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In education, **teachers** are those who help students or pupils learn, often in a school. The objective is typically a course of study, lesson plan, or a practical skill, including learning and thinking skills. The different ways to teach are often referred to as the teacher's pedagogy. When deciding what teaching method to use, a teacher will need to consider students' background knowledge, environment, and their learning goals as well as standardized curricula as determined by the relevant authority.

**Related positions**

A teacher who registers a student, or who is positioned to help the student in a particular subject, is in some cultures called a "tutor".

A teacher or trainer from whom a student learns a great deal may be called a "mentor". (this term is used, in this context, in the UK.)
An "educationalist" is an educational theorist, writer or researcher. In traditional China, the model teacher, Confucius, is greatly revered. A Chinese term for teacher is shifu, (sifu) (teacher-father) or laoshi (old teacher). Other terms are rabbi, guru, etc.

**Primary and Secondary School Teachers**

Perhaps the most significant difference between primary and secondary teaching in the UK is the relationship between teachers and children. In primary schools each class has a teacher who stays with them for most of the week and will teach them the whole curriculum. In secondary schools they will be taught by different subject specialists each session during the week and may have 10 or more different teachers. The relationship between children and their teachers tends to be closer in the primary school where they act as form tutor, specialist teacher and surrogate parent during the course of the day.

This is true throughout most of the United States as well. However, alternative approaches for primary education do exist. One of these, sometimes referred to as a "platoon" system, involves placing a group of students together in one class that moves from one specialist to another for every subject. The advantage here is that students learn from teachers who specialize in one subject and who tend to be more knowledgeable in that one area than a teacher who teaches many subjects. Students still derive a strong sense of security by staying with the same group of peers for all classes.

**University teachers**

Teachers in college are called instructors or lecturers. In the United States, the term "professor" is usually applied to college or University teachers who have received their Ph.D., while instructors or lecturers have received their Masters degree, and usually are pursuing their Ph.D. Professorial rankings from Assistant Professor through Full Professor that may be defined differently at various institutions. The rank of American university instructors depends in part on the amount of relevant and publishable research completed over time.

An "assistant professor" is typically required to have completed extensive research seminars at the post-graduate level and have written and defended the dissertation. The Ph.D. is almost always required. Assistant professors are similar to lecturers or readers in
the United Kingdom. Their initial preparation for the profession takes between eight and twelve years.

An "associate professor" must typically have completed five or more years of additional research, published articles in national and international journals, developed syllabi for the teaching of various courses, provided services to the University (i.e., committee member, faculty senate member, etc.), and in most cases have published refereed books.

The "full professor" in the United States would be the equivalent of the "Professor" in the United Kingdom and elsewhere. It is not typical to achieve the title of "full professor" within the first fifteen to twenty years as an educator and researcher at a university in the United States. It requires dedication to the discipline and eminent, original scholarship, as shown through published works and a diverse curriculum vitae.

In the United Kingdom the title 'Professor' is restricted to university teachers who have been granted a 'chair'. Others are known as lecturers or readers.

**Senior teachers**

Teachers who look after the whole school are called head teachers, school principals, headmasters or headmistresses. The equivalent in colleges and universities is called the dean, principal or vice-chancellor. See also school leadership. Teachers of this status rarely teach students. A teacher in a grammar or public school in Britain may also be a Head of House. Houses were also used in secondary and comprehensive schools.

As with most large organisations a school needs a hierarchical structure of command, allowing matters to be delegated to a specific department or section of the school. In many cases there are deputy headteachers, heads of department (or subject, such as science or history) and heads of year. A head of year is in charge of the pastoral care of one year group.

Every school has a disciplinary procedure which dictates how punishments should be given to misbehaving students. One common method of coping with problems is the idea of escalation whereby the classroom teacher attempts to deal with the student(s) themselves before passing it on to a more senior teacher. Eventually, should the situation not be resolved, the headmaster becomes involved.
Emergency teachers

A teacher may be replaced by another teacher if he or she is absent due to illness, death, or planned absence. In the United States and some parts of Canada, notably Saskatchewan, replacement teachers are known as substitute teachers (or more informally as "subs") and more recently "guest teachers". In Australia and New Zealand they are known as "casual" or "relief" teachers; in the UK and in other parts of Canada, notably Ontario, they are known as supply teachers. In British Columbia, Canada, they are called TOCs (teachers-on-call). Temporary, substitute teachers in universities are usually in forms of multiple guest lecturers.

These teachers often find it difficult to acclimatise to the new environment, often moving from one school to another week after week or day after day. They are often viewed badly by the students they are looking after with a "you're not a real teacher" joke attitude making behaviour management very difficult. Meanwhile, in some subjects, they may actually know less than their students. In long term replacements, however, this often quickly subsides.

Teacher trade union groups have expressed resentment towards the continuous use of supply teachers (who may be paid a lower amount) to satisfy long-term shortages when school administrations have resisted creating a permanent teaching position.

The United States observes a Substitute Educator's Day, which was instituted by the National Education Association (NEA). The purpose of this day is to highlight the role and importance of the substitute teacher by providing information about, advocating for, and helping to increase appreciation and respect for this unique professional. This day also focuses on the needs of substitutes, which include better wages and health benefits and continual professional development. Substitute Educator's Day is observed on the Friday during American Education Week. Other countries and jurisdictions have similar observances.

Qualification and registration

Teachers are usually educated in a university or college. Often they must be certified by a government body before they can teach in a school.

Australia
Certification in Australia differs from state to state; however as a general rule all teachers must possess a tertiary certification - either a Bachelor of Education (BEd), Bachelor of Teaching (BTeach) or a graduate program after an appropriate Bachelor such as the Diploma of Education (DipEd) or Master of Teaching (MTeach) - awarded by an Australian certified University or an equivalent award from overseas plus experience in the classroom. Many states now have Teacher Registration Boards or are soon to institute them. These organisations are charged with certifying potential teacher's qualification and ensure constant Professional Development.

It is important to note that an Australian bachelor's degree is typically not seen as equivalent to a bachelor's degree in some countries, including North America and parts of Europe, as it is a three-year degree vs. a four or five-year degree. An honours degree is usually required for equivalency to be assured. North American models, for example, require a broad and rigorous liberal arts and sciences general education component and therefore take longer to complete. This is not the case in the British, Australian, and New Zealand models. Students take far less course work in the field of the major and this course work is less in-depth at higher levels of the course. Australians who would like to work outside of Australia, New Zealand, the UK and so on, should have their qualifications evaluated before attempting application in a foreign institution of education.

**Canada**

Canadian teachers must receive certification from a provincial College of Teachers or the provincial department responsible for teacher certification in order to be able to teach in elementary and secondary schools. In Manitoba, for example, the responsibility for teacher certification lies with the Department of Education, Citizenship, and Youth - Professional Certification and Records Branch. Teachers need a Bachelor's degree in Education (B.Ed.), often on top of another recognized Bachelor's degree. This adds one or two more years to a university education. To earn a degree in secondary education, teachers must have a certain number of university credits in their subject field. This number varies from province to province, and in some provinces it varies from school to school. Most employers of teachers require that successful applicants complete criminal record checks, as well as verification that an employee is not listed in the Child Abuse Registry. These same requirements are, in addition to being a sound part of the hiring
practice, a requirement of most provincial education legislation. Other requirements such as a tuberculosis test, and level of experience criteria may also be required.

The process for certification is somewhat different in all provinces, but there is no process for obtaining "inter-provincial" certification. Any teacher must obtain certification from the specific province they wish to teach in. In extreme circumstances, such as a lack of any suitable certifiable candidates for a specific teaching position, an employer may apply for temporary certification of a non-certified person. This temporary certification is usually valid for one calendar year after ministry approval, but must be requested by the school, not by a non-certified applicant for a teaching position.

**England and Wales**

In England and Wales teachers in the maintained sector must have gained Qualified Teacher Status (QTS). There are many paths in which a person can work towards gaining their QTS, the most popular of which is to have completed a first degree program (such as a BA or BSc) and then a Post-Graduate Certificate of Education (PGCE). Other methods include a specific teaching degree (BEd) or on-the-job training at a school. All qualified teachers in England must serve, after training, a statutory one year induction period that must be passed in order to remain a registered teacher. In Wales this period lasts for two years. During this period a teacher is known as an NQT (Newly Qualified Teacher). Schools are obliged to provide guidance, support and training to facilitate the NQT's success during this year. Local education authorities are also obliged to provide professional development opportunities.

Teachers in independent schools are not statutorily required to hold QTS, although independent schools increasingly prefer teachers to hold this qualification unless they have already gained significant teaching experience. The post-experience PGCE at the University of Buckingham is designed for independent school teachers. Some specialist independent schools, such as those following Montessori principles, require teachers trained in that specific educational philosophy.

The Teach First scheme, aimed at recent graduates, was introduced in 2003 in London and more recently in Manchester and it allows trainees to teach in schools without the Post-Graduate Certificate of Education (PGCE). After an intense period of training in the summer following graduation, trainees are placed in secondary schools. Following the
successful completion of the first year, trainee teachers gain QTS status and may then continue teaching for a minimum of one year.

**Scotland**

In Scotland teachers must hold a valid teaching qualification (TQ) and be registered with the General Teaching Council for Scotland. Following initial teacher education and gaining a teaching qualification a Scottish teacher is deemed to be provisionally registered with the GTCS and must undergo a year of probation supported through the Scottish Executive's induction programme.

There are several possible routes to a TQ, including a Bachelor of Education in Music, Physical Education or Technological Education for secondary school or a general BEd for primary school, a Professional Graduate Diploma in Education (PGDE) or a concurrent undergraduate degree combining a Bachelor of Science or Scottish Master of Arts with the initial teacher education elements of a PGDE. Concurrent degrees are only available from the University of Stirling.

A Scottish teacher may only qualify in a subject directly related to their undergraduate or graduate studies.

For teachers qualified outside of Scotland an application must be made to the GTCS for exceptional registration.

**United States**

In the United States, each state determines the requirements for getting a license to teach. Normally, a bachelor's degree with a major in a certifiable area (languages, arts, sciences, etc.) is a minimum requirement, along with rigorous pedagogical methods course work and practical field experiences as "student teachers." It is also required by all states that teachers pass standardised exams at the national and/or state levels both in the subjects they teach and the methods of teaching those subjects, and that they undergo constant evaluation by local, state, and sometimes even private organizations during their first years of teaching. Most states use graduated licensing programs (i.e., initial, Stage II, Rank I, professional, provisional, etc.). A license to teach in one state will usually facilitate the obtainment of a license in another state.
Until the 1960's, a person could not teach unless he or she had completed a year or more of specific teaching training at a normal school. In the past two decades, normal school courses have been made optional through the promotion of Alternate Route teacher certification. New Jersey was the first state to establish an Alternate Route program, doing so in 1984. Since then, most states have established their own programs.

Teachers in almost all states must have a Bachelor's degree with the appropriate teacher preparation course and complete a Master's degree within five years. Additionally, to be permanently certified, teachers must pass three state exams on pedagogy, general knowledge and knowledge of a content area. In order to work in a public school a candidate must be fingerprinted.

The Bureau of Labor Statistics estimates that there are 1.4 million elementary school teachers, 600,000 middle school teachers, and 1 million secondary school teachers employed in the U.S.

US News (2006) has ranked graduate programs in teacher education in the following order: Harvard University, Columbia University, UCLA, Stanford University, Vanderbilt University, University of California, Berkeley, University of Pennsylvania, University of Wisconsin, University of Michigan, Northwestern University and the University of Minnesota.

Teach for America and the Mississippi Teacher Corps are two highly competitive, alternate-route teaching programs, for college graduates who are not education majors.

**Teaching as a profession**

In many cultures, teaching is referred to as a profession. Arguments for this include the respect that is felt for teachers in some cultures, the existence of a body of specialised professional knowledge, codes of ethics, etc. Others dispute this appellation because of significant differences with other professions, especially as regards teaching's relatively low status, low salaries, and its lack of power to control entry to the profession. These aspects all vary greatly by culture.

**World Teachers’ Day**
UNESCO inaugurated World Teachers’ Day on 5 October 1994 to celebrate and commemorate the signing of the Recommendation Concerning the Status of Teachers on 5 October 1966. World Teachers’ Day also highlighted the Recommendation Concerning the Status of Higher Education Teaching Personnel adopted in 1997. Some countries such as Taiwan also celebrate Teacher's Day as a national holiday. In Brazil and Chile, it is celebrated on October 15, while in India it is celebrated on the 5th of September. In Brunei, it is celebrated on September 23.

Salaries

Teachers' salaries vary from country to country: US teachers are paid on a graduated scale, starting at the low end and moving up on the pay scale with experience. According to the National Education Association (NEA), the average starting teacher's salary in the US is just over $31,000, while the average teacher makes just over $42,000. The amount a US-American teacher earns depends on education level, experience, and the school/district/state--the cost of living in certain areas heavily influences the amount of a teacher's salary. Britain and a lot of other Commonwealth States pay their teachers an approx. $30 000. However, the countries where teachers are paid the most are Germany, Switzerland and South Korea.

South Korea

Salaries go from $25 000 up to $60 000 (mind: GDP/person: $16 500!). Korean teachers are widely regarded to be the best-paid ones in the world with regard to the Real Income.

Switzerland

Salaries go from $65 000 up to $80 000 (mind: GDP/person: $50 000!)

Germany
German teachers are usually Beamte (see: Beamter). The term "Beamtentum" means "officialdom". In Germany, state employees are permanent workers, i.e. they can never be fired, are paid all the necessary social insurances and usually get more money than others. Teachers are Beamte of the Länder. There are 3 different types of secondary schools: a) Hauptschule - teachers are, as Beamte, paid according to the BBesO (Bundesbesoldungsordnung); Hauptschul-teachers start with A 12 and usually "climb" one step.

b) Realschule - same as Hauptschule

c) Gymnasium - Gymnasien (not English gymnasium, but rather lyceum) prepare the students for the Abitur, after which they can go to university. Gymnasium-teachers are the best paid. They usually have a degree called "Staatsexamen", which can be compared to a MA in two subjects (e.g. Maths and Biology). After the First Staatsexamen, the trainee teachers have to do some practical training for two years, which they are going to finish with their Second Staatsexamen. Then, they are "Beamte zur Anstellung", i.e. they are not permanently employed yet. Until their real Verbeamtung, they have to wait another three years. Then, they become Beamte. Gymnasium-teachers are not called Lehrer in Germany. The first step (A 13, BBesO) is Studienrat (abbrev.: StR) or Studienrätin (StR'). The second step (A 14, BBesO) is Oberstudienrat (OStR) or Oberstudienrätin (OStR'). The third step (A 15, BBesO) is Studiendirektor (StD) or Studiendirektorin (StD'). The fourth and last step (A 16, BBesO) is Oberstudiendirektor (OStD) or Oberstudiendirektorin (OStD'), i.e. headmaster or -mistress. Higher posts are at the ministry, where the Beamte are paid according to Salary Class B (also BBesO). [A translation for Oberstudienrat would be: Higher/Superior Educational Council (Council for Studies); all officials of the Higher Service have these titles, e.g. Verwaltungsrat (Administrative Council, Kriminalrat, ...) Salary: example

Oberstudienrat, married, three children, has been teaching for 20 years. A 14 family benefit Step 10

Basic salary (A 14, Stufe 10): 4020,61 € family benefit 1138,56 € wife child 1 child 2 child 3 Studienzuschlag 184,53 € Pauschale 245,91 € --> 5589,61 € per month Mind: German officials get 13.5 salaries each year (winter: 1vH; summer: 0,5vH). Therefore, our OStR gets c. 76 000 € (~100 000 USD ;~56 000 GBP). After taxes*: 60 000 € --> 5 000 € per month
Preparing a Course: Course Design

Course design involves the planning of curriculum, assessments, and opportunities for learning which attempt to meet to goals of the course and evaluate whether those goals are indeed being met. The designing of a course can be adeptly performed through the use of backwards design, which is based on the principle of working first from the material and concepts you want students to master, in order to plan how you will assess whether this learning has occurred, and this information thus guides which resources and methods of teaching are employed in order to enact learning of this material.

Four questions from Wiggins & McTighe (1998) are suggested as a guide for condensing the course’s material into a few key topics:

1. To what extent does the idea, topic, or process represent a “big idea” having enduring value beyond the classroom?
2. To what extent does the idea, topic, or process reside at the heart of the discipline?
3. To what extent does the idea, topic, or process require uncoverage?
4. To what extent does the idea, topic, or process offer potential for engaging students?

Also consider the goals and characteristics of your future students. Some reasons that students may be taking your course include: to develop a philosophy of life, to learn to interpret numerical data, to understand scientific principles or concepts, to learn to effectively communicate, to learn to organize ideas, or to understand how researchers gain knowledge. As the instructor, you can use this information, along with your own goals for the course, to guide your course structure and teaching pace.

After having determined which material will guide the course design, the next step in backwards design is to establish the criteria you will employ to evidence student learning. Instead of using a lone cumulative exam to assess learning, however, backwards design is guided by the concept that understanding increases across time, as students process, reassess, and connect information. Therefore, assessments to measure this increasing level of understanding should be conducted throughout the semester, using a variety of methodologies such as discussions, tests and quizzes, projects, and assessments in which students analyze their own level of understanding. Once key concepts and assessment criteria have been decided upon, you can then focus on which teaching methodologies and activities you will use to help students reach these course goals. In this manner, teaching is driven by the concepts that are crucial to the course, rather than the course being driving by the teaching methodology itself.
Preparing a Course: Building a Syllabus
Start with the basic information of the course, including the year and semester of the course, the course title and number, number of credits, and the meeting time/place. Provide your name, office address (and a map if it's hard to find), and your contact information. Indicate whether students need to make appointments or may just stop in. If you list a home number, be specific about any restrictions for its use. Next, clarify what prerequisites, knowledge, skills, or experience you expect students to have or courses they should have completed. Suggest ways they might refresh skills if they're uncertain about their readiness.

When discussing the course, outline the course purpose(s); what is the course about and why would students want to learn the material? Outline the three to five general goals or objectives for the course (see Course design for more information), and explain why you've arranged topics in a given order and the logic of themes or concepts you’ve selected. When discussing the course format and activities, tell students whether the class involves fieldwork, research projects, lectures, and/or discussion, and indicate which activities are optional, if any.

In regard to the textbooks & readings, include information about why the readings were selected. Show the relationship between the readings and the course objectives. Let students know whether they are required to read before class meetings. Also detail any additional materials or equipment that will be needed.

Specify the nature and format of the assignments, and their deadlines. Give the exam dates and indicate the nature of the tests (essay, short–answer, take–home, other). Explain how the assignments relate to the course objectives. Describe the grading procedures, including the components of the final grade and weights for each component. Explain whether you will grade on a curve or use an absolute scale, if you accept extra credit work, and if any of the grades can be dropped. Also explain any other course requirements, such as study groups or office hour attendance. Clearly state your policies regarding class attendance, late work, missing homework, tests or exams, makeup exams, extra credit, requesting extensions, reporting illnesses, cheating and plagiarism. You might also list acceptable and unacceptable classroom behavior. Let students know that if they need an accommodation for any type of disability, they should meet with you to discuss what modifications are necessary.

Include a course calendar with the sequence of course topics, readings, and assignments. Exam dates should be firmly fixed, while dates for topics and activities may be tentative. Also list on the course calendar the last day students can withdraw without penalty. Give students a sense of how much preparation and work the course will take.

Finally, a syllabus is a written contract between you and your students. End with a caveat to protect yourself if changes must be made once the course begins; e.g., “The schedule and procedures in this course are subject to change in the event of extenuating circumstances.”
Using Class Time Well: Active Learning
Teaching is developmental rather than directive or presentational.

Active learning involves the implementation of “learning experiences in which the students are thinking about the subject matter” (McKeachie, 2002). It is based on the premise that students must do more than just listen to fully comprehend new information. They must read, write, discuss, and problem solve. By employing active learning in your classes, you will increase the effectiveness of your teaching and your students’ learning.

Reading
One suggestion for encouraging active learning is the use of the Treasure Hunt technique (Magnan, 1990). This strategy is based on the premise that if you’ve assigned a reading, there must be something valuable for the students in it. Choose several pages or sections, and then ask students to find the most important point, idea, or argument and write it down, along with a sentence or two justifying their selection. If you choose assigned passages well, you can increase understanding and participation immediately.

Writing
John C. Bean suggests several ways to incorporate writing into a class, including:

- Writing at the beginning of class to probe a subject: Ask students to write short answers to a question that reviews previous material or stimulates interest in what’s coming.
- Writing during class to refocus a lagging discussion or cool off a heated one: When students run out of things to say, or when a discussion gets too hot, ask students to write for a few minutes.
- Writing at the end of class to sum up a lecture or discussion: Give students a few minutes to sum up the day’s lecture or discussion and to prepare questions to ask at the start of the next class.

Discussing
While the most common approach to encouraging active learning in the classroom is the use of discussion, not all discussions are created equal, and there are other methods in which to achieve the difficult task of drawing students into lectures, discussions, and readings. One suggestion for engaging students in active learning is using the Thumb’s Up technique (Ukens, 2000). To implement this technique, ask students to form groups of six to ten people, with each group sitting in a circle. Participants will discuss topics within their groups. To keep everyone involved, each person is to extend his or her fist toward the middle of the circle. Once discussion begins, each member is to share, in any order, one idea or piece of information on the topic. As each person shares, his or her thumb will go up. A person may not share again until all thumbs are up. Then, members can begin again and continue the process. After about five minutes, stop the discussion. If you wish, repeat with new topics.

Another method to employ asks the students to frame the discussion, or determine the direction of the discussion. Ask students to identify one question from their readings that they would like to have answered in class. Ask them to share their question with three peers, and then have the group pick one of the three questions to present to the instructor. Allow each group to ask its question.

Problem-Solving
Invite students to use Think-Pair-Share: To help them better understand a lecture, stop for a moment. Ask students to think about a question or problem that relates to the lecture material, turn to a peer, and explain their answer or solution. This is a great way to apply and reinforce key ideas.
Using Class Time Well: Teaching Inductively

Inductive teaching, also known as inquiry or discovery teaching, centers around the idea that knowledge is dependent on an individual’s experience and interaction with the material. The instructor provides examples from which students are encouraged to seek patterns and applications, explore and extend the material, and make connections, thus inductively learning the concept that these examples indicate. This is opposite of deductive teaching, in which the concept is defined by the teacher, and the class is then exposed to examples on this previously learned concept.

Structuring your class such that it requires students to inductively process the course material is outlined in the Teaching for Understanding framework (Wiske, 1998). In this framework of guided inquiry, the role of the teacher is to direct students’ attention and analysis through focused and often ongoing assignments. These assignments should attempt to increase the “uncoverage” of a subject, which requires that students receive “lessons that enable them to experience directly the inquiries, arguments, applications, and points of view underneath the facts and opinions they learn if they are to understand them. Students have to do the subject, not just learn its results” (Wiggins & McTighe, 1998). This manner of teaching is beneficial for all instructors whose course goals include the sentence, “I want my students to be able to think like a ________ (scientist, mathematician, writer, etc.).” In this way, Wiske recommends shaping the assignments such that they increase in complexity across the semester, as well as move from group projects to more independent learning tasks. Learning thus occurs through observation and guided performances, and assessment of students’ increasingly honed inductive reasoning skills occurs through on-going assignments. However, a “culminating performance” is often used at the end a course or unit, which requires independent application of inductive thinking, synthesis, and a demonstration of understanding that extends beyond the learning which was attained from group work.

Using Class Time Well: Leading Discussions
Leading discussions requires us to maintain a balance between using our voices and encouraging students to use theirs. Some ideas for sparking discussions include:

- Frame discussions around students’ questions.
- Have students write their answers to a sentence completion exercise, then share their ideas: What most struck me about the reading was… A question I’d like to ask the author is … The idea I disagree with most strongly is … The part of the lecture/reading that made the most sense to me was …
- Ask students to respond to a contentious opening statement or an illustrative quote.
- Have students recall an experience in their lives that somehow connects with the topics.

A suggestion for increasing the number of student responses you get in discussion comes from John Woodcock from the University of Indiana at Bloomington. He suggests breaking up your presentation by giving students two or three minutes to discuss a question with the person sitting next to him or her. Rather than having students report on their own ideas, ask them to report on their discussion partner’s good ideas. Woodcock states that when he tried this, “Three times as many hands went up, and the reports had a consistently better energy.” This technique can work with any size group, in almost any teaching situation.

One strategy that several KU faculty members have found useful is called the fishbowl, a discussion format in which part of the class forms a discussion circle and remaining students form a listening circle around the discussion group. Check here for a description of how to implement a fishbowl discussion.

In a large group discussion, once it is moving along, questions that can keep it going include questions that ask for more evidence or clarification. Ask How? or Why? Pose questions that link or extend the discussion, that address the cause and effect, and that ask for synthesis or summary of the material. Other ways to encourage discussion are by affirming student comments and being silent when appropriate. In his book *Teaching Tips*, W.J. McKeachie (2002) notes that many lecturers check student understanding by asking if there are any questions, waiting 3-5 seconds, and after receiving no response conclude that everyone understands. But this is often not the case; the students just have not had enough time to process the material. So McKeachie recommends, “If you really want to know, give students a minute to write down a question, then have them compare notes with students sitting near them before asking for questions. You’ll get some.”

If discussions are not going well because no one is talking, consider the following questions:

- Did students complete preparatory assignments?
- Have you modeled public critique of your ideas?
- Is the discussion focused on an open-ended question of sufficient complexity and ambiguity?
- Have you ensured that you’ve avoided answering the question you’ve posed, either implicitly or explicitly?
- Have you linked the topic to a critical event in students’ previous experiences?
- Is my talking preventing students from contributing, or is discussion faltering because I don’t speak enough?
- What am I doing to build continuity and a sense of collaborative engagement?

When it comes time to conclude a discussion, end with a summary so that students know what important points were covered. A summative statement also allows the instructor the opportunity to fill in points that weren’t covered and praise the class for participation.
Using Class Time Well: Using Group Work
Ruth Federman Stein and Sandra Hurd outline several justifications for the use of student teams and group work in *Using Student Teams in the Classroom* (2000). Besides increasing learning and preparing students for the environment of teamwork in industry and other organizations, teamwork and peer discussions help students more easily construct a knowledge structure that is scaffolded upon their previous experiences (Fosnot, 1996). Group discussions also help students use and become familiar with the language of a profession or discipline. Evaluations of student understandings are usually structured to assess their ability to comprehend questions and provide convincing responses. These skills are more likely to develop if students are allowed to discuss these topics themselves, as opposed to only receiving passive exposure to this new language. Teamwork is also more useful than lectures when teaching practical knowledge or material that is evaluated based on social context. Finally, Stein and Hurd argue that group work helps students absorb the behaviors and way of thinking needed for success in the classroom.

Dan Spencer, of the KU School of Business, also provides some recommendations regarding the use of groups:

- Create groups (5-7 people each) that are diverse in terms of gender, style of learning, interpersonal abilities, class grades, nationality, outside work experience, and the type of degree they are pursuing. Also, combine people in groups who do not have previous knowledge of each other, and who have complementary schedules for meeting outside of class.
- Select group work that requires team members to collaborate and that allows as much time for group interaction as possible in order to encourage valuable interactions.
- Allow the groups to determine individuals’ roles and the goals of their teamwork. Have the roles of the individuals in the group rotate throughout the project.
- Establish classroom behaviors that encourage group interactions, such as the sharing of information between teams and student cooperation during the learning process.
- Include evaluations that measure teamwork, such as tardiness, preparation for classes, and grades on group work.
- Before assigning complex projects, engage the class in icebreaker and bonding exercises, as well as assigning projects that increase in complexity.

A suggestion for initiating group work in the classroom that does not involve an extended group project is the creation of Listening Teams. First, divide the class into four teams, then give the team members different role assignments: **Questioners** – This group will ask at least two questions about the material covered. **Agreers** – This group will tell which points they agreed with, or found helpful, and explain why. **Naysayers** – This group will comment on what points they disagreed with, or did not find helpful, and explain why. **Example givers** – This group will give specific examples or applications of the material. Present your material. After you are done, give the teams a few minutes to complete their assignments.

One reason that listening teams are successful is because they create an environment in which each student feels as though their contribution to the group and their individual contributions are important and rewarded. Structuring group work with this in mind will increase the quality of student participation and the effectiveness of the group exercise.
Using Class Time Well: Classroom Interactions
Wilbert McKeachie offers several suggestions for ways to encourage students to be active in classroom interactions. Create an expectation of participation early in the semester, by defining the various facets of the course and explaining why participation is valuable. Understand that boredom, lack of knowledge, passivity, cultural norms, and above all, fear of being embarrassed, may contribute to keeping a student from not talking in class. To reduce a fear of embarrassment, use small groups and help students get to know each other. Ask questions that have no wrong answers to help students get used to participating. Call students by name (see suggestions for learning students’ names under First Day). Ask students to take a couple minutes to write out answers to questions. A shy person will be more likely to respond to being asked, “What did you write?” Get to know those students who don’t participate in class interactions so you’ll find any special knowledge they may have; ask them to contribute it at appropriate times.

In some scenarios, students may assume some negative roles. If we deal successfully with these situations, we can preserve a positive classroom environment. If the student assumes the Prisoner role, be clear about the benefits of the course. Ask the whole class to brainstorm 12 reasons why they shouldn’t be there. Review this list with the class, and tell them that you can see why they may not want to be there. Then, promise you’ll do your best to make the course worthwhile, and ask students to meet you halfway. Sometimes asking the student to help (e.g. passing out handouts) to show that you trust them, or engaging in a one-on-one talk, will bring the student around.

If the student assumes the role of the Introvert, use small group projects or employ group-generated questioning. This will give shy students a chance to succeed, and may make them more willing to participate in a large group in the future. This can also be achieved by asking for written responses to a question or problem. Most importantly, allow students to participate at their own comfort level; forcing an introverted student into an uncomfortable situation will probably cause him or her to retreat even further.

Finally, if the student assumes the Domineering role, make sure that you establish ground rules that discourage domination. Use small groups and don’t give the floor to a domineering person; while in these small groups, rotate group membership and leadership. And be proactive about the situation; if you can tell early on that someone will be a monopolizer, speak privately with him or her. Say you’ve noticed that others aren’t participating much and ask for help drawing them out. This gives the student a positive role to play, rather than a negative one.

If a few of your students still refuse to participate in classroom interactions, after you have made numerous efforts to engage them, keep in mind that the majority of your students are engaged. “If some students opt out, don’t let it bother you – it’s their loss, not yours” (Felder & Brent, 2003). Focus on the fact that most of the students are engaged, and move forward.
Lecturing and Presenting
William E. Cashin in his Idea Paper titled, “Improving Lectures,” provides several suggestions for effective lecturing and presenting of material. First, the appropriateness of the lecture format is dependent on the goals of the course, and the instructor should evaluate the course aims before determining whether a lecture-style course will most effectively achieve the course goals. The strengths of the lecture are that it “can communicate the intrinsic interest of the subject matter, and it can present the newest developments” (Walker & McKeachie, 1967).

Other strengths of lecture formats include their ability to restructure information into a unique manner, relevant to the course directions. Lectures are also useful in that they provide a large amount of material to many students at the same time. Finally, they can also be used as examples for how professionals approach an intellectual question.

The negative aspects of lecturing include the lack of feedback that students receive, the presumption that all students are learning the material at the same pace, and the problem that lectures are not well suited for higher levels of thinking, such as what is involved in synthesis and application. To overcome these hurdles, Cashin offers several recommendations for increasing the effectiveness of lectures:

• Fit your lecture to your audience, by gathering information about your audience beforehand.
• Prepare an organized outline with 5-9 major points, and decide which minor points you will include. Present this outline at the beginning of class.
• Present multiple sides to an issue, to make your audience aware of the various viewpoints, or to help strengthen an argument you are making.
• Repeat the points you are making in two or three different ways, and stress the points you deem most important.
• Look at your audience, include discussions, and solicit questions.

Another way to enhance your lectures is with effective blackboard or overhead use. Students' notes are often an exact copy of what appeared on the chalkboard or overhead, with very few additional points or connections. Effective board work highlights and emphasizes the organization required in problem-solving or the evolution of an argument. Remember that even the best students will occasionally lose the thread of a lesson or forget the original objective of a discussion. The chalkboard is their major, and often their only, resource for reentering the lesson. Therefore, be organized, use headings, write clearly, and when solving problems on the board, show each step in a logical sequence. If at the end of a lecture, you can stand back, look at the board, and reconstruct the lecture using what is written, then you are developing good board skills.

Lectures can also serve as a mechanism for encouraging higher levels of thinking in your students. In the book, What's the Use of Lectures? Donald A. Bligh addresses how to promote thought using lecture. He recommends the following: Make sure the your lectures encourage application and discovery of the material (also see Teaching Inductively) as opposed to only serving as a platform for the presentation of material. In this way, students learn how to use the information provided to analyze novel situations. Second, ask questions throughout the lecture, focusing on...
Motivating Students

Motivating Students: Attending Class
A study conducted by the Center for Teaching Excellence in Fall 1999 titled, *Why Students Do and Do Not Attend Classes*, examined the relationship between course characteristics, student characteristics, and the rationale of students for either attending class or not attending class on a daily basis. The study sought to answer the following four questions:

1. How do characteristics of the students relate to their attendance behavior?
2. How do characteristics of the courses in which students are enrolled relate to their attendance behavior?
3. What reasons do students give for their day-to-day attendance decisions?
4. How do these reasons relate to the number of their absences?

Variables assessed included gender, class standing, age, grade point average, employment, residence (either on campus or off), cost of tuition and who was paying it, and the number of credit hours the student was enrolled in. A total of 333 students participated in this study, and they had an average of 3.17 absences per class, with a range from 0 to 12.25 absences. Some of the reasons provided by students for why they attended classes included personal values, obtaining course content, fulfilling grade requirements, factors related to the teacher, and peer influence. Reasons not to attend class included being sick, participating in other school or non-school-related activities, participating in leisure activities, avoiding teacher- or class-related experiences, and having no incentive to attend. Results indicate that students who had higher GPAs had fewer absences than those students who had lower grades. Other student characteristics, such as gender, age, class, residence, method of funding education, or number of credits enrolled in, did not correlate with number of absences.

Students were more likely to attend classes that were taught by a GTA as opposed to those taught by a professor. The main reason cited for attending GTA-taught classes was that “absences above the minimum affect my grade,” and the one of the main reasons cited for not attending professor-taught classes was that “attendance is not taken or does not affect my grade.” Therefore, it appears that whether or not attendance is required significantly predicts whether students attend class or not. Students also said that they were more likely to attend class if the class size was small due to the teacher noticing if they were present, if their presence affected their course grade, and if they had the opportunity to participate in class discussion.

Overall, a combination of teacher and student influences affect class attendance, with a large factor being whether or not a penalty exists for missing class. The study concludes, “If students believe they should attend class, are not sick, not tired from having fun the night before, and like the subject matter, and if teachers notice when students are there, take their attendance into account for the course grade, and provide information students must be in class to get, attendance will be optimal.”
Motivating Students: Completing Reading Assignments and Homework
Many students believe that they already have a firm grasp on how to read when they get to college. Why then, are students often discouraged by their attempts to read college texts? Anne Cudd (2003) of the Women’s Studies department at KU proposes that much of this frustration stems from the fact that they do not understand that the type of reading approach used should vary based on the type of text that is being read. “You don’t read a novel the same way you read a philosophical essay or a mathematical proof or a poem. Students have to be helped to realize this and then to develop the new eyes they need to see the kinds of texts you assign them,” she states.

Robert Magnan (1990) believes that it is best to help students achieve critical thinking skills before they read, in order to aid their analysis and evaluation of texts. He suggests:

- **Use a review as a preview**: Review facts your students already know that relate to the reading. By connecting new information with already-learned concepts, students will be in a better position to understand and remember what they read.
- **Give them a bird’s eye view**: Discuss the topic covered in the reading in general terms, but avoid specifics. Students will think the reading is essential, not repetitive.
- **Work with the words**: Explain essential vocabulary used in the readings.
- **Put questions in their heads**: Ask them a mix of general and specific questions that require students to find the facts as well as analyze and interpret. Avoid putting questions in the order of the text, or students may just skim for words instead of read for meaning.
- **Put questions in their hands**: Give them a guide to follow as they read.

*Engaging Ideas* by John C. Bean addresses several problems that students show when trying to read college textbooks, and he provides suggestions for how teachers can help students develop their reading skills. If students have difficulty with the reading process, teachers can demonstrate their own reading processes and provide materials to help students practice reading. If students have difficulty reconstructing arguments, create writing assignments that ask students to summarize the readings, have students make outlines or flowcharts, or go through an example text, providing summarizing statements.

If students are having difficulty processing unfamiliar, uncomfortable, or disorienting views, draw students’ attention to these instances, provide examples of when they had to assimilate unfamiliar material in the past, and contrast various ways of looking at the class material. If the problem is student understanding of rhetorical context, create guides for the readings, explain the connections between the lectures and the reading assignments, and ask questions that require students to explain the context of the writing. Bean also addresses how to increase reading skills in individuals who have trouble with complex syntax. He recommends asking students to rephrase dense passages into their own words, and have the students rewrite complex sentences into several shorter ones.
Motivating Students: Teaching for Success
Successful teaching requires helping students understand the best methods to use to get the most out of being in class. One way to help students is to direct their note taking so that it is more effective. In The Teaching Professor November 2003 issue, Maryellen Weimer shares some dos and don’ts for students’ note taking, based on the work of M.H. Dembo.

**Should I recopy notes after class?**
No, because recopying requires little or no thinking. A better use of time would be writing questions and answers about the material in your notes.

**What should I do if the instructor talks so fast that I can’t get everything written down?**
Don’t try to write down everything word for word. Instead, paraphrase, listen for the most important things the instructor says, and leave blank spaces to show you’ve missed some material you thought was important. Check with classmates to see if they got the material down.

**Should I listen and not write when the instructor is discussing something I don’t understand?**
No, the best thing to do is to keep taking notes, but indicate in your notes that you don’t really understand what the material means. If you don’t ask about this in class, after you review your notes, see if another student, a TA, or the instructor can explain it to you again.

**How do I deal with an instructor who often wanders off topic?**
If the instructor isn’t well organized, see if your textbook helps to provide a logical structure for the material instead. Working with other students can really help in situations like this, too. Form a small study group and together organize notes from class.

For information on encouraging students’ inductive thinking and understanding, see [Inductive Teaching](#).

For more information on how to reach students, see information regarding non-participants and difficult students under [Classroom Interactions](#). See information regarding helping students read under [Completing Reading Assignments and Homework](#).
Evaluating Students’ Learning: Designing and Administering Tests

When you design an exam, it is often advantageous to mix types of items (multiple choice, true/false, essay) on a written exam or to administer a mix of assessments throughout the course (e.g. a performance component with a written component). Weaknesses connected with one type of item or aspect of students’ test taking skills will be minimized. It is also helpful for instructors to test students early in the term and consider discounting the first test if results are poor; students often need a practice test to understand the format and anticipate the best way to prepare for and take particular tests. Another way to help students prepare for your exams is, when designing your tests, save the items you decide not to use. Make practice tests using these items along with instructions from the exam, including the percentage or points for each section or exercise, for your students to complete. This technique has two advantages: You can test your exercises and expose students to instructions. If an exercise structure is weak, you can improve it before the exam. If instructions are unclear, you can clarify them. The “test drive” should include only a sample of test items. Correct and discuss them as a group. If there are several possible answers, indicate which are better and why. If you have included essays, ask students to list the essential points that they think should be included when addressing the essay question, and then evaluate their responses. The key is to use the minimum amount of time to get the maximum benefit for you and your students.

