

# The “Change-up” in Lectures

Joan Middendorf & Alan Kalish. *TRC Newsletter*, 8:1 (Fall 1996).

Instructors and students often have the same mental image of how a college class works: The professor talks (lectures); the students usually listen and occasionally write something in their notes. But as teaching consultants visiting a great many classes, we’ve found the real picture looks somewhat different.

Listen to a colleague reporting on a recent visit: I sat in the back of the classroom, observing and taking careful notes as usual. The class had started at 1:00 o’clock. The student sitting in front of me took copious notes until 1:20. Then he just nodded off. The student sat motionless, with eyes shut for about a minute and a half, pen still poised. Then he awoke, and continued his rapid note-taking as if he hadn’t missed a beat.

Not infrequently we observe students having lapses of attention. And we’ve found that it’s not enough for us to tell faculty with whom we are working about the problem. They’re often aware of it already. What really makes a difference is for us to be able to offer a little theory, which we will do in the first part of this article, and then some concrete suggestions of activities they can use in their classes to break up a particular lecture on a particular day.

One explanation for the lapses in students’ attention is that the “information transfer” model of the traditional lecture does not match what current cognitive science research tells us of how humans learn. Research tells us that the brain does not record information like a videocassette recorder. Instead, it handles information by reducing it into meaningful chunks, that we call categories. Learning consists of fitting this reduced information into already existing categories or, sometimes, of forming new ones. Categorization determines how a concept is acquired, how it is retrieved from memory, and how it is put to work in abstracting or generating inferences. Examples are a primary means of making connections between old knowledge and new knowledge. Their concreteness allows students to draw connections between the new, abstract idea or principle and what they already know. Once a new concept has been introduced, students need an opportunity to practice thinking in terms of that concept. Right in a lecture class, you can ask students to generate their own example of the concept, summarize it, write an exam question for it, or explain it to someone else. This approach works with the mind’s natural processes, and thus improves learning (Savion & Middendorf, 1994).

Studies on attention span also shed light on why students have difficulty with the traditional lecture format. Adult learners can keep tuned in to a lecture for no more than 15 to 20 minutes at a time, and this at the beginning of the class. In 1976, A. H. Johnstone and F. Percival observed students in over 90 lectures, with twelve different lecturers, recording breaks in student attention. They identified a general pattern: After three to five minutes of “settling down” at the start of class, one study found that “the next lapse of attention usually occurred some 10 to 18 minutes later, and as the lecture proceeded the attention span became shorter and often fell to three or four minutes towards the end of a standard lecture” (pp. 49–50). Other studies appear to confirm these findings.

In 1985 Ralph A. Burns (1985) asked students to write summaries of presentations and tallied the bits of information reported by the “half-minute segment of the presentation” in which they occurred. He reports that students recalled the most information from the first five minutes of the presentation. “Impact declined, but was relatively constant for the next two 5-minute portions, and dropped to the lowest level during the 15- to 20-minute interval” (Burns, 1985). Both of these studies note the severe lapse of attention 15 to 20 minutes into a lecture. As researcher P. J. Fensham observes, “During the falls [in attention] the student has, in effect, phased out of attending to the information flow” (1992, p. 510)

Given that students have an attention span of around 15 to 20 minutes and that university classes are scheduled for around 50 or 75 minutes, instructors must do something to control their students’ attention. We recommend building a “change-up” into your class to restart the attention clock. If your main mode of instruction is lecture, clearly the primary activity for most of your students is listening to one person talk; even in whole class discussion, only the student actually speaking at any given time is doing anything other than listening. Combining what we know about attention span and how the mind works, we suggest that lectures should be punctuated with periodic activities.

Johnstone and Percival (1976) report that lecturers who “adopted a varied approach...and deliberately and consistently interspersed their lectures with illustrative models or experiments...short problem solving sessions, or some other form of deliberate break...usually commanded a better attention span from the class, and these deliberate variations had the

effect of postponing or even eliminating the occurrence of an attention break" (p. 50). Many of our colleagues also report that when they intersperse mini-lectures with active engagement for students for as brief a time as two to five minutes, students seem re-energized for the next 15 to 20 minute mini-lecture.

By planning exactly when to insert an activity, you can make sure that your students pay the most attention to the issues which you feel are most important.

Don't do activities for their own sake; they should be integrally related to giving students practice with the most important concepts in that day's class. So, telling jokes about lawyers halfway through a fifty minute economics class will change students' level of attention, but will add little to their learning of cost/benefit analysis.

