Chapter 3 The Interactive Lecture

The lecture is the most commonly used information sharing strategy utilized in educational institutions and training organizations. It has been deployed for centuries. Used appropriately, lecture is highly effective in promoting student learning, especially with respect to the lower two intellectual skills, i.e., knowledge and comprehension. When active learning (AL) activities are integrated into lectures, higher order intellectual skill (i.e., analysis, synthesis, and evaluation) acquisition is materially enabled. Used inappropriately, lecture will not only limit learning but destroy student motivation to learn. An example of inappropriate lecture use is to talk at students for 30 or more minutes. In this chapter, we will study the interactive lecture.

I. **The Interactive Lecture (IL)**
   A. Cooper, Robinson, and Ball (2003) attribute coining the term, "interactive lecture" (IL) to Drs. D.W. Johnson and R.T. Johnson from the University of Minnesota.
      1. They trace the development of IL from Donald Bligh at the University of Exeter in the 1970's through the feedback lecture (Osterman, 1985) to the structured lecture (Gibbs & Jenkins, 1992).
      2. Johnston and Cooper (1997) define the IL as "a lecture in which active- and group-learning exercises are embedded at frequent intervals in order to foster deeper processing of content." Cooper, Robinson, and Ball (2003) added classroom assessment. Thus, an interactive lecture is one in which "active learning, group learning, and classroom assessment strategies" are embedded into a lecture at strategic points (Cooper, Robinson, and Ball, 2003).
         a. The interactive lecture is most effective when students are somewhat familiar with that class session's content. The greater the degree of familiarity, the more effective the interactive lecture is in promoting student learning.
         b. The interactive lecture is most effective with the intellectual skills of analysis, synthesis, and evaluation.

   B. **An IL Model**
      1. The Cooper, Robinson, and Ball (2003) IL model includes cognitive scaffolding and "quick-thinks" along with classroom assessment techniques embedded into a lecture.
         a. Cognitive Scaffolds
            (1) Scaffolds are used to build schema or schemata (plural) that are stored in long-term memory. Students employ existing schemata to recognize what they already know within a new learning experience. In order to bridge prior knowledge with that presented within a new learning experience scaffolds are constructed to enable students to create new (for them) knowledge.
            (2) Cognitive Scaffolding is assistance provided by an instructor or student to enable other students to bridge the gap between their current knowledge and/or skill level and a specified learning standard or

outcome (Rosenshine & Meister, 1995). Brown and Palincsar (1989, p. 411) write, "The metaphor of a scaffold captures the idea of an adjustable and temporary support that can be removed when no longer necessary" (cited in Cooper, Robinson, and Ball, 2003).

(3) Johnston and Cooper (1999) recommend reading King (1995) and Rosenshine and Meister (1995). See also Berk & Winsler (1995), Diaz, Neal, & Vachio (1991), and Wood, Bruner, & Ross (1976).

(4) Presented below are several scaffolds adapted from Johnston and Cooper (1999) as well as some used by the author.

b. Cooper, Robinson, and Ball (2003) define quick-thinks as, "brief active-learning exercises that can be inserted in[to] lectures or other instructional formats and require students to process information individually or collaboratively." Seven quick-thinks, drawn from Johnston & Cooper (1997) are presented below.

c. Embedded Classroom Assessment

(1) Embedded classroom assessment is a strategy of integrating immediate feedback checks into a course, class session, or lecture to quickly assess student understanding (Angelo & Cross, 1993).

(2) Presented below are seven immediate feedback techniques.

2. The interactive lecture model presented in the present chapter includes the Cooper, Robinson, and Ball (2003) scaffolding and classroom assessment elements but extends beyond the quick-thinks to include graphic organizers and simple generic AL activities suitable for individual students, dyads, or trios.

a. Graphic Organizers

(1) Diaz-Rico (2004, p. 115) defines a graphic organizer to be, "a visual frame used to represent and organize information." A graphic organizer can be used to show how concepts are related so as to make visible conceptual structures underlying content.

(2) Diaz-Rico (2004, pp. 115-116) indicates that there are three applications for graphic organizers.

(a) Generative graphic organizers are used to propagate content.

(b) Representative or explanatory organizers enhance content understanding to construct background knowledge or produce new information.

(c) Evaluative organizers are used to assess content understanding.

(3) Selected types of Organizers (Diaz-Rico, 2004, pp. 116-121)

(a) Sequential Organizers show the proper order of events, phases, etc.

(b) Compare and Contrast organizers show differences between two or more concepts, variables, etc.

(c) Relational organizers show relationships (e.g., whole/part, cause/effect, etc.) between two or more concepts, variables, etc.

(d) Classification organizers show hierarchies or matrices, e.g., organizational charts.

(e) Concept Development Organizers are used in brainstorming exercises to related ideas or concepts.

(f) Evaluation organizers (Kagan 1998) show positivity, e.g., a grading scale, Likert scale, agree/disagree, or no/maybe/yes, etc.

(4) Parks and Black (1990) is an excellent source for additional information.

b. Generic CL Activities to Foster Teambuilding and Learning

(1) These activities increase individual learner class participation without disrupting class flow or requiring significant instructor time and resource investment. These particular strategies encourage students to be prepared and can be employed within a traditional lecture/discussion format.

(2) Four individual student AL exercises and 18 AL techniques for student pairs or trios are presented below.

II. Lecture & Discussion: A Review
A. Selected Types of Lectures

1. In the expository lecture, the instructor presents a lecture organized around a single topic, problem, case, or hypothesis, which consists of major and minor points.
   a. Such a lecture is typically formatted as an outline of major and related minor points; list of major points which serve as prompts; or a flowchart which presents key points, planned tangents, or examples by an instructor.
   b. To check understanding, the instructor asks students questions and corrects misunderstandings, and responds to student questions.
   c. The expository lecture is most appropriate for students who have had little exposure to that class session's content or for content which has been found to be particularly difficult for students.
   d. The expository lecture is most appropriate for the intellectual skills of knowledge and comprehension.

