Coop workshop

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| Welcome to **Cooperative and Collaborative Learning**. In this session we'll focus specifically on how this technique for using small, cooperative groups in education can help improve learning in your class. Then you can proceed from CONCEPT TO CLASSROOM as you begin to apply new ideas to your lessons.  |

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| http://www.thirteen.org/edonline/concept2class/images/icon_dot.gif | **What are cooperative and collaborative learning?** |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**How do cooperative and collaborative learning differ from the traditional approach?**](http://www.thirteen.org/edonline/concept2class/coopcollab/index_sub1.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**How have cooperative and collaborative learning developed since they became popular?**](http://www.thirteen.org/edonline/concept2class/coopcollab/index_sub2.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**What are the benefits of cooperative and collaborative learning?**](http://www.thirteen.org/edonline/concept2class/coopcollab/index_sub3.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**What are some critical perspectives?**](http://www.thirteen.org/edonline/concept2class/coopcollab/index_sub4.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**How can I use cooperative and collaborative learning in conjunction with other educational techniques?**](http://www.thirteen.org/edonline/concept2class/coopcollab/index_sub5.html) |

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| **What are cooperative and collaborative learning?**Collaborative learning is a method of teaching and learning in which students team together to explore a significant question or create a meaningful project. A group of students discussing a lecture or students from different schools working together over the Internet on a shared assignment are both examples of collaborative learning. imageCooperative learning, which will be the primary focus of this workshop, is a specific kind of collaborative learning. In cooperative learning, students work together in small groups on a structured activity. They are individually accountable for their work, and the work of the group as a whole is also assessed. Cooperative groups work face-to-face and learn to work as a team.In small groups, students can share strengths and also develop their weaker skills. They develop their interpersonal skills. They learn to deal with conflict. When cooperative groups are guided by clear objectives, students engage in numerous activities that improve their understanding of subjects explored. In order to create an environment in which cooperative learning can take place, three things are necessary. First, students need to feel safe, but also challenged. Second, groups need to be small enough that everyone can contribute. Third, the task students work together on must be clearly defined. The cooperative and collaborative learning techniques presented here should help make this possible for teachers.Also, in cooperative learning small groups provide a place where:* learners actively participate;
* teachers become learners at times, and learners sometimes teach;
* respect is given to every member;
* projects and questions interest and challenge students;
* diversity is celebrated, and all contributions are valued;
* students learn skills for resolving conflicts when they arise;
* members draw upon their past experience and knowledge;
* goals are clearly identified and used as a guide;
* research tools such as Internet access are made available;
* students are invested in their own learning.
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How do cooperative and collaborative learning differ from the traditional approach?

Cooperative and collaborative learning differ from traditional teaching approaches because students work together rather than compete with each other individually.

Collaborative learning can take place any time students work together -- for example, when they help each other with homework. Cooperative learning takes place when students work together in the same place on a structured project in a small group. Mixed-skill groups can be especially helpful to students in developing their social abilities.

The skills needed to work together in groups are quite distinct from those used to succeed in writing a paper on one's own or completing most homework or "seatwork" assignments. In a world where being a "team player" is often a key part of business success, cooperative learning is a very useful and relevant tool.

Because it is just one of a set of tools, however, it can easily be integrated into a class that uses multiple approaches. For some assignments individual work may be most efficient, while for others cooperative groups work best.

Research suggests that cooperative and collaborative learning bring positive results such as deeper understanding of content, increased overall achievement in grades, improved self-esteem, and higher motivation to remain on task. Cooperative learning helps students become actively and constructively involved in content, to take ownership of their own learning, and to resolve group conflicts and improve teamwork skills.

**How have cooperative and collaborative learning developed since they became popular?**

Over the past twenty-five years, the use of small-group learning has greatly increased. Informal collaborative projects have grown into structured, cooperative group work. Cooperative learning became especially popular in the early 1980s and has matured and evolved since.

One evolving aspect of cooperative and collaborative learning involves how the educational community approaches the composition of the small groups. Debates still occur on this topic. Researchers disagree mainly about whether to group students according to their ability, or to mix them so that stronger students can help the weaker ones learn and themselves learn from the experience of tutoring.

Some researchers, such as [Mills](http://www.thirteen.org/edonline/concept2class/w5-resources.html#a10) 1 and [Durden](http://www.thirteen.org/edonline/concept2class/w5-resources.html#a10) (1992), suggest that gifted students are held back when grouped with weaker students. More researchers support diversity in small groups, however. [Radencich](http://www.thirteen.org/edonline/concept2class/w5-resources.html#b3) and [McKay](http://www.thirteen.org/edonline/concept2class/w5-resources.html#b3) (1995) conclude that grouping by ability does not usually benefit overall achievement and can lead to inequalities of achievement. With good arguments on both sides, most teachers make choices based on their objectives.

**1.** Or, they simply alternate. Sometimes they group according to the strengths or interests of students, and other times they mix it up so that students can learn to work with different types of people.

Just as experts differ on the make-up of groups, they also debate about the most effective size for small groups. According to [Slavin](http://www.thirteen.org/edonline/concept2class/w5-resources.html#a15) 2 (1987), having two or three members per group produces higher achievement than groups with four or more members. [Antil](http://www.thirteen.org/edonline/concept2class/w5-resources.html#a1) et al. (1997) conclude that most teachers prefer pairs and small groups of three and four. [Elbaum](http://www.thirteen.org/edonline/concept2class/w5-resources.html#a4) et al. (1997) suggest that we have dialogues with students about their preferences for group composition and expected outcomes. And [Fidler](http://www.thirteen.org/edonline/concept2class/w5-resources.html#a5) (1999) discusses the value of reflecting in order to correct errors we make in group assignments. Through many mistakes, Fidler learned how to refine the composition of his groups.

**2.** As we work through some examples of cooperative learning, you will learn how to devise groups that work best for particular assignments.

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| http://www.thirteen.org/edonline/concept2class/coopcollab/images/poster_a4.jpgFeatureScience teacher Janet Torkel at Brooklyn's P.S. 200 discusses how collaboration between teachers helps her students learn better. Seeing teachers working together helps reinforce the students' own collaborative work.  |

Most recently, new technologies have added an exciting new dimension to collaborative and cooperative learning. With the Internet, collaboration can occur without regard to distance or time barriers: e-mails can be sent at students' or teachers' convenience to practically anywhere around the world, and the recipient can reply when he or she has time. Students can work together to create Web pages or find and share data gleaned from the Net. There is software that can be used with school computer networks to allow students in different classrooms to work together simultaneously or a group of students to collaborate on projects like desktop publishing

**What are the benefits of cooperative and collaborative learning?**

Benefits from small-group learning in a collaborative environment include:

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| http://www.thirteen.org/edonline/concept2class/images/ding_checkbox.gif | Celebration of diversity. Students learn to work with all types of people. During small-group interactions, they find many opportunities to reflect upon and reply to the diverse responses fellow learners bring to the questions raised. Small groups also allow students to add their perspectives to an issue based on their cultural differences. This exchange inevitably helps students to better understand other cultures and points of view.  |
| http://www.thirteen.org/edonline/concept2class/images/ding_checkbox.gif | Acknowledgment of individual differences. When questions are raised, different students will have a variety of responses. Each of these can help the group create a product that reflects a wide range of perspectives and is thus more complete and comprehensive.  |
| http://www.thirteen.org/edonline/concept2class/images/ding_checkbox.gif | Interpersonal development. Students learn to relate to their peers and other learners as they work together in group enterprises. This can be especially helpful for students who have difficulty with social skills. They can benefit from structured interactions with others.  |
| http://www.thirteen.org/edonline/concept2class/images/ding_checkbox.gif | Actively involving students in learning. Each member has opportunities to contribute in small groups. Students are apt to take more ownership of their material and to think critically about related issues when they work as a team.  |
| http://www.thirteen.org/edonline/concept2class/images/ding_checkbox.gif | More opportunities for personal feedback. Because there are more exchanges among students in small groups, your students receive more personal feedback about their ideas and responses. This feedback is often not possible in large-group instruction, in which one or two students exchange ideas and the rest of the class listens.  |

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| http://www.thirteen.org/edonline/concept2class/coopcollab/images/poster_j3.jpg**Part 1 of 2**  | http://www.thirteen.org/edonline/concept2class/coopcollab/images/poster_j3-2.jpg**Part 2 of 2**  |

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| Transcript |
| In Part 1 of this video clip, Kathryn Mitchell Pierce, who teaches grades one through three in Clayton, Missouri, talks about adjusting the make-up of cooperative groups. In Part 2, she discusses how even shy students can blossom when assigned to the right kind of group.  |

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Beneficial, cooperative-learning situations are not easy to set up. In many situations, particularly those in which people must work together on a problem, conflicts prevent learning. As a result, cooperative learning requires teaching kids to work well with others by resolving these inevitable conflicts. In the next section, we will present specific techniques for dealing with group conflicts.