Varying your approach to teaching also allows you to get your students actively involved in their own learning. The research on the mind gives us the theoretic base for advocating active learning. A large body of literature tells us that when the goal is to foster higher level cognitive or affective learning, teaching methods which encourage student activity and involvement are preferable to more passive methods (Sorcinelli, 1991).

Active learning lets you give your students opportunities in class to practice with the concepts you want them to learn. Particularly effective for getting students actively engaged in the classroom are collaborative learning techniques. What better way to get students active than to have them explain their new knowledge to one another? By making the classroom a social learning experience instead of a solitary one, instructors can reduce the student passivity through which some students seem to hide out in large classes. Research confirms that breaking down the walls of anonymity promotes learning (Sorcinelli, 1991).

One colleague, who teaches journalism, told us that he fell into using small groups by accident, but they generated so much energy and interest in class that he now uses them regularly: "I wanted to show some slides and have the entire class talk about [them], but the slides didn't get processed in time. So I got half a dozen magazine spreads, and I divided the [students] up into six groups. I was really, really shocked, but delighted, to see what a tremendous wave of energy this released in the class. All of a sudden these students who had been sitting there listening very passively got very energetic; they began to talk to each other, and they were actually doing

exactly what I wanted them to do." (Cookman interview, 1994)

When you plan your classes, you will want to decide how often to add a change-up and what activity to use. Use the 20 minute attention span as a rule of thumb: in a 50 minute class, use one change up in the middle; in a 75 minute class, use two change-ups, at roughly 1/3 and 2/3 of the way through the class period. But don't follow this slavishly; anything that becomes predictable will have less impact. Variety is a powerful force. Having a handful of activities you can use comfortably will keep the students guessing, wondering what you will do next. Be sure to earmark at least one third of the time you allow for the activity for debriefing afterwards; this is when most of the substantive lessons of the activity will be confirmed. Without a wrap-up, students see these activities as amorphous and sometimes confusing; a concluding debriefing helps them understand what was important and what was not.

### **A Change-Up Sampler**

The list below presents many options for changing the activity for all of your students at once, allowing you to revitalize their attention when you want to do so and to get them actively involved with the material. You should be able to find a few here that work for you. On that dark night of the teaching soul, when you have run out of ideas for a change-up, pick something new from this list.

### **Student Generated Questions:**

1. *Write a Question.* The simplest of these techniques: instead of saying, "Are there any questions?", ask each student to write down one to three questions they have about the material just covered in class. Then ask several (volunteers at first) what their questions are and answer them (or get other students to answer them). Writing their questions down gives them all a chance to work out what they really do not know and seeing the questions in writing helps them feel authorized to ask them.
2. *Guided Reciprocal Peer Questioning.* Show students a set of generic question stems (see samples below). Each student writes down questions about the material just covered in class. They need not be able to answer their own questions; the purpose is to generate discussion. Groups of four students then discuss possible answers to the questions each group member wrote. Sample Generic Question Stems "What is the main idea of \_\_\_?" "What is a new example of \_\_\_?" "What is the difference between \_\_\_ and \_\_\_?" "What are

the strengths and weaknesses of \_\_\_\_?" (Millis & Cottell, 1993)

3. *Press Conference*. Alone or in pairs, students generate press-conference style questions to ask you or a panel of students who had been assigned to prepare on the topic. (Thiagarajan, 1988).
4. *Exam Questions*. Alone, or in pairs, or groups of three, students write an exam question about material just covered in class. (They should follow the format of your actual exam – essay, multiple-choice, etc.) After a brief time for discussion, you select at least four groups to report their questions to the whole class. Write these on the board and ask other students to critique them (give specific criteria). You can collect all of the questions in writing; use the best ones on the exam! (Angelo & Cross, 1993).
5. *Send a Problem*. Each team member writes a review question on a card and her teammates try to answer it, writing their consensus on the back. The cards are then passed to the other teams for their answers. (Wright, 1994).
6. *Student-Developed Cases*. Alone or in small groups, ask students to develop a case (a fictional situation which presents a problem) based on the theory of the current topic. This can be done in class, as homework, or both. The class should then discuss several of the cases.
7. *Minute Papers*. At the end of a class or a section of material, ask your students to write for a minute or three. Questions such as "What was the most important point of today's class?" or "What question do you still have about this material?" give you important feedback about the students' comprehension and a useful starting point for the next class. (Schwartz as described in Wilson, 1986; see also Angelo & Cross, 1993)

### **Problem Solving:**

1. *Think (or Write) – Pair – Share*. Pose a question which requires analysis, evaluation, or synthesis. Each student thinks or writes on this question for one minute, then turns to the person next to him to compare ideas. Then the pairs share their ideas with some larger group (pairs of pairs, section of the class, or whole group). (Wright, 1994).
2. *Paired Discussions*  
In three or four minutes, have students discuss something with the person next to them: summarize class so far; react to theory, concepts, or information being presented; relate today's material to past learning; etc. Make your question as specific as you can. (Wright, 1994).