2. The short lecture permits the instructor to "set the stage" for a discussion period of an issue, problem, or topic. Another short lecture is presented to tie together the main points of the discussion, correct errors, and "road map" the next class session.
   a. The use of the short lecture strategy assumes that students are familiar with that class session's content.
   b. The short lecture is most appropriate for the intellectual skills of comprehension, application, analysis, synthesis, or evaluation depending on how the issue, problem, or topic is framed given the intellectual skill to be taught.

3. In the case lecture, the instructor presents a real or realistic scenario whose purpose is to illustrate a problem solving strategy, an analysis model (e.g., ratio analysis in accounting), or a general principle. The case lecture is also

appropriate for advanced students who are suitably prepared to dissect a case while being coached by the instructor.

    a. The use of the case lecture assumes that students are familiar with that class session's content.

    b. With less advanced students, the case lecture is most appropriate with the intellectual skills of knowledge and comprehension.

    c. With advanced students the case lecture is useful in teaching the intellectual skills application, analysis, synthesis, or evaluation depending on how the case is constructed considering the intellectual skill to be taught.

Any one of these three types of lectures can be "turned into" an interactive lecture by integrating scaffolding and AL techniques.

B. Strategies for Effective Lecturing

  1. <u>Before Planning the Lecture</u>

    a. Know the material to be considered, including its application if the content and/or performance standard so requires.

    b. Know the intellectual skill or skills required of students to successfully learn and apply the content.

    c. Know the abilities and interests of the audience, including likely learning styles and preferences. This can be ascertained by talking to other instructors or students, who have either previously taught or have taken the course. If such information is not available, seek the counsel of senior colleagues and learn about the content and skills typically learned in prior courses.

    d. Visit the "real" or virtual classroom before the first class sessions so that you are familiar with the learning environment and can competently operate relevant instructional media and/or computer software.

    e. An instructional strategies matrix is presented in Appendix 2.3. Guidelines for using black or whiteboards, overhead projectors, videotapes, presentation software, e-mail and list-serves, conferencing software, and web resources are found in Appendix 2.4.

  2. <u>Planning the Lecture</u>

    a. Select the appropriate type of lecture guided by the content or performance standard and intellectual skills required by the students.

    b. Once the content is specified (e.g., a content or performance standard benchmark), it must be meaningfully organized in such a fashion so that students can recall and if required apply the most critical material. The logical organization of the lecture should be self-evident. The following format may be useful.

      (1) Employ an attention getting device. A short active learning strategy is recommended.

      (2) Road map the lecture by presenting a brief summary of its key points before introducing detail.

(3) Briefly explain how the content and/or skill relate to prior learning and how students will benefit from the presentation.

(4) Present the most important major point and relevant detail first, followed by no more that 2 or 3 others.

(5) Conclude with a summary of the major points.

c. Anticipate student questions and when possible build the answer into the lecture. Always leave time for student questions that you did not anticipate; be sure to write down the most significant ones for later inclusion into your lecture notes.

d. Write out relevant formula, critical information, and/or useful examples so as not to stumble or forget during delivery.

e. Some instructors use small cards, a single sheet of paper, or several pages to record their lecture notes. Experiment with different approaches and select the one or ones which best fit your personality, the audience, and the content or learning standard.

f. Rehearse the lecture, including the anticipation of student questions that were not previously incorporated into the lecture content and a concise and accurate answer to each.

g. Integrate lecture into a class session map (Appendix 2.6). The session map is an organizing device to efficiently manage the class session. It does not contain lecture notes. The session map is a useful tool to record when and what instructional media are to be deployed.

3. Delivering the Lecture

a. Go to class early to speak informally with students; this will help establish rapport. To further establish rapport and extend attention spans:

(1) Vary voice tone and speaking pace; this extends students' attention span, as does maintaining eye contact.

(2) Asking questions, body movement, deploying active learning activities, and use of instructional media extend attention spans and enable deeper learning. Pausing is a subtle way to gain attention, let students "catch-up", rest, and reflect.

(3) Show your enthusiasm for the subject matter and your personal interest in their learning.

(4) Stand and breathe normally. This assists with articulation, pitch, intonation, and volume.

b. Do not read from your lecture notes. Use simple, short words and sentences. Watch the body language of the class, especially facial expressions and physical movements – such as wiggling in the seats or yawning. Where strategic, incorporate metaphors, anecdotes, analogies and illustrative stories.

c. Appeal to multiple senses; students lean more and learn more deeply when more of the physical senses are used (e.g., hearing, seeing, and touching – writing). Use your facial expressions to appropriately convey emotions.

d. Begin and end with a summary statement. Restate and summarize critical information. Explicitly transition between key points; moving about the

classroom will reinforce transitions. Ensure that a conclusion is drawn for the class to not only restate critical information but to also give students closure.

e. To promote student learning,

(1) Refrain from making assumptions about what students know; reintroduce key terms and concepts as needed.

(2) Let students know when a typically difficult concept is about to be presented; this helps them focus on the coming information.

(3) When presenting difficult content, first give a simple illustrative example. Then introduce an explanation of the principle, process, issue, etc. Thirdly, add more detail as needed. Move from the general to the specific, simple to complex, or familiar to the unfamiliar.

(4) Use repetition strategically. Student learning is promoted when key points are repeated; different words are used to make the same point; repetition allows slower note taking students to "catch up."

f. A presentation rating form is presented in Appendix 2.5.

C. Leading the Discussion

1. Planning the Discussion

a. Benefits of discussions include face-to-face exchange of knowledge, facts, and opinion; an opportunity to acquire or refine social skills; practice in analyzing problems, formulating arguments and counter arguments; responding appropriately to criticism and others' opinions; and evaluating the evidence associated with their own and others' position.

b. Some instructionally useful discussions just happen; however, most are well planned. When contemplating a discussion consider the following:

(1) Devise assignments that will prepare students for the discussion. Several examples follow:

(a) Prepare 4-7 study questions that students prepare responses to either individually or in small groups.