When administering tests, Barbara Gross Davis in *Tools for Teaching* (2001) has compiled the following recommendations:

- Make sure that you or a proctor is in the room at all times.
- Seat students randomly in alternate chairs. If that’s not possible, use alternate forms of the test.
- If students will use blue books, have students turn them in early, then redistribute them randomly for the test. Provide scratch paper if students will need it.
- Take action if you observe wandering eyes. If you observe cheating, position yourself near the student to discourage him or her.
- Spend some time in the back of the room. Students who may be thinking about cheating will have to turn around to see you.
- Don’t allow students to rush to turn in papers or tests. Count those present at the exam to make sure that number matches the number of tests. This prevents students’ claim that a paper or test was lost.
- Recognize that excuses like “my grandmother died” are more likely to be valid than fraudulent. Don’t become so cynical that you dismiss every family emergency as an invention.
Evaluating Students' Learning: Grading Tests

What does it mean to grade? Grading is a context-dependent, complex process that is at its best when teachers recognize the opportunity it offers to enhance student learning. Walvoord and Anderson (1998) identify four major roles of the grading process:

1. It works as a means of evaluating student learning in relation to course material and goals.
2. It can communicate the level of learning to the students, as well as to employers and others.
3. It functions as a motivation device in that it affects what students focus on in their studies.
4. It helps organize course components by marking transitions between topics and by bringing closure to particular segments of the class.

In order for grading to be as effective and worthwhile to yourself and your students as possible, make sure that you consider the tests you will implement when you are designing the course (see Course Plan for more information). Design tests that will measure the concepts and learning that you set out to achieve in the course, allow student input when designing course goals, and be clear in your instructions. Walvoord and Anderson recommend that teachers ask themselves the following question: “By the end of the course, I want my students to be able to (fill in the blank).” Use your responses to guide the design of your assessments. The authors provide examples from professors of several disciplines:

At the end of Western Civilization [a 100-level general education course for first-year students], I want my students to be able to:

- Describe basic historical events and people
- Argue as a historian does: Take a position on a debatable historical issue, use historical data as evidence for the position, raise and answer counterarguments

At the end of this math course, I want my students to be able to

- Solve [certain kinds] of mathematics problems
- Explain what they’re doing as they solve a problem and why they are doing it.

If grading is considered only in hindsight, it is likely that your time will be ineffectively used and students will be discontent with how their learning was assessed.
Evaluating Students' Learning: Designing Writing Assignments

John C. Bean in *Engaging Ideas* states that writing assignments can help students exhibit their mastery of the material, synthesize the course material, and better understand the goals and direction of the overall course, thus increasing overall retention and understanding of the material. He states that, “Essay exams send the important pedagogical message that mastering a field means joining its discourse, that is, demonstrating one’s ability to mount effective arguments in response to disciplinary problems.”

In order to improve how essays are used in the classroom, students need to be taught how to write essay exams. Provide students with copies of essays from previous years’ classes, without any instructor comments. Have the students rank the essays from best to worst, and ask the class to list which factors they think distinguish an A paper from a B, C, and so on. After that, explain your grading criteria and discusses them with the class. In that way, students are more likely to internalize these criteria and apply them to their own work. Allowing students to assess previous writing assignments could also be used in conjunction with a PTA-designed rubric (see *Grading Writing Assignments* for more information). Having students work with the rubric to assess another student’s work will help them understand the assignment requirements and hopefully aid them in their own writing of the assignment. Other ideas for teaching students how to write essay exams include allowing students to practice writing cogent thesis statements in groups settings, thus gaining insight and guidance from other students, and allowing students to revise an essay, so that they receive guidance and learn strategies for future writing assignments.

Another method for increasing the processing of information through the design of in-class essays is including time for pre-writing and synthesis before the essay is given. Some ways to achieve this include providing students with a list of all the potential essay questions before the day of the exam, requiring that students create and bring to the exam a crib sheet for each essay question, which they can use to answer the essay questions, or assigning take-home essay exams. All of these methods will allow students time for deeper critical thinking and organization of their arguments.

Evaluating Students' Learning: Grading Writing Assignments
When you’re grading a stack of papers, it’s easy to mark mistakes or note negative points and give a grade – nothing more. But a positive word or two might make a big difference to students. When you need to point out an error, telling students to “Clarify this” or “Be concise” may be like telling them to “Be tall;” they might not know how to do what you ask. Consider how you can help students see why they might have made the error, to help them focus their thinking on areas where they need the most work.

John C. Bean in his book, *Engaging Ideas*, offers four tips for grading essay exams. First, do not look at students’ names when you read the exams, or have students write an ID number on the test instead. In this way, you will be able to eliminate grader bias. Second, grade the exam one question at a time, rather than reading the whole exam of each student. This will help with grading reliability.

The third recommendation Bean provides is to shuffle the exams after you complete each question so that you read them in a different order. Record scores in such a way that you don’t know what a student received on Question 1 when you grade Question 2. Finally, if time permits you should skim a random sample of exams before you make initial decisions about grades. Your goal is to establish “anchor papers” that represent prototype A, B, and C grades. Then, when you come to a difficult essay, ask yourself, “Is this better or worse than my prototype B or C?”

Instead of using “anchor papers” to determine grades, you may find it beneficial to use a scoring rubric to grade essays and papers through Primary Trait Analysis (PTA). The teacher determines the criteria for each score within the rubric and describes this in a handout given with the assignment or included in the syllabus. Developing a PTA scale requires four steps:

1. Choose a test, assignment, or group of assignments that you will evaluate. Clarify your objectives.
2. Identify the criteria or traits that will count in this evaluation. These are usually words or phrases such as “thesis,” “use of color,” or “use of relevant examples.”
3. For each trait, construct a 2-5 point scale, with each point relating to a descriptive statement; e.g. “A 5 thesis is clear and appropriate for the scope of the essay; it neither repeats sources nor states the obvious.”
4. Try out the scale with a sample of student work and revise as needed. CTE also has samples of rubrics available.

The advantage of using this method is that, rather than writing out extensive comments, you score the essay or assignment using the rubric, making this a timely way of grading written work. Students can refer to it when writing the assignment, as well as use their scored rubric to examine the evaluation of their work’s strengths and weaknesses. This method also increases inter-grader reliability when multiple individuals are responsible for the grading of these assignments. See Walvoord and Anderson’s *Effective Grading* (1998) for an in-depth discussion of PTA.
Evaluating Students' Learning: Student Feedback

In order to assess student progress in the class, continuous information should be collected on student learning and growth. According to Angelo and Cross (1993), the most effective times to assess and provide feedback are before chapter tests or before the midterm and final exam, so that both instructors and students gain information on the areas that are clearly understood and those points regarding which students are more uncertain. Here are several techniques to help you assess and get feedback from your students.

The one-minute paper
The one minute paper is a brief, anonymous feedback instrument you can use up to three or four times a term at the end of a class. Ask these two questions: What is the most important thing you learned today in this class? and What important question remains unanswered? At the beginning of the following class, discuss the results with students. Let them know that you have read the papers, and respond to their feedback.

Pause buttons
In each of your classes, establish a signal for students to use if they want to call a time-out. At that point, you stop talking. Why? Because they can’t take notes fast enough. Because they have questions. Because they need a moment to consider a point. Maybe the best reason is to give them ownership in the class.

Think about it: When we read, we stop to read something a second time, to weigh a thought, or to verify a detail. Time-outs encourage students and teachers to think about material, to interact, to integrate, and to assimilate.

Muddiest point
The muddiest point is a simple technique that is remarkably efficient, since it provides a high return of information for a very low investment of time and energy. Ask students to jot down a quick response to one question: What was the muddiest point in _____? In the blank, ask students to respond to a lecture, a discussion, a homework assignment, or instructional methods.

This technique helps you know what students find least clear or most confusing about a topic. You can use that feedback to discover which points are most difficult for students to learn and to guide them about which topics to focus on. At the same time, this technique requires students to quickly identify what they do not understand and articulate those muddy points, thus engaging in higher-order thinking.

Using Technology: In Class
The use of technology in the classroom can enhance student learning by increasing the exposure that students get to material, as well as diversifying the formats of this exposure. Technology provides the teacher with more ways in which to present material and aid student learning (e.g. aural, visual, demonstrations, applications). David Brown states, “The computer assists professors in their delivery of the picture that is worth a thousand words, of sound accompanying text, of attention-grabbing animation.” A PowerPoint presentation of a lecture’s outline can help students see where the class is going and how to organize their notes. Videotaped demonstrations can be used when in-class demonstrations are not feasible, or when presenting the information to a large class that would have difficulty seeing an in-person presentation. Images or videos can be presented to reinforce lecture material.

Technology can also be used in class to not only vary formats of presented information, but also to encourage **active learning** and initiate interactive exchanges between students and between the professor and the class. For example, an image or video clip can be used as a discussion starter. Clickers can be used to initiate discussions: Present a thought-provoking question that corresponds with the day’s lecture material, as well as several possible responses. Ask students to use their clickers to select which response they most agree with. Use this information as the platform to start a discussion.

Clickers can also be used to implement in-class quizzes, take a poll of student opinions or understanding, and record attendance. One suggestion is to take a break in the middle of class to gage student comprehension of the material covered so far. Ask a question that would require student understanding to correctly answer, and have the students respond using their clickers. In this way, teachers can gain immediate feedback on the current level of student comprehension of the material, and shape the direction of the rest of the class accordingly. However you use technology in the classroom, ensure that students understand how they will be graded for their responses.

**Using Technology: Outside of Class**
There are several ways to use technology outside of class to help you achieve course goals. One way to expand on information discussed in class is the use of online discussion groups using Blackboard. Teachers can use these Blackboard groups to disseminate class information or to establish an arena in which students interact with one another about various topics or class activities. Here are some ideas for online discussions in your class:

- Ask students to post their responses to a selected reading or homework problem.
- Initiate a conversation on a topic not fully covered during class time.
- Have students post potential discussion questions for the next class.
- Ask students to post a quick response to the muddiest point question (see the discussion of this question under Student Feedback).

As with in-class discussions, be sure students know how their contributions will be evaluated and graded.

Another way to deepen and assess student understanding outside of class is to use online quizzes. These quizzes can be created on Blackboard, and questions could address in-class material or outside reading assignments. Making the completion of online quizzes worth points in the class will likely increase class participation, and requiring completion of online quizzes over reading assignments before class will increase the number of students who do the readings prior to class. Moreover, online quizzes can be set up in such a way that students can take them multiple times, thus gaining practice working with the material and increasing understanding.

**Faculty/Teaching Assistant Interactions**
The teaching assistant (TA) plays an large role in the undergraduate teaching experience, with responsibilities varying from grading assignments and taking attendance to holding office hours, designing and presenting lectures, and writing exams. Given the many obligations that both professors and TAs must fulfill in academia, positive and effective interactions between faculty and TA can help all class members have a successful and productive experience. Negative interactions, on the other hand, can be stressful for faculty and TAs, and can negatively affect the effectiveness of the teaching team and the resulting teaching product. Therefore, concerted efforts should be made to ensure that these interactions are positive experiences for everyone involved.

*The TA Experience* (1993) has many suggestions regarding how this relationship can be nurtured or improved. First, make sure that the roles and expectations of each member are explicitly discussed at the beginning of the course. This is particularly relevant in regard to TAs. When these roles are not clearly stated, TAs can often feel as though they must try to infer what their responsibilities are, which can in turn affect the level of confidence they exude when performing classroom duties and their commitment to their tasks. Therefore, faculty/TA interactions may benefit from clear guidance by the faculty mentor.

Other recommendations for improving faculty/TA interactions are outlined in Clyde Herreid’s discussion in *The TA Experience* of viewing the TA experience as an apprenticeship. Once a week, he meets with his teaching assistants for a planning and debriefing session to talk about what worked, what didn’t, how to improve in the future, and what the next week will hold. At this meeting, teaching questions and class concerns are addressed. When a decision is required, a TA group vote is taken and the teaching team collectively decides. These teaching meetings bring to light many teaching issues and allow time for discussion of the issues of grading, exam design, and academic integrity. In this way, the TA feels included and motivated, and the faculty member receives important feedback and assistance so that he or she can effectively lead the current class and shape the direction of future classes as well.

Another recommendation that Herreid provides is to ask each TA to choose one lecture topic to cover, and the assistant receives guidance from the faculty member when outlining, preparing, practicing, and finally giving the lecture. He also involves honor’s undergraduate students in the implementation of the course. Overall, the author concludes that the graduate assistants “see themselves as part of a collaborative enterprise where they determine much of the course’s policies and direction,” while the professor observes that this system of positive interactions has “brought me immeasurable satisfaction and produced a decided improvement in the education of both students and TAs.”
Academic Integrity

In Teaching Tips, McKeachie suggests several ways that teachers can promote academic honesty with their students:

- Reduce the pressure, by providing several opportunities for students to demonstrate their learning, rather than giving only one or two exams. Keep students informed of their progress throughout the semester.
- Make reasonable demands and write reasonable and interesting tests. If students are frustrated and become desperate with an assignment that is too long or a test that focuses on trivial facts, they may be more tempted to cheat.
- Develop group norms that support honesty. Even discussing academic honesty in class helps students recognize its value.
- Preserve each student’s sense that he or she is an individual with a personal relationship with the instructor and other students. Dishonesty is less likely to occur if students feel that teachers and other students know them, as opposed to if they feel alienated and anonymous.
- When you’re giving a test, if a student has wandering eyes, ask the student to move to a different seat where s/he will be less crowded. McKeachie writes, “If he says he’s not crowded, I simply whisper that I’d prefer that he move. So far no one’s refused.”

In order to defend against plagiarism, Walvoord and Anderson (1998) recommend intervening early. “If you ask to see a proposal, outline, or draft of a student’s paper, it is much harder for that student to purchase or copy someone else’s work at the last minute.” This method is also recommended so that students receive early direction, as opposed to finding out that they have spent many hours on a flawed work. This also forces the student not to procrastinate until the last moment. Finally, taking time to check a draft helps you reach students during a teachable moment – when they can still do something to improve their work – rather than doing an autopsy on a final paper. It will also save you at the end of the semester from making extensive comments on a final draft, because they have already received a good amount of
Write a Lesson Plan Guide

How to Develop a Lesson Plan

We have received several questions regarding how to write a good lesson plan. We went ahead and asked our experts, did some research, and have included some tips and guidelines below.

To begin, ask yourself three basic questions:

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<th>Question</th>
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<tr>
<td>Where are your students going?</td>
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<tr>
<td>How are they going to get there?</td>
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<td>How will you know when they've arrived?</td>
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Then begin to think about each of the following categories which form the organization of the plan. While planning, use the questions below to guide you during each stage.

Goals

Goals determine purpose, aim, and rationale for what you and your students will engage in during class time. Use this section to express the intermediate lesson goals that draw upon previous plans and activities and set the stage by preparing students for future activities and further knowledge acquisition. The goals are typically written as broad educational or unit goals adhering to State or National curriculum standards.
What are the broader objectives, aims, or goals of the unit plan/curriculum?
What are your goals for this unit?
What do you expect students to be able to do by the end of this unit?

**Objectives**

This section focuses on what your students will do to acquire further knowledge and skills. The objectives for the daily lesson plan are drawn from the broader aims of the unit plan but are achieved over a well defined time period.

What will students be able to do during this lesson?
Under what conditions will students' performance be accomplished?
What is the degree or criterion on the basis of which satisfactory attainment of the objectives will be judged?
How will students demonstrate that they have learned and understood the objectives of the lesson?

**Prerequisites**

Prerequisites can be useful when considering the readiness state of your students. Prerequisites allow you, and other teachers replicating your lesson plan, to factor in necessary prep activities to make sure that students can meet the lesson objectives.

What must students already be able to do before this lesson?
What concepts have to be mastered in advance to accomplish the lesson objectives?

**Materials**

This section has two functions: it helps other teachers quickly determine a) how much preparation time, resources, and management will be involved in carrying out this plan and b) what materials, books, equipment, and resources they will need to have ready. A complete list of materials, including full citations of textbooks or story books used, worksheets, and any other special considerations are most useful.

What materials will be needed?
What textbooks or story books are needed? (please include full bibliographic citations)
What needs to be prepared in advance? (typical for science classes and cooking or baking activities)
Lesson Description

This section provides an opportunity for the author of the lesson to share some thoughts, experience, and advice with other teachers. It also provides a general overview of the lesson in terms of topic focus, activities, and purpose.

What is unique about this lesson?
How did your students like it?
What level of learning is covered by this lesson plan? (Think of Bloom's Taxonomy: knowledge, comprehension, application, analysis, synthesis, or evaluation.)

Lesson Procedure

This section provides a detailed, step-by-step description of how to replicate the lesson and achieve lesson plan objectives. This is usually intended for the teacher and provides suggestions on how to proceed with implementation of the lesson plan. It also focuses on what the teacher should have students do during the lesson. This section is basically divided into several components: an introduction, a main activity, and closure. There are several elaborations on this. We have linked to some sample lesson plans to guide you through this stage of planning.

- Introduction

How will you introduce the ideas and objectives of this lesson?
How will you get students' attention and motivate them in order to hold their attention?
How can you tie lesson objectives with student interests and past classroom activities?
What will be expected of students?

- Main Activity

What is the focus of the lesson?
How would you describe the flow of the lesson to another teacher who will replicate it?
What does the teacher do to facilitate learning and manage the various activities?
What are some good and bad examples to illustrate what you are presenting to students?
How can this material be presented to ensure each student will benefit from the learning experience?

**Rule of Thumb # 1:**

Take into consideration what students are learning (a new skill, a rule or formula, a concept/fact/idea, an attitude, or a value).

Choose one of the following techniques to plan the lesson content based on what your objectives are:

- Demonstration ==> list in detail and sequence of the steps to be performed
- Explanation ==> outline the information to be explained
- Discussion ==> list of key questions to guide the discussion

- **Closure/Conclusion**

What will you use to draw the ideas together for students at the end?
How will you provide feedback to students to correct their misunderstandings and reinforce their learning?

- **Follow up Lessons/Activities**

What activities might you suggest for enrichment and remediation?
What lessons might follow as a result of this lesson?

**Assessment/Evaluation**
This section focuses on ensuring that your students have arrived at their intended destination. You will need to gather some evidence that they did. This usually is done by gathering students' work and assessing this work using some kind of grading rubric that is based on lesson objectives. You could also replicate some of the activities practiced as part of the lesson, without providing the same level of guidance as during the lesson. You could always quiz students on various concepts and problems as well.

How will you evaluate the objectives that were identified?
Have students practiced what you are asking them to do for evaluation?

**Rule of Thumb # 2:**

Be sure to provide students with the opportunity to practice what you will be assessing them on. You should never introduce new material during this activity. Also, avoid asking higher level thinking questions if students have not yet engaged in such practice during the lesson. For example, if you expect students to apply knowledge and skills, they should first be provided with the opportunity to practice application.

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### Sample Lesson Plans from the Educator's Reference Desk Collection

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**General Rule of Thumb:**

Your plan should be detailed and complete enough so that another teacher knowledgeable in your subject matter could deliver the lesson without needing to contact you for further clarifications. Please do not forget to edit and spell check your work before submission to the Educator's Reference Desk Collection.

**Sample Lesson Plans**

**A Line is a Dot That Went For a Walk**

**Grade Level:** Preschool Education, Kindergarten

**Subject(s):**

- Arts/Process Skills

**Duration:** 1-2 hours

**Description:** This lesson, part of a series called "Elements of Art Extravaganza," introduces young children to one of the basic elements of art using a variety of interdisciplinary art activities.
Goals: To show young children the importance of lines in drawing/art.

Objectives: Students will be able to:
1. identify different types of lines.
2. develop art vocabulary.
3. "practice" lines through a variety of interdisciplinary activities.

Materials:

Introduction:
- flip chart
- art poster(s) or postcards
- magic markers
- sheet of white drawing paper for each child

Activity #1:
- various pieces of yarn, ribbon, pipe cleaners, etc.
- glitter glue pens
- colored electrical tape
- glue
- construction paper
- magic markers or crayons

Activity #2:
- magic markers
- white paper (8 1/2 x 11")
- rulers if desired

Activity #3:
- variety of musical instruments: drums, kazoo, triangles, recorders, rattles, etc.

Activity #4:
- hard soap (hotel soaps work really well)
- black construction paper
- brightly colored crayons or crayon
- water (sink or large tub)
- drying rack or lots of newspapers
- rubber gloves
- children's book: *When a Line Bends... a Shape Begins*, by Rhonda Gowler Greene, illus. by James Kaczman

Activity #5:
- shallow box - shoe boxes and lids will work, stationery boxes, etc.
- marbles
- tempera paint - red, yellow, and blue (additional colors if you desire)
- paper cut to fit the box lid
- shallow bowls for paint

**Vocabulary:** dotted, wavy, straight, spiral, fat, thin, curvy, zig zag, vertical, horizontal, diagonal, parallel, perpendicular, and angle

**Procedure:**

*Introduction:*
Review the types of lines on the flip chart -- have children draw the lines on their own piece of paper. Include the following types of lines: dotted, wavy, straight, spiral, fat/thin, curvy, zig zag, vertical, horizontal, diagonal, parallel, perpendicular, and angle. Have art prints/postcards available for students to look at. Ask them to describe the types of lines that they see in the pictures.

Use the activities below to reinforce line concepts (for each activity, please refer to the materials list above):

**Activity #1:** Yarn drawings or glitter glue drawings
Have students create different types of lines. Pipe cleaners work well for creating zig zag or wavy lines. The glitter glue works well for dotted lines. Other materials can be placed vertically, horizontally, and diagonally. Colored electrical tape makes great wide lines; yarn is good for skinny lines. Discuss the types of lines with the children when the work is finished. Ask them what each type of line is called to reinforce vocabulary.

**Activity #2:** Line Blankets (look similar to Navajo blankets)
This project works well for kindergarten students. Show the students pictures of Navajo blankets (choose striped blankets). Have the children put the paper in front of them vertically (as you would if typing). Starting at the bottom and working up to the top, have them make different types of horizontal lines - wide lines, thin lines, zig zag lines, and wavy lines - using different colored markers. Have the child fill the whole page. If you wish, fold the paper in half - across the 5 1/2 inch mark. Have the child start at the bottom and work up to the fold. Then unfold the paper and copy the lines going backwards to create a symmetrical blanket. Colored electrical tape can be used for wide lines if you desire. Space the tape out and use wavy or zig zag lines in between.

**Activity #3:** Line Dancing (with instruments)
Have students decide which instrument goes best with each type of line - e.g. triangle for dotted lines, rattle for curvy line, kazoo for straight line, etc. Then decide what type of movement is appropriate - sliding step for straight line, hopping on one foot for dotted line, walking pigeon toed, etc. Practice the movements, play Simon Says, create a Conga line, etc.
Activity #4: Disappearing Magic Line Drawing

Give each child a piece of black paper, and have them make a line drawing with soap. This should look like a coloring book drawing - caution them not to fill in areas with the soap. Scribble drawings are fine. Discuss the types of lines the child used before going on to the next step. Color in the drawing with crayons or cray pas (cray pas give a more vibrant color). Rinse the drawing underneath water until the soap lines disappear - make sure the child watches while his lines disappear! Discuss the project, focusing on what purpose the lines served. Read When a Line Bends... a Shape Begins, which will talk about lines as outlines to create shapes.

Activity #5: Marble Drawings

This activity is a great way for young children to reinforce the idea of "A line is a dot that went for a walk..." Place the paper in the box lid. Put a marble in a bowl of paint and coat it with paint. Gently lay the marble on top of the paper in the box lid. Carefully tip the box from side to side so that the marble rolls around, creating a line as it rolls. Repeat with other colors until desired result.

Assessment: Go back to the activities the next day to review - you can look at the art posters again to define the various lines. Ask students to share and describe the lines used in their artwork.

SimCity and PowerPoint

Grade Level: 7, 8

Subject(s):

- Computer Science

Duration: 2 weeks

Description: Students use the program SimCity to create a city. Afterwards, students use PowerPoint to create an election campaign to get themselves elected as mayor of their SimCity!

Goals: National Educational Technology Standards for Students:

1. **Standard 3: Technology Productivity Tools** - Students use technology tools to enhance learning, increase productivity, and promote creativity.
2. **Standard 4: Technology Communication Tools** - Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

Objectives:

1. Students will be able to use SimCity to create a "functioning" city.
2. Students will be able to use PowerPoint to create a 7-slide election campaign presentation.
Materials:

- computers with Internet access
- SimCity (any version, or SimTown)
- Microsoft PowerPoint
- digital camera (optional)
- Project Rubric

*Project Rubric in .pdf format; requires free Adobe Acrobat Reader.*

Procedure:

Introduce students to SimCity, a city simulation program. Use the first class session to instruct students on the "basics" for setting up a city (water pipes, power plants, residential and industrial zones, etc.). During the next 3-5 class sessions, students form their own SimCity.

When all of the cities have been constructed, introduce the class to the basic components of PowerPoint (this may take 1-2 class sessions). Focus on how to create a new slide, how to format backgrounds, how to add clip art and animation, and how to incorporate sound effects and transitions. Students should have 7 slides in their slide show. [Author’s Note: I usually build the first slide with the students. The first slide might say, Elect ______ for mayor! -- inserting the student's name.]

As for content, students may want to consider the following questions when creating their slide show:

- What qualities do you have that would make you a good mayor?
- What have you done for your town in the past? (students can make this up)
- What will you plan to do in the future?

Teachers may want to spend a class session on how to search for free clip art on the Internet and how to add the clip art to a slide show. (Some sample Internet sites are provide below.) Also, if access to a digital camera is available, then students can include pictures of themselves in their slide show. Once all of the PowerPoint presentations are finished, students can share their slide shows with the rest of the class. Students can share their feedback on what they liked about the slide shows -- both the technical aspects and the campaign content.

Assessment: Use the Project Rubric (see Materials) to assess students' PowerPoint presentations.

Minimal Pairs Bingo!

Grade Level: Kindergarten, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, Higher Education, Adult/Continuing Education

Subject(s):

- Foreign Language/Linguistics

Duration: 20-40 minutes

Description: Minimal pairs are pairs of words that differ in only one sound, with the sound occurring in the same position in each member of the pair, e.g. "bat" vs. "bet." Certain combinations are known to be challenging for certain
groups of foreign language learners, depending on their native language. For example, Japanese learners have trouble with "l" and "r." Russian learners have trouble with short vowels, such as "e" and "a." Placing such minimal pairs side-by-side in a game situation can raise learners' consciousness of their pronunciation challenges, albeit in a non-threatening context.

**Goals:**

1. To develop students' phonological awareness.
2. To promote student-to-student negotiation.
3. To promote a more student-centered classroom.

**Objectives:**

1. Students will be able to identify the differences between minimal pair phonemes when spoken by others.
2. Students will practice and improve their pronunciation of minimal pair phonemes.

**Materials:**

- pencils
- erasers
- chips (to cover Bingo sheets)
- Bingo Sheets

*Bingo Sheets in .pdf format; requires free Adobe Acrobat Reader.*

**Procedure:**

Prepare a list of minimal pairs, based on your students' pronunciation challenges. (For example, l and r for Japanese students; as in lip and rip.) Introduce the target phonemes to students and practice them. Divide the students into pairs. One student receives Bingo Sheet A, and the other student receives Bingo Sheet B. Let the students dictate their words to each other (taking turns) until they have completed 12 minimal pairs. Once they have written all of the words on their sheets, correct their answers as a group. Address any questions that students might have. (This is a good chance for supplementary instruction, too. As an alternative, the teacher could hand out an answer key and have students correct their answers with a partner.)

Inform students that they will use their sheets to play a game of Bingo! Have students choose one word from each of 12 minimal pairs listed on their papers. Students fill in the blanks on the racetrack with the words they have selected. (It is important to make sure that students choose only one of each pair. This allows another chance to focus students' attention on the difference between the minimal pairs when the words are read out loud.) Hand out chips which can be used to cover the words on students' Bingo sheets. Let the races begin! (Play Bingo!) Read only one of each pair until all the pairs are exhausted. If there is still no winner, then continue with the second word from each pair. Have students evaluate their results. (Note: For a variation in the Bingo game, use rhyming words or normal vocabulary words instead of minimal pairs.)

**Assessment:** Collect students' Bingo sheets to check for accuracy. Note any words which are giving students difficulty, and focus on these words for the next class.

SunSmart
Grade Level: Kindergarten, 1

Subject(s):

- Health/Safety

Duration: 30 minutes

Description: In this lesson, students learn how to protect themselves from the dangers of the sun. Although aimed at students living in Australia, this activity can be adapted by teachers worldwide.

Goals:

1. To educate children on the dangers of the sun.
2. To encourage good habits to help prevent skin cancer.

Objectives:

1. Students will be able to identify the proper clothing/protection which should be worn when out in the sun.
2. Students will be able to identify the times of day that they should avoid being outdoors in the sun.
3. Students will be able to identify the appropriate places to be when outdoors in the sun.

Materials:

- glue or paste
- coloring pencils
- scissors
- Queensland Kids are SunSmart (available in Australia: Coombabah Primary School, Oxley Drive, Coombabah QLD (07) 55772611)
- teacher-made worksheet with a character in the middle (I used Sid from the "Slip Slop Slap" commercials -- SunSmart Campaign)
- teacher-made worksheet that contains pictures of proper and improper clothing to wear in the sun (see Procedure below for more information about the worksheets)

Procedure:

Begin by asking students, "In what ways is the sun helpful to us?" (ex. warmth, light, helps things grow). Introduce the book, Queensland Kids are SunSmart, and point to the character "Sid" on the cover. State that, "Besides being helpful, the sun can also be dangerous -- the sun's rays can burn us." Ask students to share ways in which they enjoy the sun (ex. beach, swimming, playing outdoors). Ask students, "Why can Sid enjoy the sun?" (Sid is wearing appropriate clothing.) "How can we protect ourselves?" (Bring up the school's hat policy if one is in place, and stress the importance of the hat rule and why it is in place.)

Direct students to the clock in the book, and tell them when the danger zone is (between 10am and 3pm). Ask, "If we have to be in the sun, what can we do to protect ourselves?" [Author's Note: The book offers good visuals, so during the story encourage students to take turns pointing to the right things to wear when they are in the sun (wide brim hat, t-shirt, sunglasses, sunscreen). There is always a picture of the right apparel and the wrong apparel, so children have to decide which one is better rather than just pointing to any picture.]

After going through the book, give each student two worksheets. [Author's Note: The author regrets
that the teacher-made worksheets could not be included with this lesson. Please see the Internet resources for supplementary materials that teachers can use to make their own worksheets.] One worksheet is simply a picture of "Sid the Seagull." The other worksheet contains pictures of a number of items that are appropriate and inappropriate to wear when in the sun. Students must color and cut out all of the "unsafe" clothes and paste them on Sid.

**Assessment:** Observe students' participation during group discussions. Collect students' worksheets to check for appropriate "unsafe" clothes.

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**Teaching Internet Library Instruction Sessions in the Electronic Classroom: The Adult Learner, the Internet, and Training Skills & Teaching Styles**

**Grade Level:** Higher Education, Vocational Education, Adult/Continuing Education

**Subject(s):**
- Information Literacy

**Duration:** Three 2-hour sessions

**Description:** This workshop is designed to address the needs of all professional librarians who will be expected to conduct library instructions in an electronic environment, whether or not they now regularly conduct library instruction sessions. By the end of this training, participants will have gained knowledge and skills leading to more productive library instruction dedicated to better serving the students’ needs.

**Goals:**

1. Learn about the concept of training adult students.
2. Learn about the Internet and the challenges of teaching it to adult students.
3. Learn about some specific training skills and teaching styles used for delivering a successful Internet library instruction session to adult students in an electronic environment.

**Objectives:** By the end of this training, participants will be able to accomplish the following cognitive understandings (CUs), affective understandings (AUs), and cognitive skills (CSs):

1. Express increased confidence on the end-of-course evaluation about preparing for an Internet library instruction in the electronic classroom (EC) relative to feelings prior to taking the course. (AU)
2. Appreciate the importance of knowing the categories and types of computer learners in regards to instruction. (AU)
3. Describe the two categories and four types of adult learners on a short quiz. (CU)
4. Describe, in a short quiz, five of eight key principles to follow in helping adults learn. (CU)
5. Demonstrate a teaching style used for Internet computer instruction through a 5-7 minute presentation on any topic of interest regarding the Internet. (CS)
6. Describe four unique characteristics of the Internet and Internet instruction in a short quiz. (CU)

7. Appreciate, on an end-of-training evaluation and in group discussion, the practical use of using basic facilitation skills for training adults in an electronic environment. (AU)

8. Demonstrate basic facilitation skills through a 5-7 minute presentation on any topic of interest regarding the Internet. (CS)

9. Identify in a group setting the four basic facilitation skills used in conducting instruction for adults. (CU)

10. List, in a group setting, six characteristics of adult learners. (CU)

Materials:


- Content Outline -- see "Content Outline: Internet Library Instruction in the Electronic Classroom" below

- one computer with Internet access for each training participant with a maximum of two participants per computer

- one computer for instructor with Internet access and MS PowerPoint software installed

- electronic classroom equipped with data/video projector and overhead screen

- PowerPoint presentation on Adult Learners, the Internet, and Electronic Classrooms with copies of slides for each participant (taken from Content Outline -- PowerPoint presentation is created by the instructor)

- PowerPoint presentation on transparency with overhead projector (for back-up)

- End-of-Training Evaluation Form

  End-of-Training Evaluation Form in .pdf format; requires free Adobe Acrobat Reader.

Rationale for Training:

This workshop is designed to address the needs of all professional librarians who will be expected to conduct library instructions in an electronic environment, whether or not they now regularly conduct library instruction sessions. Because most public services librarians perform reference duties and have acquired basic skills through completion of their graduate programs, the educational and experiential foundations have already been laid for this workshop. However, training sessions addressing the concept of training adults in an electronic environment -- especially on topics such as the Internet -- are not offered often enough. This workshop considers adult learners and the pertinent aspects of training these learners in the Internet or computer environment.

This workshop focuses on the effectiveness of Internet library instruction and the methods used to achieve specified ends or purposes, which is highly evident in technological and academic subject approaches to education. The role of the training instructor is that of a director who is mostly in control of the knowledge that will be imparted. A large aim of this introductory course is to develop more rational thinking in the minds of the participants so that they will tackle the project of teaching the Internet to adult learners more easily in the future. Traditional learning activities involving transmission will be used; however, the material is not concentrated around a particular core academic subject.

The curricular function that this workshop serves is a specialized function, since it is comprised of subject matter that further educates the participants on a primary job task -- that of providing library instruction sessions to adult students on a variety of topics, including the Internet, in the electronic classroom environment. This workshop promotes curriculum synthesis, because it draws upon information from the fields of education, instructional technology, psychology, and sociology.

Using the Internet as one of the foci for the workshop cuts across all disciplines, because it can be taught and used in all subject areas. In addition, teaching about specific training skills and teaching styles in an electronic classroom, as well as instructing participants on the concept of the adult learner in a computer environment, prepares the instructor to better relate to and address the personal and social concerns of the adult student learners before, during, and after the library instruction session.
All three training sessions focus on the participant (learner), specific knowledge, and the society. It was by addressing the individual learner’s unique interests, abilities, and needs that this workshop was organized and created to help them better prepare and feel more confident in the instruction tasks ahead. The topic of providing Internet library instruction to adult students in the EC is of particular interest to librarians today, since it is a fact that they will be expected to know the “what,” “why,” and “how” associated with conducting these sessions. Societal values are addressed by this staff development seminar, because it gives the librarians the opportunity to better supply students with knowledge and skills they will need to function successfully as a student and a member of society. By the end of this course, participants will have gained knowledge and skills leading to more productive library instruction dedicated to better serving the students’ needs.

Content Outline--Internet Library Instruction in the Electronic Classroom:
I. Training Adult Students
   A. Characteristics of Adult Students
      1. Impatient or Urgent
      2. Definite Needs and Goals
      3. Need Quick Success
      4. Have Experience to Share
      5. Fearful of Embarrassment
      6. Easily Frustrated
   B. Adult Learning Principles
      1. Focus on “Real World” Problems
      2. Emphasize How Learning can be Applied
      3. Relate Learning to Goals of Learner
      4. Relate Materials to Past Experiences of Learner
      5. Allow Debate and Challenge of Ideas
      6. Listen to and Respect Opinions of Learners
      7. Encourage Learners to be Resources
      8. Treat Learners as Adults
   C. Categories of Adult Computer Learners
      1. Procedural/Less Experienced or Older Student
         a. Need Specific Procedures
         b. Depend on Memorized Material
      2. Navigational/More Experienced or Younger Student
         a. Comfortable Experimenting
         b. Rely on Online Help
   D. Types of Adult Computer Learners
      1. Reflective
         a. Subjective Learners
         b. Active Participants
      2. Conceptual
         a. Take Prolific Notes--Details
         b. Want Whole Picture
      3. Practical
         a. Look for Shortcuts
         b. Look for Ways to Transfer to Job
      4. Creative
         a. Love to Play/Experiment/Practice (Unguided)
         b. Have Difficulty with Established Learning Structure
II. The Internet
   A. General Information
      1. Growth
      2. Great Finds
      3. Problems
      4. Future
   B. Characteristics of Internet
      1. Huge
      2. Unorganized
      3. No Authority
4. Poor Indexing
5. Endless Resources
6. Fun

C. Expectations of Internet
   1. Learners (Students)
      a. Easy (Point & Click)
      b. Self-Explanatory
      c. Evil Pornographic Cesspool
      d. More Information than a Million Libraries
      e. You can find Anything
   2. Instructors (Librarians)
      a. Difficult
      b. Overwhelming
      c. Ever-Changing
      d. Valuable Resource
      e. Not Always Appropriate for Task

III. Internet Library Instruction Session in the Electronic Classroom
   A. The Electronic Classroom (EC)
      1. What is it?
      2. Types of ECs
      3. Pedagogy in the EC
   B. Basic Facilitation Skills for Training in the EC
      1. Attending
      2. Observing
      3. Listening
      4. Questioning
   C. Teaching Styles for EC
      1. Lecture
      2. Demonstration with Hands-on Practice

Training Session #1--Training Adult Students

Instructional Foci: Ittner workbook (Chapters 2 & 9), brainstorming, group discussion, PowerPoint presentation & lecture, flipcharts for participants, informal oral quizzes

Instructional Learning Objectives:

- List six characteristics of adult learners in a group setting.
- Describe, in a short quiz, five of eight key principles to follow in helping adults learn.
- Identify in a group setting the four basic facilitation skills used in conducting instruction for adults.

