloquia**- A guest or guests are invited to class for the purpose of being interviewed in order to find out about the persons or activities in which they are involved. Thus, a guest musician might serve as a stimulus for arousing interest in music and musical performance.

7. **Contract**- Written agreements entered into by students and teachers which describe academic work to be accomplished at a particular level ill a particular period of time such as a week or month.

8. **Controversial Issues**- An issues-based, teacher-directed method that focuses on controversies. Students are directed through a process that assists them in understanding how to deal with controversial and sensitive issues and clarifies these issues in a group context. Involves critical thinking and discourse analysis (Chapter 4).

9. **Cooperative learning**- Learners are placed in groups of four to six. Sometimes the groups are as diverse or heterogeneous as possible. In such cases, group members are often rewarded for the group's overall success. Student groups might be given a teacher presentation on division of fractions. They would then be given worksheets to complete. Team members would first help and then quiz one another (Chapter 4). See also student team learning.

10. **Culture jamming**- A methods used to empower students to "speak back" to mass advertisements and media images that enforce stereotypes and select representations of individuals or groups. Empowers students to mock or "jam" images of popular culture.

11. **Debate**- A form of discussion whereby a few students present and contest varying points of view with regard to an issue. For example, students could take different positions and debate an issue: "Should rights to free speech on the internet be extended to students in schools?"

12. **Debriefing**- A method used to provide an environment or platform for the expression of feelings and transfer of knowledge following an experience. Debriefing may come at the hands of a tragic event or may be used more generally following an intentionally educational experience. Debriefing relies on the skills of the facilitator to reframe an experience or event to appropriately channel emotions and knowledge toward understanding and transformation.

13. **Demonstration**- A teaching method based predominantly on the modeling of knowledge and skills. A form of presentation whereby the teacher or learners show how something works or operates, or how something is done. For example, a teacher could demonstrate how to use a thesaurus, how to operate a power drill, how to scan an image, or what happens when oil is spilled on water as when an oil tanker leaks. Following that, students practice under teacher supervision. Finally, independent practice is done to the point of proficiency (Chapter 1).

14. **Direct instruction**- A term used to describe explicit, step-by-step instruction directed by the teacher. The format or regimen advocated is demonstration, guided practice, and independent practice. Thus the teacher might teach a reading, mathematics, geography or technology concept or skill. Following that, students practice under teacher supervision. Finally, independent practice is done to the point of mastery.

15. **Discovery or inquiry**- Discovery learning is used when students are encouraged to derive their own understanding or meaning for something. For example, Students are asked to find out what insulation acts as the best barrier for cold or hot environments. Experiments that are not teacher demonstrations are part of discovery learning (Chapters 2, 5).

16. **Discussion**- Discussions occur when a group assembles to communicate with one another through speaking and listening about a topic or event of mutual interest. To illustrate, a group of learners convenes to discuss what it has learned about global warming (Chapter 4).

17. **Drill and practice**- A form of independent study whereby, after the teacher explains a task, learners practice it. After Students are shown how to use Ohm's Law, they are asked to make calculations of current, resistance and voltage.

18. **Feedback**- A semi-formal mode of communicating to students constructive criticism regarding their performance during an activity (Chapter 1).

19. **Field observation, fieldwork, field trip-** Observations made or work carried on in a natural setting. Students visit the local museum of natural history to see displays about dinosaurs, or they begin and operate a small business to learn about production and marketing.

20. **Games / Gaming**- Immersive experiences that involve a range of environments or platforms. Digital or video games can be employed to reinforce or inspire educational concepts or more expansive approaches such as alternate reality games (ARG's) or serious games can be adapted to classrooms or expand classrooms into real or virtual worlds.

21. **Independent study or supervised study**- Described in this chapter, independent study occurs when learners are assigned a common task to be completed at their desk or as a home study assignment.

22. **Individualized instruction**- Any of a number of teaching maneuvers whereby teaching and learning are tailored to meet a learner's unique characteristics.

23. **Installation**- Students present material within a formal structure for displaying audio, multimedia or visual artifacts.

24. **Jigsaw Method**- Students within cooperative groups are become expert on different aspects of one topic of study. Each cooperative group becomes expert as well. Similar to the Place Mat method.

25. **Module**- A module is a self-contained and comprehensive instructional package, meaning that basically everything that the student needs is in the module. A form of individualized instruction whereby students use a self-contained package of learning activities that guides them to know or to be able to do something. Students might be given a module containing activities intended to help them understand good nutrition (Chapter 9).