(b) Have student teams go on fact-finding missions which could include library or Internet searches, conducting interviews, or completing a small scale research project. The fact-finding mission should be in response to a specific well-prepared prompt, which serves as the basis for ensuing discussion.

(c) Assign or ask individual student or students team to select a topic relevant to the course or a specific class session. A one page position paper should be developed with adequate references to serve as the starting point for a discussion.

(d) The instructor prepares a set of questions or other prompts to initiate or refocus a discussion.

(e) Organize a debate or role play a scenario.

(2) Prepare for students a list of unfamiliar terms, concepts, etc., related to the anticipated discussion. Learning is enhanced if students define terms, concepts, etc.

(3) Limit discussions to around 20 minutes; include time for debriefing and questions.

(4) Explain to students your participation expectations. Does everyone have to participate? How are those who elect not to participate affected? Will those not wanting to participate be called on to participate? These are very important considerations.

(5) Prepare and distribute discussion guidelines. These should be simple statements at to instructor expectations, "do's", and "don'ts."

(a) Speak politely, always observing good manners.

(b) If you disagree with an opinion, don't attack the one who said it.

(c) Don't let your previous ideas, prejudices, or attitudes interfere with your ability to think about what is being said.

(d) Have facts to back up your arguments. Seek the best answer to the topic, issue, or problem. Don't argue for a single position to the point of stopping others from introducing different opinions or potential solutions, if the topic requires a solution.

(e) Speak anytime you like, but don't interrupt another person who is speaking. Wait your turn. Keep comments short and related to the topic.

(f) Stay on task with the topic; don't try to change topics until everyone who wants to comment has spoken.

(g) Ask, politely, for clarification if you don't understand; don't attack the speaker or the idea. Think fully about what has been said, before commenting.

(h) Be critical of ideas, not people. Listen fully, even if you disagree.

(i) Be prepared to change your thinking and/or position if the evidence and logical analysis is convincing.

2. Managing the Discussion

a. There are several different strategies for initiating a discussion.

(1) Ask a student to pose the dumbest or smartest question he or she can compose to initiate the discussion.

(2) Ask a student to briefly describe a critical incident related to the discussion's topic for his or her experience.

(3) An instructor could pose a question or prompt to initiate the discussion; pose a question based upon a shared experience (e.g., field trip, class demonstration, film, video, etc.); require student to respond to a short survey and then use the responses as a basis for starting the discussion; or organize a debate or role play and then use the debriefing experience as either the discussion or start of a discussion.

b. There are several strategies which effectively guide discussions.

(1) Monitor student comments (content, logic, etc.), voice and tone, class mood, emotions, and body language.

(2) Assess the health of the discussion. Look for opportunities to move the discussion along, by changing the group process using humor, quickening the discussion pace, etc. Search for signs that the

discussion is falling apart (repetition, side conversations, limited participation, a hardening of position, or petty bickering.)

(3) Keep notes of the discussion (comments, content, emotional intensity, student behavior, health, duration, participation quality) so that you can correct errors, clarify confusion, and evaluate the educational efficacy of the discussion.

(4) Use body language and verbal cues (e.g., humor, gently disagreeing with a student, elaborate upon a student's comments or contribution, or compliment an insightful comment, etc.) to (a) keep the discussion focused and flowing, (b) prevent one or two students from dominating the discussion, (c) stop one student from interrupting another, (d) keep the discussion from stagnating or deteriorating, (e) mediate differences between students, (f) close the discussion.

(5) Strategies to close the discussion include a listing of key points as a summary or to have students write down one question that remains unclear or unanswered; the instructor then answers the questions with other student help.

c. Encouraging Participation

(1) Create a hospitable learning environment. Build rapport with students by maintaining eye contact, encourage students to learn about each other, know your students' names, arrange seats to promote discussion, or start an informal conversation prior to the discussion.

(2) To increase the participation by shy students, give each a small assignment which requires a very brief report, stand next to a shy student while asking for volunteers to speak, use icebreaker activities so that students get to know one another, assign roles to students if you are using role playing, use small learning teams as these tend to draw shy students out more than large groupings, or assign a small research project to a couple of students who then present their findings and have two students who have researched the same topic to comment on the presentation.

(3) Use email to start the discussion and read high quality comments from shy students (with permission) to the class. Supportive body language such as a smile, nod, or verbal affirmation will encourage shy students to participate.

(4) In every class there are a few students who want to monopolize any discussion. There are strategies to control these students.

(a) Break the class into small groups to formulate and answer or respond to a question or prompt and then appoint one speaker whose report is time limited.

(b) Use unsupportive body language – avoid eye contact, move physically away from the "monopolizer," use your hand to stop him or her from talking, etc.

(c) Assign time limits to comments and enforce them.

(d) Ask other students if they agree or disagree with the talker and shift the focus on them.

(e) If polite, gentle strategies do not work, then meet with the talkative one or ones and tell them to contribute less, but explain why.

(5) Do not grade discussion participation as it tends to inhibit participation on the part of some and encourage over-participation on the part of others.

(6) Use cognitive scaffolding and AL strategies suitable for individual students, duos, or trios.

d. Evaluating the Discussion

(1) Distribute a brief survey form to assess student perceptions of the discussion as to tone, learning value, social skill building, and other academically relevant interests.

(2) Based on your notes and observations, prepare your own assessment of the discussion. Pay close attention to what "worked" and "what didn't."

(3) With student (i.e., all students) permission, videotape the session, and then analyze the tape.