Teaching Strategies/Procedures:

- The Instructor will teach and/or refresh participants about the adult learner/student by initially conducting a survey (from Ittner workbook, Chapter 2—see Materials section) to identify learning styles found in adults. (20 minutes)
- Through group discussion, facilitated by the instructor, the participants will explore the adult learner further by discussing the characteristics of adult learners in depth, and adult computer learners in general. A PowerPoint presentation with copies of the slides put into worksheets for the participants will help keep the training session focused. (30 minutes)
- Adult learning principles from the workbook (see Ittner, Chapter 2) will be explored with the participants writing their own version and rank ordering their list and sharing them with the group in a flipchart. (30 minutes)
- The session will conclude with the instructor lecturing on four basic facilitation skills and demonstrating each (see Ittner, Chapter 9). (30 minutes)
- A short informal quiz on all topics covered will follow, along with group discussion on the skills. (10 minutes)
Training Session #2--The Internet

**Instructional Foci:** Group discussion, PowerPoint presentation & lecture, workbook, brainstorming, listing

**Instructional Learning Objectives:**

- Describe the two categories and four types of computer learners in a short quiz.
- Discuss the two categories and four types of computer learners in a group setting to help to better relate to them.
- Identify in a group setting the four basic facilitation skills used in conducting instruction for adults.
- Describe four unique characteristics of the Internet and Internet instruction in a short quiz.

**Teaching Strategies/Procedures:**

- The Instructor will give a brief summary of session #1. (15 minutes)
- Participants will then write a short list of descriptions of adult computer users and the types they would expect to find in their instruction sessions. (10 minutes)
- The instructor will then compare these with the formal list on the PowerPoint slides/outline and see if the participant-generated list is closely related to the formal listing and initiate a group discussion and evaluation of them both. (15 minutes)
- Participants will then write a short description of the Internet, after a general information lecture/PowerPoint presentation is given. (10 minutes)
- After group discussion, the instructor will ask participants to write a few expectations of the Internet from (1) a student’s perspective and (2) a librarian’s perspective. (10 minutes)
- The instructor will again compare these with the PowerPoint slides and initiate a group discussion and evaluation of the findings. (15 minutes)
- The session will conclude with the group sharing their experiences with this topic and examples of how to better use the basic facilitation skills (attending, questioning, listening, and observing) in an EC. (45 minutes)

Training Session #3--Training Skills & Teaching Styles in the EC

**Instructional Foci:** PowerPoint lecture, workbook, group discussion, demonstration, practice training, evaluation

**Instructional Learning Objectives:**

- Demonstrate a teaching style used for Internet computer instruction through a 5-7 minute presentation on any topic of interest regarding the Internet.
- Demonstrate basic facilitation skills through a 5-7 minute presentation on any topic of interest regarding the Internet.
- Express increased confidence on the end-of-course evaluation about preparing for an Internet library instruction in the EC relative to feelings prior to taking the course.
- Appreciate the importance of knowing categories and types of computer learners in regards to instruction.
- Appreciate, on an end-of-training evaluation and in group discussion, the practical use of using basic facilitation skills for training adults in an electronic environment.

**Teaching Strategies/Procedures:**

- The Training Instructor will introduce the concept of an electronic classroom and explain the types and pedagogy used in them. (15 minutes)
• The instructor will then demonstrate using the basic facilitation/training skills in a lecture and a demonstration teaching style. This will be covered in a PowerPoint presentation lecture/class discussion session at the start of this session. (15 minutes)
• Each participant will have prepared a 5-7 minute presentation on any topic of interest using the Internet, and will demonstrate how to use facilitation skills while presenting this quick, informal Internet practice presentation to the group. (1 hour)
• Each participant will provide written feedback using a sharing feedback form and discuss with the group current feelings about conducting Internet library instructions and their use of training skills. (15 minutes)
• The Instructor will then summarize the lessons learned, and after a discussion, all participants will fill out a training evaluation. (15 minutes)

Assessment of Instructional Learning Objectives: By the end of this training, participants will be able to accomplish the following cognitive understandings (CUs), affective understandings (AUs), and cognitive skills (CSs):

• Express increased confidence on the end-of-course evaluation about preparing for an Internet library instruction in the EC relative to feelings prior to taking the course. (AU)
  o Evidence: Participants, at the conclusion of the training—if not before, informally—will tell the group participants how they feel about preparing for and conducting an instruction session now. Also, the end of training evaluation will ask if they feel more confident, less confident, or about the same as they did about this than they did before this training.
• Appreciate the importance of knowing categories and types of computer learners in regards to instruction. (AU)
  o Evidence: Participants will be given an opportunity during group discussion to express, in oral form, the reasons they feel it is important to understand all computer users/learners. On the end-of-training evaluation, participants will be asked to state in a short paragraph why instructors should be aware of the different categories and types of computer learners.
• Describe the two categories and four types of adult learners on a short quiz. (CU)
  o Evidence: Participants will describe in writing these on their own to their best ability after reading a passage in the workbook, but prior to the lecture covering them. During the lecture, all participants will compare their individual lists to the "lecture list" and discussion will follow. A short informal oral quiz could follow this section.
• Describe, in a short quiz, five of eight key principles to follow in helping adults learn. (CU)
  o Evidence: Participants will list without assistance adult learning principles from the workbook or their own version and rank ordering their list and sharing them with the group in a flipchart.
• Demonstrate a teaching style used for Internet computer instruction through a 5-7 minute presentation on any topic of interest regarding the Internet. (CS)
  o Evidence: Participants will conduct a 5-7 minute presentation to the group on any topic of interest using the Internet, demonstrating use of facilitation skills in one of the two teaching styles presented earlier in the training.
• Describe four unique characteristics of the Internet and Internet instruction in a short quiz. (CU)
  o Evidence: Through question and answer periods and group discussion, participants will be able to describe a unique characteristic of the Internet and Internet training expectations.
• Appreciate, on an end-of-training evaluation and in group discussion, the practical use of using basic facilitation skills for training adults in an electronic environment. (AU)
  o Evidence: Participants will state why the use of one or more of the facilitation skills can assist an instructor to effectively conduct an Internet library instruction session in an electronic classroom. This will be addressed in group discussions facilitated by the instructor as well as be a short answer question on the end-of-training evaluation.
• Demonstrate basic facilitation skills through a 5-7 minute presentation on any topic of interest regarding the Internet. (CS)
  o Evidence: Participants will conduct a 5-7 minute presentation to the group on any topic of interest using the Internet, demonstrating use of facilitation skills in one of the two teaching styles presented earlier in the training.
• Identify in a group setting the four basic facilitation skills used in conducting instruction for adults. (CU)
Evidence: After the practice training, each participant will be asked to discuss how he or she used or didn't use the four basic facilitation skills during their presentation in the EC and how difficult or easy it was to incorporate them into the presentation.

- *List, in a group setting, six characteristics of adult learners. (CU)*
- Evidence: Participants, through group discussion facilitated by the instructor, will explore the adult learner further by discussing characteristics of adult learners, and adult computer learners, with the instructor evaluating comprehension through short question & answer sessions.

Who am I?

Grade Level: 3

Subject(s):

- Interdisciplinary/First Day Activities
- Language Arts/Writing
- Computer Science

Duration: 3-4 days

Description: This lesson is to be completed at the beginning of the school year, as a way for students to introduce themselves to their fellow classmates. (It would also be nice for the teacher to complete this lesson so that the children can “meet” their teacher as well.) Students write a paragraph about themselves, type the final draft in a word processing program, and then post the paragraph on the class web page (or a class bulletin board can be used instead). Once all of the information is posted on the web page, then students participate in a Venn diagram activity to compare the similarities and differences among classmates. In addition, this lesson is a good way for the teacher to assess each student's writing skills at the beginning of the year.

Goals:

1. To have students develop a sense of pride about themselves through writing and sharing information about their personality, family, and favorite things.
2. For students to appreciate that each person is unique and that we must value the differences in others.

Objectives:

1. Students will be able to write a paragraph describing themselves, including details about their personality, family, and favorite things.
2. Students will revise and edit their writing to improve content, mechanics, spelling, style, and clarity at a level appropriate for the learner’s grade level.
3. Students will be able to use a word processing program to type the final draft of their paragraph.
4. Students will be able to complete a Venn diagram, identifying similarities and differences between them and another classmate.
Materials:

- paper and pencils
- crayons/markers
- dictionaries
- computers with word processing program
- class web page or bulletin board
- floppy disks
- scanner
- Venn Diagram Worksheet

Procedure:

Day 1:
(Since this is still early in the year, you may want to begin the class by having the students sit in a circle.) The teacher begins by stating her name and one interesting thing about herself. Then a student next to the teacher follows the same pattern, continuing all the way around the circle. The students may have a hard time thinking of something to share, so the teacher might tell them that they can share information about their families ("I have a new baby sister."), information about their friends ("My best friend's name is…"), or information about themselves ("My favorite food is…"). Once everyone has had a turn to share, explain to the students that, "we have all just described ourselves in one way or another. Let's brainstorm other ways you might describe yourself or someone else." Write students' ideas on the chalkboard. Once a nice list of descriptive words has been accumulated, pass out a piece of paper and have the students write a paragraph describing themselves. During this time you may help students spell words, but encourage the use of a dictionary. When students are finished with their paragraphs, have them draw a picture of themselves on the back of the page they wrote their paragraph on. When they have completed their picture, have them turn in their sheets. (Students can read quietly at their desks until the rest of the class is finished.)

Days 2-3:
Students make appropriate adjustments to the paragraph they wrote previously. They will make these revisions based on the re-reading of their work and on comments made by the teacher. Students review any corrections made on their paragraphs and re-write or make any other changes to their work. When they are satisfied with their work and believe it is ready to be published, they may begin to type their paragraphs into a word processing program. (This process would be done best in a computer lab where each student has a computer terminal, but if this is not realistic for your surroundings then the students may do their work at scattered times throughout the day.) Prior to allowing students to use the computers, review any classroom computer rules that you have in place. When all students have their paragraphs typed, then have them scan in their drawings. The paragraphs and pictures will be displayed on the class web site. (If your school does not have a class web site, then you can post the typed papers and the students' drawings on a bulletin board.)

Day 4:
Discuss how we each have things about us that are unique and that we each have our own differences. Discuss what a Venn diagram is and what each of the sections represent -- namely that one side of the circle will be information about us, the other circle will be information about one of our classmates, and the overlapping part of the circles will be information that we share with that classmate. Have students use the class web site (or bulletin board) to find information about their peers. They should find someone that has something in common with them as well as something different from them. The students will fill in a Venn diagram with the information that they found on the web site (or bulletin board). When students are finished, they will share the information on their Venn diagrams.

Assessment: How well did students behave during the brainstorming process? Did they raise their hands and wait to be called on? Did they respect each other's ideas? Assess each student's final draft -- all aspects of the paragraph do
not have to be correct, but did students take time to develop their ideas and turn in a quality piece of work? Assess students' Venn diagrams to see if students understand each section of the diagram.

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The Sounds of "EA"

Grade Level: 2, 3

Subject(s):

- Language Arts/Phonics
- Foreign Language/English Second Language

Duration: 1 hour

Description: In this lesson, the sounds of "ea" are dramatized in a PowerPoint presentation. Students will learn that "ea" can sound like a "long e," a "short e," a "long a," and more.

Goals:

1. Students will understand that the "ea" pattern has several sounds in English.
2. Students will develop confidence in differentiating the varied "ea" sounds.

Objectives: At the end of the lesson, students will be able to match pairs of words containing the same vowel sound.

Materials:

- a computer with Microsoft PowerPoint installed
- a large monitor or television with S video connection (or a computer projector can be used)

Procedure:

Begin by asking students, "Can you think of words that contain 'ea'?" Record students' responses on the board. "Does the 'ea' in all of these words have the same sound? How many sounds do you think 'ea' makes in English? Today you will find out how many different sounds 'ea' can make."

Introduce the PowerPoint presentation and the "ea" characters
Throughout the presentation, students will learn about the many different sounds "ea" can make. Graphics are used to illustrate the meanings of the vocabulary words. At times, students will view a selection of words and will be asked, "Which word doesn't belong?" At the end of the lesson where "E" and "A" tease the children, the students can count how many sounds "E" and "A" made.

The conclusion of the presentation contains a 25-word evaluation. Students can practice matching words that contain the same "ea" sound. As an extension, teachers may want to create a word wall with "ea" words, and students can add words to the wall as they find them.
**Assessment:** Formally or informally, students will match words containing the same "ea" sound using the evaluation section of the PowerPoint presentation. Teachers should note any sounds that students are having difficulty with and then review those sounds using the PowerPoint presentation.

**Special Comments:** I have found that this approach is very successful with ESL students. I have been using it for two years in Costa Rica and have been very pleased with the results. This is a wonderful tool when materials and books are not available for groups or classes. It is my hope that someday teachers will exchange their best lessons using PowerPoint.

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### Find a Pattern with "One Grain of Rice"

**Grade Level:** 6

**Subject(s):**
- Mathematics/Patterns
- Language Arts/Literature/Children's Literature

**Duration:** 45 minutes

**Description:** Students use the problem solving strategy of "find a pattern" to predict the number of grains of rice Rani (from One Grain of Rice) will receive after 30 days. Students use a table to assist with making predictions.

**Goals:**

1. Apply guess and check, find a pattern, draw a diagram, and other problem solving strategies to develop inductive and deductive thinking.
2. Students will algebraically represent, model, analyze, and solve mathematical and real world problems involving patterns and functional relationships.

**Objectives:**

1. Students will apply find a pattern and make-a-table strategies in order to solve problems.
2. Students will be able to record data from an Indian folktale.
3. Students will explore, describe, and extend patterns.
4. Students will be able to make a generalization about a pattern.

**Teacher Materials:**
- One Grain of Rice: A Mathematical Folktale by Demi
- overhead projector with markers
transparency of table worksheet
rice - a small handful

Student Materials:

- pencils
- calculators - one for each student or pair of students
- Table Worksheet
  
  *Table Worksheet in .pdf format; requires free Adobe Acrobat Reader.*

Vocabulary: patterns, table

Story Vocabulary: Rani - girl's name in the story, raja - Indian king, famine - extreme lack of something

Procedure:

Explain the objectives of the lesson, and then begin reading One Grain of Rice. [Brief summary of story: During a famine, Rani outsmarts the raja by asking him to give her one grain of rice to be doubled every day, for 30 days.]

Discuss book vocabulary as it comes up in the reading. Show one grain of rice on the overhead, then two, four, and eight... Stop at the ninth day in the story. Revisit the objective by asking, "What are we doing today and how?" [I have a Problem Solving Guidelines poster in my room: Understand, Plan, Solve, Look Back. You can use something similar to help students think through a problem.]

Ask students, "What is a pattern?" (A list that occurs in some predictable way.) Pass out the table worksheets and have students fill in the table, stopping at the ninth day. Ask students to share any patterns that they notice. Most likely, students will say that the pattern doubles every day. Students will predict how many grains of rice Rani will receive in all after the 30th day. In pairs, students will complete the rest of the table. (Calculators will be needed, as numbers get into the millions.) As students are working, ask if anyone can find an easier way to calculate the next day's rice count without adding. (Usually someone notices that you can multiply by 2.) Tell students to complete the table using this new pattern. (Students should fill in the table faster now.) After the tables are completed, ask for students' predictions for the number of grains of rice on the 30th day. Finish reading the story to see if students' calculations were correct. As you read the story, students should check their answers with the story to make sure that they calculated correctly.

Assessment: Independently, students will answer the following questions:

1. Find out how many grains of rice Rani received in all. Explain how you got your answer. (1,073,741,823 - more than 1 billion grains of rice)

2. What do you notice about the grains of rice received each day? Describe the pattern you see in the table. (doubles or "times 2")
Special Comments: I used grains of rice as a behavior management strategy. If students were on task, participating...they earned a grain of rice. Pairs of students needed to earn 10 grains by the end of class to be "winners." The prize is up to you.

Plato's Allegory of the Cave

Grade Level: Vocational Education, Adult/Continuing Education

Subject(s):
- Philosophy/Platonism

Duration: 2 hours

Description: Students are introduced to Plato's "Allegory of the Cave." After listening to a re-telling of the story, students work in groups to analyze various parts of the allegory.

Goals: Students will be able to identify situations and issues where they have made changes and need to make changes, particularly surfacing issues around why we choose to change or not to change.

Objectives: Students will be able to define philosophy, allegory, and the images in "The Allegory of the Cave" as they pertain to their lives.

Materials:
- "The Allegory of the Cave" in The Republic, by Plato
- flashlight
- flipchart
- markers
- pens
- tape
- an assistant to hold the flashlight
- Discussion Sheet and Class Evaluation Form
  Discussion Sheet and Class Evaluation Form in .pdf format; requires free Adobe Acrobat Reader.

Procedure:
Before you teach, you will need to read a biography about Plato, read "The Allegory of the Cave," and practice re-telling the story. You will also need to gather the following supplies: flipchart, markers, tape, and copies of "The Allegory of the Cave." In addition, enlist the help of another staff
person to be the “fire” (holding a flashlight at the back of the room) while you re-tell the story.

**Lesson Outline:**

**What is philosophy?**

- live your life according to ideas and assumptions about what the world is like -- that's your philosophy
- the word means, "love of wisdom"

Which begs the question, "What is wisdom?" What do you think? Facilitate conversation answering this question.

Why do you think we study philosophy? There are many reasons to study philosophy and humanities. (Author’s Note: here are my three favorite reasons):

- The unexamined life is not worth living. (Socrates 400 BC)
- Vocational training is the training of animals or slaves. It fits them to become cogs in the industrial machine. Free men need liberal education to prepare them to make a good use of their freedom. (John Dewey, 1916 AD)
- Know yourself. (Plato, 387 BC)

Today we're learning about Ancient Greek philosophy. Three famous men in Ancient Greek philosophy were Socrates, Plato, and Aristotle. All three lived in Athens most of their lives, and they knew one another.

**Socrates 469-399 BC**

- Father was a stone carver; mother was a midwife
- Father claimed to be descendent of the god Poseidon
- Father died when Socrates was a boy
- Mother remarried her uncle; they raised Socrates
- Tried his hand as a stone sculptor and was very bad by all accounts
- Known for teaching through discussion of ideas, using questions to challenge students’ assumptions about the world
- Learning how little we know is how we learn
- Never wrote anything down, so we have no written works by him; also no pictures (although they say he was quite ugly)
- Sentenced to death by hemlock for not recounting his atheist beliefs and for corrupting the young men he taught

**Plato 428-348 or 347 BC**

- Socrates student
- Wealthy family
- Started out with career in politics, but left when he realized that politicians weren't truthful -- didn't think clearly
- Started his own university, "The Academy," in 387 BC
- Was all about "ideas" as truth -- ideas exist in perfect truthful state in our minds
- Physical world is misleading, and therefore not what you should base truth upon
- Constant struggle for humans is discovering the reality of the world while balancing what you know to be true, and what the physical world is showing you to be true
- People born with knowledge in their heads; knowledge gathered as moved from life to life
- Recalling knowledge from previous life called anamnesis -- it's how you can know something without having first hand experience of it
- Point of education is to draw out the knowledge that's already in your head; use dialogues to do this
- Prolific writer - approximately 24 books; wrote in dialogues so it's easy to read, and he had a sense of humor, too

**Aristotle**

- Plato’s student -- we will be discussing Aristotle in a future class

**What is an allegory?**
A story where the things in the story represent other things (also think parable, metaphor). Can you think of an allegory you know? Plato’s allegory is about a cave.

**Whole Group Activity: Allegory of the Cave**

- Ask students, “What do you know about caves?” Use the flipchart to document their brainstorming.
- Inform students that you are going to share Plato’s "Allegory of the Cave." Turn off the lights, close the blinds, and welcome them to Plato’s cave.
- Have your “fire” person at the back of the room (using a flashlight as fire) when you give her the sign. (This should be while you’re telling the first part of the Allegory, describing the cave.)
- Re-tell the allegory; use questioning to tell the story with input from the group. For example, when you are telling the part where some of the prisoners re-enter the cave ask, “What happens when they come back down into the cave?”
- At the end of the allegory, turn the lights on and open the blinds.
- Ask students to tell you what things in the story could represent other things. Write students’ responses on the flipchart.
- Ask for a volunteer to tell what each of these items could represent and write them on the flipchart next to each item. For example: “Prisoners - people, Shackles - addiction,” etc.

**Small Group Activity:**
Distribute a discussion sheet to each student, and ask the participants to work in pairs or groups of three, thinking about the cave in our worlds. Students should write their responses on the discussion sheets.

**Whole Group Sharing:**
After 10 or 15 minutes, ask the groups to report back to the whole group on what their things represented. Write these on the flipchart. Make sure to note that we do not spend entire days in or out of the cave. We will probably spend time in both places during our workday. The key to coming out of the cave is to be aware we’re in the cave, and to work on moving toward the light. Ask participants for ways they’ve learned to “Come out of the cave” in their worklife.

**Time permitting:**
In pairs, have students write their own allegory.

**Journal Question:**
Plato said, "There will be no end to the troubles of the state or indeed of humanity itself until philosophers become kings or until those we now call kings really and truly become philosophers." Do you agree? Why or why not?

**Assessment:** Observe students’ participation throughout the lesson. Collect students’ journal writings and/or allegories. At the end of class, the teacher can ask students to complete the class evaluation form. The teacher can use the information on this form to make changes/adjustments/improvements to future lessons.
Basketball Golf

Grade Level: 7

Subject(s):
- Physical Education/Games
- Physical Education/Skill-Related Fitness

Duration: 45-50 minutes

Description: This activity is an integration of two sports, basketball and golf! Students practice their shooting skills and use a scoring system taken from the game of golf.

Goals:
1. Each student will improve his/her level of physical fitness as well as his/her knowledge of shooting a basketball.
2. Each student will improve his/her self-image through positive reinforcement given by peers and the instructor.
3. Students will grow in their personal development. Each student will learn cooperation and teamwork when dealing with peers and will be taught to compete fairly and appropriately. In addition, students will be willing to recognize, accept, and appreciate individual differences within a diverse learning group.
4. Students will learn playing rules and strategies (with at least 70% accuracy) associated with physical activities presented in class.
5. Students will learn basic skills and movement patterns associated with physical activities presented in class.
6. Students will develop a sense of fair play and feel a sense of accomplishment when they do their best to achieve a goal.

Objectives:

Psychomotor:
1. Each student will perform the basic warm-up exercises with 100% accuracy.
2. Each student will increase his or her level of fitness by running one lap of the track without stopping.

Psychomotor and Affective:
Each student will participate in lead-up games and activities to prepare them to play basketball.

Psychomotor and Cognitive:
Each student will be able to correctly shoot a basketball as demonstrated by performance in drills.
Materials:
- basketball charts (handout)
- pencils
- basketballs

Procedure:
Before playing basketball golf, have students do warm-up exercises for about five minutes: jacks, toe touches, sit-ups, and push-ups. Have students line up on the track (if available) and instruct them to run one lap without stopping.

How to play:
Basketball golf is played like golf, using "pars" to keep score. In basketball golf, one station is set up on each half of a basketball court (see diagram in handout). Each station has nine positions to shoot from (you can use tape to label each position on the floor). Divide students into groups of four, with each group receiving a score card and a pencil.
Beginning at the first position, each student shoots until he/she makes the shot or misses five shots. Another student in the group records the number of shots taken, no more than 5 (students should take turns recording the scores). After students have completed the first position, then they move on to position #2 and so on. After students have completed all nine positions, they may tally their scores to see who came closest to "par." Time permitting, students can switch stations and repeat the score keeping process.

Assessment: Observe students' participation in basketball golf. Collect students' score sheets and see how many students came close to par (and how many were under or over par).

The Notion of Motion

Grade Level: 7, 8, 9, 10, Vocational Education

Subject(s):
- Science/Physics
- Vocational Education/Technology

Duration: Ten 45-minute sessions

Description: Students are given a problem-solving activity where they must design a device that will accurately and quickly deliver a specific load from one location to another by using non-traditional resources.
Goals:

1. Students will gain an understanding of the importance of Power and Energy in society.
2. Students will use their knowledge of Power and Energy to solve a given problem.
3. Standard(s): History and Nature of Technology; Design; Develop and Produce Products and Systems; Use and Management of Technology.

Objectives:

1. Students will identify historical milestones in Energy and Power that have extended people's ability to modify the natural world.
2. Students will describe how a system functions in comparison to the Universal Systems Model (input, process, output, feedback).
3. Students will participate in the processing of exploring possible solutions by using the following skills and activities: brainstorming, creativity, investigating, diagnosing, planning, testing, evaluating procedures, etc.
4. Students will select and safely use appropriate resources, measuring devices, and tools in developing a product, process, or system.
5. Students will describe how a system functions in comparison to the Universal Systems Model (input, process, output, feedback).

Materials:

- videos and texts (see Useful Resources below)
- safety glasses (**Students using tools and equipment must pass a safety examination first.**)
- What is Energy/What is Power? Study Sheet
- What is Energy/What is Power? Examination
- Size Up the System Worksheet
- The Notion of Motion Assignment Sheet

Post-Activity Assessment Form (PAAF)

Handouts in .pdf format; requires free Adobe Acrobat Reader.

Vocabulary:

1. Potential Energy - Stored or motionless energy.
3. Thermal Energy - The ability to do work in a thermal (heat producing) environment.
4. Chemical Energy - The ability to do work in a chemical environment.
5. Mechanical Energy - The ability to do work in a mechanical environment.
6. Radiant Energy - The ability to do work in a radiant (heat receptive) environment.
7. Electrical Energy - The ability to do work in a sub-atomic environment.
8. Nuclear Energy - The ability to do work in an atomic environment.
9. Mechanical Power - The rate of work done in a mechanical environment.
10. Fluid Power - The rate of work done in a fluid environment.
11. Electrical Power - The rate of work done in a sub-atomic environment.
12. Thermal Power - The rate of work done in a thermal (heat producing) environment.
13. Universal Systems Model - A model of a combination of parts that work together as a whole. There are four parts to the Universal Systems Model:
   - Input(s) - Things or ideas that go into a system that have a purpose.
   - Process(es) - What is done with the inputs.
   - Output(s) - The final results of the inputs being processed.
   - Feedback - Information about the other components of the System. Typically, this is to match that the output is what was wanted from the input.
Procedure:

**Day 1:**
Students will view two video segments (Overview of Energy–15:00 minutes and Conversion of Energy into Power–14:30 minutes). Note-taking is encouraged. Students will be given the "What is Energy/What is Power" study sheet for silent or group review for the remainder of the class period.

**Day 2:**
Review the previous day's video and worksheet definitions, impacts, and histories. Give students a few minutes of study time (group or individual) to review notes, the study sheet, and class discussions. Administer the "What is Energy/What is Power" examination. Correct the examination and discuss principles presented by the examination.

**Days 3 & 4:**
Demonstrate different forms of Energy and Power (ideas for teachers):

**Energy:**
- **Thermal Energy:** heating different types of materials (Ex: heat expansion from TLC); bimetallic switch to turn on an electric motor; cooking food on a solar cooker / heating with a magnifying glass; shaping metal, welding, tempering, etc.
- **Chemical Energy:** alkaline batteries; solid rocket propellent; explosives are stored Chemical Energy (not appropriate in school, however!).
- **Mechanical Energy:** rubber band / compound bow (Potential / Kinetic); coil spring from a ball-point pen or an automobile (Potential / Kinetic); small pulleys/hoist/winch/gearbox (Potential / Kinetic).
- **Radiant Energy:** greenhouses; terrariums; passive solar heaters.
- **Electrical Energy:** computer; battery / generator / DC transformer; microwave.
- **Nuclear Energy:** marbles (effect of the shooter marble hitting a group of marbles); bowling pins or Billiards (much the same as marbles); "Fired-up about Fission" Nuclear Simulator.

**Power:**
- **Mechanical Power:** (typical measurements are in watts and horsepower) - Mechanical work done by a device divided by the time it takes to do the work. The formula for Power in Linear Mechanical Systems is: \( P = \frac{F \times D}{t} \); where \( F \) = applied force, \( D \) = distance traveled, and \( t \) = time. [Examples: timing a student running up the stairs, across the lawn, etc; timing a Lego/Capsela designed car as it travels a specified distance.]
- **Fluid Power:** (typical measurements are in watts and horsepower) - A measure of how fast fluid work is done. The formula for Power in Fluid Systems is: \( P = \frac{\text{Fluid Work}}{\text{time}} \) [Examples: timing a water pump to move a gallon of water; timing an air compressor to reach a specific PSI.]
- **Electrical Power:** (typical measurements are in watts) - The electrical work done divided by the time it takes to do the work. The formula for Power in Electrical Systems is: \( P = \frac{\text{Electrical Work}}{\text{time}} \) [Examples: timing how long it takes to heat water with an electric heating element; interpreting the readings on a household electric bill.]
- **Thermal Power:** (typical measurements are calories per second, or BTU's) - How fast or how slow thermal energy flows from hot regions to cold regions. The formula for Power in Thermal Systems is: \( Q = \frac{H}{t} \); where \( Q \) = heat-flow rate, \( H \) = heat energy moved, and \( t \) = time [Examples: timing the heating of air or water to a desired temperature; timing of turning bread to toast in a toaster.]

Discuss the Universal Systems Model and apply the Model by using examples from the discussion of types of Energy and Power. Cite real-life technical applications and interrelationships between power systems (Mechanical, Fluid, Electrical, Thermal).

**Day 5:**
Review the Universal Systems Model. Give out the worksheet, "Size Up the System." Correct and discuss the answers to the problems. Students should turn in the worksheet for grading. Introduce and discuss the problem-solving activity: "The Notion of Motion." Assign groups for the activity (2-4 students per group). Begin group brainstorming, investigating, diagnosing, planning, testing, evaluating procedures, etc. for "The Notion of Motion."

**Days 6-10:**
Continue development and refinement of the device required in "The Notion of Motion" activity. Conclude the activity by testing devices as per the grading criteria on the reverse side of "The Notion of Motion" assignment sheet.

**Assessment:** As a result of participating in these activities, students will gain an awareness of the importance of Energy and of Power in society. Students will also be able to identify basic components of the Universal Systems model and apply the model to situations placed before them. Students should complete and turn in a Post-Activity Assessment Form (PAAF) prior to beginning a new activity.

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**Crisis in the Balkans**

**Grade Level:** 10, 11, 12, Higher Education

**Subject(s):**

- Social Studies/World History

**Duration:** Five 55-minute sessions

**Description:** This five-day simulation focuses on the Yugoslavian civil war of the 1990's. The activity is set in early 1991, when international involvement in Yugoslav politics was minimal. Students will learn the geography and history of the Balkans, assume a role in the conflict, and make decisions which may maintain peace or begin a war. The details of this activity reflect actual facts.

**Goals:**

1. To increase students’ knowledge of world history.
2. To involve students in an interactive simulation analyzing historical events.
3. For students to synthesize their own solutions and act on them.

**Objectives:** Students will be able to:

1. Locate general geographic features within the Balkans (in the pre-simulation mapping phase).
2. Recall demographic and historical facts about the Balkans and the United Nations (during the simulation).
3. Use historical facts to support the different perspectives of the combatants in the Balkans conflict (during the simulation).
4. Formulate creative strategies for solving the Balkans conflict (during the simulation).
5. Relate the stress factors underlying the Balkans conflict to their own lives (in the post-simulation discussion phase).

**Materials:**
• world atlas (one per student)
• two 6-sided dice
• overhead projector and overhead pens
• the following pages (one instructor overhead & one per student):
  o blank Balkans map (see Procedure for details)
  o Balkans Data Sheet (Appendix B)
  o Yugoslav Situation Summary (Appendix C)
  o Quality of Life Points (Appendix D) (Appendix D1 for instructor, D2 for students & overhead)
• the following pages, pre-tailored to each of the four groups (one copy of the appropriate version to each group member):
  o Fact Sheet (Appendix E-1 through E-4)
  o Student Instructions (Appendix F-1 through F-4)
  o Individual Roles (Appendix G) cut into roles--unique for each group--and distributed, one per student, within the proper group
• Appendices in .pdf format; requires free Adobe Acrobat Reader.

Procedure:
As the simulation begins, students representing one of three different factions within Yugoslavia will meet with others in their region to determine mutual concerns and demands. Each participant must balance individual and group interests in this initial negotiation process. These regional groups will then send diplomatic representatives to the other regions to discuss conflicts and possible compromises. A fourth group of students representing the United Nations will determine whether to impose sanctions or award aid to any region. At the end of each round, the instructor will calculate how the various groups' decisions have affected each region's quality of life. The region with the most Quality of Life (QOL) points at the end of the game wins.

The activity requires five class hours to complete: two hours of advance reading and map work, two hours of the simulation proper, and one hour of follow-up discussion.

Sample Timeframe:

Day One:
- Spend 2 to 3 minutes introducing the activity.
- Distribute a world atlas, Balkans map, and Balkans Data Sheet (Appendix B) to each student. [The authors regret that, due to copyright restrictions, we could not distribute our map over the Internet; however, any blank map of Europe should suffice.]
- Ask students to find in their atlases and draw on their own maps:
  1. the six regions of Yugoslavia outlined on the blank map
  2. the three main geographic features listed on the Balkans Data Sheet--the Dinaric Alps, the Romanian Plain, and the Dalmatian Coast
- When half the class has finished, ask volunteers to fill in their findings on the overhead map, so other students can finish and check their work.
- On a European map in the atlas, point out the position of the former Yugoslavia relative to Moscow, Istanbul, and
Rome--centers of the Eastern Orthodox, Islamic, and Roman Catholic religions which play a central role in dividing the Balkans to this day.

- Spend any remaining time drilling students on the Balkans Data Sheet, focusing particularly on the table at the bottom. Ask students to note on their maps the majority nationality in each region. (Note that Tito recorded Muslims as a “nationality” in a deliberate effort to maintain a balance of political power).

*Day Two:*

- Distribute the Yugoslav Situation Summary/QOL Points sheets (Appendices C & D), and read aloud and dissect each paragraph.

- Crucial knowledge about the Balkans includes:
  1. the common language and ancestry
  2. the religious differences
  3. the differences in nationality
  4. the different forms of government desired
  5. the historical bases of the Croat-Serb enmity

- Inform the students that, for the purposes of the game, they will be divided into only four groups, representing Serbia (including Macedonia and Montenegro), Croatia (including Slovenia), Bosnia-Herzegovina, and a United Nations Security Council (UNSC).

- Read the Student Instructions to the class.

- Explain the Quality of Life Points scoring system, whereby groups try to augment their starting scores by various actions detailed under QOL Points.

*Day Three:*

- As a class, review the Yugoslav Situation Summary.

- Choose 3 to 5 students to form the UNSC, and then break the remainder of the class into three equal-sized parts--the regional groups.

- Distribute the appropriate Student Instructions/Fact Sheet to each student. Ask one person in each group to read the information aloud (quietly) to the group.

- Distribute to each student an Individual Role appropriate to her group. Each student should read hers in secret and, based on these roles, write on her Fact Sheet 2 to 3 personal goals she wants to achieve during discussions within the regional group.

- Each group should then produce 3 to 5 group goals its members want to achieve during negotiations with the other regions. Allow 5 to 10 minutes for group members to reach some consensus. Each student should write the group's final goals in the space provided on his Fact Sheet.

- As a class, review the Quality of Life Points scoring system, and list each group's starting score on the board.

- Announce that the first round of negotiations is about to begin. Each round should include 5 to 7 minutes of
negotiation, after which everyone must return to her region and--after 3 minutes of discussion--make public press releases, hear any UNSC decisions, and watch the instructor tally the Quality of Life points.

- Instructor tips:
1. Any treaty or other agreement between two regions should be written out and signed by a representative of both parties.
2. The UNSC is typically neglected during the initial round, so urge the regional groups to send a representative to the UNSC as early as possible.
3. Emphasizing the scores might prompt dramatic action if none has occurred after two or three rounds.

- Begin Round 1.
- When the first round of negotiations seems to be winding down, ask students to return to their regional groups and prepare their announcements.
- When each group has read its press release to the class and the UNSC has announced its decisions, tally the QOL Points (q.v.) and start the next round.
- Don't forget to record the day's final scores for continuation the next day.

Day Four:
- Reassemble the students into their groups and begin the next round.
- In the event of war or a complete impasse (or if the students seem tired of negotiations), the final scores should be tallied and the game brought to a close.
- Follow-up discussion can be in many forms. Suggested questions include:
1. What were the main causes of conflict in the simulation?
2. How did group and individual goals contrast? Did they conflict?
4. How might the simulation have differed from real life in Yugoslavia?
5. How were events in the simulation similar to those in students' lives?

Day Five:
- To update students about the current situation in the Balkans, we suggest these sources:
1. Various current articles available on the Internet or from one organization that specializes in global issues (ACCESS: Information on World Issues; tel. (202) 783-4767)
2. Useful articles from the time of this simulation’s creation may be found in:
   Atlanta Journal-Constitution; 12, 13 February 1994, pp. A-14, G-1
   Europe; no. 337
   History Today; vol. 44, no. 3
   New Statesman Society; vol. 6, no. 249
Assessment: Observe students' participation throughout the simulation. Students can be asked to share and write about their reactions to the simulation. Possible follow-ups include a test or a research project on Balkan history and future.

Special Comments: An article about this simulation, "Conflict in the Balkans: A Classroom Simulation," was published in the Sept/Oct 1995 issue of Social Studies. A brief citation of this article can be found in the ERIC Database (EJ519010).

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Theme Meal

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Grade Level: 9, 10, 11, 12, Vocational Education

Subject(s):  
- Vocational Education/Occupational Home Economics

Duration: Four 50-minute sessions

Description: Students plan and implement a "theme" party.

Goals: To show students first-hand what is required to pull off a successful party. To demonstrate good use of time, money, and resources.

Objectives:  
1. Students will be able to plan and complete preparations for a theme party.  
2. Students will be able to budget materials needed for the theme party.

Materials:  
- food needed for the theme party  
- cooking utensils  
- tables and chairs  
- tableware  
- party decorations
Procedure:

Day 1:
Allow students to work in groups to develop a theme. Some themes that have worked well include: child's birthday party (cake, finger foods, punch); Mexican night (taco casserole, chips, salsa, fried ice cream); western (BBQ, baked beans, small cakes baked in soup cans); Italian cafe (spaghetti, breadsticks, sparkling grape juice); back to school (cake decorated like a bus, sandwiches in brown bags, juice boxes); and Valentine's Day (heart pizza, heart cookies).

Students need to create a shopping list for the items that are needed. Students cannot spend more than $3.05 per person. They must price out all of the ingredients. If they use 1 teaspoon of salt, for example, they must calculate what 1 teaspoon costs. If students do not want to price some items, they can use the prices set up by the teacher. For instance, the teacher might set a price of 5 cents for a teaspoon of salt. In this case, it is much cheaper to do the math, since a teaspoon of salt is less than 1 cent. Students might want to look at sale flyers to determine the cost of ingredients, or the teacher can have a list of prices prepared ahead of time.

Day 2:
The second day, students go to a local grocery store to purchase the food. If time allows, students can begin preparations for the next day.

Day 3:
Students start preparing the meals. Students should also try to get all of the last minute details taken care of (such as menus and decorations). Students need to work cooperatively in their groups to ensure success. Invitations are sent to teachers, administrators, and support staff that are free that period to come to the party. (They love this!)