**What are some critical perspectives?**

Critics of small-group learning often point to problems related to vague objectives and poor expectations for accountability. Small-group work, some claim, is an avoidance of teaching. According to these critics, dividing the class into small groups allows the teacher to escape responsibility.

[Vicki Randall](http://www.thirteen.org/edonline/concept2class/w5-resources.html#a12) (1999), who has taught elementary, high-school, and college-level students, cautions against abuse and overuse of group work. According to Randall, the many benefits of cooperative learning sometimes blind us to its drawbacks. She identifies the following practices as common weaknesses:

* Making members of the group responsible for each other's learning. This can place too great a burden on some students. In mixed-ability groups, the result is often that stronger students are left to teach weaker students and do most of the work.
* Encouraging only lower-level thinking and ignoring the strategies necessary for the inclusion of critical or higher-level thought. In small groups, there is sometimes only enough time to focus on the task at its most basic level.

You can find information about this and other critical works we cite on our [Resources](http://www.thirteen.org/edonline/concept2class/w5-resources.html#artic) page.

Some critics cite the mix of students as a source of potential difficulties, although they disagree on which types of groups are problematic. Other dissenters highlight the overuse of cooperative groups to the detriment of students who benefit more from learning alone. Yet others recommend that we negotiate more with students to determine how they learn best and apply these ideas to the way we structure classes.

Recommendations from advocates of cooperative learning to address issues that critics raise include:

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| 1.. | making sure to identify clear questions at the outset and to show how these questions relate to students' interests and abilities and the teaching goals;  |
| 2.. | resolving small-group conflicts as soon as they arise and showing students how to prevent trouble in future;  |
| 3.. | creating **rubrics** 1 at the beginning of any assignment and using these for guiding the learning process and for assessing final work;  |
| 4.. | helping students reflect on their progress on a regular basis;  |
| 5.. | expecting excellence from all students and letting them know that you believe in them and their ability to produce excellent work.  |

**1.** Another possible problem with cooperative learning involves racial and gender inequities. Research ([Cohen](http://www.thirteen.org/edonline/concept2class/w5-resources.html#b1) 1986; [Sadker](http://www.thirteen.org/edonline/concept2class/w5-resources.html#a13) et al. 1991; [Linn](http://www.thirteen.org/edonline/concept2class/w5-resources.html#a9) and [Burbules](http://www.thirteen.org/edonline/concept2class/w5-resources.html#a9) 1993) shows that in science, and perhaps in other areas of the curriculum as well, group learning may be LESS equitable for girls than autonomous learning. Group learning may reinforce stereotypes, biases, and views of science and math as a male domain. Male students may discredit females, and the classroom may become a microcosm of the "old boy" network that has frequently discouraged women and minorities from participating in certain curricular activities. Specifically, according to Sadker et al. (1991):

The different and contradictory findings of the relatively few studies analyzing cross-gender performance in cooperative learning organizations suggest that, by itself, the implementation of cooperative learning groups does not necessarily lead to a more equitable and effective learning environment for females and minorities.

Group formations that avoid diversity -- e.g., all female or all racial-minorities -- may be useful in these situations, but these groups also have drawbacks of their own.

How can I use cooperative and collaborative learning in conjunction with other educational techniques?

Since cooperative-learning techniques revolve around the use of a particular tool -- small groups -- they can be used with almost any other educational strategy.

Many of the other teaching techniques detailed in previous workshops include small-group learning activities. The cooperative-learning techniques described here will help you and your students make the best use of these small-group activities.

Some types of cooperative learning (like those demonstrated in this workshop) have been developed in concert with [the theory of multiple intelligences](http://www.thirteen.org/edonline/concept2class/mi/index.html), so they work very readily with this strategy. In small groups, students can share their strengths and weaknesses and use the group activities to develop a variety of their intelligences.

Cooperative activities involve the construction of new ideas based on personal and shared foundations of past experiences and understandings -- so they naturally apply some of the principles of [constructivism](http://www.thirteen.org/edonline/concept2class/constructivism/index.html). Learners also investigate significant, real-world problems through good explorative questions, and as a result these groups can easily be used for an [inquiry-based approach](http://www.thirteen.org/edonline/concept2class/inquiry/index.html).

They can also help students meet [national, state, or local standards](http://www.thirteen.org/edonline/concept2class/standards/index.html). Cooperative and collaborative activities can have many different objectives, ranging from mastery of basic skills to higher-order thinking. Because the specifics of a cooperative-learning project depend on the objectives of the particular teacher, the teacher can easily orient the project toward meeting these standards.

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| In the previous sections of this workshop, you were introduced to basic ideas about cooperative and collaborative learning. You have seen how they can be used in class to involve more students in active learning. In this section of the workshop, we will explore practical options for forming different kinds of groups for specific purposes. Through tips, guides, and strategies from researchers and teachers, you will find a good range of group formations to choose from. Now that you are familiar with various group possibilities, you may wish to vary the nature and purpose of groups. You may wish to try the alternative formations highlighted in this section. By reflecting on your own experiences with group formats you have tried, you can determine their effectiveness for your class. |

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| **IMPLEMENTATION**

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| http://www.thirteen.org/edonline/concept2class/images/icon_dot.gif | **How do I get started using cooperative and collaborative groups?** |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**What are the most effective small groups I can use for different learning objectives?**](http://www.thirteen.org/edonline/concept2class/coopcollab/explor_sub1.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**What are some challenges I might face?**](http://www.thirteen.org/edonline/concept2class/coopcollab/explor_sub2.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**How do I assess students' progress?**](http://www.thirteen.org/edonline/concept2class/coopcollab/explor_sub3.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**How can small-group projects involve parents and the community?**](http://www.thirteen.org/edonline/concept2class/coopcollab/explor_sub4.html) |
| http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif | [**How can technology be used with cooperative and collaborative learning?**](http://www.thirteen.org/edonline/concept2class/coopcollab/explor_sub5.html) |

http://www.thirteen.org/edonline/concept2class/images/line.gif**How do I get started using cooperative and collaborative groups?**imageHere is a step-by-step guide to using cooperative and collaborative groups in your classroom. It starts with the development of a good question and then moves through a cycle that allows the teacher and students to get better at working collaboratively over time.

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| 1.   | Form a question. Excellent questions, as good teachers from the time of Socrates have known, form the bedrock for motivating small groups. A good question motivates students to ask, wonder, and discover in order to know. A quick checklist for small-group questions can help you get started. Good group questions should: |

* Work from the known to the unknown. When teams connect new ideas to their past knowledge and experiences, they draw from personal understanding for a deeper response.
* Allow for distinctive roles for each studentFor example, one student may record, another ensures that all students participate, another organizes Internet searches, another gathers creative responses from all participants.
* Encourage additional queries. We teach students to ask each other follow-up questions about each topic in order to tap into deeper responses. Students can learn to probe each other through sets of questions they compile. Ask them to hand in lists of questions they create and add your own queries to their lists.
* Vary the techniques used for moving toward answers. These might include humor, group competition, or mock interviews to respond to real world problems.
* Allow students to create visuals such as charts, boards, overheads, and diagrams that students can use for presenting their ideas.
* Avoid jargon. The questions that motivate small-group inquiry will adequately cover content, address real-life problems, and range from lower-level facts and comprehension to higher-level application and critical thinking.