D. Questioning

1. Cooperative learning requires learner active participation. A time-tested strategy is the use of questioning.

   a. Questions can be used to assist students to recall prior session content, thus bridging sessions.

   b. Questions can set the stage for a class session, e.g., "Here are a few questions we will consider and answer today."

   c. Questions can stimulate student participation, e.g., "What procedure or technique should I use to solve this problem?"

   d. Questions can check student understanding.

2. Prepare Questions before the Class Session.

   a. Write out the key questions you want to ask before the class session.

   b. To whom will you direct each question—individuals, small groups, or the whole class?

   c. Be very aware of how you ask questions. Pay close attention to voice tone, inflection, volume and body language—facial expression, eye movement, gestures, etc.

   d. Keep a record of what types of questions worked as well as how individual students participated.

3. There are specific types of questions which are suitable for specific purposes. Know which one to use for which purpose. Know the intellectual skill required of students to answer your question; frame the question so that the specific intellectual skill is employed.

   a. Exploratory questions draw out basic knowledge, i.e., recall information.

   b. Challenge questions scrutinize assumptions, interpretations, or conclusions. This type of question can also elicit recommendations for action in response to a stimulus or premise.

    c. Relational questions require comparing and contrasting of ideas, positions, opinions, issues, solutions, etc.

    d. Diagnostic questions explore causes, reasons for behaviors, and motives.

    e. Causal relationships between variables are posited by cause-and-effect questions.

    f. Hypothetical questions seek to forecast or predict an outcome given a change in the facts which form the question's premise.

    g. Summary questions are intended to generate a synthesis.

4. Guidelines for effective questioning
   a. Ask a single question at a time, while avoiding yes or no questions.
   b. Do not ask leading questions, such as, "Don't you think I look really good today?"
   c. Ask focused questions which substantially narrow the number of possible correct responses without suggesting a preferred answer, if there is one.
   d. Asking questions which require higher order intellectual skills will require students to demonstrate their understanding of the content and/or its application.
   e. If after asking a question, one student provides the correct or most correct answer, ask others to comment. This strategy promotes student-to-student interaction and encourages shy students to participate.
   f. An instructor must effectively manage student responses to questions.
      (1) Use body language to acknowledge a response—nod your head.
      (2) Alternate your reactions to students' responses by paraphrasing the respondent to buttress the response; seek clarification and/or elaboration; ask others to comment; and reward originality.
      (3) Praise correct answers and politely correct wrong ones.

5. Skill in question management is demonstrated in how an instructor responds to student questions.
   a. Directly ask students (some instructors require students) to ask questions. Be sure your words and body language actually encourage student questions.
   b. Acknowledge the questioner and the question in the order recognition was sought.
   c. Ensure all students can hear and understand the question—paraphrase if needed.
   d. If after other students are unable to answer a question; do so directly.
   e. When answering a question, speak to the whole class; verify with the questioner as to whether the question has been answered and that the answer was understood.
   f. Defer questions which address later topics or which are tangential. One strategy is to ask the questioner to see the instructor after class or during a break. With the widespread use of email, one instructor answers these questions to the whole class later in the same day or week.

g. When answering questions, be diplomatic; when you do not know the answer say so, but offer to locate the answer. If another student does not know; be patient, it is common to answer the same question more than once. If a questioner is particularly long in asking his or her question, politely encourage him or her to be more direct.

6. The Faust and Paulson (1998) approach will improve an instructor's questioning skills.
   a. Typically, an instructor poses a question, and then calls on volunteers or names answer candidates until the "right" answer is given. Faust and Paulson (1998) cite three problems with this strategy.
      (1) A small percentage of any class voluntarily regularly participates.
      (2) Only the chosen learner must actively try to answer the question.
      (3) After answering or attempting to answer, the learner usually stops paying attention as it will be a long time before he or she is called upon again.
   b. To improve question management, Faust and Paulson (1998) suggest:
      (1) <u>Wait</u>: Pause for 15-20 seconds before asking learners to answer questions. Students have time to think; time to frame responses, will enable more respondents.
      (2) <u>Answer Management</u>: Usually an instructor will paraphrase an answer. This tells other learners to listen to the instructor and not their fellow students. The instructor can
         (a) Ask a new question for which the submitted answer is correct.
         (b) Ask an additional clarifying question.
         (c) Ask for other learner input.
         (d) Don't give out a correct answer unless there is not another option.
      (3) <u>Summarize the Answer</u>: The instructor can ask another learner to summarize and/or extend a prior response.

III. Integrating Scaffolding, Graphic Organizers, and AL Strategies into Lecture
A. Interactive Lecture: Cognitive Scaffolding Strategies
1. <u>Anticipating Errors & Misunderstandings</u>: After teaching a course for some time, instructors are able to anticipate errors and misunderstandings. Instructors are then able to "pre-correct" these common errors and misunderstandings.

2. <u>Anticipate Questions</u>: When planning a lecture or instructional exercise, an instructor should predict student questions and build the answers into the lecture, except where an anticipated question is desirable to reinforce a key concept, provides an opportunity to summarize, etc. If a desired question isn't asked, the instructor can both pose and answer the question or use a series of leading questions to stimulate inquiry so that the question is asked. Anticipated questions can be listed along with answers in a handout prior to class and then distributed.

3. <u>Advance Listing</u>: An instructor can list unfamiliar terms with definitions (all or some) prior to the class session in a handout or on the board. This saves time and provides students with tools to stimulate thinking to make connections between the terms and the definitions.

4. <u>Partial Solutions</u>: Instructors can give students a problem, exercise, or graph with the first few steps completed. This allows the instructor time to focus student learning on more critical steps in solving the problem, completing the exercise, or constructing the graph (Johnston and Cooper, 1999).

5. <u>Checklists</u>: Checklists are provided to students as they complete a procedure (e.g., CPR), or activity or process (e.g., applying for college or graduate school).

6. <u>Quick Checks</u>: Quick checks are quick assessments of understanding made periodically which are deployed either strategically or as needed during a lecture. Any one of the immediate feedback techniques would be suitable.