Day 4:
Students have 30 minutes to finish or re-heat the food prepared from the day before. Students also prepare the room. They must have place settings for four people at a table (or more depending on the types of tables you have). Menus should be available at each table. When guests begin to arrive, students must greet them and welcome them to the party. Students take the guests' orders and serve the meals. The guests are to evaluate the use of theme, time, and decor. They are instructed to ask questions of the host/hostesses.

Assessment: Each guest is given an evaluation sheet. On this sheet, guests are to indicate what they felt the theme was. They are also free to make comments concerning preparedness and organization of the groups. They can also pick the group that they felt had the best use of the theme.
Teaching Thinking Skills

Perhaps most importantly in today's information age, thinking skills are viewed as crucial for educated persons to cope with a rapidly changing world. Many educators believe that specific knowledge will not be as important to tomorrow's workers and citizens as the ability to learn and make sense of new information.

INTRODUCTION

Throughout history, philosophers, politicians, educators and many others have been concerned with the art and science of astute thinking. Some identify the spirit of inquiry and dialogue that characterized the golden age of ancient Greece as the beginning of this interest. Others point to the Age of Enlightenment, with its emphasis on rationality and progress.

In the twentieth century, the ability to engage in careful, reflective thought has been viewed in various ways: as a fundamental characteristic of an educated person, as a requirement for responsible citizenship in a democratic society, and, more recently, as an employability skill for an increasingly wide range of jobs.

Deborah Gough's words quoted at the beginning of this report typify the current viewpoint in education about the importance of teaching today's students to think critically and creatively. Virtually all writers on this subject discuss thinking skills in connection with the two related phenomena of modern technology and fast-paced change. Robinson, for example, states in her 1987 practicum report:

Teaching children to become effective thinkers is increasingly recognized as an immediate goal of education....If students are to function successfully in a highly technical society, then they must be equipped with lifelong learning and thinking skills necessary to acquire and process information in an ever-changing world.

Beyth-Marom, et al. underscore this point, characterizing thinking skills as means to making good choices:

Thinking skills are necessary tools in a society characterized by rapid change, many alternatives of actions, and numerous individual and collective choices and decisions.
The societal factors that create a need for well developed thinking skills are only part of the story, however. Another reason that educators, employers, and others call for more and better thinking skills instruction in schools is that American young people, in general, do not exhibit an impressive level of skill in critical or creative thinking. The following observation from Norris's 1985 review is typical:

Critical thinking ability is not widespread. Most students do not score well on tests that measure ability to recognize assumptions, evaluate arguments, and appraise inferences.

Likewise, Robinson notes that:

While the importance of cognitive development has become widespread, students' performance on measures of higher-order thinking ability has displayed a critical need for students to develop the skills and attitudes of effective thinking (p. 13).

There is yet another major force behind the call for improved thinking skills instruction. Educators are now generally agreed that it is in fact possible to increase students' creative and critical thinking capacities through instruction and practice. Ristow (1988) notes that, in the past, these capacities have often been regarded as:

a fluke of nature, a genetic predisposition....qualities [that] are either possessed or not possessed by their owner and that education can do very little to develop these qualities.

Ristow then goes on to say:

However, a great deal of the research currently being reported indicates that the direct teaching of creative skills can produce better, more creative thinkers.

Presseisen makes this point even more forcefully, asserting that:

The most basic premise in the current thinking skills movement is the notion that students CAN learn to think better if schools concentrate on teaching them HOW to do so (p. 17).

DEFINITIONS

Thinking skills. Critical thinking. Creative thinking. Higher-order thinking. Those who take an interest in this field of study soon realize that they cannot go tossing off these
terms in a casual manner, since there are no universal agreements as to their precise meanings.

**CRITICAL THINKING**, for example, has been variously defined as:

- Reflective and reasonable thinking that is focused on deciding what to believe or do (Robert Ennis, quoted in Presseisen, p. 24)
- The disposition to provide evidence in support of one's conclusions and to request evidence from others before accepting their conclusions (Hudgins and Edelman 1986, p. 333)
- The process of determining the authenticity, accuracy and worth of information or knowledge claims (Beyer 1985, p. 276).

Beyer goes on to say that "critical thinking has two important dimensions. It is both a frame of mind and a number of specific mental operations" (p. 271). Norris (1985) agrees, stating that:

> Having a critical spirit is as important as thinking critically. The critical spirit requires one to think critically about all aspects of life, to think critically about one's own thinking, and to act on the basis of what one has considered when using critical thinking skills (p. 44).

Lists of alternative definitions could also be generated for other terminology commonly used in the thinking skills literature. In an attempt to come to terms with these definitional differences, Alvino, in his 1990 "Glossary of Thinking-Skills Terms," offers a set of definitions which are widely—though not universally—accepted by theorists and program developers. For purposes of the present report, these definitions are applicable. They include:

- **BLOOM'S TAXONOMY.** Popular instructional model developed by the prominent educator Benjamin Bloom. It categorizes thinking skills from the concrete to the abstract—knowledge, comprehension, application, analysis, synthesis, evaluation. The last three are considered HIGHER-ORDER skills.
- **COGNITION.** The mental operations involved in thinking; the biological/neurological processes of the brain that facilitate thought.
- **CREATIVE THINKING.** A novel way of seeing or doing things that is characterized by four components—FLUENCY (generating many ideas), FLEXIBILITY (shifting perspective easily), ORIGINALITY (conceiving of something new), and ELABORATION (building on other ideas).
- **CRITICAL THINKING.** The process of determining the authenticity, accuracy, or value of something; characterized by the ability to seek reasons and alternatives, perceive the total situation, and change one's view based on evidence. Also called "logical" thinking and "analytical" thinking.
- **INFUSION.** Integrating thinking skills instruction into the regular curriculum; infused programs are commonly contrasted to SEPARATE programs, which teach thinking skills as a curriculum in itself.

- **METACOGNITION.** The process of planning, assessing, and monitoring one's own thinking; the pinnacle of mental functioning.

- **THINKING SKILLS.** The set of basic and advanced skills and subskills that govern a person's mental processes. These skills consist of knowledge, dispositions, and cognitive and metacognitive operations.

- **TRANSFER.** The ability to apply thinking skills taught separately to any subject.

### THE THINKING SKILLS RESEARCH

This summary is based on a review of 56 documents. Thirty-three of these are reports of research studies or reviews and are cited, with annotations, in the Key References section of the bibliography. Twenty-three are descriptive, theoretical, or guidelines documents or are concerned with research in areas other than the effectiveness of programs and practices. These reports are itemized in the General References.

Of the 33 key documents, 22 are research studies or evaluations, and 11 are reviews or syntheses of research. Subjects of these investigations include: general (or unspecified) student populations - 12 reports, elementary students - 9, secondary students - 9, and both secondary and postsecondary students - 3. The research involved regular, gifted, EMR, and Chapter 1 student populations; a representative range of racial/ethnic groups; and a balance of urban, suburban, and rural settings. Only three of the reports deal with student populations outside the United States. Five of the reports have teachers as well as students as their subjects.

The effects of many individual practices and whole programs were investigated. Many reports looked at the effects of instruction in various clusters of higher order thinking skills, including analysis, synthesis, and evaluation, together with the related skills and subskills of making predictions, making inferences, self-questioning and other metacognitive functions, formulating hypotheses, drawing conclusions, elaborating, solving problems, making decisions, identifying assumptions, determining bias, recognizing logical inconsistencies, and others.

Other reports looked at specific instructional practices, such as tutoring, using thinking skills software programs, and using advance organizers. Five were concerned with the effects of training teachers to conduct thinking skills instruction. The full thinking skills programs investigated by the research are discussed in the section on findings.
Outcome areas were likewise numerous, including student achievement as measured by assessments in the areas of reading comprehension, mathematics, general science, biology, physics, chemistry, art, social studies, and geography. Other outcome areas studied include SAT scores, commercial and locally developed higher-order thinking skills test scores, IQ test scores, and behavioral outcomes such as engaged time/level of participation. Research studies addressing effects on student attitudes or self-concepts were insufficient to allow for any general conclusions.

**RESEARCH FINDINGS**

**EFFECTS ON STUDENT OUTCOMES**

**THINKING SKILLS INSTRUCTION ENHANCES ACADEMIC ACHIEVEMENT.** A broad, general finding from the research base is that nearly all of the thinking skills programs and practices investigated were found to make a positive difference in the achievement levels of participating students. Studies which looked at achievement over time found that thinking skills instruction accelerated the learning gains of participants, and those with true or quasi-experimental designs generally found that experimental students outperformed controls to a significant degree. Reports with such findings include: Barba and Merchant 1990; Bass and Perkins 1984; Bransford, et al. 1986; Crump, Schlichter, and Palk 1988; Freseman 1990; Haller, Child, and Walberg 1988; Hansler 1985, Horton and Ryba 1986; Hudgins and Edelman 1986; Kagan 1988; Marshall 1987; Matthews 1989; MCREL 1985; Nickerson 1984; Pearson 1982; Pogrow 1988; Ristow 1988; Riding and Powell 1985, 1987; Robinson 1987; Sadowski 1984-85; Snapp and Glover 1990; Sternberg and Bhana 1986; Tenenbaum 1986; Whimbey 1985; Wong 1985; and Worsham and Austin 1983.

**RESEARCH SUPPORTS INSTRUCTION IN MANY SPECIFIC SKILLS AND TECHNIQUES.** Gains on learning and intelligence measures were noted in response to providing instruction in a variety of specific techniques, including:

- **STUDY SKILLS**, such as paraphrasing, outlining, developing cognitive maps and using advance organizers (Barba and Merchant 1990; Snapp and Glover 1990; Tierney, et al. 1989).

• **INQUIRY TRAINING**, in which students are given a "discrepant event" and practice information-gathering skills to resolve the discrepancy (Baum 1990; Hansler 1985; Pogrow 1988).

**VARIABLES INSTRUCTIONAL APPROACHES ENHANCE THINKING SKILLS.**
In addition to instruction in specific mental operations, research also supports the use of several teaching practices as effective in fostering the development of thinking skills, including:

• **REDIRECTION/PROBING/REINFORCEMENT.** Known to increase students' content knowledge, these techniques also enhance the development of critical and creative thinking skills (Cotton 1988; Pearson 1982; Robinson 1987; Tenenbaum 1986).


• **LENGTHENING WAIT-TIME**, i.e., the amount of time the teacher is willing to wait for a student to respond after posing a question (Cotton 1988; Hudgins and Edelman 1986; Pogrow 1988).

These practices are also associated with increases in student engaged time/level of participation (Cotton 1988; MCREL 1985; Freseman 1990).

**COMPUTER-ASSISTED INSTRUCTION HELPS TO DEVELOP THINKING SKILLS.** Although the approach taken differed across the various kinds of instructional software studied, all of the CAI programs designed to improve students' thinking skills were effective. The programs focused on skill building in areas such as verbal analogies, logical reasoning, and inductive/deductive thinking. Supportive research includes Bass and Perkins (1984); Horton and Ryba (1986); Riding and Powell (1985, 1987); and Sadowski (1984-85). The computer-oriented HOTS Program originally developed for Chapter 1 elementary students also shows positive results; however, developer Stanley Pogrow (1988) notes that the heart of the program is the teacher-student interaction called for by HOTS activities.

**RESEARCH SUPPORTS THE USE OF SEVERAL SPECIFIC THINKING SKILLS PROGRAMS.** The research consulted in preparation for this report is not all-inclusive, and no doubt there are studies and evaluations supporting the effectiveness of
programs other than those identified here. The following programs are cited here because they are widely known and used, are representative of the kinds of thinking skills programs in current use in schools, and have been studied by researchers. Programs found to be effective include:

- **COMPREHENSIVE SCHOOL MATHEMATICS PROGRAM (CSMP).** This is an elementary-level math curriculum that focuses on classification, elementary logic, and number theory. Children use computers, calculators and geometry models to pose problems, explore concepts, develop skills, and define new ideas (Baum 1990).

- **CORT (COGNITIVE RESEARCH TRUST).** Intended for use by students of any age/grade level, the program develops critical, creative, and constructive thinking skills over a three-year period (Baum 1990).

- **HOTS (HIGHER-ORDER THINKING SKILLS).** HOTS is a computer laboratory program for Chapter 1 and other elementary students. It uses readily available computer software in concert with specific teaching practices to enhance skills in metacognition, inferencing, and decontextualization, i.e., taking something learned in one setting and applying it to another (Pogrow 1988; Baum 1990).

- **INSTITUTE FOR CREATIVE EDUCATION (ICE).** ICE is a creative problem-solving process for students in grades K-12. It develops students' ability to apply the creative thinking qualities of fluency, flexibility, originality, and elaboration to problem-solving activities (Baum 1990).

- **INSTRUMENTAL ENRICHMENT (IE).** Upper elementary and secondary students engage in clusters of problem-solving tasks and exercises that are designed to make students "active learners" and enhance their general learning ability (Baum 1990; Sternberg and Bhana 1986).

- **KIDS INTEREST DISCOVERY STUDY (KIDS) KITS.** Elementary schools conduct surveys of students' interests and, based on results, students engage in active, self-directed learning and higher-level thinking around selected topics (Baum 1990).

- **ODYSSEY.** For use by upper elementary or secondary students, this program focuses on six aspects of cognitive functioning—the foundations of reasoning, understanding language, verbal reasoning, problem solving, decision making, and investive thinking (Sternberg and Bhana 1986).

- **PHILOSOPHY FOR CHILDREN.** Designed to develop thinking and reasoning skills through classroom discussion of philosophical topics, the program is organized around six novels in which children apply philosophical thinking to their daily lives. The curriculum spans the entire K-12 range (Baum 1990; Sternberg and Bhana 1986).

- **PROBLEM SOLVING AND COMPREHENSION.** This program concentrates on four problem-solving components— decoding skills, vocabulary, basic arithmetic operations, and precise thinking. Students work in problem solver-listener pairs. The program is frequently used in conjunction with other thinking skills programs (Sternberg and Bhana 1986).
- **SAGE.** Sage is designed for gifted elementary students and extends the regular curriculum through incorporating thinking skills development activities, mini-study units, and independent study (Baum 1990).
- **SOI.** Based on Guilford's structure-of-intellect theory, the program is organized around the development of 120 intellectual skills from foundation level to higher order and emphasizes reasoning as the key component of successful learning (Baum 1990; Sternberg and Bhana 1986).
- **TALENTS UNLIMITED (TU).** TU is designed for elementary students and helps participants develop multiple thinking skills (called "talents" in the program). Teachers receive training to instruct their students in productive thinking, decision making, planning, forecasting, communication, and knowledge base development (Crump, Schlichter, and Palk 1988; Baum 1990).
- **THINK.** Secondary students engage in problem-solving activities in which they are encouraged to discuss the rationales leading to their conclusions, consider other points of view, and analyze various reasoning processes (Worsham and Austin 1983).

**TRAINING TEACHERS TO TEACH THINKING SKILLS LEADS TO STUDENT ACHIEVEMENT GAINS.** Developers and researchers of most of the effective programs cited above claim that teacher training is a key factor in the programs' success. The majority of these programs have a strong teacher training component, and developers consider this training to be as important as the program content in bringing about the learning gains noted. In addition to the key role of staff development in the programs cited by reviewers Sternberg and Bhana (1986) and Baum (1990), a positive relationship between teacher training and student achievement was also identified in studies conducted by Crump, Schlichter, and Palk (1988); Hudgins and Edelman (1986); MCREL (1985); and Robinson (1987).

**PROGRAMS, STRATEGIES, AND TRAINING ARE IMPORTANT, BUT...** In drawing conclusions about the effectiveness of particular thinking skills instructional strategies, whole programs, or staff development approaches, several researchers also offer a caveat to those who might make curriculum decisions based on this information. Essentially, they say, yes, these programs, practices and training activities CAN BE effective, but their effectiveness is partially dependent on factors other than the methodologies themselves. In a typical expression of reservation, Sternberg and Bhana, at the conclusion of their 1986 review of several thinking skills programs, write:

...the success of a given program depends on a large number of implementation-specific factors, such as quality of teaching, administrative support, appropriateness of the program for the student
population, and the extent to which the program is implemented in the intended manner.

Sternberg and Bhana's observation about the match between program and student population also serves to remind us of another truism: just as there is no one certifiably "best" approach to teaching many other things, there is no one best way to teaching thinking skills. At the end of a study comparing different approaches to teaching critical thinking, Bass and Perkins write, "Like so much educational research, our final results were not supportive of just one instructional technique".

THE CONTROVERSIES IN THINKING SKILLS INSTRUCTION

Is it better to teach thinking skills to students via infused programs or separate curricula? Is it better to teach these skills directly or to create situations whereby students learn them inferentially through being placed in circumstances which call for them to apply these skills? How much classroom time is required in order for thinking skills instruction to be effective, i.e., for students to master higher-order skills and be able to transfer them to other learning contexts? Is successful thinking skills instruction partly a matter of establishing a certain classroom climate, one that is open and conducive to "thinking for oneself"?

Differences of opinion—sometimes profound ones—have been expressed by theorists, developers, and classroom teachers in response to these questions. What does the research say?

INFUSED VERSUS SEPARATE PROGRAMS. Of the demonstrably effective programs itemized above, about half are of the infused variety, and the other half are taught separately from the regular curriculum. In addition, while several documents in the thinking skills literature (e.g., Bransford, et al. 1984; Baum 1990; and Gough 1991) offer support for infusion of thinking skills activities into subjects in the regular curriculum, others (Freseman 1990; Matthews 1989; Pogrow 1988; and Baum 1990) provide support for separate thinking skills instruction. The strong support that exists for both approaches (in the research, not to mention in the views of warring experts) indicates that either approach can be effective. Freseman represents what is perhaps a means of reconciling these differences when he writes, at the conclusion of his 1990 study:

...thinking skills need to be taught directly before they are applied to the content areas....[I] considered the concept of teaching thinking skills
directly to be of value especially when there followed immediate
application to the content area...

In a similar vein, Bransford (1986) says:

"Blind" instruction [in which students are not helped to focus on general
processes or strategies nor to understand how new concepts and strategies
can function as tools for problem solving] does not usually lead to transfer
to new tasks....as the instruction focuses on helping students become
problem solvers who learn to recognize and monitor their approaches to
particular tasks, transfer is more likely to occur (p. 69-70).

DIRECT VERSUS INFERENTIAL LEARNING. Approaches such as inquiry
development and the techniques used in the HOTS program involve guiding students
through the process of figuring out what strategies to apply and where those strategies
can lead them. Some researchers and developers (e.g., Hansler 1985; Orr and Klein 1991;
Pogrow 1988) offer evidence that this approach enables students to learn thinking skills,
rather than merely learning ABOUT them. HOTS Program developer Stanley Pogrow
calls the process "controlled floundering"—"floundering" because students must feel
their way (along a line of reasoning, for example), but "controlled" because teachers stay
with them and assist them to work through the steps of their tasks.

Others favor direct instruction in the steps of whatever thinking process the teacher wants
the students to learn. Teachers using this approach typically demonstrate the process
using events and ideas which are familiar to the students and then applying the same
generic process to unfamiliar material, usually new content from the school curriculum.
Proponents claim that many students, particularly those whose out-of-school lives have
offered little exposure to higher-order thinking, cannot be expected to develop these skills
inferentially and must be taught them directly. The efficacy of direct instruction in a
variety of thinking skills is demonstrated in the work of Freseman (1990); Herrnstein, et
al. (1986); Pearson (1982); and Wong (1985), among others.

Again, it would appear that either approach can be effective, and a blend of the two may
well be most effective. Pearson, for example, favors both direct instruction and guided
practice:

...I think the justification exists for placing more emphasis on direct
explicit teaching, interactive discussions, substantive feedback, and
control and self-monitoring strategies
TIME REQUIREMENTS FOR THINKING SKILLS INSTRUCTION. This topic is not so much the subject of controversy as of uncertainty; even the experts seem uncertain as to how much time should be devoted to thinking skills activities in order for students to learn those skills well. Of course, time requirements will be different for different students, and experience shows that some students become adept thinkers with no explicit instruction at all.

The research can only address the time question obliquely, since most researchers don't design studies in which different groups of students are exposed to different amounts of instruction. What the research does show is that those commercial or locally developed programs which have made substantial differences in students' academic performance are quite time intensive.

Instrumental Enrichment requires three to five hours of instruction per week over approximately two years. Philosophy for Children, a K-12 curriculum, calls for three 40-minute periods weekly. Odyssey is made up of 100 45-minute lessons. Programs such as HOTS, which are designed especially for at-risk students who have limited experience in understanding and applying higher-order strategies, require even more time. Pogrow (1987) says:

It takes an extensive amount of time to produce results—at least 35 minutes a day, four days a week, for several months, for true thinking skills development to occur.

Given these kinds of time demands, conducting meaningful thinking skills instruction clearly requires a high level of staff commitment and administrative support.

CLASSROOM CLIMATE. Research shows that positive classroom climates characterized by high expectations, teacher warmth and encouragement, pleasant physical surroundings, and so on, enhance all kinds of learning. In the thinking skills literature, there is an especially strong emphasis on the importance of climate go so far as to say that:

Teachers and administrators should systematically evaluate the general culture of their classrooms and schools and should estimate how this culture affects their ability to promote critical reasoning habits among students.
The point made by these writers and many others is that moving beyond one's mental habits and experimenting with new ways of looking at things—the very stuff of thinking skills instruction—involves risk. In order for students to be willing to participate in such activities, they:

...need to feel free to explore and express opinions, to examine alternative positions on controversial topics, and to justify beliefs about what is true and good, while participating in an orderly classroom discourse.

Here again, research can provide illumination only indirectly; however, it is the case that the validated programs in the research base include both teacher training components and classroom activities which emphasize establishing open, stimulating, supportive climates.

How might this be accomplished? Thacker lists twelve recommended teacher behaviors, all of which will be familiar to good teachers, for fostering a climate conducive to the development of thinking skills:

- Setting ground rules well in advance
- Providing well-planned activities
- Showing respect for each student
- Providing nonthreatening activities
- Being flexible
- Accepting individual differences
- Exhibiting a positive attitude
- Modeling thinking skills
- Acknowledging every response
- Allowing students to be active participants
- Creating experiences that will ensure success at least part of the time for each student
- Using a wide variety of teaching modalities.

**SUMMARY**

Findings emerging from the thinking skills research reviewed in preparation for this report include:

- Providing students instruction in thinking skills is important for several reasons:
  - These skills are necessary for people to have in our rapidly changing, technologically oriented world.
  - Students, in general, do not have well-developed thinking skills.
  - Although many people once believed that we are born either with or without creative and critical thinking abilities, research has shown that these skills are teachable and learnable.
• Instruction in thinking skills promotes intellectual growth and fosters academic achievement gains.
• Research supports providing instruction in a variety of specific creative and critical thinking skills, study techniques, and metacognitive skills.
• Instructional approaches found to promote thinking skill development include redirection, probing, and reinforcement; asking higher-order questions during classroom discussions, and lengthening wait-time during classroom questioning.
• Computer-assisted instruction is positively related to intellectual growth and achievement gains.
• Many commercially available thinking skills instructional programs have been shown to bring about improvements in students' performance on intelligence and achievement tests.
• Training teachers to teach thinking skills is associated with student achievement gains.
• In addition to program content, classroom practices, and teacher training, the success of thinking skills instruction is also dependent upon other factors, such as administrative support and appropriate match between the students and the instructional approach selected.
• Neither infused thinking skills instruction nor separate curricula is inherently superior to the other; both can lead to improved student performance, and elements of both are often used together, with beneficial results.
• Student performance has been shown to improve as a result of both direct teaching and inferential learning of thinking skills. Again, some programs have successfully combined these approaches.
• Because thinking skills instruction requires large amounts of time in order to be effective, administrative support and schoolwide commitment are necessary for program success.
• It is especially important to establish and maintain a positive, stimulating, encouraging classroom climate for thinking skills instruction, so that students will feel free to experiment with new ideas and approaches.

In both school settings and in the world outside of school, it is crucial for people to have "skills in questioning, analyzing, comparing, contrasting, and evaluating so that [they] will not become addicted to being told what to think and do". Putting into practice the findings from the thinking skills research can help schools to teach these skills and students to gain and use them.
Teaching Tips

Encouraging Academic Integrity in Your Courses

In any given situation, it is up to the individual whether he or she chooses to cheat or to Behave honestly. Notwithstanding that, circumstances matter, and good people under Certain circumstances will choose what they perceive as the easier alternative. What can? You do as a teacher to encourage your students to do honest work? There are many Reasons cited by students when they are asked why they cheated, plagiarized or Collaborated dishonestly. Some of the most common reasons can be instructive regarding what faculty members and teaching assistants can do to discourage dishonest behavior and encourage academic integrity in their courses.

I do not feel any sort of personal connection with my professor/TA. Class sizes are increasing, which makes it harder to get to know our students. The more We can try to connect in a meaningful way with our students, the less likely they are to Cheat.

- Tell them a little about yourself, and how you came to be a professor or graduate student.
- Make a serious effort to learn the names of at least some of your students.
- Let them know that you are an honest person and that you value that trait in Others.
- Explain why practicing the principles of academic integrity is important in your Field/profession, and what the consequences are if these principles are not Followed.
- Let them know that you are all on the same side as far as the ultimate goal – Learning – is concerned, rather than establishing a “me against them” mentality.
- Establish an environment that is conducive to their coming to see you (rather than Resorting to cheating or plagiarizing) if they have a problem with getting a paper or an assignment done on time.

If my professor doesn’t take teaching this course seriously, why should I take learning the material seriously?

Students perceive that professors and teaching assistants who re-use assignments and tests repeatedly without changing them are not putting much effort into teaching or helping the students learn the material. If students respect you, they will be less likely to cheat in your course.

- Change assignments and exams regularly. Provide students with copies of old exams and assignments for practise or post them on the web.
- Make assignments relevant and interesting, and design them so that it is difficult for students to plagiarize or cheat on them. For example, you can ask for outlines and drafts, annotated bibliographies, and photocopies of the first page of each of the references. You can also assign very specific topics that would not be available from a commercial paper mill. The following website has more specific suggestions for how to create such assignments:

Take a real interest in teaching by talking about it with your colleagues and
attending seminars or workshops about teaching. You will probably find that both you and your students will enjoy your course more, which should have a positive effect on your teaching (and your course evaluations!).

My professor just tells off students who cheat and makes them resubmit the assignment, so what’s there to lose? It’s definitely worth the risk to cheat. Students get to know the professors and the teaching assistants who turn a blind eye to cheating and plagiarism, and interpret this as implicit support for dishonest behaviour.

- Discuss in your class or tutorial the issue of academic integrity as well as your and the University’s policies regarding academic offenses and the penalties involved.
- Include some reference to these policies in your course outline for every course.
- Consider inviting your liaison librarian to your class to discuss proper citation and paraphrasing practices.
- Make absolutely explicit your expectations regarding collaboration (and outside help such as tutors) on assignments and/or papers at the beginning of each course, and repeat this information often during the term.

It’s impossible NOT to see the test paper of the person sitting beside me during exams.

- Provide sufficient space between people taking a test. Reserve another room, if necessary, to allow for this, and ask the departmental secretary to arrange for graduate-student proctoring help.
- Have more than one ordering of questions on tests, and do not colour-code different test versions, as this allows students to know which tests are the same as theirs.
- Proctor tests conscientiously. Avoid merely sitting or reading passively at a desk at the front of the class or allowing your TAs to do this – circulate in the room and monitor students’ behaviour carefully.

How could I possibly have time to do a weekly assignment in each of the five courses I’m taking? My instructor seems to have no idea that I’m taking other courses!

- Be reasonable in your expectations of students. They are (usually) taking other courses and have responsibilities beyond their school work. Students should spend 8-10 hours per week on each course, and this includes in-class time.
- Set assignments that have reasonable, achievable deadlines and that have a clear purpose that aligns with the goals of the course. Avoid assigning ‘busy work’.
- Be available to students and/or have teaching assistants be available for help, particularly at crucial ‘crunch’ times before assignment due dates and test dates.

I thought that the material I found on the web didn’t need to be referenced because it is in the public domain, not actually in a book.

- Let your students know that ALL ideas and information that they incorporate into their work should be referenced, even something that someone told them about (referenced as a “personal communication” from that person).
- Warn them that some material on the web might not be as accurate or reliable as
that found in books and scholarly journals because much of it has not been subjected to peer review.

- Teach them proper citation practice for information from all sources, including web sources. Your liaison librarian can help with this if you are unsure about it yourself.

**Key Strategies for Effective Tutorials**

For many graduate students, teaching tutorials is often their first – and in some instances, only – chance to apply and develop their teaching skills. Running tutorials (also called “seminars”) can provide challenges for both TAs and faculty members. Numerous teaching aspects are involved in making tutorials productive learning events. Among the most important are: planning, communicating, delivery, question strategies, activities, and motivation. Below you will find useful strategies to help you deal with each one of these aspects.

**Planning**

- *Tutorials should have their own learning goals.* Check that your goals are congruent with those of the course instructor and that they clearly define what students will do. Then communicate these goals to your students. Focus not on “covering material” but rather encourage active learning among your students.

- *Define guidelines and rules from the beginning.* Devote time early in the term to familiarizing students with essential guidelines for successful and productive learning. Tell them your guidelines, and ask for their input and opinions about them. You will also likely have a number of non-negotiable rules (e.g., due dates), but be flexible when possible (e.g., time for submitting assignments, locations for assignment submission, etc.). Provide students with an accurate copy of the goals and guidelines for your tutorial. Make sure that the penalties for infringement are clearly explained (i.e., how many marks will be lost).

- *Prepare a lesson plan for each session.* Begin with your learning objectives for the session as a way to help you limit your content to 2-3 main concepts for a 50-minute session. Make sure to include time estimates for each section of the tutorial.

- *Have your supporting materials ready.* If you plan to use visual aids (i.e., overheads, handouts), make sure they are legible and concise. If you plan to use the chalkboard, determine how to
partition and use it. It’s also a good idea to prepare a few extra problems, examples, or activities in case students want or need additional practice. If you need to demonstrate equipment use, practice before the tutorial.

**Communicating**

- **Encourage students to participate.** Make sure you are not the only one talking in your classroom. Mention explicitly that you expect students to participate and that they should feel free to make comments and ask questions. Provide opportunities for participation (e.g., pause periodically and ask if there’s something that students would like to say).
- **Comment on student performance and behaviours.** With large classes, tutorials may be the only time when students can get expert feedback on their work. Explain what’s wrong, where and why. Put it in writing, if possible. Remember to commend good work too. The more your students get out of your tutorials, the better their attitude (and attendance) will be.
- **Make an effort to learn students’ names and use them.** You could use name tents, ask students to say their name when asking questions, or return assignments to them personally. Students will regard the tutorial as more important if they feel that they are known to you, and that you will notice if they are absent.
- **Avoid excessive formality, but don’t get too close.** Some tutorial leaders may feel insecure or nervous and behave in an overly strict or stand-offish manner. Assess your work climate by watching how your colleagues relate to students. Try to act naturally. If you are close to students in age, you may be tempted to socialize too much with them. Faculties have codes of conduct between staff and students. Remember that your job may require assessment. You need to ensure that students do not question your objectivity.
- **Do not ignore disruptive student behaviour.** Although dealing with it can be awkward, you need to resolve it as soon as possible because it can deprive other students of their right to learn. Ask the disruptive students if they have questions. Remind students of expected classroom behaviour stated on the first day of class. You may also need to speak to the student(s) involved outside of class.
Delivery

- *Keep pace with lecture progress.* Tutorials normally follow up a lecture. Try to attend lectures yourself (seek lecturer’s consent first). Alternatively, arrange for a pool of students to bring you a copy of their notes after the lectures, so that you have a better picture of what students have learned.
- *Make connections among parts of the course/tutorial.* Help students visualize the ‘big picture’ and integrate together the tutorial contents with the rest of their experiences in the course. Make statements like, “remember when we learned how to calculate x earlier in the term?” or “later on in the term, you will learn about…” You may also ask students to make such links.
- *Use relevant examples.* Illustrate points with examples taken from the field under study. When possible, share personal research or real-world experiences to help students visualize practical applications of concepts.
- *Use solid delivery skills.* Maintain eye contact during your tutorials so you can see raised hands and develop a rapport with your students. Speak loud enough and with enthusiasm to keep student attention. As well, move naturally around the room. Circulating the room while students are working allows them to ask questions easily.
- *Avoid speaking to your visuals.* Whether you use the blackboard or a screen (for overheads or electronic presentations), you may be tempted to look at and speak to your visuals. Remember to point your toes to the back of the room before you speak so that students can hear you and you can see their responses to your teaching.

Questions

- *Tutorials are the best times to ask detailed questions.* Make sure that students are aware of this. Suggest that they jot down questions and issues as they arise during lectures and bring their lists to the tutorial. But also let them know that you expect them to search for answers by themselves before coming to you.
- *Prepare questions in advance.* Challenge students to venture beyond their current knowledge and attitudes. To help accomplish this, carefully design questions before the tutorial sessions. Even
when you expect students to have enough questions during the tutorials, having prepared your own set of questions (and answers) can help you to improve their learning and increase your confidence.

"Are there any questions?" Many education experts believe this type of question is somewhat wasteful. Such inquiries are often viewed by students as a "ritualistic" exercise on the instructor's part and are usually met with silence. When asking for questions, be sure that your question is genuine and has a clear purpose. Ask for questions on specific topic areas. If your question is met with no response, be prepared to use follow-up probing questions, such as: "So if I were to ask you on an exam whether ..., you would know how to answer?" This usually increases students’ desire to understand the concept and elicits questions. Be sure to wait up to 10 seconds for a response.

Before answering, repeat questions. By doing this, you will ensure that everybody has a context for your answer. An additional point to remember is to look at the whole class when responding, not just at the questioner. A general rule of thumb is to give 25 percent of your eye contact to the questioner and 75 percent to the rest of the audience. By using this “25/75 rule,” you help to include everybody in the room.

Admit when you don't know the answer. You will lose more credibility by trying to fake an answer than by stating that you don't know. If you don't know the answer to a student's question, compliment the student on the question, then ask the class if anyone knows the answer (be sure to verify any responses). If there are no answers, volunteer to find the answer yourself and report back at the next class or ask the student to do this.

Activities

Favour high-learning activities. Taking notes, listening passively and pretending that they understand are behaviours that students should not be displaying during tutorials. Some subject-related tasks that can help students to learn-by-doing are: solving problems, discussing different perspectives, asking questions, answering questions, working out different approaches to problems or case studies, and engaging in debates.

Give clear instructions. Before starting an activity, make sure that students understand what to do.
Explain the goals and provide time breakdowns, then form groups if necessary. Write the instructions on the board, or consider providing printed instructions. When an activity is over, be sure to debrief to reinforce the goals and the “take home” message.

Avoid the temptation to turn tutorials into lectures. It is all too easy for tutorials to degenerate into an extension of lectures, and for students to be as passive in tutorials as they may be in lectures. You may decide to expand on lecture topics from time to time; however, if this becomes a trend in your tutorials, it may indicate that the learning goals are not being met during lectures. If you suspect this is the case, talk to the lecturer.

**Motivation**

Students’ attitudes toward tutorials may need changing. Students often regard tutorials as optional and their attendance may be erratic. If it is possible to divert some of the syllabus coverage – and some of the associated assessment – into academic tutorial times, it is more likely that staff and students will take tutorials more seriously. Be sure that your tutorials add value to the course.

Never put students down. Showing respect for all students is critical. Students can be highly sensitive to snubs or sarcasm, especially if they’re feeling insecure. You need to act professionally at all times.

Acknowledge and thank participation. Short phrases such as, “that’s a good point,” “thanks for saying that,” or “I see what you’re saying, but have you considered…?” allow students to develop insight instead of feel inadequate or foolish. Acknowledge all answers whether they are accurate or not. Students get disheartened if their response is passed over without comment because it is not what the tutor wants to hear – in ordinary conversation it would be considered extremely disrespectful to do this. However, be sure to provide or elicit an accurate response so the class has correct information.

Don’t be afraid to commend good performance. Receiving praise for doing something well is highly motivating. Sincere praise from a tutor for insight, achievement, participation, or helpfulness will make students feel good and more likely to participate again.

**Other Strategies**
Save time by making time. If you need to be available to students outside of class, set up office hours, post them on your office door or website, and be there! Office hours can minimize the interruptions to your research work that can occur when students do not know when best to approach you.

If you need help, ask somebody. Your first resource should be the course instructor or coordinator. Whether a fellow TA or a faculty member, she/he will most likely have accumulated experience and insight to share with you as well as suggestions. In difficult cases, the University Conflict Resolution Office can be helpful.

Keep good records. Make notes about attendance, topics covered, questions asked and student difficulties with the material. Such records will be very helpful if you’re involved in running the same tutorial again and may provide useful feedback to the course instructor.

Solicit student feedback. Ask how they are finding their learning experience and what they think you should stop, start, and continue doing. Check whether or not they have mastered concepts that have been covered already. Also, consider having an anonymous website where students can post opinions and suggestions for you.

Don’t wait until after the midterm or end of the term to get feedback. The instructor evaluation forms will not help you diagnose and address problem areas in real-time. You have to constantly monitor your tutorial. Evaluation data are also helpful for overall reflection on your teaching and they provide evidence of your teaching effectiveness.