[http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow_up.gif](http://www.thirteen.org/edonline/concept2class/coopcollab/exploration.html#top)

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| 2.   | Identify goals. The second phase for successful group formation relates to creating goals for each group assignment. Foggy goals mean wasted time and poor motivation to learn.  |

Goals, or objectives, are performance-based and usually begin, "Learners will" (LW). Group objectives, clearly stated, motivate students and offer precise directions on the lesson content, so you will want to substitute vague words such as "know," "understand," "appreciate," or "realize" for performance words such as "list," "demonstrate," "describe," or "compare." Effective group objectives might include: * imageLW list and illustrate on a poster three foods that bears typically enjoy.
* LW demonstrate \_\_\_\_\_\_\_\_\_\_\_\_through a survey that determines \_\_\_\_\_\_\_\_\_\_\_.
* LW describe a business proposal for a bear conservation plan in state parks.
* LW compare bear lifestyles in three countries.

You might identify one or two significant objectives for any group task. Time spent in identifying clear objectives is often time saved from reteaching content that could have been handled in group interactions. [http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow_up.gif](http://www.thirteen.org/edonline/concept2class/coopcollab/exploration.html#top)

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| 3.  | Create **rubrics** 1. Rubrics provide another tool to guide students' expression of knowledge as they solve problems. They also help students and teachers to assess the group work accurately.  |

**1.** A group rubric that guides students' investigations about any topic might simply begin by listing areas of strength expected, such as:* imageIdentifies relevant and meaningful problems
* Creates effective responses or possibilities
* Applies specific solutions from the text or Internet
* Contributes data from interviews
* Displays personal strengths and interests
* Suggests future considerations about the problem
* Illustrates communication about the problem

Armed with a probing question, clear objectives, and specific rubrics, you can then assign diverse tasks that enable students to express their unique methods of solving a real world problem. You may want to do this by challenging more of their brains' capacity to respond through multiple intelligence applications.

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| 4 WIDTH=.  | Assign a specific assessment task. The fourth phase of group work is the assignment of performances that:  |

image* Match related learning approaches. So, if group members conducted an interview, they might be expected to provide a transcript of dialogue, compare two different perspectives, and so on. You would not expect multiple-choice tests to accurately assess knowledge obtained in original interviews, for instance.
* Cover content. The task should illustrate students' active engagement with the text and other learning materials used.
* Enable students to develop their interests and abilities. Students might complete interest inventories to discover their interests and then check to determine how they used their unique interests and abilities to explore questions.
* Involve authentic events. Authentic tasks are those relevant to your students' lives and usually represent solutions to real-life problems.
* Create meaningful challenges for students. Students often use their stronger abilities or intelligences to develop weaker areas. Cooperative and collaborative groups can use multiple approaches to solve any problem so that students broker their gifts and abilities to explore topics at a deeper level. [http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow_up.gif](http://www.thirteen.org/edonline/concept2class/coopcollab/exploration.html#top)

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| 5.  | Reflect to adjust. Finally, the fifth phase of cooperative-group design ensures that teachers and students regularly reflect on group progress and make adjustments to improve outcomes. They look back over the small-group session through a series of simple questions.  |

In this phase, you ensure the regular adjustments that build more successful groups for each new task assigned. Following any group assignment, for instance, you and students might reflect on questions about content: * What main goal did the group cover today?
* What facts did each member contribute? How?
* What did the group not learn about the topic? Why?
* What would the group do differently to achieve more?
* What content did members find interesting?
* Did members possess enough background knowledge?
* What will future group goals be to ensure completion of its goals?

imageReflection questions about process might include:* How much time did each member spend talking?
* Who talked most? Why?
* Did members question each other and wait for responses?
* How do members motivate each one to participate?
* Did motivation efforts work? Why or why not?

During a collaborative project, students might also reflect on their attitude, work habits, and areas of need. Reflective questions about attitude include:* What was I particularly good at during group work?
* How did I improve over the time we worked together?
* What do I still need to work on?

Reflective questions about work habits include:* How would I describe my work and cooperation?
* Did I contribute regularly as we worked together?
* What learning goals did I set and which ones did I achieve during this time together?

Reflective questions about areas of need include:* What three areas still need development most?
* What areas do I need help to improve?
* What advice would (or did) other group members give me?
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**What are the most effective small groups I can use for different learning objectives?**

Take a backward glance at any lesson before you decide which group formations might work best to achieve your learning goals. (Some common group types are listed below.) You might begin by considering the following questions:

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| 1.  | Which group formation would enable each student to get actively involved in this lesson?  |
| 2.  | How does the group formation selected help students develop their weaker areas as well as use their stronger skills and intelligences?  |
| 3.  | Should students have any say in their group formations for this lesson?  |
| 4.  | Will the group formations chosen accomplish our lesson objectives? If not, how can we redesign groups to meet these goals?  |
| 5.  | How can students reflect and keep records of their progress and their peer's contributions for improved group participation?  |

Also, see our [Resources](http://www.thirteen.org/edonline/concept2class/w5-resources.html#artic) page for research on the most effective group size for collaborative learning.

You may also wish to take a look at your classroom furniture arrangement to make the most of grouping spaces in your class. Most teachers prefer to create grouping arrangements that do not limit their space. Groups should be located so that you can move around and easily interact with each cluster. Once the space has been determined you are ready to choose a group form that best fits your needs.

The following are some possible group configurations:

**Pair-share**

**The group formation defined:** Pair-share is the simplest group to arrange. It draws together two students to solve one problem, share ideas or explore a question. Often, this group is useful when large-group instruction includes parts that require discussion, Explanation, or reflection. Pairs come together for a brief time, and each person finds an opportunity to speak, listen, and get feedback on the ideas raised.

**Suggested tasks for this group:** Use pair-sharing for: peer editing, sharing personal experiences, discussing complex issues raised by materials and media. Share responses to a field trip or museum. Share stories from experiences related to the lesson topic.

**Benefits of this formation:** Students have more active engagement time when there are fewer people in a group. For students with fewer interpersonal skills, two is a comfortable setting to share without the threats they may perceive in larger groups.

**Possible drawbacks:** With two members only, students receive fewer perspectives and less diverse insights on complex topics. Chances of developing better solutions increase in groups with a few more members.

**Jigsaw (sometimes called novice/expert), for research and peer teaching.**

**The group formation defined:** In jigsaw groups, students research and discuss as part of one group (sometimes called a novice group) and then teach (the group is now called the expert group).

**Suggested tasks for this group:** This group formation works best when you have four or five parts of one topic to research. For example, you may have four questions that relate to Arctic ravens -- for instance, physical characteristics, habits, mating rituals, and symbolism. Each group researches five significant facts about their questions in the novice group and then teaches the other groups while taking notes on additional questions.

**Benefits of this formation:** By giving students both responsibility to teach and learn you are giving them opportunity to develop both research and teaching skills. Students gain wonderful review sheets for exams when this task is set up well.

**Possible drawbacks:** Some students feel time constraints in this task and appear unable to teach the expert group after research time is up. In these cases, students need additional time to research and discuss the issues.

**Split-class discussion (to debate a major issue)**

**The group formation defined:** Class split in two. Discussion or debate topics must be clearly selected to engage students. This group formation works best when everyone is involved.

**Suggested tasks for this group:** Face desks in four rows - two facing the other two. Use a Nerf brain ball or other soft object to throw back and forth -- the speaker holds the ball -- to ensure that each side gets equal discussion opportunities. Ask students to catch the ball once each until all members have spoken, in order to give everybody a chance to participate.

**Benefits of this formation:** The entire class can hear diverse views on meaningful topics. Students often change their opinions or develop a deeper understanding of a variety of perspectives based on the diverse ideas and insights of others.

**Possible drawbacks:** Students each speak less since the group takes more time to get around to everybody. Some students find it difficult to speak in front of larger groups and enjoy a smaller circle more. These students learn better and with less stress when they share in smaller groups.

**Random groups of three**

**The group formation defined:** Discussion topics in random groups of three members; topics must be broad enough to capture the entire group's interest and focused enough to elicit a significant response.