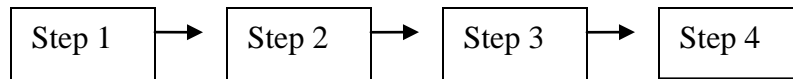## B. Graphic Organizers
1. Sequential Organizer

| Step 1 | → | Step 2 | → | Step 3 | → | Step 4 |

Figure 3.1 A Sequential Organizer

2. Compare and Contrast Organizer

Currency	
China	United States
Yuan	Dollar
5 Jiao	50 cents
-------	25 cents
1 Jiao	10 cents
1 Fen	1 cent

Figure 3.2 Compare and Contrast Organizer

3. Relational Organizer (Venn Diagram)
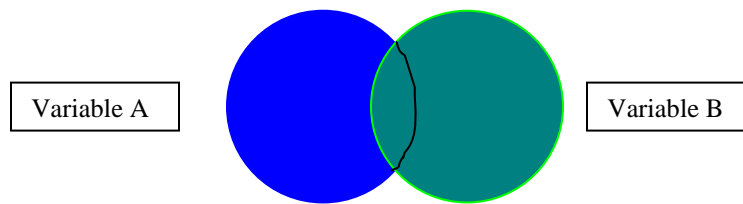

Variable A   Variable B

Figure 3.3 Relational Organizer

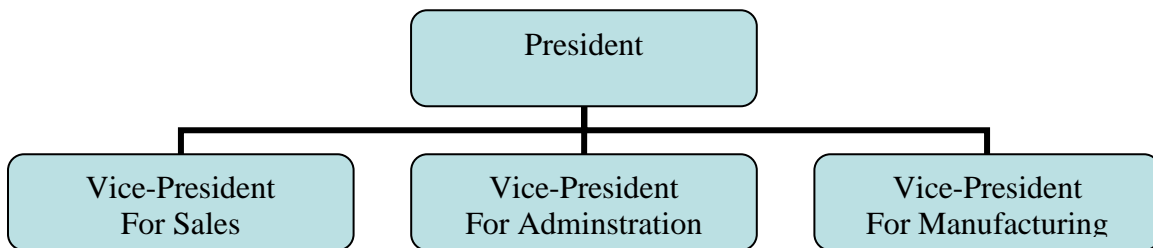4. Classification Organizer

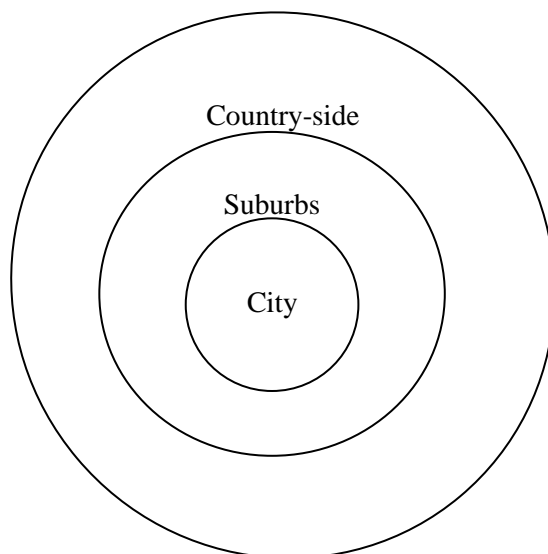Figure 3.4 Classification Organizer

5. Concept Development Organizer

Figure 3.5 Concept Development Organizer

6. Evaluation Organizer (Item assesses examinee's attitude towards art.

I like Art.	Strongly Disagree	Agree	Neutral	Agree	Strongly Agree
	1	2	3	4	5

Figure 3.6 Likert Scale Item

C. Active Learning: Individual Student Strategies
1. Daily or Weekly Journals
   a. Students are to write how course concepts or ideas can apply to their personal and professional experiences, if any.
   b. Students first describe an application and then to write thoughtful and well-reasoned reactions. .
   c. Students share their journal with a class partner to receive feedback so that any errors or difficult to understand passages can be corrected before the teacher reads the journals.
   d. This strategy can be combined with other assignments such as a research paper; newspaper, blog, or magazine reading; film, TV, or movie viewing assignment; or laboratory experiments.
   e. For example, a student can be assigned to watch a documentary about European imperialism in Asia. After watching the documentary, the student will write a summary of a few pages and his or her explanation for imperialism including its short- and long-term impact on Europe and Asia, and finally his or her reaction.

2. Reading Quiz
   a. A short quiz on the reading assignment for the day or class period will encourage learners to read. Quizzes are an effective technique to prepare students for end-of-course and other "high stakes" examinations.
   b. The quizzes should be constructed carefully so that the instructor can identify who has and who hasn't done the assigned reading. Quiz questions should ask about detail that can be answered only by having done the reading.
   c. There should be some questions that indicate to the student what the teacher sees as important and these types of questions should be asked repeatedly on quizzes. Learners will focus on and remember what is tested.
   d. Paulson (1999) found the correlation on reading quiz points and total course points to be r = 0.80, a very large correlation.