Motivating Students: Creating an Inspiring Environment

We can positively affect the environment within which students learn by paying attention to students’ sense of inclusion, their attitudes toward learning, the meaning they make of course material, and their feelings of competence. The strategies listed below overlap somewhat and should work together. Consider how much difference one small change might make toward creating an inspiring teaching and learning environment. And refer to the last page for a reflection tool on your profile as a motivating instructor.
1. Establishing inclusion: Create or affirm a learning atmosphere in which you and your students feel respected by and connected to one another (focus on these strategies, in particular, at the beginning of class):
   - Establish a relationship with your students by sharing something of value with them (e.g., time, humour, feelings, values)
   - Introduce yourself so that your students know more than your name and contact information (e.g., outside interests, family, academic history, personal experiences)
   - Have your students introduce themselves, either to the whole class or to a small group (in a large class setting)
   - Use a short opening activity ("ice-breaker") to help your students relax and get to know each other
   - Get to know your students as individuals (e.g., their academic history, their goals for taking course, their future plans) by using 3x5 index cards or a questionnaire
   - Use students’ names, not only in class but also when giving written feedback
   - Use gender-inclusive and culturally diverse examples
   - Listen to students with warmth and respect – give them your full attention
   - Be personable and approachable – remember the positive power of a smile
   - Validate all comments and questions, even those that seem irrelevant or inappropriate
   - Welcome criticism and receive it with an open mind
   - When you don’t know something, ask your students for help
   - Use a class management approach that is fair, accepted by students, well understood, and consistently applied
   - Be faithful to your promises: follow through on what you have said regarding class structure, course content, and grading

2. Developing attitude: Create or affirm a favourable disposition in your students toward learning in your course (focus on these strategies, in particular, at the beginning of class):
   - Model enthusiasm for the subject taught
   - Be clear about your expectations: tell students what they need to do to succeed in your course
   - Preview the content and structure of the course to build student interest
   - Use focusing methods to arouse curiosity and to draw students’ attention to new topics (e.g., puzzling questions, problems to be solved, suspenseful stories, cartoons, newspaper clippings)
   - Clearly state course objectives from the students’ perspective (e.g., “You will learn…”).
☐ To the extent possible, shape the course content and goals based on your students’ interests and needs – use a survey or question-answer session to determine these needs
☐ When feasible, give students a choice in the type of assignments they can do (e.g., essay, artwork, model, group presentation)
☐ Provide the opportunity for self-discovery through problem solving, experimentation, and self-evaluation
☐ Allow flexibility in how the final grade will be calculated, e.g., paper=35% and mid-term=25% or vice-versa; allow students to take two mid-terms or to take one mid-term and write a paper
☐ Communicate high expectations – assume that students do want to learn
☐ When a student’s (negative) emotions are apparent, approach the student in a caring way and discuss the feelings and positively confront the possibly erroneous beliefs, expectations, and assumptions that may underlie the student’s negative attitude
☐ Associate a seemingly unmotivated student with other students who are enthusiastic about the subject

3. Enhancing meaning: Create engaging and challenging learning experiences that target your students (focus on these strategies throughout the class period):
☐ Introduce the unfamiliar through the familiar – build on information students have learned previously, either in your course or in other courses
☐ Discover students’ strengths, interests, and goals, and relate the topic or learning activity to them
☐ Use effective presentation skills (e.g., movement, voice inflection, gestures, and pauses)
☐ Use audio-visual aids and props to reinforce your material
☐ Midway through a long lecture, give your students a stretch/chat break
☐ Be structured: give clear summaries and transitions, and make explicit connections between the objectives and class activities
☐ Vary your presentation style (i.e., don’t lecture for the whole class period)
☐ Use humour, examples, analogies, and stories
☐ Use active learning techniques (e.g., question-answer sessions, pair problem-solving, short discussions, and brief independent study activities in lectures)
☐ Give students opportunities to work together (in and out of class time) on projects and case
studies
☐ Limit your use of knowledge and comprehension questions, and increase the use of application, analysis, synthesis, and evaluation questions
☐ Ask students to provide relevant examples from their job or co-op experience
☐ Invite practitioners from a relevant field to speak to the class
☐ Take your students on a field trip either during the lecture period or outside of class time
(You can assign small groups for large classes and you may cancel a class period to make up for any extra time spent out of class)
☐ Hold high but realistic expectations for your students – challenge them to grow
☐ Challenge students’ thinking on controversial issues and address opposing views to your argument
☐ Design tests that encourage the kind of learning you want students to achieve

4. Engendering competence: Create or affirm an understanding that your students have effectively learned something they value and perceive as authentic to their real world

(focus on these strategies at the end of class or the end of an activity):
☐ Encourage students: give recognition for real effort, minimize mistakes when they are still struggling, show consistent trust in their capacity to learn, emphasize learning from mistakes
☐ When students are working on large projects, give feedback at each stage
☐ Make students feel valued about their progress, not only about their final grade
☐ Ask students questions which help them realize that they do know a lot – encourage them to try or guess
☐ Use closure techniques such as reviewing material, asking for feedback, and allowing for clarification
☐ Use a variety of feedback procedures to provide frequent, consistent feedback regarding mastery of learning
☐ Accompany grades with written or verbal feedback that is genuine, immediate, and specific
☐ Use constructive criticism: emphasize strengths, and be specific about areas for improvement
☐ Acknowledge and affirm the students’ responsibility in completing the learning task
☐ Acknowledge the risk taken and challenge involved in the learning accomplishment
☐ Demonstrate respect for your students’ efforts, however ill-informed and unsophisticated they may seem
Encourage your students to explore how the information they’ve learned will be useful for future courses or jobs. If, at the beginning of the period or course, you have sparked students’ curiosity with a problem they can not solve, return to that problem at the end of the learning time to show them how much they have learned. Involve other students in affirming the strengths of each student (e.g., peer evaluation). Help your students reflect on the process of their own learning: how and what were the critical processes that helped them achieve this knowledge. Link grades as tightly as possible to what has been learned. See yourself as assisting students to do well rather than as keeping them from good grades. To minimize competition, avoid norm-referenced grading systems (e.g., a “curve”). Celebrate class accomplishments with a discussion, party, round of applause, or congratulations – snacks still work for university students.

Your Motivation Profile

To help maximize your effectiveness as a motivating instructor and increase your self-awareness, respond to the questions below. They represent five areas that significantly affect your approach to student motivation. Writing out responses to each section can clarify your thoughts and make the entire process more concrete and useful for you.

1. Your perception of your students as learners:
   - Do you see them as naturally curious, intelligent, and creative? List six of your teaching behaviours that indicate this.
   - Do you trust them to learn? How?
   - Do you allow them to be responsible for their own learning? How?

2. Your perception of your teaching situation:
   - Do you feel free to be creative and imaginative in your teaching situation? If not, why?
   - What are the three major advantages and the three major obstacles in your teaching situation?
   - How is your teaching situation changing? How are you changing with it?

3. Your goals as a teacher:
   - What do you specifically want to happen as a result of your teaching? List and rank your five most important goals as a teacher.
   - How are you accomplishing these?

4. Your assumptions about student motivation:
   - What does motivation mean to you?
   - Describe the behaviour of a motivated student. What does she or he specifically do to let you know she or he is motivated? List five observable behaviours of a motivated student.
   - How often do you see these in your classroom?

5. Your perception of yourself as a motivating instructor:
List the top six things that you often do to facilitate student motivation.

Consider the best and the worst lessons that you teach. In your opinion, what makes the former motivating and what makes the latter unmotivating for students?

Complete this sentence as often as you can in a way that you believe your students would: “My instructor helps me to feel motivated because she or he . . . .”

After you have reflected upon and completed the five areas, return to each of the five sections and complete this sentence for each: “Answering and reflecting upon these statements and questions makes me realize that I . . . .” You will then have five declarative statements that personally relate to student motivation and your role as an instructor. There are no predictable answers, but these statements should help to stimulate your reflection on student motivation and clarify who you are or want to be as an instructor.

**Tools for Reflecting on Your Teaching**

To help you reflect on your teaching, you need some data. You may collect feedback on your teaching at any time of the term and from a variety of sources: your students, your colleagues, and yourself. This sheet provides a number of tools for you to choose from when collecting data about your teaching.

**Students’ Input:**

1. **Open-ended Questionnaires**

   **Description:** This tool requires students to provide written or verbal responses to various questions. It can be combined with closed-questions or a checklist. If using this technique, keep in mind that some questions can be too open (i.e., What did you like most/least about this course? could produce responses about how you dress). Try to focus students on their learning (i.e., What is helping you to learn in this course?), and ask them to provide examples and to recommend strengths, weaknesses, and ideas for improvement. *Example:* How does the sequence of course content in this class support or undermine your learning?

   **Variation:** Use sentence stems instead of complete sentences to prompt student responses (i.e., If I could change one thing in this class, it would be . . .)

   **Caveat:** Students generally have no training in observing instructional processes. As a result, they may have difficulties describing their reactions clearly and providing suggestions. To receive quality suggestions, you may need to give adequate time - perhaps overnight - for students to think about their responses.

2. **Closed-ended Questionnaires**

   **Description:** These questionnaires involve using a fixed set of items to solicit responses to certain characteristics of a course. Responses are scored on a scale (i.e., one to five, one to seven) or are multiple choice. These questionnaires are often machine-scorable, making them a good choice for any class size.

   *Example:* The way the course content is structured is clear and logical to me. Strongly Disagree 1 2 3 4 5 Strongly Agree
Variation: Ask students to complete the questionnaire. Then on a separate sheet of paper, ask them to highlight the three items with the highest ratings and the three with the lowest and list one or two specific behaviours or course incidents that made them give those ratings.

Caveats: This tool generally gives you only a general sense of the class's response. Also, if you do not use the variation listed or include a few open-ended questions, you will not receive any concrete ideas about why students gave the ratings they did. This tool used on its own also does not allow students to suggest ideas for improvement.

3. Checklists and Inventories

Description: These tools are like closed-ended questionnaires without the scale. They essentially establish the presence, absence, and extent of a behaviour or activity. They can be quite effective to use when reviewing an audio- or videotape (i.e., a taped class). These tools represent a good starting point if you're wary of collecting formative feedback. They may also help clarify discrepancies between how you view your teaching and how your students view your teaching.

Example: Is the course material clear and logical?

yes__ no__

Variations: Have students watch a videotape of another professor and rate that. Then use those comments to determine what also applies to your own teaching style. If you are wary of an initial feedback session, using a videotape of another professor will take the focus away from you. You can also supplement checklists with an open-ended section.

Caveats: With these tools, you can only learn about what you do (or don't do), not whether these activities are effective or how to improve them.

4. The One-Minute Paper and the Muddiest Point

Description: These exercises ask students to provide a written response to a specific prompt that you have given. The prompt is usually written on the board or an overhead for the class to see. They then take one minute to think about the question and another to write their responses. You collect the papers and assess them for recurrent themes, then you can address these themes in the following class.

Example: What was the most important concept discussed during this class? What question(s) do you still have?

Variations: Instead of asking students to tell what they understood during the class, ask them what the muddiest point of the lecture was, so you can learn what you may need to explain differently in future classes. Another variation is to divide the class into small groups and have them identify one or two common themes. Then have each group report them to the class.

Caveats: Since the one-minute paper is time restricted, students may not be able clearly articulate what they are thinking in such a short time span. You may decide to change this technique to be a little longer. Also the tool provides little opportunity for you to receive feedback on how to improve your teaching; it is more of a fact-finding technique about students' learning. The tool only gives you feedback on your instructional techniques if you specifically ask for it.
5. Blank Index Cards
*Description:* Similar to the One-Minute Paper, blank index cards enable you to gather a small amount of feedback quickly and easily. Students respond to two questions that you pose, answering one question per card side. The questions could be very general (i.e., What do you want more of? Less of?) or more specific (i.e., Are the problem sets too difficult?). Only allow students one to two minutes to jot down their ideas. With any more time, they may become frustrated with the limited paper space.
*Caveats:* The limited space may limit the depth and value of the responses; this is not a tool for extended feedback.

6. Suggestion Box
*Description:* This tool could involve bringing a suggestion box to your classroom every class or hanging an envelope on your office door. Students can use this method to provide you with anonymous suggestions regarding your teaching or the course in general. If using this type of assessment, be sure to direct students about what types of suggestions you would like: the more open you are, the more unfocussed the suggestions will be. Scan the suggestions regularly to put them into context, summarize them for the class, and indicate which ones you will act on and why.
*Caveats:* Students who write their suggestions by hand may not be totally honest since you may recognize their writing. Encourage students to submit typed suggestions if they are concerned.

7. In-class Troubleshooting Sessions
*Description:* If you have a solid rapport with your class, you may want to try a more direct approach to collecting feedback. With this method, you begin each class by asking students to raise issues, make complaints, and ask questions. In order for this to work effectively, students must see the value in such a discussion since it will take away from class time. There needs to be an atmosphere of openness and honest sharing to make this worthwhile. It is a time for discussion about the course and their learning.
*Caveats:* Students need to know what your rationale is for doing such an exercise. Without this explanation, the exercise will not reach its full potential.

8. Learning Letter or Student Journal
*Description:* Learning letters give students a more traditional venue for providing you with feedback about your course and your teaching. Students may feel more comfortable with this pen and paper (or computer) method, and the personal quality of a letter may encourage them to be more open and honest. As with many of the other tools discussed, try to keep the questions focussed to ensure you receive feedback only on the areas you are interested in. Also, you may want to set a length limit on the letters to limit the amount of reading you will have to do. Give students time to reflect on what they are going to say and pass it in next day. Once all letters have been collected and read, post or read your response letter to the class. This letter should include answers to common questions and your plans to address their concerns.
*Caveats:* This method may not be reasonable to use with a large class because of
reading it requires. Also, if students choose to use pen and paper, they may be concerned that you will recognize their handwriting and they may avoid being totally honest.

9. Email
Description: Email allows for immediate feedback from students. Simply pose a question or set of questions about the class, send it to your students or post it on an electronic bulletin board, and students can respond whenever they choose. You may, however, want to set a time limit for responses so you can move on to other question areas. You also need a system that ensures student anonymity. This tool works best in classes where students are already using computers for other purposes.
Caveats: You should avoid this method if not all of your students have access to email or if you cannot commit to checking your messages on a regular basis. You should also not have email replace office hours.

10. Voice mail
Description: Like email, students can use your voice mail at any time of the day or night to leave messages or provide feedback. Students are likely to use this tool only to inform you of their problems with the course content, not your instructional techniques. If using this method, be sure to check your messages regularly, particularly before each class so you can respond to students’ questions as soon as possible.
Caveats: It is unlikely you will get extensive, open feedback, since you may be able to identify students’ voices. As with email, voice mail should not replace office hours.

11. Student Liaison Committee (“Ombuddies”)
Description: “Ombuddies” or the student liaison committee can be an excellent way of getting feedback from large classes in particular. With this tool, a group of student volunteers act as a liaison between you and the class. The group can meet independently on a regular basis and then periodically meet with you to provide you with the feedback they have gleaned from their classmates. Or, this can be less formal and the students simply report to you questions or concerns as they arise. This method can be as formal or informal as you wish. What is important is that you provide the volunteers with some guidance about how to function as a committee and how to solicit and collect feedback from their peers. As well, the class should always know who the volunteers are and should receive regular reports from the “ombuddies” and/or you.
Variation: You may want to give the students who volunteer on the committee some compensation for their time, such as credit for one assignment or bonus marks.
Caveats: This tool can sometimes be quite time-intensive for you to meet with committee members regularly.

12. Group Instructional Feedback
Description: An outside facilitator, such as a colleague or someone from TRACE, leads this technique once you have introduced it and left the room. The method involves having the students respond to questions individually, then
moving into groups of 4-6 and recording the responses they agree on. The facilitator then reconvenes the whole class and asks groups to share responses in an effort to probe for further clarification and let the class see common ideas. The facilitator collects the groups’ response sheets and prepares a report for you. The activity takes 25-30 minutes and generally involves the following open-ended questions:
1. What is helping you to learn in this course? (Strengths/Specific Examples)
2. What could be changed to assist you with your learning? (Changes/Ways to Make Changes)
3. Other Comments? (Not to be discussed with the whole class)

Caveats: An outside facilitator may have difficulty understanding the course content. As a result, if that is the focus of your concern, you may be better to ask a colleague in your department to lead the exercise. Another concern is the vocal student with complaints who may negatively influence the others. A strong facilitator will limit this possibility. Finally, you will have to give up some class time to use this technique effectively.

Colleagues’ Input
1. Classroom Visit
Description: The best way for colleagues to provide feedback on your teaching is to watch you teach. The classroom visit enables colleagues to experience both your teaching style and your students’ reactions to it. To ensure you receive useful feedback from the visit, you should meet with your colleague in advance and discuss what you hope the visit will accomplish. Ask yourself: What do I want feedback on? and Can I act on the feedback I may receive? Thoughtful pre-planning will result in more focussed comments that you can put into action. Also keep in mind that you are under no obligation to tell your students that you have a colleague observing the class, but you may want to tell them to demonstrate you are interested in improving your teaching. Other tools you may want to use for the visit are checklists (as described in the student section) and videotapes (described next). Plan to meet with your colleague after the visit in order to receive feedback.

Variation: Instead of having a colleague come into your class, perhaps you could go into theirs. By observing what a colleague does, particularly within your own department, you may become aware of new teaching practices. Upon reflection, you may decide to incorporate or eliminate some techniques in your own teaching.

Caveats: Some faculty members may feel awkward about inviting a colleague, particularly their own department, to sit in on a class. If you are concerned about confidentiality, please consider contacting the TRACE office for a confidential classroom visit.

2. Microteaching (Videotape)
Description: This feedback method involves having your class videotaped. The video operator should tape you and your students to get a picture of your teaching and your students’ reactions to your teaching. You can then
review the tape on your own or, preferably, with a colleague (for a second opinion). This tool can be even more helpful if you use a checklist or some specific prompts when analyzing the video. This is an excellent resource for discovering exactly what you do and don’t do when teaching a class and does not have to be done for an entire class (i.e., 15 minutes of a 60-minute class, 25 minutes of a 90-minute class).

**Example Checklist Prompts:**
1. What am I doing well/not doing well?
2. What do the students seem to enjoy least/most?
3. If I could do this session again, what are 3 things I would change?
4. What resources do I need to use in order to change?

**Caveats:** This method offers factual information, but some faculty may find it too revealing to be comfortable with it. Consider reviewing the tape with a TRACE consultant for confidential feedback.

**Your Input**

1. **Journals**
   **Description:** Following each class, go to your office and write down what you felt worked and did not work for that day and why. Make note of things that you would like to keep the next time you deliver this class and things you should change. It is also a good idea to record any questions that students asked so that you can address them in the next delivery of the class. This tool can also be effective as an ongoing self-evaluation and can be a way to determine what you would like to change or keep the same in any teaching situation (i.e., delivery style).
   **Variation:** You may have a specific set of questions that you ask yourself after each class. Such as: “What worked well in my last class? How can I do more of that?” or “What concepts or areas did my students not seem to understand? How can I change that?”

2. **Questionnaires/Checklists**
   **Description:** Any questionnaire or checklist you have students or colleagues complete, you should complete as well and use as a point of comparison. How do your answers compare to those of your observers'? Similar answers can boost your confidence in your ability to read your class, while discrepancies can uncover problem areas you weren’t aware existed.
   **Caveats:** It is often more useful to discuss the feedback with others to clarify your understanding of the data and to see the data from another perspective. If you rely solely on yourself, you may not get an accurate picture of what is really going on.

3. **Assessment Tools as Feedback Tools**
   **Description:** Use your tests and exams as indicators of student learning. The simplest way to use these is with multiple choice exams and examproc. Instead of just getting the marks and giving them out, review the trends. In the examproc program, for example, you can get data indicating each student's answer to each individual question. You can use these counts to determine what areas most students seem to understand or have trouble
with. If you discover that most of the class answered a specific question incorrectly, you can review this concept again. You may also want to review the way you worded the question to determine its clarity or refer back to the class when you taught the concept to determine whether or not the confusion could have been a result of the way you taught that particular concept.

*Caveats:* You may not get an accurate picture of what caused students to answer the question correctly or incorrectly. Perhaps your method could have been effective but outside factors (i.e., a concert the night before) led people to pay less attention that day. As well, multiple choice questions do not provide a clear picture of why students choose a specific response because they do not allow for elaboration. You may need to follow up your statistical analysis with class discussion focusing on why students chose the answers they did.

TRACE can help at any point in the feedback process, including questionnaire development, data collection, data analysis, and ideas for improvement. All of these services are available to you on a confidential basis. Please call the TRACE Office (x3132) for more information or assistance.

**Using Mid-Term Feedback**

**General Strategies**

- **Decide what you want to assess.** For example, do you want to find out how well the students are learning the material, the effectiveness of your teaching, or something else of interest to you? The type of feedback you wish to receive will determine the questions you ask.

- **Schedule fast feedback at times appropriate to the course.** If you have just begun teaching, have drastically revised a course, or observed that students are having difficulties, you may want to hold a feedback session as early as the third week of classes. Otherwise, you may want to wait until mid-semester. Remember, though, if you ask for feedback after the mid-term test, most of the comments will relate to the exam.

- **Use different feedback techniques throughout the semester.** Experiment with techniques that appeal to you and see which produce the most helpful information. Consider developing your own methods for obtaining feedback.

**Collecting Feedback**

- **Review student work to collect informal feedback.** Use students’ in-class questions and work on assignments as gauges of their understanding of the course material. You might also periodically check their notes to see how well they are taking in the information.

- **Ask the students to reply anonymously to a few questions.** You can ask questions about what is going well in the course and what needs improvement. Leave the room while the students write their comments and have a student collect the responses and return them to you. You could also devise a questionnaire for them to complete.

- **Use a suggestion box.** Place a large envelope on your office door and encourage students to drop off questions, comments, or problems. You can bring a box to each class, too, if you wish.
If you are prepared to answer questions on a daily basis, you could give students your e-mail address. You might want to write open letters to the students asking them to answer specific questions about the class. Remember, though, e-mail is not a replacement for office hours, but rather one of many ways to hear from students.

Arrange for a formal feedback session by inviting a TRACE representative to collect feedback from your students. After you leave, the facilitator will ask questions, agreed upon by you, which students first answer individually, then in small groups, and finally, together as a whole class. With the class, the facilitator summarizes the points on which there is consensus, asks for clarification on points of disagreement, and probes for more detail where needed. The written comments are collected and a confidential report is created for you.

Have your class observed. You could arrange to have either a TRACE representative or a colleague observe one or more classes to give you feedback before the term is over. You may also opt to have a class videotaped by the Audio-Visual Centre staff.

Do your own analysis. You can be collecting your own mid-term feedback by writing notes to yourself on your lecture notes after each class, keeping a teaching journal, or completing checklists. One tip here is to make sure you record concepts that caused students difficulty or really insightful student questions so that you can alter your future lecture to deal with those areas.

Responding to Students’ Feedback

It is best to respond to students’ comments during the class following a TRACE feedback session: therefore, you should schedule these sessions when you are able to immediately review the comments. Respond to feedback received by other means, such as e-mail, as appropriate.

Consider carefully what students say. Review the positive comments about the course first, since it may be easy to be discouraged by negative comments. Then consider the suggestions for improvement and group them into three categories:

- Those you can change this semester (e.g., turnaround time on homework)
- Those that must wait until the next time the course is offered (e.g., the textbook)
- Those that you cannot or, for instructional reasons, will not change (e.g., the number of quizzes or tests)

Let students know what, if anything, will change as a result of their feedback. Students appreciate knowing that you care about what they say. Thank them for their comments and ask them to continue to help you improve the course. Clarify any misunderstandings about your goals and their expectations. Tell them what suggestions you will act on this term, those that must wait until next term, and those that you will not act on and why. Let students know what they can do to improve their learning, such as asking questions when they are confused.

Building Students’ Note-Taking and Study Skills

In the transition to university, students often take a “stenographer” approach to note-taking. Many feel that they need to record everything they hear. As a result, students may miss vast chunks of information as they struggle to write quickly. Students can organize their notes in several ways to highlight important concepts or information
Sequential notes are the most typical kind of notes we see from undergraduates. They start at the top of the page, use the whole width of the page, and are developed as they move down the page. Though these are efficient for listing important factual information, they do not illustrate relationships very effectively. Here are a few alternatives to sequential note-taking. These strategies are also effective study skills.

**Annotated Note-Taking (Cornell Method)**

You can maximize the effectiveness of sequential notes by dividing the note pages and annotating them. It allows students to take notes during the lecture, but also reserves space to summarize information, edit their notes, and insert their own questions and reflections.

Key terms and concept headings here

Text of the notes recorded here

Students' reflections, ideas, and relevant questions here

Adapted from: Encourage students to “think outside the box” when using this method. For example, they can optimize page use by organizing their page lengthwise (“landscape”).

Lecturers can help students by prompting them when topics change, or when a key concept is introduced. Writing your lecture “agenda” on the chalkboard beforehand is an essential way to indicate which main topics will be covered. Some lecturers provide PowerPoint skeletal notes to students (or make them available on a course website) so students can follow along appropriately.

In math lectures, the idea of dividing a lecture into columns of “central ideas”, “notes”, and “independent analysis” can be accomplished by using three different colours. In a math lecture, definitions, theorems, and subject headings might be presented in blue, indicating to the students that these are central concepts. The details of the lecture might be written in black, while questions for the students to answer or commentary might be presented in red, drawing the students’ attention and encouraging the students to think independently. Even if the lecturer is limited to a single colour of chalk, the same effect can be accomplished by underlining central concepts and writing questions and comments in a different font or style.

**Concept Mapping**

Mapping is a particular style of note-taking where a ‘tree’ is built around a central concept. It is very helpful in making relationships clear.

Maps start with a central topic (here: learning efficiently), then main branches are added, which should be the main subdivisions or the main factors affecting the topic. Here the main branches are motivation, students’ expectations, human limitations, and instructor’s input. Next, the ramifications of or connections to each branch can be added; they describe the relationships between the topics in each branch.
When describing each branch, students should ensure that they use short nouns and descriptive verbs in order to concisely and clearly describe the relationships or effects. Long words and sentences will make these maps cumbersome and hard to follow.

Study Skills
Cognitive Strategies
Concept Mapping
Note Taking
Time Management Strategies
Results Resources

include described by motivated by
Higher Marks
TRACE Tips Sheets
Study Skills Workshops
Increased Comprehension
TRACE Tips Sheets
Study Skills Workshops
Increased Comprehension
Reorganizing Ideas

include include include include
related include
include

All maps will look different. Students should be creative in adapting content to their map.

You can model the mapping approach with students using the topics of one lecture. For example, at the end of your lecture, instead of providing a verbal summary of the content, you can interactively create a concept map with the students. You can also use mapping for in-class review activities covering course-wide material.

Matrices
Matrices are an effective way to organize, categorize, and otherwise learn the relationships between related aspects of a topic. They are essentially tables where topics are listed for each column and common aspects are listed for each row. You can help students build these by handing out empty matrices they can fill in themselves.

Types of Notes
Sequential Annotated Notes Mapping Matrix

**Uses**
- Traditional method
- Editing, summarizing, and students’ reflections
- Helps define key ideas and relationships
- Helps define key ideas and relationships

**Benefits**
- Convenient for students
- Helps with factual detail
- Room for reorganization
- Encourages reflection
- Students discover more relationships
- Leads to higher-order thinking
- Students discover more relationships
- Leads to higher-order thinking

**Format**
- Verbatim notes
- No indentation, full sentences
- Left column: topics and summaries
- Right column: student reflections
- Key ideas within circles, surrounded by lines
connecting to
information
☐ A table like
this one!

How to Integrate Note-Taking and Study Instruction into your Classes

Research finds that the vast majority of students have never been explicitly taught how to learn. It also finds that students who learn how to learn are more likely to be retained in university and have higher grades. Therefore, introducing these reading skills requires a bit of time on your part. Students need to understand what the strategy is, when they should use it, and how to perform it.

You should:
☐ Find out how your students approach note-taking and studying by asking them to write a short, informal piece on the first day of class. This will enable you to efficiently introduce skills that your students don’t know about. Diagnostics at the term’s onset are extremely helpful!
☐ Model the strategy and provide explanations. It is important for students to learn how to properly perform these skills.
☐ Intervene early in your course. Don’t wait until the midterm assessment to find out that your students are not taking notes properly.

You could:
☐ Provide a reading assignment that requires using any of the above strategies.
☐ Use an agenda to indicate key concepts for the lecture.
☐ Prompt students when lecture topics change.
☐ Provide skeletal PowerPoint notes on a course website.
☐ Create a concept map together with your class to summarize the lecture or term.
☐ Provide the class with a ‘note-taking and study strategies’ handout on the first day of class.
☐ Have a short class discussion about students’ personal note-taking and study strategies.

Ultimately, keep in mind that students make choices about their note-taking and study habits. Teaching them effective habits will increase the likelihood of retention in university and solid academic performance.

Motivating Students:
Creating an Inspiring Environment

We can positively affect the environment within which students learn by paying attention to students’ sense of inclusion, their attitudes toward learning, the meaning they make of course material, and their feelings of competence. The strategies listed below overlap somewhat and should work together. Consider how much difference one small change might make toward creating an inspiring teaching and learning environment. And refer to the last page for a reflection tool on your profile as a motivating instructor.
1. Establishing inclusion: Create or affirm a learning atmosphere in which you and your students feel respected by and connected to one another (focus on these strategies, in particular, at the beginning of class):
   - Establish a relationship with your students by sharing something of value with them (e.g., time, humour, feelings, values)
   - Introduce yourself so that your students know more than your name and contact information (e.g., outside interests, family, academic history, personal experiences)
   - Have your students introduce themselves, either to the whole class or to a small group (in a large class setting)
   - Use a short opening activity ("ice-breaker") to help your students relax and get to know each other
   - Get to know your students as individuals (e.g., their academic history, their goals for taking course, their future plans) by using 3x5 index cards or a questionnaire
   - Use students’ names, not only in class but also when giving written feedback
   - Use gender-inclusive and culturally diverse examples
   - Listen to students with warmth and respect – give them your full attention
   - Be personable and approachable – remember the positive power of a smile
   - Validate all comments and questions, even those that seem irrelevant or inappropriate
   - Welcome criticism and receive it with an open mind
   - When you don’t know something, ask your students for help
   - Use a class management approach that is fair, accepted by students, well understood, and consistently applied
   - Be faithful to your promises: follow through on what you have said regarding class structure, course content, and grading

2. Developing attitude: Create or affirm a favourable disposition in your students toward learning in your course (focus on these strategies, in particular, at the beginning of class):
   - Model enthusiasm for the subject taught
   - Be clear about your expectations: tell students what they need to do to succeed in your course
   - Preview the content and structure of the course to build student interest
   - Use focusing methods to arouse curiosity and to draw students’ attention to new topics (e.g., puzzling questions, problems to be solved, suspenseful stories, cartoons, newspaper clippings)

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☐ Clearly state course objectives from the students’ perspective (e.g., “You will learn…”)
☐ To the extent possible, shape the course content and goals based on your students’ interests and needs – use a survey or question-answer session to determine these needs
☐ When feasible, give students a choice in the type of assignments they can do (e.g., essay, artwork, model, group presentation)
☐ Provide the opportunity for self-discovery through problem solving, experimentation, and self-evaluation
☐ Allow flexibility in how the final grade will be calculated, e.g., paper=35% and midterm=25% or vice-versa; allow students to take two mid-terms or to take one mid-term and write a paper
☐ Communicate high expectations – assume that students do want to learn
☐ When a student’s (negative) emotions are apparent, approach the student in a caring way and discuss the feelings and positively confront the possibly erroneous beliefs, expectations, and assumptions that may underlie the student’s negative attitude
☐ Associate a seemingly unmotivated student with other students who are enthusiastic about the subject

3. Enhancing meaning: Create engaging and challenging learning experiences that target your students (focus on these strategies throughout the class period):

☐ Introduce the unfamiliar through the familiar – build on information students have learned previously, either in your course or in other courses
☐ Discover students’ strengths, interests, and goals, and relate the topic or learning activity to them
☐ Use effective presentation skills (e.g., movement, voice inflection, gestures, and pauses)
☐ Use audio-visual aids and props to reinforce your material
Midway through a long lecture, give your students a stretch/chat break

Be structured: give clear summaries and transitions, and make explicit connections between the objectives and class activities

Vary your presentation style (i.e., don’t lecture for the whole class period)

Use humour, examples, analogies, and stories

Use active learning techniques (e.g., question-answer sessions, pair problem-solving, short discussions, and brief independent study activities in lectures)

Give students opportunities to work together (in and out of class time) on projects and case studies

Limit your use of knowledge and comprehension questions, and increase the use of application, analysis, synthesis, and evaluation questions

Ask students to provide relevant examples from their job or co-op experience

Invite practitioners from a relevant field to speak to the class

Take your students on a field trip either during the lecture period or outside of class time

(You can assign small groups for large classes and you may cancel a class period to make up for any extra time spent out of class)

Hold high but realistic expectations for your students – challenge them to grow

Challenge students’ thinking on controversial issues and address opposing views to your argument

Design tests that encourage the kind of learning you want students to achieve

**Engendering competence: Create or affirm an understanding that your students have effectively learned something they value and perceive as authentic to their real world** *(focus on these strategies at the end of class or the end of an activity)*:

Encourage students: give recognition for real effort, minimize mistakes when they are still struggling, show consistent trust in their capacity to learn, emphasize learning from mistakes

When students are working on large projects, give feedback at each stage

Make students feel valued about their progress, not only about their final grade

Ask students questions which help them realize that they do know a lot – encourage them to try or guess

Use closure techniques such as reviewing material, asking for feedback, and allowing for clarification

Use a variety of feedback procedures to provide frequent, consistent feedback regarding
mastery of learning
- Accompany grades with written or verbal feedback that is genuine, immediate, and specific
- Use constructive criticism: emphasize strengths, and be specific about areas for improvement
- Acknowledge and affirm the students’ responsibility in completing the learning task
- Acknowledge the risk taken and challenge involved in the learning accomplishment
- Demonstrate respect for your students’ efforts, however ill-informed and unsophisticated they may seem
- Encourage your students to explore how the information they’ve learned will be useful for future courses or jobs
- If, at the beginning of the period or course, you have sparked students’ curiosity with a problem they can not solve, return to that problem at the end of the learning time to show them how much they have learned
- Involve other students in affirming the strengths of each student (e.g., peer evaluation)
- Help your students reflect on the process of their own learning: how and what were the critical processes that helped them achieve this knowledge
- Link grades as tightly as possible to what has been learned
- See yourself as assisting students to do well rather than as keeping them from good grades
- To minimize competition, avoid norm-referenced grading systems (e.g., a “curve”)
- Celebrate class accomplishments with a discussion, party, round of applause, or congratulations – snacks still work for university students!

Your Motivation Profile
To help maximize your effectiveness as a motivating instructor and increase your self-awareness, respond to the questions below. They represent five areas that significantly affect your approach to student motivation. Writing out responses to each section can clarify your thoughts and make the entire process more concrete and useful for you.

1. Your perception of your students as learners:
   - Do you see them as naturally curious, intelligent, and creative? List six of your teaching behaviours that indicate this.
   - Do you trust them to learn? How?
   - Do you allow them to be responsible for their own learning? How?

2. Your perception of your teaching situation:
   - Do you feel free to be creative and imaginative in your teaching situation? If not, why?
   - What are the three major advantages and the three major obstacles in your teaching situation?
   - How is your teaching situation changing? How are you changing with it?

3. Your goals as a teacher:
What do you specifically want to happen as a result of your teaching? List and rank your five most important goals as a teacher.
How are you accomplishing these?

4. Your assumptions about student motivation:
   What does motivation mean to you?
   Describe the behaviour of a motivated student. What does she or he specifically do to let you know she or he is motivated? List five observable behaviours of a motivated student.
   How often do you see these in your classroom?

5. Your perception of yourself as a motivating instructor:
   List the top six things that you often do to facilitate student motivation.
   Consider the best and the worst lessons that you teach. In your opinion, what makes the former motivating and what makes the latter unmotivating for students?
   Complete this sentence as often as you can in a way that you believe your students would: “My instructor helps me to feel motivated because she or he . . . .” After you have reflected upon and completed the five areas, return to each of the five sections and complete this sentence for each: “Answering and reflecting upon these statements and questions makes me realize that I . . . .” You will then have five declarative statements that personally relate to student motivation and your role as an instructor. There are no predictable answers, but these statements should help to stimulate your reflection on student motivation and clarify who you are or want to be as an instructor.

Active Learning Activities
Following are various active learning activities that you might use in conjunction with the traditional lecture format. These activities are viable for classes of any size.

Questions: Questions are the simplest form of interaction and can occur at any time during the lecture. By asking questions, you not only turn students into active participants, but you can also get a sense of their interest and comprehension. You might try asking questions at strategic points or asking for comments or opinions about the subject. Vary the timing of your questions though to avoid creating a known pattern for students which can lull them into passivity.

Pro and Con Grid: The Pro and Con Grid lists advantages and disadvantages of any issue and helps students develop analytical and evaluative skills. It also forces students to go beyond their initial reactions, search for at least two sides to the issue, and weigh the value of competing claims. Let students know how many pros and cons you expect and whether they should use point form or full sentences.

Brainstorming: In this activity, students generate ideas which you record on the blackboard or overhead. When beginning a new topic, you might begin by saying “Tell me everything you know about…” You may decide to put the students’ comments into categories, or you might ask students to suggest categories and comment on the accuracy and relative importance of the array of facts, impressions,
and interpretations. The main rules of brainstorming are to acknowledge every offering by writing it down and save any critiquing until after the idea generation time is over.

☐ **Formative (ungraded) Quizzes:** This technique involves writing quiz questions on the board, an overhead projector, or a handout and giving students an appropriate time to respond. You may wish to collect anonymous responses, or if the question entails multiple choice, students can raise their hands in agreement as you announce each response. A quiz at the beginning of class allows you to determine how familiar students are with important terms, facts or concepts prior to the lecture, while a quiz that follows a lecture segment can reveal how well students understood the material.

☐ **Think-pair-sharing:** In its simplest form, students think about a particular question or scenario then they pair up to discuss their ideas. They then share their results in a large class discussion. Think-pair-sharing forces all students to attempt an initial response to the question, which they can then clarify and expand as they collaborate. This process should take five to ten minutes, depending on the question’s complexity. An extension of this format is to have two pairs join each other and compare answers.

☐ **One-Minute Paper or Short Writes:** Punctuating your class with short writing assignments is a powerful way to assess the degree to which students understand presented material. You might ask, “What was the most important thing you learned during this class?” “What questions remained unanswered?” or “Summarize the main point of today’s lecture in one sentence.”

☐ **Problem Solving: Demonstrations, Proofs and Stories:** Begin a lecture with a question, a paradox, an enigma, or a compelling, unfinished human story. Solving the problem, depending on what it is or in what field, may require a scientific demonstration, a mathematical proof, an economic model, the outcome of a novel’s plot, or a historical narrative. You refer back to the problem throughout the lecture, inviting students to fill in imaginative spaces in the story (or model) with their own solutions. Students fill in their successive answers passively, or the instructor elicits responses which are recorded on the board and discussed. Example questions include: “What do you think will happen?” “Which solution, outcome, or explanation makes the most sense to you?”

☐ **Modeling Analytical Skills:** This involves viewing and analyzing passages of text, paintings, sonatas, graphs, charts, artifacts, etc. together with your students. You should make sure students have a copy of the document in front of them (or visual access through slides or overhead transparencies), and then follow three steps: model the analysis, let the students practice it, and then give them feedback.

☐ **Debates:** Debates allow you to add a participatory dimension to your lecture without compromising your control of the class. One strategy is to divide students according to where they happen to sit. Another approach is to ask them in advance to seat themselves in the section representing a particular side of the debate. When some students refuse to choose one side or the other, create a middle ground and invite their reasons for choosing it. Before concluding, you should ask two or three volunteers to make summary arguments for each side.

☐ **Role Playing:** The first step in this lecture variation is to give a mini-lecture to
establish the context and setting for the role playing. Then divide the class into a number of small groups of varying sizes (if you have a large class, you may have to assign duplicate roles). Each group is assigned a clearly delineated role and given a specific, concrete task – usually to propose a position and course of action. To bring closure to the topic, a debriefing exercise is necessary to help identify what students learned and make the transition to the next topic.

Using Visual Aids
There are effective and ineffective ways to use visual aids in presentations. Ineffective use is very common in both academia and industry. Good visuals used in the right way can help your audience stay attentive and retain information. The tips below will help you decide when and how to effectively use overhead projectors and slides, blackboards, handouts, and computer programs like PowerPoint. You may also wish to see the Tips from TRACE sheet called “Designing Visual Aids.”