**Suggested tasks for this group:** Predict what will happen in a story or play. Respond to a crisis situation and create a group response to resolve the problem.

**Benefits of this formation:** Students receive feedback from a variety of perspectives. Group members serve as models for one another and hold one another accountable. Three is a good number for extra speaking opportunities, but it is not so big as to risk ignoring some members.

**Possible drawbacks:** It is easier to leave out students who are shy or quiet in this formation. Occasionally two team up and one feels ostracized.

**Ability groups, interest groups, or friendship groups**

**The group formation:** Ability groups bring together students with similar grades, backgrounds, interests, or abilities. A variation of ability grouping is stratified grouping, in which you bring together students from high, middle, and low achievement groups.

**Suggested tasks for this group:** Creating plays or skits. Building and constructing projects outside of class in which students must visit one another's homes and work together. Students who know one another or live close to each other can meet more easily than those who live long distances from each other.

**Benefits of this formation:** Students can work at the pace and level that most fits their abilities in the subject. They find special interest in talking with people who engage at their level about lesson topics. Students are rarely bored when they can move along at a comfortable pace. Peers who know one another or who work at similar levels often motivate one another and enjoy each other's insights.

**Possible drawbacks:** It is unrealistic to find students who are homogeneous in all areas. Students who are slower get labeled by students in faster or stronger groups. Weaker students cannot develop in homogeneous groups since they cannot rely on accurate peer coaching. And unpopular children may feel excluded if they don't fit into any friendship group.

**Diversity groups with mixed interests, abilities, and backgrounds**

**The group formation defined:** Groups with representatives from different backgrounds, cultures, and genders. Generally in these groups you find a wide range of interests, abilities, and experiences.

**Suggested tasks for this group:** Generally, the diverse group most benefits from exploring geographic sites, historic events, diverse lifestyles, and worldview differences. Before the reading of a New Year's story in class, students might be invited to write "Happy New Year" in their language on the board -- or to create a greeting appropriate to the New Year celebration. Diverse groups provide unique opportunities to value many languages and bring together different customs from a variety of backgrounds to respond to one issue.

**Benefits of this formation:** Students have repeated opportunities to experience an issue from other perspectives. When well-guided, diversity groups can help students understand one another and celebrate other cultures and lands.

**Possible drawbacks:** Without clear guidance, or with preconceived notions about a person's background, minority students can feel alienated in diverse groups. It is particularly important for these groups to receive careful guidelines about strategies for respecting one another and listening to each other.

For research on the pros and cons of mixed-ability vs. ability groups, see our [Resources](http://www.thirteen.org/edonline/concept2class/w5-resources.html#artic) page.



**Multi-aged groups**

**The group formation defined:** A group of students from different grade and age levels who work together for a combined task that benefits each member.

**Suggested tasks for this group:** Teens might come together with an elementary class to teach math concepts or help with science experiments. A task that works especially well with this formation is interviews conducted by teens to create a special-interest book for elementary-grade students. Students can also be grouped with older "reading buddies" who help them with reading skills. Mixed ages and abilities work best when the goals are clearly defined and each member understands his or her role in the project.

**Benefits of this formation:** Teens are less likely to feel pressure to compete against peers when mixed with younger students. And elementary kids feel important when singled out and engaged by an older student for a task they both find meaningful.

**Possible drawbacks:** Sometimes teens can be a negative influence on younger children; at-risk youngsters with behavioral problems can be difficult for teens to relate to. However, often children with behavior problems, "at-risk" kids, are amongst the sweetest and most thoughtful students. In difficult cases, an adult may be required to monitor behavior and ensure success for both ages.

**Peer-led conferences**

**The group formation defined:** Students prepare and then lead a roundtable discussion of the material with parents, teachers, and other students.

**Suggested tasks for this group:** A major project, set up in your classroom, in which students prepare stations for each of several intelligences (see our workshop on [Multiple Intelligences](http://www.thirteen.org/edonline/concept2class/mi) for more about this concept). Then parents and other community members are invited to interact with students and to ask questions about the work. International food might be served for a history topic, music might be played in the background, and so on. Students prepare the environment for their conference and take the lead in engaging others in their work. They might then prepare an interactive newsletter in which they write notes to the adults about the experience and type up notes from community participants.

**Benefits of this formation:** This group structure gives students an opportunity to teach that is very authentic. They benefit from questions asked by real-life participants and from engaging others in their projects. Students also learn self-confidence and gain the ability to respect others' ideas from this group formation.

**Possible drawbacks:** If parents attend and one student is left without guests, he or she can feel alienated in this activity. It is important to ensure that adults move throughout the room so that all students are included in the interactions. Teachers might also ask students individually ahead of time who has guests coming and who doesn't. That way, they can help to move additional guests to students without family. Through cooperative sharing of our experiences with small groups used in our classes, we can learn helpful hints and tips from one another.

Here's another detailed Scenario of an innovative group formation:

**What are some challenges I might face?**

The main challenge faced in cooperative and collaborative learning is group conflict. Students need to learn to work together. It is not always something that comes naturally. You can teach skills like praising others, taking turns for equal participation, and shared decision making. Each week, you could emphasize one of these techniques to help develop group work.

Teachers who haven't previously used cooperative or collaborative learning might also need to get used to the noise level in the classroom, which is raised during these activities.

But what do you do when one or two students complain about their group's inability to work together? You could remove unhappy participants. However, a more effective approach is probably using simple conflict-resolution checklists.

Group cohesiveness occurs only to the extent that people's needs are satisfied. But how do you foster such cohesiveness? Whenever the dynamics of interpersonal relationships, diverse learning styles, or power imbalances obstruct a group's flow of communication, conflict-resolution strategies can assist students in resolving and diffusing the situation.

Students sometimes require assistance and may need to be reassured that they can positively interact with others. But if you remove students, the group learns that conflict should be avoided rather than resolved. Instead, you may want to encourage groups to:

|  |  |
| --- | --- |
| http://www.thirteen.org/edonline/concept2class/images/num_s1.gif. | Listen to every member. The extent to which you genuinely hear others will increase confidence, acceptance, and success. Problems are more easily solved when people keep an open mind and listen to others' perspectives. Listening carefully to others also helps us understand and appreciate how group members feel and think.  |
| http://www.thirteen.org/edonline/concept2class/images/num_s2.gif. | Define responsibilities. Whenever one person dominates by doing all of the work others feel less valued and tend to shrink back. On first glance it may appear as though some group members are simply lazy. But in reality, students accused of slacking off will often tell you that somebody else is bossing them without allowing choices or welcoming their contributions. The idea here is to agree on who does what, and by when. Collaboration takes place around the "how" and "what" questions.  |
| http://www.thirteen.org/edonline/concept2class/images/num_s3.gif. | Value each person's gifts. Trouble occurs if one student is after marks only and fails to trust others in the group to attain high marks. So rather than welcoming each person's ideas and contributions, the domineering person relies on only one or two to demonstrate their talents. But we know that people are motivated by demonstrating their own individual strengths, not by coasting on another member's abilities.  |
| http://www.thirteen.org/edonline/concept2class/images/num_s4.gif. | Model excellence. Rather than preach to other group members how to achieve excellent work, group members can demonstrate their own willingness to create quality responses. If one student falls short of the group's expectations, others can help by supporting and encouraging change. However, members should avoid sharp criticism and negative reactions to each other's ideas and insights.  |
| http://www.thirteen.org/edonline/concept2class/images/num_s5.gif.  | Promote humor. Humor often prevents and diffuses conflicts before they blow up. The best humor is created around a situation in which everybody can laugh, never laughing at one person's expense. People who have a knack for humor often laugh at themselves. This creates a safe environment in which others become more willing to take similar risks.  |

[](http://www.thirteen.org/edonline/concept2class/coopcollab/explor_sub2.html#top)Even with the conflict-resolution strategies above, some students will require more help than others. To prevent or solve conflicts within groups, a checklist may be useful:

**Checklist to Help Students Resolve Small-Group Conflicts**
(This checklist may be turned in with the projects, used as a point of discussion between students and teacher, or placed in a student's portfolio. The students should rate each criterion as "not at all," "some," or "very much.")