3. One Minute Papers
   a. One-Minute Paper: Angelo and Cross (1993) described this device. The instructor stops the class and poses a question relevant to the topic at hand. Students are given one or two minutes to write a response. Responses are

submitted to the instructor anonymously. Anonymous papers might discourage active student engagement.

b.   One-Minute Paper-Clearest or Muddiest Point: As described by Angelo and Cross (1993), learners are asked to describe either their clearest understanding from the instructor's presentation or their "muddiest". This strategy allows the instructor to modify subsequent presentations to either build on understanding and/or correct misunderstanding.

c.   One-Minute Paper-Affective Response: In this variation, learners describe their response to material presented during a class or the course. This variation is useful for practice oriented, ethics, or current issue courses or discussions. The tactic enables the instructor to discern learner sentiment to a topic or issue.

d.   One-Minute Paper-Response to a Demonstration: After a classroom or laboratory demonstration, learners are asked to respond to one of four prompts
(1) I was surprised that…
(2) I learned that…
(3) I wonder about…
(4) I don't understand…

4.   Quick Thinks (Johnston & Cooper, 1997)
a.   Best Response Selection: This strategy tests student recall or application of lecture information. A question or scenario is presented either as a fill-in-the-blank item, incomplete sentence, or multiple choice question. Three or four responses are presented; students select the best response.

b.   Error Correction: A deliberate error is created in a statement, description, procedure, conclusion, or prediction. Students identify the error. This task requires students to comprehend, mentally process, and apply just presented content.

c.   Sentence Completion: A sentence stem or starter is constructed; to complete the stem, students must provide a definition, implication, prediction, rationale, or cause and effect relationship.

d.   Statement Support: An instructor makes a statement regarding a theory, conclusion, inference, or opinion. Students must support that statement with logic and evidence drawn from lecture notes, immediate prior reading, or homework.

e.   Step Reordering: Incorrect steps in a sequence, plan, strategy, procedure, or process are presented to students, who must correctly reorder the steps. This task may be used as a summary exercise or as a motivational device where students predict the correct order before the lecture topic is presented.

f.   Concluding: After reading, hearing, or viewing facts, opinions, concepts, or principles, students logically derive probable results, conclusions, causes, and/or outcomes. It is likely there will be differing defensible responses.

g. Paraphrasing: Students restate an idea, concept, definition, theory, or procedure in their own words. This translation activity requires students to monitor their understanding of lecture or reading content.

5. Programmed Notes
   a. A handout is prepared which serves as the basis of the session's lecture.
   b. The handout is organized as is the instructor's lecture outline, but key words are replaced by blanks. Students write in the words or phrases as the instructor presents his or her lecture.
   c. Definitions or the terms they define can be left blank. One or more entries in a series can be left blank. Steps in a procedure can be left out for students to write in. Key words in a brief paragraph can be left blank. All blanks should be uniquely numbered.
   d. Care must be taken to follow the format of the handout carefully. It is recommended to check student progress by asking what word or phrase belongs in a specific blank.

D. **Active Learning: Student Pair (Dyad) or Trio Strategies**
   1. Team Questioning
      a. Each student pair or trio is assigned to produce one or two questions over the reading material they don't understand, which are sent to the instructor electronically.
      b. The instructor distributes the question list electronically to learners; otherwise each question is read and answered in the next class session. This focuses attention on readings not understood, and advises the instructor as to what content or application is not understood.
      c. The teacher focuses on needed remediation.

   2. Read, Underline, and Share
      a. This AL activity combines the senses of sight, hearing, and talking.
      b. Read directions and answer questions.
      c. Assign reading pages in text, workbook, or supplemental materials. You should direct students to underline key points.
      d. Each dyad discusses readings and unlined points.
      e. Each dyad lists its most significant learning(s).
      f. Each dyad reports its most significant learning(s). The instructor then resolves confusion. If time is limited select only a few teams.

   3. Reciprocal Teaching (RT)
      a. This strategy, emphasizing "cognitive elaboration," is primarily used to teach reading comprehension skills. Cognitive elaboration is the use of specific cognitive skills to learn information or to improve intellectual skills.
      b. Palincsar & Brown (1984, p. 124) as cited in Greenway (2002) describe RT as "a procedure … where teacher and student took turns leading a dialogue [conversation] concerning sections of a text. Initially the teacher

modeled the key activities of summarizing (self-review), questioning (making up a question on the main idea), clarifying and predicting. The teacher thereby modeled activities: the students were encouraged to participate at whatever level they could. The teacher could then provide guidance and feedback at the appropriate level for each student."

c. Summarizing the key idea of a paragraph or text passage enables the student to connect what he or she knows about the text, and to predict what might happen next; and through summarizing the next few paragraphs, to assess the prediction's accuracy.
(1) At first the teacher models the skills of summarizing, questioning, clarifying for understanding, and predicting.
(2) With practice students become more proficient at summarizing, questioning, clarifying for understanding, and predicting. Eventually, the teacher assumes a consultative role.

d. To understand a passage of text, to frame a question about it so as to ask another student or the teacher, and to predict a future event within the passage, the student must analyze each word, sentence, and paragraph for meaning. In doing so he or she must explicitly seek knowledge and analyze the passage's structure. Not only is reading comprehension improved, but the student is learning how to learn.

e. Greenway (2002), Palincsar (1987), and Rosenshine and Meister (1994) have found the strategy to be effective. RT can be used for teaching any subject where it is important to teach critical thinking skills and to comprehend the vocabulary and writing style of various academic disciplines.

4. Reciprocal Peer Tutoring (RPT)
a. RPT was developed by Pigott, Fantuzzo, & Clement (1986) and Wolfe, Fantuzzo, & Wolfe (1986).

b. Rittschof & Griffin (2001) reported that in RPT, student dyads are formed where each member rotates between tutor and tutee roles.
(1) The tutor prepares a "lesson" for the tutee based on a simple lesson planning guide provided by the teacher. A test is also prepared by the tutor. After lesson delivery, the test is administered; further tutoring is provided by focusing on test items answered incorrectly.
(2) Fantuzzo, King, and Heller (1992) add that as students interact, they give each other prompts, support each other, and monitor each other's performance.
(3) Once the dyad determines that it has met its performance goals a teacher constructed examination (or project) is completed which demonstrates learning goal attainment. If a specified performance criterion is reached the dyad receives a reward.

c. RPT has been found to be effective repeatedly in mathematics instruction (Fantuzzo, Dimeff, & Fox, 1989; Fantuzzo, Riggio, Connelly, & Dimeff, 1989; Fantuzzo, & King, 1992; Fantuzzo, Davis, & Ginsburg, 1995;

Ginsburg-Block & Fantuzzo, 1997), building construction (Choudhury, 2002), and reading instruction (Allen & Boraks, 1978).

d. Griffin & Griffin (1995) found no statistically significant RPT effects on either achievement or self-efficacy, but RPT did increase test anxiety of education students. Rittschof & Griffin (2001) reported that RPT did not reduce test anxiety nor increase students' understanding of content (measured by an examination) as compared to an individual study strategy; however, students did report that RPT aided in studying course content. It should be noted that each of these two studies implemented RPT somewhat differently than Fantuzzo and colleagues, so conflicting results could be expected. The current weight of the evidence favors RPT, especially with children.

e. RPT findings are consistent with those of Webb (1989, 1992) who found that learners who provided elaborated explanations learned more than those who received such explanations. Both explainers and receivers learned more than students working alone.