26. **Mastery learning**- As a class, students are presented with information to be learned at a predetermined level of mastery. The class is tested and individuals who do not obtain high enough scores are retaught and retested. Those who passed undertake enrichment study while classmates catch up.

27. **Mixed-mode instruction**- A combination of "face-to-face" and on-line methods.

28. **On-line instruction and learning**- A self-directed and automated approach that utilizes hypermedia (internet browsers, etc.) for communication that generally provides independence from the architectural constraints of classrooms.

29. **Performance**- Students act out through dance, drama, music or other expressive forms.

30. **Presentation and lecture**- Students listen to a person who talks about a topic. To illustrate, the teacher, or a guest speaker, tells the class all about the invention of the transistor.

31. **Problem**- A general teaching method and organization of curriculum and knowledge where students work purposefully toward a solution, synthesis or cause. Often called problem-based learning (Chapter 5).

32. **Programmed and automated instruction**- A form of individualized instruction whereby information is learned in small, separate units either by way of reading programmed texts or using computer-based programs (See On-line instruction).

33. **Project**- Students work through a series of activities and problems culminating in the completion of something tangible (e.g., artifact, media, performance). A form of individualization whereby learners choose and work on projects and activities that facilitate and support the development of skills and knowledge. Often, learners not only choose topics but also the means of their conduct and production. (Chapters 6, 9).

34. **Protocols**- Learners study an original record or records of some important event and then try to understand the event or its consequences. They might watch a film depicting actual instances of discrimination and then consider its causes and effects.

35. **Recitation**- Students are given information to study independently. They then recite what they have learned when questioned by the teacher. For example, students read about what causes pollution, and the teacher, through, questioning, determines the extent and nature of their knowledge and understanding.

36. **Reports, written and oral**- Individuals or groups of learners are given or choose topics. For example, each may be asked to find out about one planet in our solar system, or about solar powered vehicles. What they learn is shared with other class members by way of oral or written presentations.

37. **Role playing**- Learners take on the role of another person or character to see what it would be like to be that person or character. Thus, a student could play the role of an imaginary student no one likes or a news reporter.

38. **Simulation game-** Students play a specially designed, competitive game that mirrors some aspect of life. For example, they might play the Ghetto Game to find out about the problems and pressures that ghetto dwellers face and to sense how difficult it is to improve one's lot in life. Another commercially available simulation game is Gold Rush (life and adventure in a frontier mining camp). Many simulation games, such as Sim City, are automated.

39. **Simulation**- Learners engage with something intended to give the appearance or have the effect of something else. Thus students may engage in a simulation of the United Nations General Assembly in order to have "first hand experience" with how it works and what its delegates do.

40. **Synectics**- The use of specific techniques to foster creativity in students. For example, the students may be asked to develop metaphors to describe mobility across different terrains (Chapter 5).

41. **Tutoring**- A form of individualization whereby either a teacher, or perhaps a fellow student, provides a learner or small group of learners with special help, usually because they are not learning well enough with only conventional instruction.

42. **Unit**- An intentionally designed, integrated, thematic organization of curriculum and knowledge through combinations of demonstrations, discussions, activities, problems, and projects (Chapter 9).

43. **Values clarification**- Teachers lead students through a series of moral and ethical dilemmas, such as birth control or clear-cutting forestry practices, to assist them in clarifying their values and moral choices (Chapter 4).

In the next few sections, a summary of some of the most commonly used methods in technology studies is provided. Other common methods are described in other chapters as indicated in the definitions above.

Research Methods
Models of active learning require that students spend a fair amount of time constructing knowledge. Most often, teachers provide pre-established knowledge for their students to analyze and contemplate. At times, teachers design the route and passageways for students to construct and discover new knowledge *via* a discovery method. Here, the teacher is well aware of the type of knowledge to be constructed. At other times, teachers equip their students with a research method to challenge them to construct new meanings and knowledge. In schools, the research methods are simplified, allowing the students to access the methods at their own levels.

<div align="center">Research Methods</div>

1. **Content Analysis**— A systematic method in the social sciences by which contents of spoken or written text are counted. This involves counting the number of times particular words, or phrases, are used, within selected passages (speeches, news stories, etc.). Conceptual and operational codes, like conservative or radical, and economic or cultural help to give latent meaning to the analysis of content.