**Listen:**

|  |  |
| --- | --- |
| http://www.thirteen.org/edonline/concept2class/images/num_s1.gif. | We listened to each person's ideas each time we met. \_\_\_\_\_  |
| http://www.thirteen.org/edonline/concept2class/images/num_s2.gif. | We used at least one idea from each person. \_\_\_\_\_ |
| http://www.thirteen.org/edonline/concept2class/images/num_s3.gif. | We encouraged every participant to share. \_\_\_\_\_ |

**Define responsibilities:**

|  |  |
| --- | --- |
| http://www.thirteen.org/edonline/concept2class/images/num_s1.gif. | We invited volunteers for each task. \_\_\_\_\_ |
| http://www.thirteen.org/edonline/concept2class/images/num_s2.gif. | Every person chose a meaningful part. \_\_\_\_\_ |
| http://www.thirteen.org/edonline/concept2class/images/num_s3.gif. | We took turns facilitating the others' input. \_\_\_\_\_ |

**Value each person's gifts:**

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| http://www.thirteen.org/edonline/concept2class/images/num_s1.gif. | We can describe the strengths of each person in the group. \_\_\_\_\_ |
| http://www.thirteen.org/edonline/concept2class/images/num_s2.gif. | We can identify what each enjoys doing most. \_\_\_\_\_ |
| http://www.thirteen.org/edonline/concept2class/images/num_s3.gif. | We give encouragement where people show weakness. \_\_\_\_\_ |

**Model excellence:**

|  |  |
| --- | --- |
| http://www.thirteen.org/edonline/concept2class/images/num_s1.gif. | Each person had opportunities to show his or her best work to the group. \_\_\_\_\_ |
| http://www.thirteen.org/edonline/concept2class/images/num_s2.gif. | We encouraged everybody to bring his or her very best work. \_\_\_\_\_ |
| http://www.thirteen.org/edonline/concept2class/images/num_s3.gif. | Together we set goals for excellence. \_\_\_\_\_ |

**Promote humor**

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| http://www.thirteen.org/edonline/concept2class/images/num_s1.gif. | We laughed together. \_\_\_\_\_ |
| http://www.thirteen.org/edonline/concept2class/images/num_s2.gif. | We did not laugh at each other's efforts. \_\_\_\_\_ |
| http://www.thirteen.org/edonline/concept2class/images/num_s3.gif. | We worked together to enjoy our entire group. \_\_\_\_\_ |

With a group's weaknesses identified and problem areas articulated, students can create compromises, resolve disagreements, or seek further help. As a preventative measure, the group might discuss this conflict checklist before critical problems take root. Imagine each group member's unique and special gifts when working together to solve complex content problems. Now imagine that first important step toward unleashing each member's unique gifts through easing conflicts that prevent learning. The checklist provided here can help ensure success.

Here are some additional tips on dealing with students who have difficulty working collaboratively:

* Examples of responses that help modify behavior:

. Respect the student.
. Identify specific and clear expectations.
. Structure the environment.
. Create contracts, perhaps with parents' help.
. Affirm students' positive behavior.
* Examples of unproductive teacher responses:

. Ignore disruptive behavior.
. Expect blind compliance to adult expectations.
. Embarrass the student in front of peers.
. Judge a student's motives.
. Injure the student in any way.

**How do I assess students' progress?**

**Rubrics** 1 created in the process of designing tasks can help you assess students' progress. These include clear directions regarding what is expected for high marks on a project. Assessment is built into the design of the questions and the group projects. Also, once you have created trusting collaborative groups you can incorporate peer assessments into your grading system.

**1.** For examples of rubrics, see the [Inuit Peoples](http://www.thirteen.org/edonline/concept2class/coopcollab/lp_inuit1.html) lesson plan and [Water in Your Community: Drought!](http://www.thirteen.org/edonline/concept2class/coopcollab/lp_drought5.html) lesson plan in the "[Demonstration](http://www.thirteen.org/edonline/concept2class/coopcollab/demonstration.html)" section. Also, here is a step-by-step formula for creating rubrics:

|  |  |
| --- | --- |
| http://www.thirteen.org/edonline/concept2class/images/num_s1.gif.  | Determine how an "expert" would perform in the situation. List the knowledge, skills, or dispositions an "expert" might have.  |
| http://www.thirteen.org/edonline/concept2class/images/num_s2.gif.  | Examine work that students have completed to see the range of possible answers and responses.  |

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| http://www.thirteen.org/edonline/concept2class/coopcollab/images/poster_j1.jpgKindergarten teacher Michael Beason in Apoka, Florida, explains how just watching groups in action can be an assessment tool.  |

|  |  |
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| http://www.thirteen.org/edonline/concept2class/images/num_s3.gif.  | Identify the observable differences between "excellent/expert" and "poor/novice" performance.  |
| http://www.thirteen.org/edonline/concept2class/images/num_s4.gif.  | Turn the "good" and "poor" performance into a range of possible performances.  |
| http://www.thirteen.org/edonline/concept2class/images/num_s5.gif.  | Try to assess students with the range of performances you identify.  |
| http://www.thirteen.org/edonline/concept2class/images/num_s6.gif.  | Revise criteria as needed.  |

Collaborative and cooperative learning can also lead to study guides that help students perform well on standardized or other tests in the subject areas they are studying.

You can also gather a great deal of insight about how well students are learning in their groups simply by watching them in action.

How can small-group projects involve parents and the community?

Acting on the well-founded assumption that when parents participate, kids learn more, you can involve parents in a cooperative lesson by introducing the topic at a parent-teacher gathering and by modeling small-group learning with parents.

Invite parents to an evening meeting in your classroom to discuss a particular theme or unit to be taught in your subject area.

Brainstorm with them for their ideas on what you might include in teaching that topic. The strategy here is to include parents' ideas in order to make your content more relevant to their kids.

Ask them for contributions and suggested activities for presenting the unit. They may know of speakers or other useful resources. Ask them, for instance: "How would you like to play a more constructive role in helping your child's group?" Have them share in small groups and then list their suggestions on a chart for the whole group to share.

Discuss expectations you have for the students by the end of this unit and ask the parents to help their kids at home in reaching them.

Finally, plan some avenues and mark calendar spots for continued communication between the class and parents during the unit.

Parents can also help cooperative groups make progress in their work through shared journals. Every day each student could write an entry about the group's work to be responded to by a member's parent. Shared journals can also be exchanged among the group's parents for regular communication during a project. In these journals, the students should be encouraged to ask questions, reflect on their process, report findings, and make predictions. Parents can see what their children are learning and help guide them if they encounter difficulties.

Students often think they know something until they attempt to explain it. Learning gaps can become evident when a speaker hears limitations in his own knowledge as he tries to describe it. Parents can offer a forum for their children to discover what they know and expand upon it.

Students can also work together to publish their own Web site that will be available for viewing by anyone, anywhere, with a Web browser. A Web site is an ideal project for cooperative learning, because a Web page can involve the use of many media -- graphics, text, video and audio files, and animation -- and building one requires many skills (Web-page design, writing, editing, programming, shooting videos, etc.). Such a project invites contributions from each group member. And the product will help communicate with the community.

**How can technology be used with cooperative and collaborative learning?**


Technology -- especially the Internet -- has opened up vast new opportunities for cooperative and collaborative learning. With the Net, students can correspond -- and collaborate -- with "keypals" (e-mail penpals) around the world. E-mail can also be used to facilitate collaboration with students in other classes in your school or district -- or anywhere in the world, for that matter.

There are organized collaborative projects called WebQuests on the Web that are ready for you to join. These allow students from many locations to work together while learning about a particular subject and searching for information. See our CONCEPT TO CLASSROOM workshop devoted entirely to the subject of [WebQuests](http://www.thirteen.org/edonline/concept2class/webquests/index.html).

The Net can also allow students to communicate with experts in different subject areas -- there are many "ask the expert" Web sites devoted specifically to answering student questions. Or, students could correspond by e-mail with experts from universities or industries as part of a particular project.