5. Guided Reciprocal Peer Questioning (King, 1993)
   a. High level question stems are provided to student pairs or trios who craft questions, using those stems, over course or session content.
   b. Questions are exchanged with other pairs or trios who develop answers.
   c. Questions and answers can be combined and shared with the authoring team or the class.
   d. Students should focus on content they don't understand. A reasonable time limit should be announced and enforced.
   e. Generic question stems include
      (1) How does…affect…?
      (2) Why is…(important, relevant, etc.) to…?
      (3) Explain how…(why)?
      (4) How would I use…(apply) to…?
      (5) What can I conclude…about…?
      (6) How are…and…different (similar)?
      (7) What is a new (or opposite) example of…?

6. Focused Discussion
   a. Student pairs or trios are formed either by the students or the teacher.
   b. A question is posed, a brief reading assignment is given, or a short video is watched.
   c. Students then discuss the question, reading, or video and prepare a response which is then presented to another pair or trio. The teacher can also randomly pick a few pairs or trios to present to the class.
   d. This strategy can be modified. For example, students who have completed a test can compare answers and discuss why the item was marked incorrect. The students then can find the correct answer.

7. <u>Comparing and Sharing Notes</u>
   a. Many students simply do not write "good" notes. Poor note taking is evidenced by gaps, failure to record key or critical information, or poor note organization.
   b. The instructor can model efficient and effective note taking for students using simple course introductory information.
   c. Student pairs or trios can compare notes, by reading and filling in gap in each others' notes.
   d. A few minutes can be allocated to letting students "fix" their notes and answer any questions amongst themselves they might have.
   e. This strategy is useful for introductory courses and after the presentation of critical lecture material.

8. <u>Peer Evaluation</u>
   a. After completing homework or a brief paper, students exchange a copy of the assignment for review and evaluation of grammar, logic, flow, or computations. If the assignment is to present a particular position or opinion (e.g., an essay) gaps or inconsistencies in arguments or logic can be exposed and corrected. If the assignment is to solve a problem, then problem solving errors can be found and corrected; the same holds true for computational assignments.
   b. To improve student writing, a writing guide can be distributed or students can be told where to locate assistance. Letting students review and evaluate an anonymous paper from a prior class taught by the instructor will also clue students as to what to look for to help each other improve writing skills.

9. <u>Cooperative Scripts</u>
   a. It has been reported that students working together using "cooperative scripts" learn technical content and procedures more effectively than those working by themselves (Dansereau, 1988; Newbern, Dansereau, Patterson, & Wallace, 1994; O'Donnell, 1996; O'Donnell & Dansereau, 1992).
   b. Cooperative Scripting
      (1) Students assume one of two roles, recaller or listener.
      (2) The learners read an assigned portion of text.
      (3) The recaller summarizes the information with the listener following along in the text.
      (4) The listener corrects errors, including omissions and writes down strategies for both to remember the critical information.
      (5) When finished, the students change roles.
   c. O'Donnell & Dansereau (1992) reported that recallers learned more of the material.

10. <u>Think-Pair-Share</u> (Felder & Brent, 1994)
    a. Students work individually on a problem (e.g., math word problem, physics problem set, or brief essay) to construct a response.
    b. Students in pairs or trios compare responses; discuss differences; resolve differences, if possible or applicable; and agree on a joint response.
    c. Pairs or trios share their response or responses with another team; each team reviews and comments.
    d. The instructor may call on one or two teams to report responses to the class. The instructor comments appropriately.

11. <u>Thinking Aloud Pair Problem-Solving</u> (Lochhead & Whimber, 1987)
    a. Student teams are presented a problem.
    b. One student assumes the role of problem-solver; the other is the listener.
    c. The problem solver verbalizes his or her thinking as a solution is sought. The listener carefully listens offering suggestions, correcting logic leaps, and comments to the problem solver as he or she frames a solution.
    d. When a new problem is presented, roles are reversed.
    e. The listener may or may not be given a solution by the instructor. Students are expected to have completed assigned readings or to possess sufficient enabling knowledge and/or skills.

12. <u>Flowcharting and Graphing</u>
    a. Students can describe or predict a relationship between concepts or variables (e.g., height and weight) by constructing a flowchart or graph.
    b. After completing a reading assignment or brief lecture, students can be given concept or variable pairs and asked to graph the relationship.
    c. If sufficient data (e.g., sales or tuition revenue) are provided, students can view the data, predict a relationship, and then graph to the data to determine if the predicted relationship exists.
    d. A sequence of events or steps in a process can be flowcharted to visually describe the relationship or sequence.
    e. The instructor may need to ensure students know how to construct a flowchart and/or graph.

13. <u>Developing Rebuttals</u>
    a. An argument for or statement supporting or opposing a position, conclusion, proposition, or strategy (e.g., economic or educational reform) is presented in a lecture or video.
    b. A student individually develops a rebuttal for the presented argument or statement drawing on prior reading and/or research.
    c. He or she is then paired with another student to debate individual rebuttals. In the case of agreement, student pairs can develop an alternative rebuttal with which they don't necessarily agree.