1) Use visuals when they will help your audience
To make visuals effective, use them to:
- focus the audience’s attention
- reinforce the key components of your verbal message
- stimulate and maintain interest
- illustrate complex concepts that are difficult to visualize
- aid the audience’s comprehension
- increase retention
Avoid using them to:
- impress your audience with overly-detailed text, charts, or animations – avoid information overload
- limit interaction with your audience
- present simple ideas that are easily stated verbally
- serve as your cue cards

2) Select appropriate visual aids and equipment
Elaborate does not necessarily mean effective. It can be tempting to spend more time preparing visual aids than presentation content. The result may be insubstantial and distracting – and the higher the technology, the more things can go wrong. The following tips will help you choose appropriate visual aids and equipment:
- consider giving your audience context via a handout before the presentation
- have a “plan B” visual aid: bulbs burn out, screens fall down, and computers crash
- weigh the pros and cons before using computer programs like PowerPoint:

PowerPoint pros:
- potentially inexpensive
- attractive designs
- smooth transitions between slides
- possible to add/subtract material (parts of charts, graphs) from slides
PowerPoint cons:
- complicated equipment required
- hassle to set up
- special effects often distracting
- time-consuming to prepare except for experienced users

3) Interact with your audience and make sure YOU remain their focus
Presenters may be tempted to hide behind (or lose themselves in) their visual aids. It is important to maintain contact with your audience and remember that you, not your visual aids, are giving the presentation. At best, visual aids are an accessory – you should remain the centre of attention. The following tips will help:
- remember to ask questions, stimulate discussions, and use other interactive methods as appropriate
- maintain eye contact with your audience
- watch out for facial cues of boredom, confusion, falling behind, etc.
- remember that visual aids are aids for your audience: lecture notes are aids for you
- assume that your audience will copy everything from your visual aids: keep information on visual aids minimal, and keep it visible for long enough
- if possible, position overhead projectors and screens diagonally to the front of the class: thus, you can occupy the room’s focal point instead of having to stand aside.
Consider ordering a free portable screen from the Audio-Visual Centre (Ext. 3031)

4) Prepare and be organized
Preparation and organization can make the difference between a successful and a frustrating presentation. The following tips can help:
- computers may be ruined in areas of excessive chalk dust
- before the presentation, check lines of sight to your visual aids from all parts of the seating area: use only those areas that will be visible to all audience members
- before the presentation, experiment with arrangements of furniture and visual aids
- place overhead slides in a pile in order, right side up before the presentation
- test overhead projectors and screens in advance to focus and find the right distance for the projector to fill the screen
- turn off overhead projectors when you’ve finished with a slide if you don’t intend to present another one shortly – the fan and glaring white screen are distracting
- you’re better off without any visual aid about which you think you will say, “You don’t need to worry about this material,” “Ignore this,” “This probably doesn’t make sense to you,” or, “You probably can’t see this at the back.”

Varying Your Teaching Activities:
Nine Alternatives to Lecturing
As long as class sizes continue to increase, it is likely that lecturing will be a dominant teaching method in university class rooms. However, there are many different activities that can be integrated into a lecture-based course to encourage the students to engage with the subject
material, to facilitate interaction among the students and between the students and the professor, and to revitalize the course by providing a change of pace. This Tips Sheet provides more detailed descriptions of nine activities, including a number of relatively structured activities, along with their time requirements, special features, implementation procedures, and function in the course. The activities are: 1) Questions, 2) Pro and Con Grid, 3) Debate, 4) Guided Analysis, 5) Case Study, 6) Field Trip, 7) Role Play, 8) One-Minute Paper, and 9) Ungraded Quiz.

**Activity 1: Questions**

**Time requirements:** Varies

**Special features:** Questions are the simplest form of interactive teaching tool. They are useful in any discipline. They can help make students active learners and gauge their level of interest and comprehension.

**Procedure:**

- Develop key questions before class. They won’t occur to you on the spot.
- Decide when you’re going to ask them. Thinking ahead also allows you to plan your time.
- Ask questions that can be answered, but favour open-ended questions over yes/no questions.
- Vary the form and level of the questions. Questions that have multiple correct answers or that rely only on general knowledge are good for encouraging participation. More complex questions can be used to gauge student knowledge.
- Ask only one question at a time or you will confuse the students.
- Pause between asking and accepting replies (pausing gives students a chance to think of an answer, and by not asking the first person who raises his/her hand, you encourage quieter students to participate).
- Acknowledge all answers – thank students for participating, repeat their comments so the class can hear and/or write them on the board. This supports continued participation.
- Keep the whole class involved in the question and answer exchange. Move around the room when trying to elicit participation. When responding to a student question or comment, split your attention so that you are focused on the class in general 75% of the time and the student commenter 25% of the time. **Function in the class:** Questions are integral to the success of discussion groups. They can also be the organizing principle behind a tutorial or lecture. During lectures, ask questions early on to stimulate interest and gauge students’ level of knowledge; in the middle, to break the pace of the lecture; and/or at the end, to review main ideas and gather ideas for future classes.
Activity 2: Pro and con grid

**Time requirements:** 15-20 minutes

**Special features:** This technique helps students develop analytical and evaluative skills, and encourages them to go beyond initial reactions to complex issues. It can be used in any discipline: students can evaluate the pros and cons of a procedure, technique, conclusion, action of a fictional character, political decision, etc.

**Procedure:**
- Divide students into small groups, if necessary.
- Specify how many pros and cons you’d like each individual or group to develop.
- Allow five to ten minutes for discussion or silent thought.
- Ask for input: write pros on one side of the board and cons on the other side.
- Combine pros and cons that are very similar, and count the number of times they recur to show their perceived importance.

**Function in the class:** Consider using the pros and cons as the basis for a debate, or for a discussion/lecture structured around the evaluation of course material.

Activity 3: Debate

**Time requirements:** 15-25 minutes

**Special features:** Debates can be formal or informal: what follows is about informal debates (i.e., debating as a method of class discussion). See Bean (1996) for instructions for holding a formal debate – a much more complicated and lengthy process that can be a focal point for an entire segment of course material. A debate is a good way to encourage class participation in large groups without losing control, and they can work in any discipline. Instructors can plan debates beforehand, or they can emerge spontaneously from classroom material.

**Procedure:**
- Describe the background context, and explain why you are having a debate.
- Consider establishing ground rules for the discussion (ex. Disagreements are welcome, name calling and interruptions are not).
- Decide on the two (or more) sides to the debate. Physically group the class according to points of view: either assign students a point of view depending on where they sit, or ask people who want to argue each point of view to move to sit together.
- Invite someone from one side to begin the debate by stating his/her point of view.
- Invite someone from the other side to state the opposite point of view.
- Open the floor to comments that question or expand on the issues that were raised.
- For large groups, you may want to have speakers raise their hands while you moderate, but for small groups, anyone can speak up.
- The debate will probably start slowly at first, but the intensity should pick up as the
students become more comfortable with the new style of in-class interaction.

- You, as moderator, can ask provocative questions, but don’t express judgement on any point of view or students will hesitate to bring out new ideas for fear of being embarrassed.
- After 10 to 15 minutes of debating, end the debate.

**Function in the class:** Use ideas and conflicts from the debate to lead into your presentation of course material.

**Activity 4: Guided analysis**

**Time requirements:** 30-50 minutes

**Special features:** This technique helps students develop their analytical skills in any field by observing your analytical skills in action.

**Procedure:**
- Select a document (a short review, section of computer programming, poem, proof, chart, abstract from an article, news item, etc.) to analyze as an example.
- Make enough copies of a similar document to distribute to all class members or to small groups (depending on your preference).
- Perform an analysis of your document in front of the class, making clear the procedure you use to reach your assertions, and using visual aids and supplementary material as necessary.
- Give students five to ten minutes to analyze their document: the conclusions they reach will be their own, but they will have learned rigour and analytical skills from you.
- Depending on class size, have students (or representatives from small groups) present their analysis, and respond to each one.

**Function in the class:** An entire 50-minute tutorial or lecture can be structured around this exercise. Consider leading into the exercise with a mini-lecture on the type of document you and your students will be analyzing.

**Activity 5: Case study**

**Time requirements:** 20-50 minutes

**Special features:** The case-study method was pioneered at the Harvard law and business schools. Business and law cases tend to be very detailed and long, and take several classes to analyze, but instructors can apply a simplified case-study method (described below) for teaching in many disciplines. Applying theory to an instance as described by some source material can demonstrate the applicability of the course material beyond the classroom.

A good case study:
- Presents students with a situation they can relate to from their own life experience.
- Includes realistic information. Examples can include scripts of exchanges that took place between key parties, news articles about situations of interest, background information
about the organization of interest, etc.
- Has a conflict that students can resolve.

**Procedure:**
- Get source material (short story, news articles, account of a decision or procedure, video, role-play script, etc.) to use as the basis for the case study.
- Provide students with a focus or framework to use in doing their analysis.
- Give students time to analyze the case individually or in groups, and to write down their analysis.
- Begin a discussion of students’ analyses.
- Act as a mediator of the discussion. Don’t offer your own opinion except to provide guidance on the process (remind students of the framework if discussion becomes unfocused).
- After analysis has been completed, show how the case study illustrates application of theoretical or background concepts in course material.

**Function in the class:** Use a case study to lead into a discussion or lecture of course material, showing its relevance by referring back to the case study.

**Activity 6: Field trip**

**Time requirements:** At least 50 minutes; preferably a couple of hours

**Special features:** A field trip can be especially interesting for students and instructors, and it facilitates some types of learning that cannot take place in a classroom. A field trip to a professional institution can show students where their studies may lead them. A field trip for the purpose of gathering data can give students practice with research techniques and show them the relevance of course material to the outside world. Some courses or departments require field trips which you will have to lead. In other courses, you might be able to consider short field trips during your discussion groups or tutorials to locations on or near campus. For example:
- For an engineering course, consider arranging a tour of one of UW’s lab facilities
- For a sociology course, consider sending students to observe the working conditions of various jobs on the UW campus.
- If leaving the classroom is not feasible, consider using media such as videos or computer simulations as "virtual" field trips.

**Procedure:**
- Prepare for time constraints, bad weather, and other misfortunes.
- Look at past course outlines or notes to gather ideas for where to go.
- Communicate a clear “mission” of the field trip to the students.
- Research shows that students learn more from field trips in which they are not simply observers: encourage students to participate in their surroundings by giving an assignment
that must be accomplished using data from the field or notes from a visit.

- Taking effective field notes and identifying the key points of a field trip can be hard: consider giving students a worksheet allowing them to do a self-guided tour – include questions to be answered.

- During the class before the field trip, have a preparatory session: discuss practical matters (dress, safety, equipment to bring) and the academic background to the field trip.

- Very important: allow enough time for debriefing (discussing and processing data obtained on the field trip) as soon as possible afterwards.

**Function in the class:** Generally, an entire class will be spent on a field trip. Classes before and afterwards can be used to prepare for and process the trip. A field trip can provide a good focus for a segment of course material.

**Activity 7: Role-play**

**Time requirements:** 20-30 minutes

**Special features:** Role-plays can be used to allow students to experiment with different styles of interaction, practice new communication techniques or explore complex issues. They are generally used in classes dealing with social issues (social sciences, management sciences, etc.) or communication strategies (interviewing techniques, conflict management, etc.). If possible, participate in a role-play yourself before trying one in class. Essentially, a role-play is a form of interactive case study where the experience of participating in the role-play is the basis for further discussion.

**Procedure:**

- Get scenarios and characters for role-plays from news stories, history books, generic business situations, or by writing them yourself from scratch.
- Explain why you are using a role-play to cover course material.
- Describe the background context or setting to the role-play.
- Give roles to “players”: hand them a card with a brief description of the character they’re playing, their point of view, characteristics, etc.
- For groups with more students than possible roles, you can either assign “observer” tasks to non-players (e.g., taking notes on a particular player), or assign identical roles to sub-groups of students (e.g., one student can play a city council member, and a sub-group of four or five students can play a homeowners’ coalition).
- Ask for volunteers for certain roles or observers: you may use this as one way to allot bonus points to students.
- Allow a few minutes for students to prepare for their roles.
- After 10-15 minutes, end the role-play.

**Function in the class:** Debrief and discuss the role-play. Use players’ perceptions and
observers’ notes to lead into discussion of course material. Pay special attention to conflicts, ambiguities, etc.

**Activity 8: One-minute paper**

**Time requirements:** 3-5 minutes

**Special features:** The one-minute paper and the ungraded quiz that follows are both examples of ungraded, written, in-class activities (see Davis, 1993 p. 209-212 for more options). These activities are a flexible way to acquire candid feedback on the course material and your presentation style. The one-minute paper can be done especially quickly and it shows students that they can write quickly and spontaneously, and enhances general writing ability.

**Procedure:**
- Give a prompt for the paper such as “what was the most important concept of this lecture?” or “what was the muddiest point of this lecture?”
- Give students one or two minutes to think about the topic without writing anything.
- Give students a short period of time (1 minute?) to write as much as they can.
- Collect papers (depending on the class atmosphere and the types of questions used, you may ask students to put their names on them but generally these ungraded assignments are left anonymous to encourage open responses to the questions.)

**Function in the class:** Assign one-minute papers at the end of a class to gauge comprehension, provide general writing practice, and give students an incentive to absorb and comprehend course material. Consider using the content of one-minute papers to plan content of upcoming classes: when students see that the instructor responds to their concerns, confusions, and questions in future classes, they will be motivated to participate.

**Activity 9: Ungraded quiz**

**Time requirements:** 5-10 minutes

**Special features:** An ungraded quiz encourages students to pay attention during lectures by presenting them with a short-term, non-threatening learning objective. It can be done very quickly, and also provides you with a source of candid feedback on students’ knowledge level.

**Procedure:**
- Write question(s) on the board, overhead, or handout
- Give students five to ten minutes to respond on a blank sheet of paper (depending on the atmosphere in the class, you may keep the quiz anonymous or ask students to put their names on papers)
- Collect papers and report on responses next time the class meets
- One variation: Prepare multiple-choice answer options and present each one in turn, asking for a show of hands
Another variation: Before (or instead of) collecting quiz papers, have students exchange and "grade" each other’s quiz papers based on the answers you present. This grading is to allow students to provide the students with timely feedback so that they can gauge their understanding and should not be used as a formal assessment.

**Function in the class:** Use ungraded quizzes at the beginning of a lecture to determine the level of knowledge, or at the end of a lecture as a review and incentive for students to retain and comprehend information. Alternatively, use an ungraded quiz at the end of a lecture to gauge how successful you’ve been in teaching the material.

**References:**
Frederick, P.J. “The lively lecture – 8 variations.” College Teaching vol. 34 no. 2, pp. 43-50.

Questions are the simplest form of interactive teaching tool, particularly in large classes, and are useful in any discipline. They can help promote active learning and gauge students’ level of interest and comprehension. Ask questions from the first day of class to set a precedent; you will have a much better participation level than if you try to change your routine midway through the term.

- Develop key questions before class (they won’t occur to you on the spot – this also allows
you to plan your time)
☐ Decide when you’re going to ask them. During lectures, ask questions early on to stimulate
interest and gauge students’ level of knowledge; in the middle, to break the pace of the
lecture; and/or at the end, to review main ideas and gather ideas for future classes
☐ Ask questions that can be answered, but favour ones with complex answers
☐ Vary the form of questions: those that gauge knowledge, require diagnosis or
explanation, or challenge conclusions
☐ Ask only one question at a time
☐ Pause between asking and accepting replies (pausing gives students a chance to think
of an
answer, and by not asking the first person who raises his/her hand, you encourage quieter
students to participate)
☐ Acknowledge all answers – repeat so the class can hear and/or write them on the board
(this
also helps to show you understood the answer)
☐ Move around the room – avoid focussing exclusively on the respondent

**Brainstorming**

Brainstorming can be simple and useful in all disciplines but it must be used appropriately to be
effective. Choose a strategic point in your class for brainstorming: for example, when
beginning
a new topic or at the end of a lecture as review. Use students’ input to decide on sub-
topics to
focus on during your class, to identify possible lines of questioning, and to assess
students’ level
of comprehension and interest in your topic.
☐ Decide exactly how much time you’ll allot to the brainstorming, and enforce it
☐ Present students with a question or issue that you want their ideas on: emphasize
*quantity*
over *quality*. For large classes you should use a prompt that asks for tentative responses
rather than declarative statements. For example, “tell me what you know, have heard, or
have read about this topic.” This allows your students to offer responses without having to
fear being “wrong.”
☐ Use a few minutes of silence for students to write down their ideas before hearing them
☐ Accept students’ input and organize it into logical groupings, if relevant
☐ Apply only two rules: acknowledge every offering by writing it down and don’t allow
judgements of any idea until brainstorming is over (this includes your judgements!)

**Quescussion**

Quescussion, as the name indicates, combines questions and discussion into one activity.
The
professor asks a question or makes a statement to the class (this question should be
written on the
blackboard or overhead projector). There are four basic rules when responding to this prompt:

☐ Discussion has to be in question form (No statements!)
☐ A person may speak only every n th time
☐ No fake questions (i.e., a statement disguised as a question. For example, "small classes are better than large ones, aren't they?")
☐ No ad hominems: an attack on someone else (i.e., "a person would be crazy if they thought that, wouldn't they?" - this is also a disguised statement)

By following these four rules, the quescussion can occur effectively. All questions are recorded, grouped, and used to determine students’ exposure to and understanding of a specific topic. It can also be used to determine topics to cover in each lecture. By framing the discussion into questions, students feel less intimidated to speak in front of the large class. As well, the questions are tentative (impossibly wrong) responses rather than declarative (possibly wrong) responses. The rule of speaking every n times (for example, 3 or 4) generates a variety of voices and allows for reflection while waiting for a turn to speak.

**Debate**

A debate is a good way to encourage class participation in large groups *without losing control*, and they can work in any discipline – not just the social sciences. They can emerge spontaneously from classroom material but are best used with planning.

☐ The first step is to describe the background context, and explain why you are having a debate
☐ Then decide on the two (or more) sides to the debate and physically group the class according to points of view. For example, the people sitting on the right-hand side of the room are for a concept, while the people on the left-hand side are against it
☐ For large groups, you should have speakers raise their hands while you moderate. The debate will probably start slowly at first, but the intensity will pick up
☐ You, as moderator, can ask provocative questions, but don’t express judgement on any point of view (at least not until afterwards!)
☐ After 10 to 15 minutes of debating, end the debate and reflect on what was said
☐ You can use ideas and conflicts from the debate to lead into your lecture, review lecture concepts to end the class, or make a segue to your next class

**Think-pair Share**
This is a good ice-breaking technique for early in the term. It’s also an easy way to make large classes interactive and encourages more students to participate than regular question strategies. Use the offerings of students after think-pair sharing to lead into a lecture or discussion of class material.

- Pose a question or problem to entire class: answerable but complex
- Give students one to three minutes to think about it individually then divide students into pairs
- Have them discuss their answers with each other for two to three minutes
- Invite students to share responses with entire class: those whose ideas have been challenged, reinforced, or refined will probably volunteer

**One-sentence Summary**

This is one possible ungraded written in-class activity. This exercise not only enhances comprehension, but also writing skills, and can provide you with valuable written feedback. Used at the end of the class, the one-sentence summary can be a good review of material just covered. At the beginning of the class, it can review material covered previously and serve as a starting point for the lecture of the day. The one-sentence summary can also be used in its own right to enhance general writing ability.

- Objective is for students to state the major point of an entire lecture or section in a limited amount of writing
- Select a recent issue covered in class, in relation to that issue, answer the following questions as quickly as possible in front of your students: “who did what to whom, when, where, how, and why?” and turn your answer into a grammatical sentence
- Announce another, similar topic to your students and give them five minutes or so to produce their own one-sentence summaries
- Collect these to determine if students recognized the key points of the lecture. One optional extension is to have students swap with the person next to them – have a few minutes’ silence for reading and formulation of comments, then a few minutes of discussion in pairs before discussing the summaries as a class

**One-minute Paper**

This shows students that they can write quickly and spontaneously, and enhances general writing
ability. Like a one-sentence summary (and the ungraded quiz that will be discussed next), a one-minute paper can provide you with a source of candid feedback on course material and your presentation style. It can also encourage students to think about the key concepts discussed during this class. You can assign one-minute papers at the end of a class to gauge comprehension, provide general writing practice, and give students an incentive to absorb and comprehend course material. Consider using the content of one-minute papers to plan content of upcoming classes: when students see that the instructor responds to their concerns, they will be motivated to participate in future classes.

☐ Give a prompt for the paper such as “what was the most important concept of this lecture and what was the muddiest point of this lecture?”
☐ Give students one or two minutes to think about the topic without writing anything
☐ Give students one minute (or another short period of time) to write all they can
☐ Collect papers (depending on the class atmosphere, you may ask students to put their names on them or keep them anonymous)
☐ You can also use this exercise as a measure of participation or as a short assignment and assign a grade to each

**Ungraded Quiz viii**
An ungraded quiz encourages students to pay attention during lectures by presenting them with a short-term, non-threatening learning objective. It can be done very quickly, and also provides you with a source of candid feedback on students’ knowledge level. Use ungraded quizzes at the beginning of a lecture to determine the level of knowledge, or at the end of a lecture as a review and incentive for students to retain and comprehend information. Alternatively, use an ungraded quiz at the end of a lecture to gauge how successful you’ve been in teaching the material.

☐ Write question(s) on the board, overhead, or handout
☐ Give students five to ten minutes to respond on a blank sheet of paper (depending on the atmosphere in the class, you may keep the quiz anonymous or ask students to put their names on papers)
☐ Collect papers and report on responses next time the class meets. One variation: prepare multiple-choice answer options and present each one in turn, asking for a show of hands.
Another variation: before (or instead of) collecting quiz papers, have students exchange and “grade” each other’s quiz papers based on the answers you present. This grading is to allow students to gauge their understanding and should not be used as a formal assessment.

**Student Liaison Committee (“Ombuddies”)**ix

“Ombuddies” or the student liaison committee can be an excellent way of getting feedback from large classes in particular. With this tool, a group of student volunteers act as a liaison between you and the class. The group can meet independently on a regular basis and then periodically meet with you to provide you with the feedback they have gleaned from their classmates. Or, this can be less formal, with the students simply reporting to you questions or concerns as they arise. The class should always know who the volunteers are and should receive regular reports from the “ombuddies” and/or you. There are two components that make this activity work:

☐ Provide the volunteers with some guidance about how to function as a committee and how to solicit and collect feedback from their peers

☐ Students should know one another. Ombuddies should be used in highly structured programs or upper-year classes where students are going to be familiar with each other. If a student is reluctant to talk to you about an issue, they will most likely be apprehensive about talking to a fellow student who is a total stranger.

☐ Be sure to tell students about what types of suggestions you would like: the more open you are, the more unfocussed the suggestions will be

☐ Scan the suggestions regularly to put them into context, summarize them for the class, and indicate which ones you will act on and why

☐ Keep in mind that students who write their suggestions by hand may not be totally honest since you may recognize their writing. Encourage students to submit typed suggestions if they are concerned

**Blank Index Cards**

Similar to the One-Minute Paper, blank index cards enable you to gather a small amount of feedback quickly and easily.

☐ Students respond to two questions that you pose, answering one question per card side
Questions could be very general (i.e., What do you want more of? Less of?) or more specific (i.e., Are the problem sets too difficult?)

- Allow students one to two minutes to jot down their ideas. With any more time, they may become frustrated with the limited paper space
- Collect students’ responses and answer any questions they have during the next lecture

**Email & Voicemail**

In large classes, it can sometimes be difficult to respond to every concern or question. Email and voicemail allow students to ask questions or provide feedback on a particular issue at any time of the day or night.

- Be sure to check your messages regularly, particularly before each class so you can respond to students’ questions as soon as possible
- Clearly explain your guidelines for using these tools. Specifically, you should explain how often you will check your messages, the type of language that should be used (it is a lot easier to be unpleasant to a computer than it is to a person), and policies regarding timing of questions (i.e., you will not explain a concept in detail the night before the exam)

**Internet**

You can use an electronic bulletin board or course website to post the course syllabus, course notes, assignment instructions, or administrative details (i.e., your office number, dates for tests and so on). More intensive use of the Internet could involve using bulletin boards, chatrooms, or on-line discussion groups to answer student questions or pose discussion questions. These tools work best in large classes if students are divided into smaller groups and are graded on their participation. Also, consider what face to face activity you will eliminate from your course to make time for on-line discussions.

**References:**

Note: you may find many books and journal articles on teaching methods in addition to these ones in the TRACE library (Math & Computing Building, room 4055). However, we have selected the following sources because they are concise and easy to use.


Effectively Communicating Assignment Tasks:

Telling Students What You Really Want

Language is a critical element in properly communicating the intent of assignments to students.

When your assignments are clear, your students are more likely to produce what you wanted.

The following tips tell you what is really meant by some common task descriptors. When you review the assignment with your students, consider explaining the terms you have used to be sure they understand what you meant.

Commonly Used Language

Identification Terms: cite, define, enumerate, give, identify, indicate, list, mention, name, state
**Description Terms**: describe, discuss, review, summarize, draw, illustrate, sketch, develop, outline, trace

**Relation Terms**: analyze, compare, contrast, differentiate, distinguish, relate

**Demonstration Terms**: demonstrate, explain why, justify, prove, show, support

**Evaluation Terms**: assess, comment, criticize, evaluate, interpret, propose

**What is really meant?**

**Analyze**: Divide a complex whole into its parts or elements, laying bare parts or pieces for individual scrutiny, so as to discover the true nature or inner relationships.

**Compare**: Look for qualities or characteristics that resemble each other. Emphasize similarities among them, but in some cases also mention differences.

**Contrast**: Stress the dissimilarities, differences, or unlikeness of things, qualities, events or problems.

**Criticize**: Express your judgment about the merit or truth of the factors or views mentioned. Give the results of your analysis of these factors, discussing their limitations and good points.

**Define**: Give concise, clear, and authoritative meanings. Don't give details, but make sure to give the limits of the definition. Show how the thing you are defining differs from things in other classes.

**Describe**: Recount, characterize, sketch, or relate in sequence or story form.

**Draw**: Give a drawing, chart, plan, or graphic answer. Usually you should label a diagram. In some cases, add a brief explanatory description.

**Discuss**: Examine, analyze carefully, and give reasons pro and con. Be complete and give details.

**Enumerate**: Write in list or outline form, giving points concisely one by one.

**Evaluate**: Carefully appraise the problem, citing both advantages and limitations. Emphasize the appraisal of authorities and, to a lesser degree, your personal evaluation.

**Explain**: Clarify, interpret, and spell out the material you present. Give reasons for differences of opinion or of results, and try to analyze causes.

**Illustrate**: Use a figure, picture, diagram, or concrete example to explain or clarify a problem.

**Interpret**: Translate, give examples of, solve, or comment on, a subject, usually giving your judgment about it.

**Justify**: Prove or give reasons for decisions or conclusions, taking pains to be convincing.

**List**: As in "enumerate," write an itemized series of concise statements.

**Outline**: Organize a description under main points and subordinate points, omitting minor details.
and stressing the arrangement or classification of things.

**Prove:** Establish that something is true by citing factual evidence or giving clear logical reasons.

**Relate:** Show how things are related to, or connected with, each other or how one causes another, correlates with another, or is like another.

**Review:** Examine a subject critically, analyzing and commenting on the important statements to be made about it.

**State:** Present the main points in brief, clear sequence, usually omitting details, illustrations, or examples.

**Summarize:** Give the main points or facts in condensed form, like the summary of a chapter, omitting details and illustrations.

**Trace:** In narrative form, describe the progress, development, or historical events from some point of origin.

**Common descriptions of information sources:**

**Web-based:** There are many types of online information, including e-journals, homepages, newsgroups, and more. When you discuss “web-based” resources, be specific about what sort of online information you are referring to.

**Scholarly journals:** Articles are long, use terminology or jargon of the discipline, usually begin with an abstract and include a bibliography (e.g., *Canadian Journal of Experimental Psychology; Journal of Academic Librarianship; IEEE Transactions on Microwave Theory and Techniques*).

For more information on scholarly journals see: http://books.valdosta.edu/ref/bi/pop.html

**Popular journals:** These are geared towards a more general audience and available on your local newsstand. Articles are short and rarely have bibliographies. (e.g., *Maclean’s, Discovery, Psychology Today, Time, Newsweek*).

**Current:** Specifically define your boundaries for “current.” Do you mean “current” as in this week, this year, this decade, this century, etc.? Can they refer to older material at all, if it is relevant?

**Peer reviewed (or refereed) journal articles:** Explain the process of having experts in the field examine an article before it is published to ensure that the research described is sound and of high quality. Refer students to the Notes for Authors section of a journal to determine if it follows peer review. Alternately, refer students to *Ulrich’s International Periodicals Directory* in the Library. It lists Refereed journals.

**Primary sources:** These provide firsthand information in the original words of the creator or eye witness and may include creative works, original documents, reports of original research, or ideas.
Secondary sources: These provide information reviews and/or, evaluation, analysis or interpretations of primary sources.

Assignment Design: Sequencing Assignments
The goal of assignment sequencing is a stepwise development of students’ skills (i.e., movement from preliminary to higher level critical thinking or disciplinary skills) through a progression of assignments that all fit together to produce a larger end product. It involves exploring subject matter in increasingly complex ways or from different angles. Assignment sequences can augment a cohesive course design in that the sequence steps can highlight various key components while the end product can incorporate all elements of the course.

Sequencing Possibilities
- **Use a book-end or entry-exit model.** Have students write down everything they know about the targeted issue/skill set at the beginning of the assignment sequence. At the end of the sequence, have them write down everything they know in light of their new experiences.
- **Submit drafts.** You might ask students to submit drafts in order to receive your quick responses on scope, content, and progress in assignments.
- **Require consultations.** Have students consult with those who work at different stages of a process, and summarize what they learned (i.e., architect, site planner, construction foreperson, landscaper, real estate agent).
- **Explore a subject in increasingly complex ways.** A series of assignments may be linked by the same subject matter or topic. Students encounter new perspectives and competing ideas with each new assignment, and thus must evaluate and balance these various points of view and ultimately adopt a position that considers them.
- **Change modes of discourse.** Have students' assignments move from less complex to more complex modes of discourse (e.g., from expressive to analytic to argumentative; or from lab report to position paper to research article).
- **Change audiences.** Have students create drafts for different audiences, moving from personal to public (e.g., from self-reflection to an audience of peers to an audience of specialists). Each change would require different tasks and more extensive knowledge.
- **Use logical stages.** A different approach to sequencing is to create a series of assignments that culminate in a final writing project. In scientific and technical writing, for example, students could write a proposal requesting approval of a particular topic. The next assignment might be a progress report (or a series of progress reports), and the final assignment could be the report or document itself.
Submit sections. A variation of the previous approach is to have students submit various sections of their final document throughout the semester (e.g., bibliography, review of the literature, methods section, etc.)

Benefits of sequencing assignments
- Provides coherence within a course
- Sustains instructors’ interest in a course
- Mirrors professional work in any discipline
- Can be used for group assignments
- Guarantees progression and continued effort on assignments (no room for last minute/night-before work on a large project)
- Allows students ample time to develop more complex ideas/skills
- Encourages complexity without overwhelming students
- Helps to foster students’ confidence in skills and knowledge
- Allows students to see progress and purpose in their work
- Stimulates and sustains students’ motivation for tasks

Drawbacks of sequencing assignments
- Potentially requires more marking effort by instructors (i.e., more work submitted for feedback)
- Not all students have the same level of skill development – earlier steps may be mundane for students with skill levels that exceed those required, whereas students who hit an early “road-block” in skills development will find later steps frustrating or unattainable
- May be challenging to implement in a 12-week term, depending on the complexity and scope of each assignment

Teaching Students Research Skills Using Library-Based Assignments
Including well-designed library-based assignments in your courses can help build students’ research and thinking skills. Make the tools of research familiar to your students and the inquiry process more engaging by using the following tips on how to: 1) Vary the Type of Assignment, 2) Teach Research Strategies, 3) Avoid Common Problems, and 4) Consult with Librarians.

1) Vary the Type of Assignment
Term papers are a common research assignment, but many other options exist that will engage students in the research process if used instead of or in combination with term papers. For example, students can be asked to:
- Reflect on the research process by submitting reports outlining their library searches, providing a summary of the research through an annotated bibliography or a graphical map of
the key concepts that includes key references, etc. Consider having students report on their progress 2-3 times over the course of a term-long research project.

Find a relevant newspaper or news magazine article and search the research literature for publications supporting or contradicting the news article. Write a brief article describing the claims made in the news article and comparing those claims to conclusions made in the research literature.

Identify an individual who has done significant work in the research area of interest. Design an informative webpage that justifies the choice of individual by summarizing their research contributions.

2) Teach Research Strategies

Assume students lack experience gathering and assessing information in any format. Basic skills learned in first year are not adequate for advanced tasks. Allowing students to engage with research strategies will help them develop these skills.

First, make it clear through assignment design, marking strategies, and instructions to students that research skills are important. Students often don’t understand the importance of research strategies. If you describe the skills they are expected to learn, list the information sources they are expected to learn to use, and explain why these capabilities are important, students are often more motivated to learn.

Provide a lecture on research skills and/or schedule librarian-led instruction in skills such as search strategies for your students. Alternatively, link a web-based tutorial for basic search skills or the webpage of general library workshops to your website.

Make sure your instructions are very clear. Students unfamiliar with the research process need to have research terms defined (e.g., “No Internet references” – could mean no websites or e-journal articles), information on how to assess sources (e.g., explain how students can tell if an article is peer reviewed), and guidance on how to cite sources. You may want to require that students follow a well-known citation style (e.g., APA, MLA, etc) to introduce them to conventions in your field.

Consider providing a framework. Novice researchers might not know what steps to follow. Have students reflect on their strategies and think critically about what they are doing at each
step and what information they are finding. Steps can be a sequence of small assignments.
For example, students could submit: 1) a brief description of their research topic and related keywords and phrases early in the term, 2) an annotated bibliography later in the term, and 3) the polished term paper at the end of the term.
- Have students learn from each other by discussing research strategies in class and/or giving group research assignments.
- Consider providing specific resources as starting points (e.g., journal indexes, books, websites, journal articles).

3) Avoid Common Problems
Each one of these common problems has the potential to create frustration, anxiety, and resentment towards library research, but can be easily avoided with a little advance planning.
- Avoid providing vague or general topics (i.e., ‘some recent work in biomechanics’) and setting obscure trivia questions. Novice researchers rarely produce useful results in a reasonable amount of time when confronted with these kinds of assignments. Your Liaison Librarian can give you feedback on the clarity of your assignment.
- Prior to providing a resource list, check that it is up to date (titles, editions, and formats change) and that the titles are available to the students through the library. Consult with your Liaison Librarian about new resources and library procedures (e.g., document delivery options, electronic reserves for journal articles).
- Make sure that the research assignment will not result in having the entire class compete for access to a limited number of sources. If specific books or journal articles are likely to be in high demand, have them placed on Course Reserve.

4) Consult with Librarians
- Discuss assignment plans and goals to learn what resources will support the assignments and identify items the Library does not own. Librarians can give valuable feedback due to their experience helping students with many assignments.
- Encourage students to contact their Liaison Librarian for help. The Information Desks and virtual reference service (Ask a Librarian) can also help.
- Discuss problems your students had using library resources and services both during the term and when planning assignment revisions for next year.
- At the very least, send a copy of the assignment and due date to your Liaison Librarian who will ensure that the reference staff members are prepared to help your students.
Asking Questions: Six Types
Both asking and answering questions are important parts of effective learning and teaching. The types of questions you ask should capture the students’ attention, arouse their curiosity, reinforce key points, and encourage active learning. Here is a list of question types based on Benjamin Bloom’s six cognitive levels:

1: knowledge (identification and recall of information):
   “Who, what, when, where, how…?”
   “Describe…”

2: comprehension (organization and selection of facts and ideas):
   “Retell…”

3: application (use of facts, rules and principles):
   “How is…an example of…?”
   “How is…related to…?”
   “Why is…significant?”

4: analysis (separation of a whole into component parts):
   “What are the parts or features of…?”
   “Classify …according to…”
   “Outline / diagram…”
   “How does…compare / contrast with…?”
   “What evidence can you list for…?”

5: synthesis (combination of ideas to form a new whole):
   “What would you predict / infer from…?”
   “What ideas can you add to…?”
   “How would you create / design a new…?”
   “What might happen if you combined…?”
   “What solutions would you suggest for…?”

6: evaluation (development of opinions, judgments, or decisions):
   “Do you agree…?”
   “What do you think about…?”
   “What is the most important…?”
   “Place the following in order of priority…”
   “How would you decide about…?”
   “What criteria would you use to assess…?”

When Things Go Wrong:
Handling Problems During In-Class Group Work
Many problems associated with in-class group work can be prevented with careful preparation, specific instructions, and appropriate facilitation. However, when your students do not respond as you had hoped they would, here are some ways to respond.

Students are resistant to group work
□ Reiterate your reasons for using this particular small-group task. Emphasize ways in which the resistant student(s) will benefit, and be as specific as possible (e.g., business students will need facilitation skills in their career).
Have students complete a brief questionnaire in which they reveal why they are resistant to working in groups.

Hold a plenary discussion about small group tasks and allow students to air concerns developed in response to experiences in past courses. Then outline how your tasks are different.

**Student talks too much or dominates the group**

- Talk to the student privately. Explain that while you are pleased he or she has a lot to contribute, you would like other learners to have more opportunity to think for themselves. Sometimes the student just needs to be made aware of the situation.
- Even if you had not planned to assign roles to group members, do so at an appropriate point during the group task, either for all groups or for only the one(s) with a dominant student. Ensure that some roles require significant periods of silence (e.g., summarizer, detective, recorder, observer, timekeeper, liaison to other groups). Alternately, speak privately to the dominant student and give him or her one of these roles.
- Ask the entire group to reflect on how it is functioning with questions such as: how well did you complete the task as a group? Did someone take the lead, and if so, how did this come about? Whose ideas are most strongly present in the solution to the task? Was there anything you thought but didn’t actually say?
- During long periods of group work, call for regular periods of reflective silence (e.g., after every fifteen to twenty minutes) in which students think (and write) about the points that have been made, contradictions that have surfaced, omissions that should be added, and where the discussion should go next. When signalling for the discussion to resume, invite students who have said little to read out what they have written.

**Student talks too little or is “freeloading”**

- Speak to the student privately to determine the reason for lack of participation, e.g., introversion, fear of looking stupid, feeling unprepared, fearing a trap, feeling unwelcome, past experiences, trying to be cool, lack of reward. Consider using even smaller groups. Quiet students may feel more comfortable participating in this situation, and “freeloading” students will be less able to coast on the others’ efforts.
- Ask students occasionally to hand in their group work notes or their preparation notes.
- As when handling dominating students, assign roles to one or all of the group members (see above). Some roles that require active vocal participation are spokesperson, skeptic, organizer, facilitator, liaison to other groups.
- Suggest go-rounds (or Circle of Voices), so that each group member has to contribute.
- Offer a general reminder, either to the whole class or to a group in particular, that every student has valuable input and that there are no poor questions. Be sure to respond appropriately, then, when students have comments or questions.
- Recognize that quantity is not quality. There is a place for silence in discussion.
- If the students are shy, consider incorporating an electronic discussion into the course. Students may find it easier to contribute on a class bulletin board, chatroom, or listserv.
- Remind students that the content of the group work will be tested on a quiz or test. You could design a test question in which students must summarize their group’s results.
Students are not on task or are chatting inappropriately

- Don’t assume that all chatter is inappropriate. Often there is a good reason, even if it is not apparent or immediately connected to the task at hand. One student might be explaining a concept to another student.
- Remind students that their time limit for the group task is approaching. They generally expend the greatest energy as the deadline approaches.
- Ask before the time limit which groups need more time. Consider observing aloud that most students seem finished (or unproductive), and so you will shorten the amount of time originally given.
- If students do not seem to be making progress on the large task, divide the task into smaller tasks, and ask for reports on these subtasks throughout the class period.
- Praise groups publicly that are acting appropriately, pointing out behaviours that are particularly effective.
- Move closer to the chatty students. As a last resort, confront them directly about their chatting, but always give them a chance to explain.