And, as mentioned in the previous section, students can collaborate on building a Web site.

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| http://www.thirteen.org/edonline/concept2class/coopcollab/images/poster_a13.jpgHow do you find another school or class with which to collaborate via the Internet? Kelly Willis, director of technology at [Collegiate School](http://www.thirteen.org/edonline/concept2class/w5-resources.html#s3) in New York City, directs teachers to [Web66](http://www.thirteen.org/edonline/concept2class/w5-resources.html#66), a registry of schools and projects online.  |

Students in schools with limited computer resources can still use collaborative and cooperative learning techniques while working on Internet projects. In fact, cooperative learning may be your best choice if you have a limited number of computers for your classes and wish to use the Net for projects. The skills learned in cooperative learning groups can help ease problems when the number of students in the class exceeds the technological resources available. The small group approach works well in these circumstances. For instance, one small group or team member might work on the computer and share the results of Internet research with other team members who are doing library research or tutoring.

Cooperative learning can also be useful if you do have enough computers; some students may be less proficient at working online than others, and the questions raised by the some of the complicated material on the Net may be best confronted in small groups. The variety of perspectives encountered in online material can also be better interpreted when students learn together. Almost any educational technology can be used in cooperative learning.

|  |
| --- |
| In this section of the workshop, we will explore frameworks and offer a few hints to help you further develop your own small groups for a variety of settings. We provide a form that you can use for planning lessons for cooperative and collaborative groups.We also provide suggested guidelines for creating and sustaining good interactive learning groups for a variety of classroom tasks. **IMPLEMENTATION** |
|  | http://www.thirteen.org/edonline/concept2class/images/icon_dot.gif**Key Principles**[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifStep-by-Step Lesson Planning with Prompts and Tips**](http://www.thirteen.org/edonline/concept2class/coopcollab/implement_sub1.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifLesson Plan Format**](http://www.thirteen.org/edonline/concept2class/coopcollab/implement_sub2.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifA Final Word**](http://www.thirteen.org/edonline/concept2class/coopcollab/implement_sub3.html)  |

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| http://www.thirteen.org/edonline/concept2class/images/line.gif**Key Principles**As we have seen in previous sections of this workshop, cooperative groups work best when:* imageEach student is involved. In groups where students are dominated by one leader, where a shy student hesitates to join in and contribute, or where you are just trying cooperative groups for the first time, you may wish to assign specific roles. One person might be the "organizer." That person will tell the students what step should come first, second, third, and so on. Another would be the "reporter," who writes down the directions and reports back to the group about their progress and goals. A third person is the "questioner," who generates questions to ask along the way in order to involve every member. A fourth member could be the "assessor," who uses a set rubric or guide to evaluate the progress of each meeting. The roles are clearly defined in advance, so that each person is accountable, and everyone in the group plays an important part.
* Seats face one another. When students face their coworkers, they are more likely to interact well with others. Seating arrangements really do make a difference, and sometimes students need to be reminded that they should move chairs closer together or place them in a circle. You can set up the room with seats in clusters to facilitate this process.
* Students assume personal responsibility. Invite students to report back to their group or to another group after each session. Give clear guidelines on paper for each person's role and go over them, so that students understand the criteria for his or her role. Change roles regularly, so that students can learn to assume responsibility in a variety of areas.
* Students relate well to others. Some students are better than others at interpersonal exchanges. You may wish to provide those who are weaker in relating to others with practice opportunities to engage in social contacts. This can be as simple as teaching others a favorite subject or joining a teammate for a special class duty.
* Members reflect in order to improve group effectiveness. Students can be given a list of questions to consider, such as the conflict-resolution inventory presented in an earlier section. They will improve their performances as they learn to reflect on past performances and create new goals based on those reflections.

**Troubleshooting**

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| http://www.thirteen.org/edonline/concept2class/coopcollab/images/problem-tab.gif | **http://www.thirteen.org/edonline/concept2class/coopcollab/images/solution-tab.gif** |
| Students are not all involved or on task: | Assign specific tasks to all students. |
| Groups are too noisy: | Have students move closer together. |
| Members act out: | Use motivation tactics to hold each person responsible for his actions -- for example, remind students that their participation in the group and their individual work are both being graded. |
| Work is slow or incomplete:  | Work with students to set specific goals each day; have students create a timeline for their project and stick to it. |

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**Step-by-Step Lesson Planning with Prompts and Tips**

Without a clear plan, cooperative learning can appear daunting and exhausting. However, a well-thought out strategy can make it work in almost any classroom.

You will probably remember the five phases for cooperative learning described earlier, in the "[Exploration](http://www.thirteen.org/edonline/concept2class/coopcollab/exploration.html)" section. They are (1) forming a question, (2) identifying goals, (3) creating a rubric, (4) assigning a specific assessment task, and (5) reflecting to adjust.

These provide a good framework for your lesson plan. The examples below suggest how to begin.

**Forming a question**

Form questions that engage the students' interests and abilities. You may want to simply list key unit themes first, then for each add a good question that will motivate students to explore that theme. It is crucial that the introductory lessons for any new topic capture students' interests and motivate them to actively learn the material.

For example, here's a basic outline for a unit on graphs that demonstrates the importance of good questions:

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| **Overall Theme: Graphs****Overall Unit Question:** How can a graph help me defend my ideas?**Lesson 1**Theme: Types of graphsQuestion: Which graphs work best?**Lesson 2**Theme: Which graph?Question: Which graph should I use?**Lesson 3**Theme: Who graphs?Question: How would I use graphs in different ways depending on who I represent in a debate?**Lesson 4**Theme: Computer aidsQuestion: How does a computer specialist create graphs?**Lesson 5**Theme: Graphs tell my storyQuestion: How would you show your story in a graph?**Lesson 6**Theme: AccuracyQuestion: How accurate is accurate? **Lesson 7**Theme: DefendingQuestion: How would you defend your graph? |

Questions are important, since themes themselves do not engage students as well as good questions. The best questions will be those that link students' interests and abilities to content goals and expected outcomes.

Students often enjoy creating their own questions after themes have been developed. This process can help them to ask significant questions and gives them ownership of the responses they create. An entire lesson may be devoted to formation of questions that can then guide students' work, helping them ask the right questions for any topic. Groups can list their questions on the board, and the class can choose the best ones from the questions listed.

**Identifying goals**

When student groups are given clear directions, they are more likely to arrive at your expected destination. The opposite is also true: without a clear map, they tend to go nowhere.

Let's say you engage students in a group debate on the controversial topic of clear-cutting and related logging issues.

Issues raised by student groups can form the debate question -- for example, "Is it acceptable to clear-cut steep hills in order to provide timber for nearby homes?"

Group One argues "yes" and shows how clear-cutting protects jobs, increases family income, and creates new homes for residents. Group Two opposes the statement and shows how clear-cutting contributes to the destruction of the ecosystem. Each group would research and support the claims they make. Since research shows that students learn most when they represent an argument with which they personally disagree, try to assign students to groups in a way that will maximize the chances of this -- for example, by asking students their positions in advance. Debates are a great way to help students hone their critical-thinking skills.

To ensure that students understand their goals, you may list the debate question on the board. Underneath, list the names of those defending side 1 and those defending side 2. Beside the names write "pro" or "con," so that the audience and judges also see clear goals for each argument presented. Create goals that motivate students to get involved.



**Creating a rubric**

Use rubrics that guide students to solve key problems together. Rubrics are simply criteria listed to ensure that students achieve your learning goals. They can guide groups or the individuals in a group, or both.

In the case of the debate above, criteria should be provided to debaters and judges. The winner of each debate will be the team that has mastered more criteria than the other team in both speeches and rebuttals.

Rubrics for the debate should be provided before students begin their work. Depending on the age of the students, you may want to include certain minimum requirements, i.e. 3-5 reasons, 4 pieces of evidence, etc. Your rubrics might, for example, include the following specific criteria:





Rubrics will vary according to your learning goals. But a simple rule of thumb in creating any rubric is to list specific criteria expected for mastery. Then lower the quality of each criterion to reflect a lower level of achievement. Rubrics provide a checklist for students to explore knowledge for deep understanding and for teachers to evaluate their investigations accurately and fairly.