14. <u>Constructing a Scenario</u>
    a. Student pairs construct a scenario as to when, how, and where a new concept, principal, or procedure can be applied.
    b. Once crafted it is exchanged with another team for critique.
    c. Once critiqued, each team meets to discuss each other's scenario and critique.

15. <u>Summarizing and Checking</u>
    a. In student pairs, one summarizes what has been presented in a brief lecture.
    b. The second student listens attentively and corrects errors or notes common questions both have as well as content not well understood.
    c. The Instructor then invites teams to report misunderstandings or errors.

16. <u>Concept Mapping</u> (Novack, 1990; Novack & Gowin, 1984)
    a. Students draw a relationship "web" between elements of a theory, principle, or concepts. This is often done when a student team generates a list of facts, ideas, opinions, elements, or concepts about a lecture topic. Lines are drawn between the items and the nature of the relationship is noted above the line. The iterative process is repeated until a set of logical relationships are drawn.
    b. Student teams exchange relationship webs for review and comment.
    c. Next, student teams discuss comments and pose questions to each other.
    d. Each individual team adjusts, if needed, its web.
    e. The instructor may request one or two teams to present their web to the class.

17. <u>"Blackboard" Work</u>
    a. Student teams are presented a math, science, logic, or critical thinking problem.
    b. Student teams go to the "blackboard" to work out the problem.
    c. If there is insufficient "blackboard" space, large sheets of paper can be posted on the wall or a student team can work at a table.

18. <u>Active-Review Session</u>
    a. Many instructors will periodically review what has been taught, before introducing newer, more complex content.
    b. In the active review session, the instructor asks student teams questions where students develop responses. Questions may be distributed randomly. Each team may be given a complete question set and then specific questions assigned to or selected by a team.
    c. Teams share their responses; a discussion of response differences follows.
    d. The instructor can guide the ensuing discussion as necessary.

E. Active Learning: Immediate Feedback Techniques
1. Finger Signs
   a. Interactive lecture AL strategies produce information on learner understanding and performance, but there is a time delay in transmitting this information to the instructor.
   b. By employing a finger code system (e.g., yes, no, don't know), an instructor can ask questions and learners can immediately respond, thus providing the instructor with an indication as to group understanding.
   c. Remediation can then be immediate. Instead of fingers, flash cards can be used.

2. Clarification Pauses
   a. During a lecture the instructor "quiets him or herself", lets learners reflect on the information, and then asks if anyone needs clarification.
   b. The instructor may circulate among the class members observing facial expressions. For those students who appear puzzled, the instructor may restate the key points or ask a student who looks puzzled whether or not he or she understands, by asking a question whose correct answer will indicate understanding.

3. The Fish Bowl
   a. Small cards are provided to learners where they are to record one question about the most recent presentation, reading, etc.
   b. The question should address material not understood or seek clarification. Application questions should be encouraged.
   c. Each question is deposited into a fishbowl or box at the end of the current class session or at the start of the next.
   d. At the next session, the instructor draws out cards and directs the class to answer each question pulled from the bowl. It is advisable for the instructor to review questions, sorting the relevant from the irrelevant and performing any needed editing.
   e. Questions not answered can be carried over to the next session or the instructor can prepare answers and post on a real or virtual board.

4. Flash Cards
   a. The teacher writes visual cues on cards and then shows or "flashes" the cards using finger signals.
   b. The question on the card or the question the teacher asks about the card must be asked so that it can be answered using finger signals.
   c. This technique is useful for chemistry, biology, physics, math, and teaching English as a second language.
   d. For example, a teacher can hold a card and pronounce a letter combination. Next, students are asked if the pronunciation is correct. One finger means yes; two fingers mean no; and three fingers means "I don't know."

5. Quotations
    a. Students first complete a reading assignment in which there are several viewpoints or arguments. The students next discuss what they have read in class describing the various points of view or arguments
    b. The teacher then shows a quote that the learners have not read but is related to the assigned reading and discussion. The teacher then asks the students what is the author's point of view.
    c. For example, suppose in a management class a case is given where the company has an employee motivation problem. Managers will discuss and likely debate strategies to motivate employees. There will be different points of view because there are different management and motivation theories.
    d. This exercise is useful in ascertaining what students learned from the lecture and discussion and for teaching critical thinking skills.

6. Car Park
    a. At any point before, during, or after a class session a student can post a note on a bulletin or other board with an anonymous question or comment.
    b. During a break in the presentation, the instructor removes one or more of the posted notes and answers the question or speaks to the comment.
    c. The instructor will quickly learn what students know and don't know about the content presented, read, or viewed.

7. Anonymous Survey
    a. The instructor asks students to write down critical learning points and material not understood from the session.
    b. Between sessions, the instructor reviews and organizes the information to identify trends or commonalities.
    c. At the start of the next session, the instructor corrects misunderstandings and reviews unlearned material.

F. **General Management Strategies**
    1. Time Management Strategies
        a. Start and end each class session on time.
        b. Prepare clear and explicit instructions and supporting materials (e.g., visual aids and handouts) ahead of time.
        c. Manage group reporting and discussions closely so that each is expedited and time is not wasted.
        d. Manage group traffic effectively so that volunteers are quickly selected, moving from the class group to small groups and then back to the class grouping is done quickly.
        e. Be prepared to prompt and encourage lethargic groups.

2. Class Management
    a. When students hold side conversations, appear drowsy, or hide, use nonverbal cues such as eye contact or moving closer to the student or students to regain attention.
    b. When a student monopolizes a discussion, move away; restate his or her opinion or comments and then ask another student to comment; or invite a private discussion during a break or after class, but acknowledge the student's opinion or comments.
    c. Ignore mildly negative behaviors. If that does not work, use good-natured humor. If necessary, invoke participation rules. Conversations about disruptive behavior should be held in private, when practicable.
    d. The most efficient and effective classroom management device is a personal connection with students. Show a professional interest. Connect.

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