Student is disruptive

- Check that the student truly is disruptive and not just momentarily expressing a strong opinion. Also recognize that disagreement is a learning opportunity and is natural and healthy in group functioning.
- Speak to the student privately in order to determine the reason for the disruption.
- Confirm that the disruption is not due to unclear instructions. If group members are disagreeing about what they are supposed to do, clear up the confusion.
- If the disruption persists, change groups regularly in future classes, so that the disruptive student is distributed fairly across a wider range of learners. The problem may disappear with a new group dynamic.

Students are not listening to fellow group members

- Comment on the issue in the general class setting.
- Tell students that in the plenary session, you will call on one member of each group (your choice) to summarize the group’s discussion or answers.
- Call a time-out, and restructure the activity so that all students must connect what they say to what the previous person just said.

References:
Slavin, R. E. (1995). *Cooperative Learning: Theory, Research, and Practice, 2nd ed*. Boston: Allyn and Bacon. As learning tools, writing exercises are valuable because they help students think critically about course material while encouraging them to grasp, organize, and integrate prior knowledge with new concepts. Furthermore, good communication skills are
valuable assets both in and out of the classroom. When instructors provide students with opportunities to organize ideas and improve their ability to articulate those ideas, they contribute to both the education and professional development of their students. Here are some examples of types of short writing activities to try out in class. They will most likely need to be customized to suit the needs of particular classes across campus. As well, instructors might want to consider various marking options to help ease the paper load. Consider, for instance, randomly or periodically collecting assignments from different students each week, using a check mark and minus sign or pass/fail system to let students know that their work is on the right track, or giving bonus marks for the satisfactory completion of certain assignments. In addition, length guidelines vary with each exercise; for some, a paragraph might suffice, while others could require a few pages of writing.

With planning and forethought, these exercises, which provide short, interesting ways to jump-start learning and engage students with material, can be incorporated into almost any university course.

**Writing to Encourage Active Thinking and Learning**

Critical thinking problems are designed to convert students from passive to active learners who use course concepts to confront problems, gather and analyze data, prepare hypotheses, and formulate arguments. Most writing activities aim to promote the use of active critical thinking strategies on the part of students. To best obtain this goal, try assigning short, focussed problems that require thorough and innovative approaches to course material. When designing these activities, you might find it useful to use terms like *formulate, develop, defend, appraise, criticize, judge, argue, determine, evaluate.* Sample activities:

- An instructor has decided that over the course of the term his class will complete five short writing assignments. One student, who is familiar only with the traditional term paper, is unsure why or how the instructor expects her to submit five written assignments. Write a dialogue between the two that comes to a mutually-satisfying resolution. Be sure to explore the student's concerns along with some reasons behind the instructor's decision to incorporate certain writing activities into the course.
- Support or refute the following argument: "Writing is both a process of doing critical thinking and a product communicating the results of critical thinking; therefore, writing exercises have a place in every university classroom." One of your colleagues comes to you for advice. He is trying to decide whether he should assign several short writing exercises or one or two longer ones. Consider the material being covered in his class, class size and desired learning outcomes. What insights can you offer about which type of assignment would be more appropriate and why?
- Create your own version of a TRACE Tips Sheet that offers ten ways to incorporate writing exercises into a class of over 100 students. Be sure to explain why these exercises would be efficient and effective learning and teaching tools. Don't forget to include examples.

**Writing to Explore**

The main goals for exploratory writing exercises are to clarify thinking, explore ideas, ask
questions, reflect on learning, and search for connections between theory and practice. These exercises are not meant to refine and polish writing skills (at least, not directly). Rather, exploratory writing exercises value process over product. Make clear to students that issues of writing style and structure are secondary in these activities while evidence of in-depth and thoughtful engagement with course material is highly valued. When designing these activities, use terms like **discuss, explore, imagine, propose, consider, contemplate, respond, reflect**.

Sample activities:

- Write a one page "thought letter" to a colleague at another university who is unfamiliar with the notion that writing can be an effective learning tool. In the letter, you might wish to discuss points that you found particularly useful in the TRACE writing workshop along with any concerns or reservations you might have about integrating these exercises into your classroom.

- Divide a blank sheet of paper into two columns. Title one column "Workshop Exercises" and beneath it list and describe the types of writing activities covered in today's workshop. In the next column, "My Mental Work and Brain Exercises," consider the thought processes involved in doing each exercise. What specific challenges did each activity pose and how did you meet these challenges?

- Imagine that you are the soon-to-be retired CEO of a multi-national corporation. You have decided to say a few words at your retirement dinner about the writing workshop you attended years ago as a graduate student. What insights into effective communication and critical thinking skills did the workshop offer? How have you put these skills to good use in your professional career?

**Writing to Explain**

These activities encourage critical thinking while, at the same time, they promote a thorough understanding of concepts through review and analysis. Exercises like these ask students to take on the role of instructor, making them search for ways to present course concepts so that they are clear and accessible. Not only do writing to explain exercises make students aware of context and audience concerns; they also require students to step outside the course material in order to see it more objectively. Fresh ideas and a deeper understanding often result from such distancing techniques. When designing these exercises, use terms like **list, select, describe, define, tell, express, explain, reveal, summarize, identify**.

Sample activities:

- Define for your students what "effective writing" means in your discipline.

- Think of a field of study that is completely different from your own. Now, imagine standing next to an instructor from that field in the Tim Horton's line. "So," your colleague from across campus asks, "how can writing exercises be adapted and used effectively by instructors in diverse faculties?" How do you respond?

- A colleague in your field is interested in learning more about using writing as an effective learning tool. Explain to this colleague how to run a writing exercise that you plan to use in your classroom.

**Types of Assignments and Tests**

- Abstract

- Advertisement
Annotated Bibliography
Biography or Autobiography (of the student or some real or hypothetical character)
Brochure, poster
Budget with rationale
Case Analysis
Chart, graph, visual aid
Client report for an agency
Cognitive map, web or diagram
Contemplative essay
Debate
Definition
Description of a process
Diagram, table, chart
Dialogue
Diary of a real or fictional historic character
Essay exam
Executive Summary
Fill in the blank test
Flowchart
Group Discussion
Instructional Manual
“Introduction” to an essay or scientific report (rather than the full report)
Inventory
Laboratory or field notes
Letter to the editor
Matching test
Materials and methods plan
Mathematical problem
Memo
“Micro-theme” (a tight, coherent essay typed on a 5x 8 note card)
Multimedia or slide presentation
Multiple-choice test
Narrative
News or Feature story
Notes on reading
Oral report
Outline
Personal letter
Ten Tips for Effective Research Writing

Thousands of books, manuals and how-to guides offer advice on research writing. Of course, if the advice given in these books were definitive, there would be no reason to publish new volumes year after year. Individual writing processes vary depending, in part, on personal preference and disciplinary expectations. Although there is no single recipe for success, here are some practical suggestions to keep in mind when approaching a research writing project.

1. Plan for the long process ahead. Establish deadlines for yourself when it comes to data collection, analysis, and the actual writing phase. Aim to meet or exceed these deadlines.

2. Figure out who you are writing for. What are the expectations of your audience? Consider writing for readers with less background knowledge than your target audience. This should help improve your clarity.

1. Decide what shape your research writing will take. Carefully analyze the writing style of articles in your target publication and emulate that style.

2. When writing about your methodology, simply tell readers what you did. Keep your discussions of various possible methods to a minimum and avoid excessive detail.
3. Write in a straightforward manner, avoiding clichés. Re-examine any uses of jargon, as they could be covering up unclear thought.
4. Decide which of your findings are important and give them a prominent place. For the sake of clarity, be prepared to relegate some of your findings to the appendices.
5. Be prepared to struggle with the presentation of statistics. Remember that tables should speak for themselves. Readers should not have to dig through the main text to make sense of them.
6. Strive for clear, straightforward sentences. The simplest form is best. Recognize that revision will be necessary.
7. Share your writing with readers of various levels. Their input can prove illuminating.
8. Always proofread a hard copy of your writing. If possible, work with a partner and read your prose out loud, punctuation and all. **Common Myths about Writing**

**Good writing …**

- **must be perfect, the first time** – Expecting your first draft to be your final product is unrealistic and demands perfectionism that can be paralyzing.
- **requires me to know exactly what I think before I even start writing** – Writing is a process of discovery. Attempting to write in a linear fashion can be overwhelming and often results in procrastination. Outlining is an excellent first step and is much less daunting.
- **emerges spontaneously as a result of inspiration** – Waiting for the muse to strike is a common pitfall that can lead to procrastination and self-doubt.
- **should proceed quickly and effortlessly** – Perpetuated by impatience, this myth can result in frustration and binge writing. Expect to spend time making necessary revisions and spread the writing process out over a reasonable amount of time. Good writing takes work.
- **comes from extensive training or an innate “gift”** – There is no secret formula for writing success; although, much like physical exercise, the more writing you do, the easier it gets.
- **requires large blocks of time** – Whole days of uninterrupted writing time are hard to come by, so this myth can result in procrastination and anxiety.
- **must be all consuming** – Devoting all of your time and attention to your writing is unrealistic and unnecessary.

**Towards Productive Writing**

- Make writing part of your regular routine. Writing researcher Robert Boice suggests that writing for 30 minutes a day, 5 days a week makes it possible to produce two journal-length articles over the course of a year. You can't write a final draft in 30 minutes, but you can use this time to chip away at your writing project. Work on your bibliographical notes, outline a chapter – these small steps add up and go a long way in reducing writing anxiety.
- Make these sessions automatic. Regardless of mood, try to work on some aspect of your research writing project every single day. Consider making a recurrent activity (like phone calls to friends) contingent on writing for a minimum period of time first.
- Set realistic goals for each session. Divide large projects into a set of smaller tasks. This practice helps prevent binge writing and results in a sense of accomplishment.
- Write when you’re fresh. You’re more likely to be productive when feeling energized and alert. Know your own peak periods and work with them rather than against them.
- Be task specific and plan ahead. Take a few minutes near the end of each session to gauge
your progress and map out your next steps so you can easily pick up where you left off. **Take the “Regular Research Writing Challenge!”**

- Try writing in short, uninterrupted sessions (no more than 45 minutes) each day for a week.
- See how your productivity and attitude towards writing are affected! **Teaching Problem-Solving Skills**

Many instructors in Engineering, Math and Science have students solve “problems.” But are their students solving true problems or mere exercises? The former stresses critical thinking and decision-making skills whereas the latter requires only the application of previously learned procedures. True problem solving is the process of applying a method – not known in advance – to a problem that is subject to a specific set of conditions and that the problem solver has not seen before, in order to obtain a satisfactory solution. Below you will find some basic principles for teaching problem solving and one model to implement in your classroom teaching.

**Principles for Teaching Problem Solving**

- **Model a useful problem-solving method.** Problem solving can be difficult and sometimes tedious. Show students by your example how to be patient and persistent and how to follow a structured method, such as Woods’ model described here. Articulate your method as you use it so students see the connections.
- **Teach within a specific context.** Teach problem-solving skills in the context in which they will be used (e.g., mole fraction calculations in a chemistry course). Use real-life problems in explanations, examples, and exams. Do not teach problem solving as an independent, abstract skill.
- **Help students understand the problem.** In order to solve problems, students need to define the end goal. This step is crucial to successful learning of problem-solving skills. If you succeed at helping students answer the questions “what?” and “why?”, finding the answer to “how?” will be easier.
- **Take enough time.** When planning a lecture/tutorial, budget enough time for: understanding the problem and defining the goal, both individually and as a class; dealing with questions from you and your students; making, finding, and fixing mistakes; and solving entire problems in a single session.
Ask questions and make suggestions. Ask students to predict “what would happen if…” or explain why something happened. This will help them to develop analytical and deductive thinking skills. Also, ask questions and make suggestions about strategies to encourage students to reflect on the problem-solving strategies that they use.

Link errors to misconceptions. Use errors as evidence of misconceptions, not carelessness or random guessing. Make an effort to isolate the misconception and correct it, then teach students to do this by themselves. We can all learn from mistakes.

Woods’ Problem-Solving Model

1. Define the problem
   □ The system. Have students identify the system under study (e.g., a metal bridge subject to certain forces) by interpreting the information provided in the problem statement. Drawing a diagram is a great way to do this.
   □ Known(s) and concepts. List what is known about the problem, and identify the knowledge needed to understand (and eventually) solve it. □ Unknown(s). Once you have a list of knowns, identifying the unknown(s) becomes simpler. One unknown is generally the answer to the problem, but there may be other unknowns. Be sure that students understand what they are expected to find.
   □ Units and symbols. One key aspect in problem solving is teaching students how to select, interpret, and use units and symbols. Emphasize the use of units whenever applicable. Develop a habit of using appropriate units and symbols yourself at all times.
   □ Constraints. All problems have some stated or implied constraints. Teach students to look for the words only, must, neglect, or assume to help identify the constraints.
   □ Criteria for success. Help students to consider from the beginning what a logical type of answer would be. What characteristics will it possess? For example, a quantitative problem will require an answer in some form of numerical units (e.g., $/kg product, square cm, etc.) while an optimization problem requires an answer in the form of either a numerical maximum or minimum.

2. Think about it
   □ “Let it simmer.” Use this stage to ponder the problem. Ideally, students will develop a mental image of the problem at hand during this stage.
   □ Identify specific pieces of knowledge. Students need to determine by themselves the required background knowledge from illustrations, examples and problems covered in the course.
   □ Collect information. Encourage students to collect pertinent information such as conversion factors, constants, and tables needed to solve the problem.

3. Plan a solution
   □ Consider possible strategies. Often, the type of solution will be determined by the type of problem. Some common problem-solving strategies are: compute; simplify; use an equation; make a model, diagram, table, or chart; or work backwards.
   □ Choose the best strategy. Help students to choose the best strategy by reminding them again what they are required to find or calculate.
4. Carry out the plan

- **Be patient.** Most problems are not solved quickly or on the first attempt. In other cases, executing the solution may be the easiest step.
- **Be persistent.** If a plan does not work immediately, do not let students get discouraged. Encourage them to try a different strategy and keep trying.

5. Look back

- **Encourage students to reflect.** Once a solution has been reached, students should ask themselves the following questions:
  - Does the answer make sense?
  - Does it fit with the criteria established in step 1?
  - Did I answer the question(s)?
  - What did I learn by doing this?
  - Could I have done the problem another way?

**Surviving Your First Day of Class**

The first day of class sets the tone for the rest of the term. The following suggestions outline general strategies and address two important tasks of the first day: handling administrative matters and setting course expectations. For tips on how to create a positive classroom atmosphere, please refer to the TRACE handout on Classroom Management.

**General Strategies**

- **Visit the classroom before the first meeting.** Get comfortable speaking in the room and see how well your voice carries. Check any audiovisual equipment you will be using and make sure your handwriting is legible from the back of the classroom.
- **Build a sense of community in the classroom.** Make an effort to get to know your students and express your interest in working with them during the semester.
- **Address students’ concerns.** Use the first day to help your students understand how the class will serve their needs and demonstrate your commitment to helping them learn.
- **Set a positive tone for the term.** Greet students when they enter the classroom, encourage questions, give students the opportunity to talk, and stay after class to answer questions.
- **Make the time worthwhile.** Once administrative tasks are completed, plunge into substantive material so that your students know you are serious about making progress at each session.

**Administrative Tasks**

- **Write the course name and number on the board.** This message will alert any students who are in the wrong classroom to leave before you begin.
- **Mention departmental course policies.** Explain procedures for waiting lists, adding and dropping courses, and so on. Know where to refer students with such problems.
- **Explain the procedures for the course’s sections.** If your course consists of multiple tutorial sections, describe the relationship between the course and its tutorial, and how tutorials will be run. It is also beneficial to have the teaching assistants introduce themselves.
- **Review any prerequisites for the course.** Let students know what skills or knowledge they are expected to have and whether alternate experience or course work
will be accepted. Is help available for those who do not possess all the prerequisites?

☐ Define your expectations for student participation. Besides submitting written assignments and taking exams, what do you expect of students during class?

☐ Tell students about campus policies on academic honesty. State your expectations, and let students know what you regard as cheating and impermissible collaboration. ☐ Hand out and discuss the course syllabus. Hearing questions about the course or the instructor on the first day identifies the concerns that are uppermost in the students’ minds.

☐ Invite students to attend your office hours. Be sure students know where your office is located and encourage them to stop by with questions and course-related problems.

☐ Review safety precautions and emergency procedures. If your course requires lab work or fieldwork, review safe practices for using equipment and supplies and discuss emergency procedures.

☐ Bring copies of the required texts to the first class meeting. Know which stores besides the campus bookstore carry the texts. Are used copies available? Is the textbook on reserve in the library?

Setting Course Expectations and Standards

☐ Discuss the objectives of the course. As specifically as possible, tell your students what you wish to accomplish and why, but also inquire what they wish to learn and what problems they would like to tackle. Ask students, in small groups or individually, to list the goals they hope to achieve by taking the course. Use these lists to identify your class’s interests and anticipated problem areas.

☐ Describe how you propose to spend class time. How will sessions be structured and how will discussions be organized? When is it appropriate to ask questions?

☐ Give your students ideas about how to study and prepare for class. Tell your students how much time they will need to study for the course and let them know about campus academic support services.

☐ Ask students to do a group exercise. Select a key word from the course title and have students generate word associations or related ideas. Put their responses on the board and use the list to give a thematic overview of the course.

☐ Work through a problem or piece of material that illustrates the course content. Engaging students in actual work during the first class session gives them an idea of what your class will be like.

☐ Give an assignment for the next class session. By moving immediately into the first topic, you are indicating to students that the course is worthwhile, well organized, and well paced. Make sure that the assignment is ungraded, however, because students may be adding or dropping your course during the first weeks.

☐ Ask students to write their reactions to the first day. Take two minutes at the end of class to have students jot down unsigned comments about what went well and what questions they have about the course.

Supervisory Relationships

Supervision of undergraduate and graduate student research represents an important yet not often discussed component of an academic’s workload. Following are some factors
to consider when you assume supervisory duties.

- **Consider how you view student research.** Is it an opportunity for adding to the scholarship of your discipline or is it more of a training exercise for students to learn valuable skills? Should it entail independent work or collaborative work? Should students work alone or as team members? Is the research project part of an apprenticeship to learn about the academic profession or is it more a form of employment? Differences exist across disciplines but may also exist within individual departments.

- **Reflect on your own research experience.** How positive was your experience as a student? Would your relationships with your research students to be similar or different? How do you currently engage in research? How much of that experience are you willing to pass on to your own research students?

- **Decide on a supervisory style that you are comfortable with.** Will you be very structured in your relationships with students or will you be more free? Will you be warm and friendly towards your students or more aloof? How flexible can your style be to meet different students’ needs and styles? Keep in mind, too, that supervisory roles are often numerous and can change as the research progresses. Consider the following roles and their fit with your supervisory style: director, facilitator, advisor, teacher, guide, critic, freedom giver, supporter, friend, manager, and examiner.

- **Make your expectations clear and explicit.** Let your students know your schedule. Indicate what you expect to get out of meetings. Explain the criteria for the finished product. Finally, encourage your students to be as open and honest with you. You need to create, at minimum, a working relationship or else your students are unlikely to make progress and your time will not be well-spent.

- **Learn to identify common problems for research students:**
  - Poor planning and management of project
  - Methodological difficulties in the research
  - Writing up the project
  - Isolation from the university community
  - Personal problems outside the research
  - Inadequate or negligent supervision

- **Avoid common criticisms of supervisors made by research students:**
  - Too few meetings with students
  - No interest in students or topic
  - Too little practical help given
  - Too little direction
  - Failure to return work promptly
  - Absence from department
  - Lack of research experience
  - Lack of relevant skills and/or knowledge

- **Learn to identify warning indicators for students at risk:**
  - Postponing meetings
  - Making excuses for unfinished work
  - Focusing on the next stage of the project instead of the current task
  - Frequently changing topics or methods
☐ Filling time with other projects or tasks not related to the research project
☐ Resisting advice or constructive criticism
☐ Procrastinating on writing
☐ Intellectualizing practical problems
☐ Blaming others for shortcomings
☐ Failing to integrate earlier work
☐ **Consider your role at meetings.** As the supervisor, you need to be questioning your students regarding their work, listening even beyond the information they give you, pushing students to make decisions and set goals, providing explanations for material or methods they do not understand, providing feedback, and helping to plan and monitor the project. You should also consider keeping written documentation about decisions and follow-up activities that stem from each meeting. (Adapted from the Brown & Atkins and Delamont, et al., books listed below).

**Selected Bibliography**
TRACE recommends a few resources to help you consider the various aspects of supervising undergraduate and graduate research work. The following bibliography identifies key resources available in the TRACE Library, MC 4051. TRACE Library codes appear after each book resource.

**Receiving and Giving Effective Feedback**
We are continually receiving and giving feedback. Whether explicit through oral or written language, or implicit in gestures or tone of voice, feedback conveys information about behaviours and offers an evaluation of the quality of those behaviours. While it is easy to take feedback personally, strive to perceive it as a learning opportunity. Feedback can reinforce existing strengths, keep goal-directed behaviour on course, clarify the effects of behaviour, and increase recipients’ abilities to detect and remedy errors on their own. Use the tips below to receive and give feedback effectively.

**Receiving Feedback Effectively**
☐ **Listen to the feedback given.** This means not interrupting. Hear the person out, and listen to what they are really saying, not what you assume they will say. You can absorb more information if you are concentrating on listening and understanding rather than being defensive and focusing on your response.
☐ **Be aware of your responses.** Your body language and tone of voice often speak louder than words. Try to avoid putting up barriers. If you look distracted and bored, that sends a negative message as well. Attentiveness, on the other hand, indicates that you value what someone has to say and puts both of you at ease.
☐ **Be open.** This means being receptive to new ideas and different opinions. Often, there is
more than one way of doing something and others may have a completely different viewpoint on a given topic. You may learn something worthwhile.

- **Understand the message.** Make sure you understand what is being said to you, especially before responding to the feedback. Ask questions for clarification if necessary. Listen actively by repeating key points so that you know you have interpreted the feedback correctly. In a group environment, ask for others’ feedback before responding. As well, when possible, be explicit as to what kind of feedback you are seeking beforehand so you are not taken by surprise.

- **Reflect and decide what to do.** Assess the value of the feedback, the consequences of using it or ignoring it, and then decide what to do because of it. Your response is your choice. If you disagree with the feedback, consider asking for a second opinion from someone else.

- **Follow up.** There are many ways to follow up on feedback. Sometimes, your follow-up will simply involve implementing the suggestions given to you. In other situations, you might want to set up another meeting to discuss the feedback or to re-submit the revised work.

### Giving Effective Feedback

- **Prioritize your ideas.** Limit your feedback to the most important issues. Consider the feedback’s potential value to the receiver and how you would respond – could you act on the feedback? As well, too much feedback provided at a single time can be overwhelming to the recipient.

- **Concentrate on the behaviour, not the person.** One strategy is to open by stating the behaviour in question, then describing how you feel about it, and ending with what you want. This model enables you to avoid sounding accusatory by using “I” and focusing on behaviours, instead of assumed interpretations.

  *Example:* “I haven’t seen you in class in for a week. I’m worried that you are missing important information. Can we meet soon to discuss it?”

  *Instead of:* “You obviously don’t care about this course!”

- **Balance the content.** Use the “sandwich approach.” Begin by providing comments on specific strengths. This provides reinforcement and identifies the things the recipient should keep doing. Then identify specific areas of improvement and ways to make changes. Conclude with a positive comment. This model helps to bolster confidence and keep the weak areas in perspective.

  *Example:* “Your presentation was great. You made good eye contact, and were well prepared. You were a little hard to hear at the back of the room, but with some practice you can overcome this. Keep up the good work!”

  *Instead of:* “You didn’t speak loudly enough. However, the presentation went well.”

- **Be specific.** Avoid general comments that may be of limited use to the receiver. Try to include examples to illustrate your statement. As well, offering alternatives rather than just
giving advice allows the receiver to decide what to do with your feedback.

- **Be realistic.** Feedback should focus on what can be changed. It is useless and frustrating for recipients to get comments on something over which they have no control. Also, remember to avoid using the words “always” and “never.” People’s behaviour is rarely that consistent.

- **Own the feedback.** When offering evaluative comments, use the pronoun “I” rather than “they” or “one,” which would imply that your opinion is universally agreed on. Remember that feedback is merely your opinion.

- **Be timely.** Seek an appropriate time to communicate your feedback. Being prompt is key since feedback loses its impact if delayed too long. Delayed feedback can also cause feelings of guilt and resentment in the recipient if the opportunity for improvement has passed. As well, if your feedback is primarily negative, take time to prepare what you will say or write.

- **Offer continuing support.** Feedback should be a continuous process, not a one-time event. After offering feedback, make a conscious effort to follow up. Let recipients know you are available if they have questions, and, if appropriate, ask for another opportunity to provide more feedback in the future.

**Question Strategies**

Here are some general strategies for asking questions and responding to student questions in ways that will capture students' attention, foster student involvement, and facilitate a positive, active learning environment.

**Using Questions Effectively…**

- **Start asking questions early in the course term and set the tone for an active learning environment.** Make it clear on the first day that you will be posing lots of questions and that you want the students to interact with you during a lecture. Let them know that you are interested in their ideas and that you encourage questions and comments throughout class.

- **Prepare your key questions and strategies for asking questions in advance.** Think about different questions that you can ask your students as well as different ways to ask them. The types of questions you ask should capture students' attention, arouse their curiosity, reinforce important material, and foster an active learning environment.

- **Wait for the answer.** Research shows that teachers wait on average about one to three seconds for a student response before answering the question themselves. Not only does this teach students that they don't need to respond, it also does not provide them with sufficient time to think about the question and formulate an answer. Although the silence seems awkward and uncomfortable, smile, wait patiently, scan
the room, and endure at least a five to ten second wait between your question and
student responses.

- **Ask only one question at a time and be sure it is clearly stated.** Instructors often
  attempt to clarify a question by rephrasing it, and in the process, ask a different
  question. This practice leads to a lot of confusion amongst students as well as a
decreased chance that they will respond.

- **Avoid leading questions.** Questions such as "Don't you all think that …?" will not
  encourage students to offer their opinions and views on the subject. Students know
what you think they should think.

- **Be cautious of asking, "Are there any questions?"** Many education experts believe
such questions to be somewhat "wasteful." Such inquiries are often viewed by
students as a "ritualistic" exercise on the instructor's part and are usually met with
silence. When asking the above, be sure that your question is genuine and has a clear
purpose. If the question is met with no response, be prepared to use follow-up
probing questions: "That means that if I were to ask you on an exam whether…, you
would know how to answer?" This usually elicits questions and concerns from
students.

- **Avoid yes/no questions and questions that require only a one-word response.**
You cannot get a discussion going or foster an active learning environment by asking
students questions that only require a one-word response. Ask a variety of questions
that will require different thinking processes and deeper thought. **Ask only one
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that will require different thinking processes and deeper thought.

**Preparing Your Presentation**

Whether delivering a presentation at an academic conference or giving a lecture,
preparation
is critical to a successful presentation. The following tips are meant to give you a great
start
on preparing your next presentation.
Set objectives
Your presentation may have more than one purpose; however, it must have at least one purpose that you're aware of!
Before beginning to plan your presentation, answer the following questions:
☐ Why am I speaking?
☐ What’s the “take-home” message?
☐ How should my audience feel when I'm done?
☐ What do I want to achieve?
- information dissemination
- motivation
- persuasion
☐ How will I know whether I've been successful or not?

Consider your audience
Keep a picture of your audience in mind while preparing your presentation. Remember that different types of presentations suit different audiences.
Before planning your presentation, ask yourself the following questions about your audience:
☐ What is their demographic profile? (Age, sex, occupation, education level, socio-economic status, etc.)
☐ Why are they here? (Self-improvement, coursework, optional or mandatory training, entertainment, desperation, etc.)
☐ What will your audience expect? For example:
- an undergraduate discussion group may expect an opportunity to share and clarify ideas;
- conference participants will expect evidence of solid research;
- workshop participants may expect practical advice;
- wedding guests may expect entertainment and creation of "atmosphere"
☐ How much does your audience…
- already know about your topic?
- need to know about your topic?
- want to know about your topic?

Decide on a structure
You must decide how you will break your topic down into points and organize them. Different topics are best organized in different ways. The most common structures are:
☐ topical: e.g., in a psychology course, examine in turn four different theorists on human behaviour
☐ chronological/sequential: e.g., in a history course, begin talking about events that happened long ago, and end with most recent events
☐ cause-effect: e.g., in an economics course, begin by talking about the factors that create the distribution of wealth in Canada, and proceed to talk about the effect of these factors
☐ structural/graphical: e.g., in a physiology course, discuss several internal organs in terms of how each fits into the larger system of the human body,
or in a neuro-physiology course, begin with a black-and-white base diagram of the brain, and proceed by adding overlays or drawing details

- **Problem-solving**: e.g., in an engineering course, discuss structural faults in bridges and proceed to discuss remedies or ways of avoiding them
- **Spatial**: e.g., in a planning course, discuss planning strategies for different cities, proceeding in a logical geographical order

Once you've decided on the structure you're going to use, plan your:

- **Introduction** (*tell 'em what you're going to tell 'em*)
  - aim for two minutes (out of a 50-minute lecture)
  - review the previous class if applicable
  - preview topics in your current presentation, and show an agenda
  - if possible, lead in with a catchy anecdote or example or even your conclusion

- **Body** (*tell 'em*)
  - average adult attention span is 15-20 minutes: divide the body of your talk into 15-minute sub-topics
  - give each sub-topic a short introduction, conclusion, and transition into the next sub-topic
  - explain how each sub-topic fits into your overall agenda
  - vary the pace: for example, have question periods at the end of each sub-topic, or alternate 15-minute lectures with 15-minute interactive activities or audio-visual presentations

- **Conclusion** (*tell 'em what you told 'em*)
  - aim for two minutes out of a 50-minute lecture
  - summarize your main points
  - have a memorable conclusion if possible and appropriate: a call for action or restatement of benefits for example
  - briefly preview your next class
  - give a clear assignment for next class, if applicable

### Polishing Your Delivery Skills

Whether delivering a presentation at an academic conference or giving a lecture, polished delivery skills can mean the difference between an effective presentation/lecture and an ineffective one. Following are some delivery tips to help you.

#### Delivering the Presentation/Lecture

- **An extemporaneous** quality to your delivery is the goal for interesting presentations. Prepare and rehearse some parts (especially your introduction and conclusion), plan out your points for the whole presentation, but allow yourself some spontaneity. This method of delivery gives you more flexibility than reading or reciting your talk from memory; it allows you to respond to your audience and the feedback they're giving you.

- **Reading** a paper verbatim may be acceptable at conferences, but is too dry and impersonal for most purposes because it minimizes the eye contact you are able to have with the audience as well as encourages your voice to become flat, leaving little or no possibility for enthusiasm.

- **Memorizing** has similar problems to reading, in addition to being time consuming.
This method may be appropriate for short speeches, though, such as weddings, funerals, etc.

**Involving the Audience**

- **Eye contact** is the key to a successful delivery since it helps you to make a connection with your audience. Eye contact can seem difficult, but it is the most important element of delivery skills. Try pretending you're having a conversation with individual audience members as you deliver your presentation/lecture. Look into individuals' eyes for 3-5 seconds: shorter seems accidental, and longer makes people uncomfortable.

- Another way of involving the audience is by using **question strategies**. You can ask a **rhetorical question** (e.g., "How can you involve your audience?") or a **direct question** (e.g., "What are the 5 key points we covered last day?"). You can also get your audience to **ask questions**. How can you do that?

- Tell them **when** you expect questions (e.g., any time, at the end). Make sure you seem **flexible** when setting the guidelines for your presentation/lecture. Remember, there should be a reason for accepting questions at different times (e.g., in a short presentation where the objective is to **tell** your audience about the material, you may indicate that there will be time for questions at the end. However, in a lecture where the objective is to **teach** the material, you will want to ask and accept questions more frequently so your audience members are able to test their understanding of the material).

- Ask them to **jot down** questions during the presentation/lecture

- Allow them time to **change gears** from being listeners to questioners and wait **at least** 10 seconds for the first question or for responses to questions you pose

- Ask a **warm-up question** such as a show of hands to allow the audience to "practice"

- Ask **open-ended questions** to encourage discussion

- Ask yourself a **common** question you would expect to receive to get questions flowing

- **Look** like you want to answer questions. Maintain an open body posture (no crossed arms), face the audience and make eye contact. (For more information on questioning, refer to the TRACE Tips Sheets,

- You can also use **examples, anecdotes, or stories** relevant to both your topic and your audience. Direct questions **(brainstorming)** and other activities **(discussion groups, demonstrations, role-plays)** are also good ways to involve your audience and maintain their attention. And it's great if you can use people's **names**; nothing grabs their attention faster. One rule of thumb here to help you gauge how often to involve your audience is to limit your **talking** to no more than **15-20 minutes** at one time. Other presentation experts recommend doing something different every **6-8 minutes**. These are both good guidelines to follow and are ones that can help all of us when planning a presentation for any group. (For more information on interactive learning.

**Showing Enthusiasm**

- You need to **look and sound enthused** in order to enthuse your audience. If you don't seem interested in your talk, why should anyone else be?

- Express enthusiasm by varying your **facial expressions**. Allow your expression to
match your content and smile occasionally: it has a relaxing effect on you and your
audience.

- **Movements and gestures** add variety and interest to your presentation, and help to
  express your energy and enthusiasm. Ensure you move with a purpose: use trips to
  the overhead projector or blackboard as an opportunity to move around. Avoid
  repetitive movements (pacing, shifting weight) – these are distracting and betray
  nervousness. Use hand gestures to emphasize points and to show openness to
  questions. When not gesturing, allow your hands to rest lightly on a podium (if
  available) or rest them naturally at your sides.

- Vary the speed and pitch of your **voice** to keep your audience awake and attentive.
  Slow, monotonous speakers lull audiences to sleep, while fast speakers are hard to
  keep up with. Avoid using filler words: **silence between words never seems as long
to your audience as it does to you.** To prove it, listen to a tape recording of yourself
  or have yourself videotaped.

- One final note here: **how you look** is critical to the success of your presentation. Dr.
  Albert Mehrabian, an American communications researcher, studied the moment by
  moment effect of a speaker's visual impact in relation to their words and voice, and he
  came to the following conclusion. A speaker's effect on an audience stems from:

  - 7% words
  - 55% visual
  - 38% voice

  Never overlook **yourself** as your best visual aid and as the best source of motivation
  for your audience.

### Methods for Assessing Group Work

#### Introduction
Students should be made aware of assessment before starting the project
- assessment method
- criteria (product and/or process)

#### Product vs. Process

- assessing the product - measuring the quantity and quality of individual work in a
  group project
- assessing the process - evaluating individual teamwork skills and interaction

#### Assessment by instructor vs. by group members

- by instructor - instructor assigns all marks
- by group members - group members evaluate their contributions to the group and
  assign marks

#### Product assessment by instructor

Equally shared mark
- All group members receive same grade

Advantages Disadvantages
- Easiest to implement - does not require any additional work aside from marking the
  projects
Individual contributions are not reflected in the distribution of marks
Appropriate if group work mark is a minor part of total mark for the course
Poor students may benefit from the work of hard-working students
Group responsibilities are enforced - group succeeds or fails together
Good students may be dragged down by poor students
Does not motivate students

Exam questions
Questions should be specifically about the project, and answerable only by students who have been thoroughly involved in the project

Advantages Disadvantages
May increase interest in the project - students may be more motivated to learn about the work of their fellow group members
Students may ignore group in order to study for the exam on their own
May mean additional work for instructor when preparing the exam questions
May not be effective - students may be able to answer the questions by simply proofreading the project

Splitting tasks
Project must be divisible into multiple tasks of the same complexity
Each student is responsible for one task
Final mark is part group mark (e.g., 50%) and part individual task mark (e.g., 50%)

Advantages Disadvantages
Objective way of determining individual participation
it can be difficult to divide a project into parts of equal size, difficulty or ease of marking
individual component grade may provide additional motivation
once students are responsible for separate parts they may stop cooperating
dependencies between tasks may slow the progress of some students

Direct evaluation
Instructor judges individual merits
oral interviews
periodic reports
meeting minutes
Advantages Disadvantages
oral interviews are a good way of getting
information on individual participation
very time consuming
enables instructor to give each student more
specific feedback
information obtained is often subjective and/or
may be inaccurate
class size may make it infeasible

**Product assessment by peer evaluation**

Issues with peer evaluation:

- Should we use self-assessment?
- Should instructor adjust marks?
- Should it be done individually or collectively by consensus?