3. *Practice Exam Question or Homework Problem*. Give the students a sample exam question or homework problem for practice. Either works quite well with more quantitative problems. Ask several students at random to report their answers to the class. Giving the students a chance to practice the type of questions they might see on homework assignments or examinations will give them more confidence when they have to work them alone. (Derek Bok Center, 1992).
4. *Finding Illustrative Quotations*. Alone or in small groups, ask students to reread the text for the day to find quotations to support a specific position. You can have all groups look for support for the same position or several different ones. (Frederick, 1981)
5. *Concrete Images*  
To help students to make specific references to the text, go around the room and ask each one to state a concrete image/scene/event/moment that stands out to them. List them on the board. Follow up by having them find themes or patterns, missing points, etc. Then discussion can move to analysis with a common collection of facts. (Frederick, 1981)

### **Generating Ideas:**

1. *Brainstorming*. Help students to see what they know by recording all of their ideas, recollections, etc. on the board. Ask students to call out any ideas they have. Write the ideas down first without analyzing them, then move to critical discussion. *Buzz Groups* Give one or two prepared questions to groups of three to five students. Each group records its discussion and reports to the whole class. Then help the class synthesize the groups' answers. (Berquist & Phillips, 1975).
2. *Roundtable*. A brainstorming technique in which students take turns writing on a single pad of paper, saying their ideas aloud as they write. Each tries to add to what has already been said. (Wright, 1994).
3. *Truth Statements*. Ask several small groups to decide on three things they know to be true about some particular issue. This is useful when introducing a new topic which students think they know a great deal, but their assumptions about it need to be examined. (Frederick, 1981).
4. *Picture Making*. Choose (perhaps with help from class) several principles or questions which could be illustrated. Groups of four or five students each illustrate one on the board or on large chart paper. Each group explains its picture to the class,

followed by discussion. (Berquist & Phillips, 1975).

5. *Kisses and Crackers*. To overcome the flagging of attention, when you notice energy and attention diminishing, pass out crackers and Hershey's kisses. The professor who taught us this technique tells us that research in "accelerated learning" shows that eating about once per hour actually promotes learning. Not only does the food wake students up, the mere act of passing the bags around changes the activity and refocuses attention. He says that this also helps students feel good about his class and him and to overcome science anxiety. (A. Basu, personal communication, February 1991).

### Controversial Topics:

1. *Structured Controversy*. Class members (or groups) to take different positions on an issue (you can assign positions), discussing, researching, and sharing their findings with the class. (Wright, 1994).
2. *Reaction Sheet*. After presenting a controversial topic, pass around several sheets to collect written reactions to these three questions: "What ideas do you question," "What ideas are new to you," and "What ideas really hit home?" Follow up with discussion. Variations are to ask each student to write their own sheet or to have small groups do so. (Berquist & Phillips, 1975).
3. *Value Lines*. Students line up according to how strongly they agree or disagree with a proposition or how strongly they value something. This gives a visual reading of the continuum of feelings in the group. Next, sort students into heterogeneous groups for discussion by grouping one from either end with two from the middle. Ask students to listen to differing viewpoints in their groups and to fairly paraphrase opposing positions. (Wright, 1994).
4. *Forced Debate*. Ask all students who agree with a proposition to sit on one side of the room and all opposed on the other side. Hanging signs describing the propositions helps. It is important that they physically take a position and that the opposing sides face each other. After they have sorted themselves out, switch the signs and force them to argue for the position with which they disagree. This is one of very few activities which gets people to consider viewpoints in opposition to their own strongly held opinions. (see also Frederick, 1981).
5. *Role Playing*. Ask several students to take on the roles of participants in the situations being

studied, characters from a novel, historical figures, representatives of political or theoretical positions, science foundation grant evaluators, etc. To reduce the students' fear, you might allow them some choice as to how involved they get, asking for volunteers for major roles and allowing some roles to be played by groups of students. You might also give them some time to prepare: a few days outside of class to research their roles, 15 minutes to confer in small groups, or five minutes to refresh their memories. Also, the definition of the roles and their goals must be clear and concrete. (Frederick, 1981).