2. **Critical incident**- A method where students are challenged to identify critical incidents in their lives to examine and elaborate on (Chapter 11).

3. **Design**- Students are challenged to generate tangible solutions to problems, through fairly strict rules guiding aesthetics, function and form (Chapter 5).

4. **Disclosive analysis**- Disclosive analysis refers to a group of methods that are used to derive meaning from the artificial and natural worlds. Common disclosive methods include basic causes, ecological footprints, laws of media, life cycle assessment, quotidian deconstruction, resource streams, reverse engineering, sociologics, systems analysis, technology assessment and forecasting (Chapter 5).

5. **Discourse analysis**- A social science and literary method for analyzing meaning in the images and text of communication. In most cases, this method is used to link everyday discourse with power structures or propaganda.

6. **Discursive analysis**- A philosophical method that draws on techniques such as logic and dialectics to help students analyze claims, grounds, warrants and conclusions in arguments and discourse. Students are given problems and proposed solutions to analyze and determine whether means are commensurate with ends, or whether ends justify the means.

7. **Ethnography-** An anthropological method of observation. Students are challenged to observe and record the actions and culture of subgroups within their own communities.

8. **Forecasting**- Students use methods of Delphi survey, extrapolation, trend analysis or scenario to project into the future and study the future as a continuum of the past and present (Chapter 5).

9. **Genetic or Microgenetic methods**- A method that focuses on the manner or process by which anything comes into experienced existence. As a teaching method, it is also anthropological in the sense that students trace the "development" of cultures, including their own, through evolutionary stages of growth. Often called the cultural epoch approach associated with recapitulation theory (Related to genetic epistemology of Piaget and Vygotsky).

10. **Hermeneutics**— The theory and practice of interpretation. This method is common to theological scholars who interpret religious texts. The text must be given space to speak for itself, literally, without editorial license.

11. **Historical method**- Students document (serialize events, organize thematically) continuity and changes over time and analyze and judge the nature of these continuities and changes.

12. **Jurisprudence**- A general method where students follow the legal arguments of a case or establish a court to hear trials and cases. The use of legal techniques to make or break cases that involve issues close to the students such as graffiti laws, minimum wage or war.

13. **Narrative**- A method for making sense of experiences by placing feelings, observations and thoughts into a story form. Narrative helps students connects a wide range of knowledge by challenging them to construct a coherent story. Narrative typically accompanies other methods, such as the historical methods.

14. **Phenomenology**- A method for getting to essences of feelings and experiences. The key is to analyze the lifeworld and nature of experience in pre-reflective ways, or without guiding concepts and theories.

15. **Problem finding and solving**- Students are challenged to identify problems or are presented with perplexing, difficult problem, to think about, troubleshoot and try to resolve. Typically, problem-solving is done with an empirical procedure (**technological method**) or scientific method (Chapter 5).

16. **Quotidian deconstruction**- A form of disclosive analysis that focuses on the feelings that people derive from their existence of "being human in a more than human world" (Feng, 2003). Students focus on their everyday life and use phenomenology to help them disclose their desires and feelings about the nature of nature and technology (Chapter 5).

17. **Scientific method**- A general method for logically testing hypotheses, proving theories or constructing generalizations and models. Deductive method begins with a hypothesis to be proved or tested (physical sciences) and proceeds within the constraints of an experiment Inductive method begins with observations and proceeds through methodical examinations of evidence and subsequent observations (biological and earth sciences) (Chapters 2, 5).

18. **Survey**- Students prepare a questionnaire to collect information on some topic of interest and eventually analyze the information.

19. **Systems analysis**- A method of for analyzing human-machine and machine-machine interactions by determining the inputs and outputs of a given system. This is an effective method of disclosive analysis for demystifying the operations and inner workings of natural, social or technological systems (Chapter 5).

20. **Task analysis**- Techniques used to identify the details of specified tasks, including the required dispositions, knowledge and skills required for successful task performance. Worker-oriented, job-oriented, cognitive and emotional task analysis help students engage with career-related knowledge (Chapter 8).

21. **Technological method**- See design, problem-solving and scientific methods (Chapters 2, 5).

22. **Technology assessment**- A specific form of disclosive analysis used or assessing the cultural, ecological and social consequences (collateral or deferred) of technological events, practices, trends and values (Chapter 5).

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