Distribution of a pool of marks (see Appendix for example)

- Award the group a mark equal to \((\text{group mark}) \times (\text{no. of group members})\)
- Let group divide marks among themselves

Advantages Disadvantages

- Easy to implement
- open to subjective evaluations by students
  (e.g., giving friends high marks as opposed to those who contributed the most)
- peer assessment may motivate students to contribute more to the group
- opens the doors to personal conflicts between group members
- may foster competition
- may be difficult for students to evaluate each other without objective criteria

Individual weighting factor (see Appendix for example)

- Points awarded for a list of tasks
- Individual mark = \((\text{group mark}) \times (\text{peer assessment factor})\)

Advantages Disadvantages

- provides students with objective criteria by which to judge individual contributions
- time consuming for instructor
- rating scale may be misinterpreted
- tasks all have the same weight

**Process assessment**

List of skills to assess, such as:

- adoption of complementary team roles
- cooperative behaviour
- time and task management
- creative problem solving
- use of a range of working methods
- negotiation
Process assessment by instructor
Direct evaluation of team behaviour using teamwork logs - sample questions:
☐ what steps have you taken to organize your teamwork?
☐ what steps have you taken to monitor the effectiveness of your team?
☐ what steps have you taken to improve the effectiveness of your team?
☐ what problems have you encountered in working as a team and how did you tackle them?
☐ if you were to embark on a second, similar task as a team, what would be different about the way you go about working, and why? Advantages Disadvantages
makes students reflect on their operation as a team
reviewing logs can be very time-consuming
logs provide plenty of information that can be used as a basis for assessment
students may need training in order to be aware of what goes on in the teams

Process assessment by peer evaluation
Individual assessment (see Appendix for example)
☐ how members view each member of the team
☐ use lists of key group work traits
☐ average of individual marks must be the same as the group mark
Advantages Disadvantages
gives a personalized view of each member's contributions
time consuming and complex; instructor must check results
list of traits provides students with objective criteria
list of traits may not give a true measure of the group work process

Appendix with numerical examples
Example for distribution of a pool of marks
☑ Group project mark: 70
☑ No. of group members: 4
☑ Instructor awards 280 points to group
☑ Advises students that difference between marks must not be greater than 20
☑ Group members divide marks by consensus as follows:

<table>
<thead>
<tr>
<th>Student</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark</td>
<td>80</td>
<td>60</td>
<td>75</td>
<td>65</td>
<td>280</td>
</tr>
</tbody>
</table>

Example for individual weighting factor
List of tasks Group members’ names
Ann Bob Chris
(a) Literature search 3 4 1
(b) Analysing the literature 4 5 1
(c) Writing a report 1 2 4
(d) Group presentation 3 1 1
Individual Totals 11 12 7
Rating scale
1 - Did not contribute in this way
2 - Willing but not very successful
3 - Average
4 - Above Average
5 - Outstanding
Peer assessment factor = (individual total) / (average total)
Average of individual totals = 10
If project mark = 60
Individual marks:
Ann = 60 * (11/10) = 66
Bob = 60 * (12/10) = 72
Chris = 60 * (7/10) = 42

**Example for Individual assessment**
3 group members (Ann, Bob, Chris), no self-assessment
Student name: Ann
Evaluated by: Bob (marks selected are underlined and in boldface in this example)
well below below average average average average
Aspect of team functioning average average average average average
1. Forming good team cohesion -2 -1 0 1 2
2. Leadership, managing meetings -2 -1 0 1 2
3. Planning and allocating tasks -2 -1 0 1 2
4. Generating ideas and solutions -2 -1 0 1 2
5. Tackling team social problems -2 -1 0 1 2
6. Organising individuals to do jobs -2 -1 0 1 2
7. Helping team members to finish jobs -2 -1 0 1 2
8. Willingly taking on unpopular jobs -2 -1 0 1 2
Instructor’s mark for team project 60%
Sum of evaluation marks +3
Individual mark for Ann given by Bob 63%
*Note: Bob’s evaluation of Chris must add up to -3*
Student name: Ann
Evaluated by: Chris
well below below average average average average
Aspect of team functioning average average average average average
1. Forming good team cohesion -2 -1 0 1 2
2. Leadership, managing meetings -2 -1 0 1 2
3. Planning and allocating tasks -2 -1 0 1 2
4. Generating ideas and solutions -2 -1 0 1 2
5. Tackling team social problems -2 -1 0 1 2
6. Organising individuals to do jobs -2 -1 0 1 2
7. Helping team members to finish jobs -2 -1 0 1 2
8. Willingly taking on unpopular jobs -2 -1 0 1 2
Instructor’s mark for team project 60%
Sum of evaluation marks +1
Individual mark for Ann given by Chris 61%
Meeting Strategies to Help Prepare Students for Group Work

Working in groups is quite different than working individually. One of the main reasons why students find it difficult is that they were not trained to perform effectively in a team setting. An instructor can help by teaching organizational, personal, and discussion skills that will help students manage group dynamics and have a positive teamwork experience. Meetings are key events during group work, and there are several techniques for running effective meetings.

Planning and Running a Meeting

1. Steps that should be taken before a meeting happens:
   - plan the meeting carefully: who, what, when, where, why, and how many
   - prepare and send out an agenda, identifying issues to be discussed
   - set up meeting room
   - send out background information about members

2. Steps that should be taken during a meeting
   - start on time
   - make introductions of group members
   - clearly define roles
   - review, revise, and order the agenda
   - set clear time limits
   - review action items from previous meeting
   - focus on one issue at a time

3. Steps that should be taken at the end of and after a meeting
   - record final decisions or actions to be taken
   - assign tasks to group members
   - set deadlines for the tasks
   - set the date and place of the next meeting and develop a preliminary agenda
   - evaluate the meeting, get feedback from members
   - close the meeting positively
   - clean up the room
   - prepare the group memo, distribute to members and others who need to know

Group Roles

1. Different roles group members may play during a meeting:
   - facilitator/leader
   - note taker
   - idea generator ("creative check-in")
   - devil's advocate
   - progress chaser
   - timekeeper
   - expert
   - mediator
   - presenter

1. Important tasks that should be performed by the facilitator of a meeting:
   - encouraging participation
   - discouraging domination
   - keeping group focused

Note: Chris’ evaluation of Bob must add up to -1
Ann’s final mark: \((63 + 61) / 2 = 62\%\)
clarifying ideas
providing feedback
energizing group members
summarizing input
encouraging decision making
making final decisions, if necessary
delegating roles and tasks
keeping the peace

1. Skills that students need to develop to promote effective group work:
active and tolerant listening
flexibility
respect for others' contributions
participation
patience
motivation
keeping deadlines
communication skills
accountability
helping others to master content
giving and receiving constructive feedback
managing disagreements

**Discussion Skills**

1. Activities and tools that can be used in a group meeting for:

1.1. Opening discussion
list available resources
state different perceptions of what the real problem is
brainstorm ideas - all ideas are encouraged and accepted
legitimate - show an understanding of how others see the problem
kickstart with an example
propose some potential solutions
ask each individual for a possible solution

1.2. Narrowing down the solutions
evaluate solutions using some criteria
make sure solutions address the issues
rank ideas in order of priority
categorize solutions
separate solutions based on "pros/cons"
look for redundant and overlapping ideas
force field analysis (what ideas give support to solving the problem? which ones prevent reaching a solution?)

1.3 Closing the discussion
majority voting
consensus
build up/eliminate (add or subtract from different options to arrive at a new option)
that everyone can support)
☐ combine ideas (avoid either/or decisions)
Education Glossary and Reference

**ABCs accountability model**

The ABCs Accountability Model is North Carolina's school improvement plan to "reorganize public schools around three goals: strong Accountability, an emphasis on the Basics and high educational standards, and providing schools and school districts with as much local Control over their work as possible" (NCDPI).

**ability grouping**

The instructional practice of grouping students according to their academic skills. *School-based (or between class) grouping*, also known as *tracking* creates entire classrooms with students of similar ability; *within-class grouping* forms groups of students of similar ability within an individual classroom.

**abstinence-only education**

Curriculum that teaches abstention from sexual activity until marriage.

**accommodation**

A change in how information is presented, or an alteration in how a test is administered (such as orally or in a different format) or test-taker is permitted to respond. Accommodations are made to take into account various learning and testing differences among students in order to provide equal opportunity to demonstrate knowledge or understanding.

**accountability**

Policies and practices that hold schools and teachers responsible for student performance. Accountability measures may serve a variety of functions for state, district and school stakeholders, including holding teachers and students accountable for performance on standardized tests, rewarding or sanctioning schools based on student performance, comparing and publicizing performance by schools in a district or across a state, and/or allocating funds based on performance.

**acculturation**

See assimilation.

**achievement gap**
Gaps in standardized achievement measures between students from different racial and ethnic groups and between students from poor and non-poor families. Research shows a significant gap between the performances of African-American, Latino/a, Native American, and low-income students and their white, Asian, and economically advantaged peers.

**active reading**

A manner of reading in which the reader is mentally engaged with a text and reads for comprehension and criticism as well as reads selectively and with a purpose.

**advance organizer**

Content that is presented prior to learning and that can be used by students to organize and clarify new incoming information. The purpose is to build a bridge from prior knowledge to the new information that encourages the understanding, learning, and retention of the new concept.

**Advanced Placement (AP)**

Program under which high school students take advanced coursework and receive college credit for acceptable scores on nationally administered tests.

**aesthetic education**

Education that recognizes the interconnectedness of body, mind, emotions, and spirit. Enabling students to express perceptions, feelings and ideas through reflective shaping of media including paint, clay, music, spoken or written words, and bodies in movement.

**aesthetics education**

Teaching students to critically view art so as to become more reflective and discriminating in their opinions of various art forms.

**alternative assessment**

Assessment that measures student learning in forms other than traditional pencil-and-paper tests.

**alternative teacher certification**

Certification of teachers by means other than traditional four-year college and university education degree programs. Candidates for alternative certification hold a degree in the subject matter they will teach and meet abbreviated pedagogical coursework requirements, often during the first two years of teaching.
**Americans with Disabilities Act (ADA)**

Passed by the U.S. Congress in 1990, the ADA guarantees equal employment opportunities for persons with disabilities. The ADA also provides for reasonable accommodations to increase the numbers of students with disabilities in primary, secondary, and postsecondary education.

**anticipation guide**

A list of true/false statements designed to challenge preconceptions and focus student attention during an assigned reading. A pre-reading strategy useful in any content area.

**Asperger's syndrome**

Disorder similar to but distinct from autism, marked by abnormal social interaction but comparatively high language skills.

**assessment**

The process or means of evaluating a student’s knowledge or skills.

**assimilation**

The process whereby minority groups adapt to and accept the linguistic, cultural, and behavioral norms of the dominant culture in a society.

**at-risk**

A term used to describe students at risk of educational failure as a result of challenges ranging from a lack of adequate service from school or social service organizations to negative life events such as socioeconomic or physical/mental challenges.

**attention deficit disorder (ADD)**

A family of neurobiological disorders characterized by hyperactivity, impulsivity, and inability to sustain attention and concentration.

**attention deficit hyperactivity disorder (ADHD)**

See attention deficit disorder.

**authentic assessment**

Assessment that seeks to evaluate students' abilities in "real-world" contexts, including the application and demonstration of skills and knowledge to authentic tasks or projects likely to be encountered in adult life.
**autism**

Disorder characterized by abnormal social interaction and communication.

**automaticity**

A skill performed spontaneously with little or no conscious attention to its execution. Automaticity of word recognition frees attention for comprehension.

**banking model of education**

Model of education in which teachers "deposit" information and skills into students. The emphasis is on memorization of basic facts rather than on understanding and critical thinking. The idea of the banking model was articulated and critiqued by Brazilian liberation theologian Paulo Freire in *Pedagogy of the Oppressed* (1970).

**basic interpersonal communication skills (BICS)**

Social language first used by English (or foreign) language learners.

**behaviorism**

Theory that human behavior and learning are guided and controlled by external stimuli (from the environment) as opposed to internal psychological processes (in the mind). Learning occurs when students are given a stimulus (such as a question or request) that results in a response. Positive reinforcements, or rewards, follow appropriate responses; punishments or negative reinforcements follow inappropriate responses.

**bibliotherapy**

Practice of using selected books to help students overcome real-life problems through identification with the characters or plot elements in the stories.

**Big6**

Problem-solving approach to teaching information literacy skills.

**bilingual education**

Classes taught in a combination of a students’ first language and English, geared toward helping student with limited English proficiency (LEP) become proficient in English as a second language (ESL). Students in bilingual programs receive part of their daily instruction in English and part in a second language. Significant portions of the school
day are devoted to ESL instruction, in which each student receives intensive assistance in learning English.

**bipolar disorder**

Disorder characterized by periods of depression or irritability alternating with periods of mania.

**block scheduling**

Secondary school organizational model implementing longer class periods (blocks) in the school day.

**Bloom's taxonomy**

Classification system developed in 1956 by education psychologist Benjamin Bloom to categorize intellectual skills and behavior important to learning. Bloom identified six cognitive levels: knowledge, comprehension, application, analysis, synthesis, and evaluation, with sophistication growing from basic knowledge recall skills to the highest level, evaluation.

**book talk**

A brief oral presentation that includes enough of a book's plot to interest a potential reader but does not reveal important events or spoil the story. Designed to encourage independent reading, the book talk may include the reading of short passages and usually ends with a cliffhanger.

**Brown v. Board of Education of Topeka, Kansas**

Landmark decision of the U. S. Supreme Court (1954) that affirmed the constitutional guarantee of equal opportunity in education. Arguing that the doctrine of "separate but equal" facilities had no place in the American system of education, the court ruled that segregation in public schools was unconstitutional.

**canon**

A collection of works recognized as an authoritative list or standard of intellectual and cultural traditions. The literary canon, for example, represents a collection of works deemed to represent exemplars of quality in literature.

**centers**
Instructional and organizational strategy in which groups of students rotate through various work stations in the classroom, each with a different learning task or goal. Centers present students with a variety of activities and supply necessary resources and materials to meet the learning task. Centers may have a developmental or educational focus.

**character education**

Educational initiative that promotes integration of core moral and civic values in the curriculum.

**character web**

Organizing tool in which students identify primary traits of characters in books and plays in a visual or graphic format.

**charter school**

A public school of choice, usually created by parents or educators seeking an alternative to traditional public schools. Developers create a contract, or charter, with a sponsoring agency (either state or local school board). In exchange for autonomy from many state and district requirements, charter schools are expected to offer financial responsibility, academic accountability for student performance, as well as innovative and challenging educational practices.

**chunking**

A technique used to improve comprehension by grouping words in a sentence into short meaningful phrases.

**cloze activity**

Fill-in-the-blank activity used to assess reading comprehension.

**coaching**

An instructional method in which the teacher serves as a guide to support student learning as opposed to acting as the sole director of student learning.

**code-switching**

The practice of combining or switching between elements of more than one language in verbal and written communication. Effective communication is the primary goal when code-switching. Originally a term understood in relation to second language learning (that is, switching between English and a second language such as Spanish), it is also
used to describe switching between "standard" English and non-standard dialects or traditions.

**cognitive academic language proficiency (CALP)**

Academic language students experience in school. CALP develops over a five to seven year period in the language acquisition of English (or foreign) language learners.

**collaborative learning**

An umbrella term for the variety of approaches and models in education that involve the shared intellectual efforts by students working in small groups to accomplish a goal or complete a task.

**competency goals**

Learning objectives that form the basis for expected student understanding. Competency goals drive curriculum and instruction and describe the core of knowledge and skills students will command upon completion of a unit of study or grade level.

**comprehensive sex education**

Sex education programs that teach about abstinence and contraception. Comprehensive sex education includes discussions of human anatomy, reproduction, and sexually transmitted diseases.

**concept map**

An organizational strategy or tool that represents knowledge in visual form (such as a graph or diagram). Concept mapping facilitates student understanding of the relationships between keywords or concepts through visual representations.

**constructivism**

Theory of learning that argues that students construct their own knowledge by incorporating new information with prior knowledge.

**continuing education unit (CEU)**

Nationally recognized unit of measurement for participation in non-credit continuing education programs. One CEU is recognized as 10 contact hours of participation in a continuing education experience under responsible sponsorship.

**cooperative learning**
Instructional method in which students work together in small, heterogeneous groups to complete a problem, project, or other instructional goal, while teachers act as guides or facilitators. This method works to reinforce the learning of oneself as well as the learning of group members.

**copyright**

A form of protection provided by the laws of the United States to the authors of "original works of authorship," including literary, dramatic, musical, artistic, and certain other intellectual works. This protection is available to both published and unpublished works. Copyright protection reserves certain exclusive rights to the author of a work, including rights of reproduction and public performance.

**creationism**

Theory of the origin of the earth and species based on a literal interpretation of the biblical story presented in Genesis in which the world was created in six days some 6,000 years ago.

**criterion-referenced assessment**

Assessment that measures student knowledge and understanding in relation to specific standards or performance objectives. Criterion-referenced assessment measures students' performance in relation to standards, not in relation to other students; all students may earn the highest grade if all meet the established performance criteria.

**critical literacy**

Thinking skills that enable students to consider all viewpoints, respect differences, and become more self-aware.

**critical thinking**

Complex thinking based on the acquisition and evaluation of new knowledge. The focus of learning is the pursuit of logical conclusions drawn from facts and evidence. The goal is for students to develop skills that help them critically assess information and avoid indoctrination into received wisdom.

**Cuisenaire rods**

Rectangular rods of different sizes (from 1 to 10 centimeters) with corresponding colors (for example, the 1 cm rod is white, the 2 cm rod is red), used in mathematics instruction.

**cultural capital**
Cultural assets (beyond the economic) such as family background and commitment to education that contribute to an individual's or group's position in society and achievement in education.

**culturally relevant teaching**

Theory of teaching that purposefully incorporates the cultural knowledge, experience, and frames of reference of ethnically diverse students to make learning more relevant for students whose cultural, ethnic, linguistic, racial, and social class backgrounds differ from that of the majority.

**curriculum**

The organization of subject matter to be taught over a prescribed period of time.

**curriculum compacting**

Curriculum compacting is a content acceleration strategy that enables students to skip parts of the curriculum they have already mastered and move on to more challenging content and activities.

**depression**

Condition characterized by persistent feelings of sadness, hopelessness, and inadequacy. Students with depression may show a decline in academic performance, seem sad or irritable, lack energy, or no longer take pleasure in activities they used to enjoy.

**developmentally appropriate**

Consistent with a child's age, maturity, and/or readiness to master a particular concept or skill; of or related to teaching practices that take into account students' level of physical or mental development.

**dialogue journal**

Written conversations between students and teachers for exchange of experiences, ideas, or reflections. Dialogue journals are communication tools for sustained writing opportunities rather than an occasion for assessment or grading.

**didactic instruction**

Teacher-centered method of instruction in which teachers deliver and students receive lessons, best suited to brief delivery of factual information.
differentiation

Instructional practice of tailoring a curriculum to diverse learners based on student readiness, interest, and learning styles.

Dimensions of Learning model

Model of learning developed by Marzano et al (1988) that links content area knowledge, metacognition, and critical and creative thinking with a taxonomy of thinking skills and thinking processes.

direct instruction

Teacher-centered instruction with methods that include scripted lesson plans, teacher lectures and presentations and student recitation, fast-paced delivery, careful attention to components of skill development, intense teacher-student and student-student interactions, homogenous skill grouping, and frequent assessments.

discovery learning

Learning that takes place, not through instruction, but through examination, analysis, or experimentation.

discrete mathematics

A branch of mathematics that focuses on the study of objects and ideas that can be divided into separated or discontinuous parts.

distance education

Instructional delivery option that takes advantage of various space or technology resources. Distance education enhances options for students to access educational resources to overcome geographic, mobility, or time constraints.

double bubble chart

See Venn diagram.

Drop Everything and Read (DEAR)

DEAR is classroom time set aside for teachers and students to Drop Everything and Read. The goal of DEAR is to encourage independent silent reading for extended periods of time on a daily or weekly basis. Students choose the book they wish to read based on interest and ability.

dysgraphia
A neurologically-based learning disability characterized by distorted or incorrect formation of written words and symbols.

dyslexia

A neurologically-based learning disability in which students have difficulties accurately recognizing and decoding written symbols, resulting in poor comprehension of written text and numeric sequences and difficulties with spelling.

dyslexia

Emergent reader

Child on the path to fluent literacy, before conventional reading and writing skills emerge. Emergent readers demonstrate alphabet knowledge, a concept of what a word is, a sense of story (beginning, middle, end), listening and retelling skills, phonemic awareness, and verbal expression.

end-of-course test (EOC)

Tests given in North Carolina at the end of high school courses to assess competencies defined by the North Carolina Standard Course of Study. Tests are administered during the last ten days of an academic year.

end-of-grade test (EOG)

Tests given in North Carolina to students in grades 3–8 designed to assess competencies defined by the North Carolina Standard Course of Study. Tests are administered during the last three weeks of the school year.

English as a foreign language (EFL)

The study of English by non-native speakers or the teaching of English to such learners.

English as a second language (ESL)

Designation for students whose native language is not English or for programs designed to teach such students. As a method of instruction, ESL usually involves pulling students out of the regular classroom for English instruction.

English language development (ELD)

Curriculum of instruction for English language learners.

English language learners (ELL)
Students (in U.S. schools) whose native language is other than English working to master English. They may be immigrants or children born in the United States. Usually such students receive bilingual education or English as a second language services.

**English-only movement**

Movement to make English the only language used in U.S. public education. English-only proponents argue that bilingual education and bilingualism threaten a sense of national identity and create divisions along ethnic lines.

**equity**

A state of educational fairness, justice, and impartiality in which all children receive a high-quality education and have equal access to services. Equity implies a state of sameness and uniformity of opportunity. Of special consideration are those students who have been denied access in the past, including minorities, female students, and students with special needs.

**exceptional children (EC)**

Designation for students who have different educational needs than the average child. Many children in exceptional children's (EC) programs have physical, mental, or social disabilities, but in North Carolina academically gifted children are also classified as EC.

**experiential education**

Instructional approach based on the idea that ideal learning occurs through experience. Learning tasks require the active participation of the child in hands-on opportunities and must connect content to the child's life.

**extrinsic motivation**

Motivating students by extrinsic or external means; encouraging on-task behavior with promise of reward, praise, or avoidance of punishment.

**fair use**

Any copying of copyrighted material done for a limited and "transformative" purpose such as commentary, criticism, or parody. "Fair" uses do not require permission from the copyright owner.

**flexible grouping**
Varying grouping strategies (combining, for example, whole group, cross-ability, student-selected, topic interest, multiage, partners, and/or ability groups) depending on instructional goals, activities, and student learning needs.

**formative assessment**

Ongoing observations and methods of evaluation designed to measure student comprehension of a concept or task in order to identify areas that require enhanced or adapted instruction.

**geosolids**

Three-dimensional shapes (for example, cubes, spheres, triangles, prisms, cones, pyramids) useful in geometry instruction.

**gifted**

A label once reserved for a small group of students who displayed above-average intellectual achievement, *giftedness* now represents a more comprehensive set of skills or capacities based not only in ability, but also in creativity, motivation, and social factors acting together. Giftedness, therefore, is distributed across all socio-economic, gender, cultural, and racial categories.

**gifted education**

Educational programs designed to offer enriched opportunities for students identified as having the highest academic potential, including additional classes, programs, or services. Gifted students are considered to have the capacity to achieve beyond the norm based either on IQ scores, demonstrated ability in the classroom, or both.

**graphic organizer**

Visual illustrations to help students establish and learn connections between concepts. Useful at any stage of learning, graphic organizers can be used to organize new material or to review information already discussed. (learn more)

**hands-on activities**

Instructional activity in which students actively work with and manipulate materials and objects in order to study a concept or solve problems.

**heterogeneous grouping**
The practice of mixing students of varying abilities, interests, or ages in academic classes. Heterogeneous classes may be formed school-wide or within classrooms where two to five students learn together.

**hidden curriculum**

The norms, values, and beliefs transmitted to students through educational practices and content.

**high-stakes testing**

Uses of standardized achievement tests that carry serious consequences for students and educators.

**higher order thinking**

Complex thinking that goes beyond basic recall of facts, such as evaluation and invention, enabling students to retain information and to apply problem-solving solutions to real-world problems.

**home schooling**

Education of a child in a home environment in which parents or legal guardians assume responsibility for instruction.

**homogeneous grouping**

Grouping students according to perceived ability, achievement, interests, or other characteristic.

**I-search**

Method of inquiry grounded in students' curiosity about a topic. Students develop a question for inquiry based on personal interest, assumed to facilitate greater investment in the project and more meaningful research experiences for students.

**immersion**

Instructional practice in which students are immersed in a non-native language classroom in order to learn to speak, read, and write in that second language through exposure to conversation and instruction in the second language.

**in-service training**
Workshops and lectures designed to keep practicing teachers informed about current trends and practices in their field.

**inclusion**

Practice of educating children with disabilities alongside non-disabled peers, providing all students with the opportunity to participate in the school community regardless of individual strengths or limitations. Inclusion provides instruction and support for special needs students in the regular classroom.

**individual growth plan**

See personal growth plan.

**Individualized Education Plan (IEP)**

The Individuals with Disabilities Education Act, IDEA, mandates that each student with a disability who is enrolled in the Exceptional Children's (EC) program have an Individualized Education Plan (IEP). The goal of IDEA is to educate students with disabilities in the least restrictive environment possible. IEPs describe how the school plans to educate each EC student while accommodating the student's disability. IEPs often specify modifications to be provided by teachers.

**Individuals with Disabilities Education Act (IDEA)**

1975 federal law (amended in 1997) under which schools must guarantee that all children with disabilities receive "free, appropriate public education in the least restrictive environment." The statute requires that children with disabilities be educated with children who are not disabled, and that removal from the regular classroom may occur only when the nature or severity of the disability interferes with the successful delivery of aid and services.

**information commons**

A place, either virtual or physical, that promotes the sharing and unrestricted access to information.

**inquiry**

Active approach to learning in which students investigate a problem based on a model of scientific inquiry. Students or teachers pose a problem, form hypotheses, collect and analyze data, and compare findings with initial hypotheses.

**interdisciplinary curriculum**
Applying methods and language from more than one academic discipline to examine a theme, issue, question, problem, topic, or experience. Interdisciplinary methods work to create connections between traditionally discrete disciplines such as mathematics, the sciences, social studies or history, and English language arts.

**Interstate New Teacher Assessment and Support Consortium (INTASC)**

A consortium of state and national education agencies and organizations focused on the preparation, licensure, and professional development of teachers. INTASC is guided by the belief that student learning standards should drive the preparation and development of teachers.

**intrinsic motivation**

Student motivation for learning that comes from internal factors such as curiosity and enjoyment.

**jigsaw**

Cooperative learning strategy in which students assume responsibility for teaching peers the elements of a lesson or unit. Students research, prepare, and present topics in small group settings.

**KWL chart**

Strategy in which students manage their learning by mapping out what they *Know, Want to know*, and *Learned*. KWL charts help students access prior knowledge and help teachers assess where students are in their learning.

**lattice multiplication**

Method of multiplying large numbers using a grid. This method breaks the multiplication process into smaller steps, which some students find easier. Digits to be carried are written within the grid, making them harder to miss.

**learning contract**

An agreement between a teacher and a student regarding how that student will achieve specified learning goals or objectives.
learning disability

A discrepancy between expected achievement and observed achievement, also known as "unexpected underachievement."

lecture

Teaching method in which the teacher communicates information primarily through oral presentation, with intermittent questions posed to students.

library database

A searchable electronic catalog or index that the library subscribes to, very much like a magazine subscription or cable service. It contains information from print resources such as newspapers, magazines, and reference books.

limited English proficiency (LEP)

Term used to describe students limited in their ability to read, write, speak, and understand English.

literature circles

Classroom organizational strategy designed to facilitate in-depth conversations about literature among students. Literature circles are characterized by student-centered responses to literature, collaborative exploration of a text's themes, and higher-order thinking as students pursue and explore questions and insights about literature.

looping

The practice of having a teacher teach the same group of students for more than one year. Following this design, teachers and students develop closer relationships and less time is spent at the beginning of the school year on getting-to-know-you activities.

magnet school

Public school of choice that emphasizes a special curricular program designed to attract students from outside an attendance zone in order to enhance desegregation efforts and diversify student populations.

manipulative

Any physical object used in the classroom to model a problem or study a concept. A manipulative capitalizes on a student's sensory exploration of concepts.
**metacognition**

The process of thinking about thinking. Students assess their current and previous knowledge, identify gaps, and develop a plan to augment current knowledge and a system for assessing learning.

**mini-lessons**

Short lessons of five to twenty minutes used to introduce or reinforce critical information or learning strategies.

**mnemonic**

A technique used to help remember or memorize names or concepts. Mnemonics take a variety of forms, including acronyms, sentences, rhymes or songs.

**modeling**

Demonstration of how to do a task so that the learner can copy the model. Modeling can involve thinking aloud or talking about how to work through a task.

**Montessori**

See Montessori method.

**Montessori method**

Educational system based on the idea that children will develop to their full mental, emotional, and physical potential when given the opportunity to learn and work at their own paces in the ways that best suit them.

**multicultural education**

Education philosophy and curriculum that expands traditional white Western European curricula, highlighting themes and subjects from diverse cultural, ethnic, racial, and gender perspectives. An important focus of multicultural education is to create equal educational opportunities so that all students can succeed in an increasingly diverse and pluralistic society.

**multiple intelligences**

Theory developed in 1983 by Dr. Howard Gardner proposing that traditional ideas of intelligence, largely based on IQ testing, are too limiting. Gardner proposed a range of different intelligences: linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, and naturalistic.
National Board Certification

Program of teacher certification (beyond education degree) focused on teacher development and professionalism, requiring "intense self-reflection and analysis of [teacher] practice" through preparation of a portfolio and responses to assessment questions drawn from their field (such as early childhood and mathematics).

No Child Left Behind (NCLB)

No Child Left Behind is a 2001 federal law placing requirements on state schools in four broad areas: increased accountability, implementing research-based instructional strategies, increasing parental options, and expanding local control in schools. Specific goals include 100% student proficiency on state achievement tests by 2013–2014 and "highly qualified" teachers in every classroom.

norm-referenced assessment

An assessment designed to measure and compare individual students' performances or test results to those of an appropriate peer group (that is, norm group) at the classroom, local, or national level. Students with the best performance on a given assessment receive the highest grades.

North Carolina Department of Public Instruction (NCDPI, DPI)

The North Carolina Department of Public Instruction administers the policies adopted by the State Board of Education and offers instructional, financial, technological, and personnel support to all public school systems in the state.

North Carolina thinking skills

Model of thinking skills adopted by the North Carolina Department of Public Instruction in 1994. Lists seven levels of thinking skills from simplest to most complex: knowledge, organizing, applying, analyzing, generating, integrating, and evaluating.

number sense

An intuitive understanding of numbers, their magnitude, relationships, and how they are affected by operations.

number theory

The study of the relationships and properties of integers, including prime numbers, sequences, etc.
**NWREL model of thinking**

A simplified version of Bloom's Taxonomy developed by the NorthWest Regional Education Laboratory (NWREL) in 1989. Levels of thinking in this model are recall, comparison, analysis, inference, and evaluation.

**obsessive-compulsive disorder (OCD)**

Disorder characterized by obsessions (such as a fear of germs) and compulsions (such as hand-washing).

**oral history**

A method of collecting historical information through recorded interviews with individuals who are willing to share their memories of the past.

**pacing guide**

A written schedule displaying the alignment of concepts, topics, and skills related to a particular curriculum to be addressed over a defined period of time.

**Paideia**

Educational model developed in 1982 by philosopher Mortimer Adler based on the notion of students as active, lifelong learners. Paideia schools advocate rigorous liberal education based on the premise that all students can learn and thus deserve access to the same quality of schooling.

**pathfinder**

A list of resources, both print and web-based, about a particular subject area.

**pattern blocks**

Multicolored two-dimensional blocks that come in shapes (for example hexagon, square, trapezoid, triangle, parallelogram, and rhombi), with each shape made of only one color. Pattern blocks are useful in demonstrating patterns and geometric concepts.

**pedagogy**

The art and science of teaching. Pedagogy is concerned with the contexts of learning and methods of instruction, and can be evaluated on a scale ranging from teacher-centered
(for example, direct instruction) to student-centered (for example, constructivist teaching, inquiry) models.

peer tutoring

Practice of one student being assigned to help another student with a particular subject or assignment.

performance assessment

Assessment that measures student performance on concrete tasks or activities as opposed to standardized multiple-choice tests. Students are expected to apply a range of skills and knowledge to solve a problem. Assessment is based not only on the results of the task but also on the processes of task performance.

performance criteria

A description of the characteristics or dimensions used to judge the quality of student work. Criteria are the guidelines or rules that outline for students what will be assessed on a given task.

personal growth plan

Teacher description of goals set for personal professional growth, including both long- and short-term goals. Many states provide a template for organizing growth plans, often aligned to professional standards (for example, INTASC or school improvement plans). Teachers select professional development, in-service, and continuing education opportunities to help them achieve personal growth goals.

phonemic awareness

Understanding that words are made up of individual sounds (that is, phonemes, the smallest units of sound), with a focus on the structure rather than meaning of words. Phonemic awareness is understood as a critical component of reading success.

phonics

The study of letter-sound relationships in reading and spelling. Phonics is used to teach letter-sound relationships to beginning readers by having them sound out words.

phonological awareness

See phonemic awareness.

picture dictionary
Learning tool that matches vocabulary words with visual images.

portfolio

A purposeful selection of student work that that showcases a variety of assignments, including written work, projects, artwork and reports. A portfolio is designed to demonstrate students' efforts and reflect progress over a period of time.

portfolio assessment

Assessment that is based on a collection of student work (see portfolio), measuring student progress in a variety of skills in one class or over the course of a school year.

post-traumatic stress disorder (PTSD)

Response to a traumatic event (such as abuse, a car accident, or a natural disaster); may include fear, anger, sadness, denial, and re-experiencing the event.

primary source

Original record or account of an event or topic that provides firsthand information. A primary source reflects the individual viewpoint of someone who observed or participated in the event or topic.

problem centered mathematics

Student-centered mathematics instruction that uses problem solving as a means to discovery of mathematical procedures and emphasizes real-world applications to mathematical concepts.

problem solving

A method of learning in which students work to understand a problem, create and carry out a plan of action, and review, discuss and evaluate processes for problem resolution.

problem-based assessment

Based on a problem-solving or problem-posing educational model, problem-based assessment involves the presentation of a problem the student must solve.

problem-based learning (PBL)

Model of instruction in which the teacher poses an authentic problem for student resolution. PBL may be one among many strategies in a classroom or an entire curricular and instructional approach. In the course of problem-solving, students work cooperatively
in groups to learn content and skills related to real world problems. The teacher acts as a facilitator to learning.

**professional development**

Educational opportunities for school teachers and administrative personnel with goals of personal and professional growth, and school improvement. Professional development is often called staff development.

**proficiency**

Minimum achievement required to demonstrate content mastery in a given subject area or at a given grade level.

**pull-out**

Removing a student from a regular classroom for remedial or advanced coursework.

**realia**

Tangible and original objects or artifacts that can be used as instructional aids.

**research cycle**

Research method that emphasizes information problem-solving and positions students as information producers (versus information consumers). Students repeatedly revisit stages in the research cycle as they refine data gathering processes.

**role-play**

Teaching method wherein students pretend to be different characters and improvise a scene.

**rubric**

A scoring guide for evaluating student work made up of definitions of quality work, well-defined criteria for measuring quality work, and a scoring method (using numbers or descriptive language such as excellent, good, etc.) to indicate level of performance.

**scaffolding**
An instructional technique in which a teacher breaks complex tasks into smaller component tasks, models the task, and creates links to students' existing knowledge. Scaffolding supports students in their learning until they are ready to pursue a task independently.

**school choice**

Legal structure allowing families and children to select a school other than the one assigned by their district. *Schools of choice* may be established by private firms or organized groups of families or educators; these groups receive public funding on a per-pupil basis.

**school improvement plan**

Comprehensive school-based plan outlining goals and objectives for ongoing school improvement. Specific measures are determined on a state-by-state basis.

**school-based management**

See site-based management.

**scientific method**

Research method using experiments and physical evidence to answer questions about the natural world.

**secondary source**

A work that interprets or analyzes an event or topic using primary and other secondary sources.

**Section 504**

Section 504 of the Rehabilitation Act of 1973 that guarantees civil rights to individuals with disabilities. Section 504 provides that individuals may not be subjected to discrimination on the basis of disability from any program receiving federal funding. A central tenet of Section 504 is free and appropriate public education for all children.

**service learning**

Intentional combination of community service objectives and learning opportunities that benefits both the recipient and provider of the service. Student service learning projects should be structured to link learning tasks to self-reflection so that they enrich learning, strengthen communities, and teach civic responsibility.

**sex education**
See comprehensive sex education.

**sheltered instruction**

An approach to teach language to English language learners by modifying the core curriculum to meet the language needs of those learners. Academic subjects are taught using English along with supplementary aids such as graphs, models, hands-on materials, and visual aids. Used mostly in classes comprised solely with English language learners.

**site-based management**

Organizational structure that decentralizes authority and increases the autonomy of individual schools. Responsibility and accountability are at the school level, and the decision-making process includes teachers, administrators, parents, and community members.

**social capital**

The norms and networks that people draw on to solve common problems.

**special education**

Programs serving students with mental and physical disabilities. Special education programs provide individualized education plans that detail services children will receive.

**spider map**

A graphic organizer used to describe the attributes and functions of a central idea or theme. Each central theme has four or more branches to organize details, resembling a spider.

**standards**

Expectations of what students should know and be able to perform.

**story map**

Graphic organizer that allows students to detail important elements of a story, including characters, plot, action, and setting.

**storyboard**

A graphic depiction of a story or narrative in which students illustrate major events in a story through sequential pictures. Storyboards can be used as a pre-writing activity or to review a story.
summative assessment

Evaluation administered at the conclusion of a unit of instruction to comprehensively assess student learning and the effectiveness of an instructional method or program.

sustained silent reading (SSR)

A period of uninterrupted silent reading in the classroom, typically from fifteen to thirty minutes.

tangram

Traditionally used to create shapes and figures from seven geometric pieces (or tans): five triangles in different sizes, one square, and one parallelogram. Tangrams can also be used for other math functions, including measures of area and fractional parts and wholes.

teacher research

Intentional and systematic inquiry by a teacher or teachers in order to improve classroom practice. Teacher researchers begin with a question about classroom life, design and implement a research plan, collect and analyze data, and adjust practice to better meet the needs of students.

team teaching

Collaboration between two or more teachers who share responsibility for presenting a subject or theme in a single classroom.

Title I

A federally funded program that provides state and local education agencies with financial assistance for schools with high numbers or percentages of students from low-income families. Schools that receive Title I funds must focus services on children who are failing or are most at risk of academic failure.

Title IX

Title IX of the Educational Amendments of 1972 bans sex discrimination in schools receiving federal funds, whether it is in academics or athletics.

Tourette's syndrome
Disorder marked by impulsivity and tics, both motor and verbal (repetition of certain phrases, pressured speech).

**tracking**

Division of students based on academic skill level. Students are "tracked" into a particular course of study intended to match cognitive abilities and to prepare students for an appropriate post-graduate future (college or university, trade school, or employment).

(learn more

**unifix cubes**

Colorful interlocking cubes used in mathematics education. Cubes can be grouped in many different ways to introduce patterns, and to demonstrate operations including counting, addition, subtraction, multiplication, and division.

**Venn diagram**

Visual tool composed of two or more overlapping circles used to show relationships between items.

**vouchers**

School-choice proposals that permit states to help pay tuition for children who attend private or religious schools.

**wait time**

Length of time a teacher waits for students' responses after asking a question. Research shows that increasing wait time from the typical 1.5 seconds after a question to at least 3 seconds increases the likelihood of student participation.

**WebQuest**

A classroom inquiry activity in which most information is drawn from the World Wide Web. Well-designed WebQuests focus learners' time on using information rather than looking for it and support learners' thinking at the higher levels of analysis, synthesis, and evaluation.
whole language

Instructional philosophy that emphasizes reading for meaning and reading in context. Whole language instruction focuses on a variety of strategies (for example, open-ended questions, discussions) to facilitate students' meaningful interpretations of texts, and does not advocate breaking language study into isolated skill components as practiced in phonics instruction.

word wall

An organized collection of words displayed on a classroom wall for easy student reference. Word walls help develop student vocabulary and support reading and writing.

year-round education

Model of education in which students attend school throughout the year with regular short breaks.

zone of proximal development (ZPD)

The gap between what a learner has already mastered (the actual level of development) and what a child can achieve (potential development) with the guidance of an experienced and capable assistant such as a teacher or more capable peer.