6. *Student Self-Evaluation*. Have the students write a brief evaluation of their learning. After an essay (or project) have them answer the following: Now that you have finished your essay [or project], please answer the following questions. There are no right or wrong answers; I am interested in your analysis of your experience writing this essay [or doing this project].
  - a. What problems did you face during the writing of this essay?
  - b. What solutions did you find for those problems?
  - c. What do you think are the strengths of this essay [project]?
  - d. What alternative plans for this essay [project] did you consider? Why did you reject them?
  - e. Imagine you had more time to write this essay [work on this project]. What would you do if you were to continue working on it?

(Allen & Roswell, 1989, as cited in MacGregor, 1993)  
See MacGregor for several other ideas on student self-evaluation.

### Vary Media:

- Slides, overheads, pictures
- Video clips
- Music or sound

Use a brief selection of a medium to provide a shared example or experience as a basis for discussion or analysis. Follow these guidelines for active viewing or listening:

1. *Pre-viewing or listening*
  - Introduce the video/film/sound by providing an overview of its content, a rationale of how it relates to the current topic being studied, and a reason students need to know about it.
  - Direct student attention to specific aspects of the presentation by asking them questions to answer following the presentation.
2. *Viewing or listening*:

- You do not need to show all of a video or film, nor to play an entire song; just the relevant parts, for best use of class time and greatest impact.
- It may also be useful to stop the presentation at appropriate points for discussion or clarification.

### 3. Post-viewing or listening:

- Follow-up a video or film with an activity that allows students to respond to or extend ideas presented.
- Discussions, short writing assignments, or application exercises, for example, will reinforce the concepts and increase learning from classroom audio-visuals. (Middendorf, 1993)

## References

- Angelo, T. A., & Cross, K. P. (1993). *Classroom assessment techniques*. San Francisco: Jossey-Bass.
- Berquist, W. H. & Phillips, S. R. (Eds.). (1975). Classroom structures which encourage student participation. In Gary H. Quel (General Editor). *A handbook for faculty development* (pp. 118-121). The Council for the Advancement of Small Colleges in association with The College Center of the Finger Lakes.
- Burns, R. A. (1985, May). Information impact and factors affecting recall. Paper presented at Annual National Conference on Teaching Excellence and Conference of Administrators, Austin TX. (ERIC Document Reproduction Service No. ED 258 639)
- Cookman, C. (1994). [Interview with Joan Middendorf].
- Derek Bok Center for Teaching and Learning, Harvard University (Producer). (1992). *Thinking together: Collaborative learning in science* [Videotape]. (Available from Anker Publishing Company, Inc., P. O. Box 249, Bolton, MA 01740-0249).
- Fensham, P. J. (1992). Science education at first degree level. *International Journal of Science Education*, 14 (5), 505-514.
- Frederick, P. (1981). The dreaded discussion: Ten ways to start. *Improving College and University Teaching*, 29(3), 109-114.
- Frederick, P. (1986). The lively lecture: Eight variations. *College Teaching*, 34 (2), 43-50.
- Johnstone, A. H., & Percival, F. (1976). Attention breaks in lectures. *Education in Chemistry*, 13, 49-50
- MacGregor, J. (Eds.). (1993). Appendix to *New Directions in Teaching and Learning*, 56, 101-117.
- Millis B. J., & Cottell, P. G. (1993, October). *Moving beyond the basics: Cooperative learning strategies for advanced practitioners*. Paper presented at 1993 POD National Conference, Rochester, MN.
- Middendorf, J. (1993). Active viewing for video, films, and other audio visuals. *Teaching Resources Center Newsletter*, 4 (1), 3.
- Savion, L., & Middendorf, J. (1994). Enhancing concept comprehension and retention. *National Teaching and Learning Forum*, 3(4), 6-8.
- Sorcinelli, M. D. (1991). Research findings on the seven principles. *New Directions for Teaching and Learning*, 47,13-25.
- Thiagarajan, S. (1988). Reading assignments: 13 interactive strategies for making sure your students read them. *Performance and Instruction*, 27(9), 45-49.
- Wilson, R. C. (1986). Improving faculty teaching. *Journal of Higher Education*, 57 (2), 195.
- Wright, D. L. (1994). Using learning groups in your classroom: A few how-to's. *Teaching at UNL (University of Nebraska-Lincoln)*, 15 (4) 1-2, 4-5.