**Assigning a specific assessment task**

The term "assessment task" refers to an opportunity for student performance that closely targets defined instructional aims and allows the students to demonstrate their progress and capabilities. Assessment tasks in cooperative groups might be one and the same as learning tasks.

Try to design assessment tasks that enable students to use all of their abilities. Using a multiple-intelligences approach, for example, assessments tasks can include verbal-linguistic, visual-spatial, logical-mathematical, bodily-kinesthetic, musical, interpersonal, intrapersonal, or naturalistic tasks.

On the topic of logging and clear-cutting practices, group assessments might include one or several of the following:

|  |  |
| --- | --- |
| image | **(verbal-linguistic)**Design a book showing a dedicated logger's and a concerned environmentalist's perspective on key issues. Or orchestrate a debate as above on the topic.  |
| image | **(visual-spatial)**Illustrate a poster to defend or oppose clear-cutting with researched data to support your claims.  |
| image | **(logical-mathematical)**Use statistics and numbers accurately to defend or oppose clear-cutting practices.  |
| image | **(bodily-kinesthetic)**Create and perform a mime to illustrate the key points in both sides of the clear-cutting debate.  |
| image | **(musical)**Perform original lyrics to illustrate clear-cutting issues and concerns.  |
| image | **(interpersonal)**Interview parents and peers on the pros and cons of clear-cutting. Draw accurate conclusions from their views.  |
| image | **(intrapersonal)**Describe in a journal your own views and reflect on how these are influenced by the views of others on the topic of logging and clear-cutting.  |
| image | **(naturalistic)**Collect data from nature to defend or oppose clear-cutting practices. Design a plan for logging that conserves and protects nature.  |

Each assessment task given to students requires clear goals and specific rubric criteria provided as guidelines at the start of their work.

After group work in any lesson, the students should know everything state exams would ask them, for instance.

As a regular check of students' understanding, you might also quiz them using exit slips. An exit slip is simply a brief note in response to straightforward questions. The slip is a "ticket" out of class and must be handed in before students leave. Student groups or individual students may complete exit slips. It may be a good idea to alternate between group and individual slips.

Your exit slip questions simply give you a bird's-eye view of students' understanding of main topics explored. An exit slip might read:

|  |
| --- |
| Exit Slip Image |

**Reflecting to adjust**

Use reflective questions that encourage regular improvements. Students should learn to reflect on their process and progress in groups by regular practice.

Debates, such as those presented in this workshop, tend to lend themselves to deep reflection. For instance, you might appoint student groups as judges for the debates. Using the rubric criteria, they can offer helpful suggestions for each side. They can suggest ways the debaters could have used criteria from the rubrics more to strengthen their positions. (It is usually a good idea to emphasize with students how to give positive comments about their peers' performances first and then to add specific suggestions for improvements.)

Reflections do not have to be long or complex, but reflection should occur on a regular basis. It may consist of a simple question or personal note following any learning task that indicates any way to improve future performances. Or, you could use a form for students to fill out, as in the following example:

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| **Group Work Assessment Sheet****by** [**Anna Chan Rekate**](http://www.thirteen.org/edonline/concept2class/w5-bios.html#anna) **and** [**Martha Ehrenfeld**](http://www.thirteen.org/edonline/concept2class/w5-bios.html#Ehrenfeld) |
| image 1 |
| image 2 |
| image 3 |
| image 4 |

**Lesson Plan Format**

Lesson plans for cooperative groups are often typed on one page for each hour session. They show exactly what goals you are after (stated in clear, specific performance objectives) and identify what specifically students will do in the cooperative groups to achieve that goal. You will want to know if students really learned the material, so the key is to relate each component to a set of clear, observable objectives. Using consistent lesson plan formats for each of the cooperative-learning lessons can help ensure that the student groups really learn the material well.

**Lesson plans for cooperative groups typically include:**

|  |  |  |
| --- | --- | --- |
|  | http://www.thirteen.org/edonline/concept2class/images/num_s1.gif. | **Unit title** The title is usually the umbrella topic (e.g., "Graphs").  |
|  | http://www.thirteen.org/edonline/concept2class/images/num_s2.gif. | **Overall question**Identify one overall unit question on each lesson plan (in the graph example, "How can graphs help me to defend my position?").  |
|  | http://www.thirteen.org/edonline/concept2class/images/num_s3.gif.  | **Related lesson question** This should frame each specific lesson and relate to the overall unit question listed.  |
|  | http://www.thirteen.org/edonline/concept2class/images/num_s4.gif.  | **Learning standard addressed**Find and list specific state, local, or national standards.  |
|  | http://www.thirteen.org/edonline/concept2class/images/num_s5.gif.  | **Performance objectives** List ONLY one or two for each lesson, briefly stated in terms that show student performances, using bullets that begin "TLW" ("The learner will...").  |
|  | http://www.thirteen.org/edonline/concept2class/images/num_s6.gif.  | **Set**Introduce this hook or motivator at the beginning of every class to engage and interest students for each lesson. Your "set" should run for about three minutes (it can be longer if the material requires, however). This is the overall guide to the subject, where you present the main material that students will need when they start group work.  |
|  | http://www.thirteen.org/edonline/concept2class/images/num_s7.gif.  | **Learning and teaching strategies**This is the body of your lesson. How will you engage students in obtaining, applying, and making decisions about the content of your lesson? This section has to be carefully planned so that students are guided in ways that make sense for learning each topic. All materials must relate specifically to the performance objectives for the lesson.  |
|  | http://www.thirteen.org/edonline/concept2class/images/num_s8.gif.  | **Assessment task**How will you determine if students know the material? Assessment tasks should vary and should be related to how they learned and demonstrated their knowledge of the content. So, if you are doing speeches or essays, you would not give multiple-choice questions as an assessment task, for example. The task must fit the learning if it is to be fair.  |
|  | http://www.thirteen.org/edonline/concept2class/images/num_s9.gif.  | **Closure** This is a final wrap-up of the ideas and, like the "set", only requires three or four minutes. But it must be tight and well related to the opening and body of the lesson. It leaves the students with a take-away after a good lesson where they actively learned quality material.  |
| 1. | 0..  | **Reflection**This is where the teacher and students reflect on the lesson's effectiveness. If portions were not effective, make revisions for next time. |

A Final Word

In addition to participating in this online workshop, we encourage you to collaborate with other teachers who use cooperative learning in order to enhance your understanding. You may wish to work with teachers in your own school or contact your school board to locate other teachers who incorporate teamwork in class. There are also schools that specialize in cooperative groups listed on the Internet and mailing lists for teachers involved in cooperative learning.

To help you further explore cooperative and collaborative learning, we have compiled a list of suggested readings, annotations, Web sites, and other resources on the [Resources](http://www.thirteen.org/edonline/concept2class/w5-resources.html) page.

You may also wish to contact undergraduate and graduate schools of education to learn more about the latest research on the subject.

We look forward to hearing about the initiatives you take to create successful cooperative-learning teams in the coming terms.

**RESOURCES

Cooperative and Collaborative Learning**





Cohen, G. DESIGNING GROUPWORK: STRATEGIES FOR THE HETEROGENEOUS CLASSROOM. New York: Teachers College Press, 1986.

[Johnson, D.W.](http://www.clcrc.com/pages/dwj.html%22%20%5Ct%20%22_blank) and [R.T. Johnson](http://www.clcrc.com/pages/rj.html). LEARNING TOGETHER AND ALONE. Englewood Cliffs, N.J.: Prentice Hall, 1991. This book explores essential components of cooperative learning that must be planned for group activities. These include: (1) positive interdependence; (2) face-to-face promotive interaction; (3) individual accountability and personal responsibility; (4) interpersonal and small-group skills; and (5) group processing. [Further reading](http://www.clcrc.com/pages/materials.html#books).

Radencich, M. and L. McKay (eds.). FLEXIBLE GROUPING FOR LITERACY IN THE ELEMENTARY GRADES. Boston, Mass.: Allyn & Bacon, 1995. Leading educators show how research illustrates that ability grouping does not usually benefit overall achievement and can often lead to inequalities of achievement. They conclude that most teachers should encourage flexible grouping using a variety of grouping formats.

Verduin, J.R., Jr. HELPING STUDENTS DEVELOP PROBLEM SOLVING AND INVESTIGATIVE SKILLS IN COOPERATIVE SETTINGS. Springfield, Ill.: Charles C. Thomas, 1996. This book provides guides for creating and helping various kinds of groups to achieve skills for inquiry and investigation.

Weber, E. STUDENT ASSESSMENT THAT WORKS: A PRACTICAL APPROACH. Boston, Mass.: Allyn & Bacon, 1999. Weber provides strategies and question checklists for students to solve group conflicts in order to improve team success for every member. She offers advice on assessing students' products and progress.

Weber, E. ROUNDTABLE LEARNING: BUILDING UNDERSTANDING THROUGH ENHANCED MI STRATEGIES. Tuscon, AZ: Zephyr Press, 1997. Weber identifies practical strategies for collaborating with parents, students, teachers, and the wider learning community in using multiple intelligences in your classroom. She lists ten useful principles of change that provide springboards for improved collaboration.

[](http://www.thirteen.org/edonline/concept2class/w5-resources.html#top)

**Antil, L., J. Jenkins, S. Wayne, and P. Vadasy. "Cooperative Learning: Prevalence, Conceptualizations, and the Relationship between Research and Practice." AMERICAN EDUCATIONAL RESEARCH JOURNAL 35, no.3 (1997): 419-454.**
<http://www.aera.net/pubs/aerj/abs/aerj3533.htm>
The authors provide guidelines for deciding on group size and membership. They conclude that most teachers who use cooperative learning use pairs and small groups of three or four at least 57 percent of the time (abstract).

**Chang, C.Y. and S.L. Mao. "The Effects on Students' Cognitive Achievement When Using the Cooperative Learning Method in Earth Science Classrooms." (requires subscription) SCHOOL SCIENCE AND MATHEMATICS 99, no.7 (November 1999): 374-379.**
<http://osu.orst.edu/pubs/ssm/>
The article compares the effect of cooperative learning and traditional teaching strategies on achievement in earth science at middle and high schools. Cooperative-learning strategies favor students' performances at higher learning levels. Lower learning levels such as fact acquisition and comprehension show neither raised nor lowered performance for either traditional or cooperative groups.

**Cohen, E.G. "Restructuring the Classroom: Conditions for Positive Small Groups." REVIEW OF EDUCATIONAL RESEARCH 64, no.1 (1994): 1-35.**
Cohen illustrates three common structures for cooperative learning: (1) assignment of individual students to specific responsibilities within a larger group task or project; (2) assignment of students to work together on a common project or task; (3) assignment of students to groups to study and be responsible for group members' learning, where the group objective is the achievement of all group members.

**Elbaum, B., J. Schumm, and S. Vaughn. "Urban Middle Elementary Students' Perceptions of Grouping Formats for Reading Instruction."(requires subscription) THE ELEMENTARY SCHOOL JOURNAL 97, no.5 (1997): 475-500.**
<http://www.journals.uchicago.edu/ESJ/home.html>
The authors show how examining students' perceptions of grouping alternatives contributes to a deeper understanding of results from various group formats

**Fuchs, D., L. Fuchs, P. Mathes, and D. Simmons. "Peer Assisted Learning Strategies: Making Classrooms More Responsive to Diversity." AMERICAN EDUCATIONAL RESEARCH JOURNAL 34 (1997): 174-206.**
The authors identify how groups can effectively address diversity within inclusive classrooms. They provide evidence that group work on academic tasks can facilitate improved student learning [Further reading](http://www.aera.net/pubs/aerj/abs/aerj3523.htm).

**Kelliher, A.V. "A Critical Study of Homogeneous Grouping." CONTRIBUTIONS TO EDUCATION (Teachers College Bureau of Publications, Columbia University) 452 (1931).**
The author shows that homogeneous grouping is not effective for achievement and can have negative effects on student attitudes, self-concept, and educational opportunities.

**Hendrix, J.C. "Connecting Cooperative Learning and Social Studies." THE CLEARING HOUSE 73, no.1 (September/October, 1999): 57-60.**
The author shows that students learn better through active involvement in activities, small-group interaction, and cooperative learning. The cooperative-learning model is presented for middle and high school social studies classes, but strategies provided here can be adapted to all subjects in most grades.

**Linn, M.C. and N. C. Burbules. "Construction of Knowledge and Group Learning," in K. Tobin, ed., THE PRACTICE OF CONSTRUCTIVISM IN SCIENCE EDUCATION, pp. 91-119. Washington, D.C.: American Association for the Advancement of Science, 1993**
[Further reading.](http://www.aaas.org/)

**Paulson, D. "Active Learning and Cooperative Learning in the Organic Chemistry Lecture Class." (abstract) JOURNAL OF CHEMICAL EDUCATION 76, no.8 (August, 1999): 1136-1140.**
<http://jchemed.chem.wisc.edu/Journal/Issues/1999/Aug/abs1136.html>
Paulson illustrates methods used over years for teaching organic chemistry to adolescents. He typically begins by dividing the class into random study groups.

**Randall, V. "Cooperative Learning: Abused and Overused?" THE EDUCATION DIGEST 65, no.2 (October, 1999): 29-32.**
The author illustrates how the popularity of cooperative learning sometimes blinds educators to its drawbacks. She highlights weaknesses of cooperative learning and warns against its abuse and overuse.

**Sadker, M., D. Sadker, and S. Klein. "The Issue of Gender in Elementary and Secondary Education," in G. Grant, ed., REVIEW OF RESEARCH IN EDUCATION, pp. 269-334. Washington, D.C.: American Educational Research Association, 1991.**

**[Slavin, R.E.](http://www.csos.jhu.edu/staff/rslavin.htm%22%20%5Ct%20%22_blank) "Synthesis of Research on Cooperative Learning." EDUCATIONAL LEADERSHIP 48, no.5 (1991): 71-82.**
Slavin provides a review of research suggesting that cooperative learning is an effective strategy [Further reading.](http://www.successforall.net/curriculum/stlearn.htm)

**Slavin, R.E. "Ability Grouping and Student Achievement in Elementary Schools: A Best Evidence Synthesis." REVIEW OF EDUCATIONAL RESEARCH 57, no.3 (1987): 293-336.**
<http://www.csos.jhu.edu/staff/rslavin.htm>
Slavin shows how the number of participants in groups affects achievement. Groups with two or three members typically do better than groups with four or more members, he says.

[](http://www.thirteen.org/edonline/concept2class/w5-resources.html#top)

**Alternative Community School**
<http://www.icsd.k12.ny.us/acs>
This middle/high school provides an alternative to traditional schools for students in Ithaca, New York.

**Blacksburg New School**
<http://www.new-school.org/>
This Blacksburg, VA., private school provides a cooperative educational environment. Faculty shares commitment to academic and civic excellence, to individual and community responsibility, and to the love of learning.

**Collegiate School**
<http://collegiateschool.org>
The oldest independent school in the United States, Collegiate School serves boys in grades K-12.

**The Cooperative Learning Center**
<http://www.clcrc.com/>
Brothers David and Roger Johnson (authors of LEARNING TOGETHER AND ALONE and many other books on cooperative learning) direct this center, which studies cooperative learning and provides information about it. Both are professors at the University of Minnesota and have studied cooperative learning for decades. Essays on developments pioneered by the Cooperative Learning Center.

**Cooperative Learning Elementary Lessons**
<http://204.184.214.251/coop/ecoopmain.html>
Cooperative-learning activities and lessons provided by subject area for grades kindergarten through fifth.

**Collaborative Learning Project, England**
<http://atschool.eduweb.co.uk/collearn>
Supports cooperative network of teaching professionals throughout the European Union for inclusive education and accessible teaching materials for all grades.

**Derry Cooperative School District**
<http://www.derry.k12.nh.us/>
This school focuses on creating a safe and successful learning environment for all students using cooperative learning.

**Emily Carr Institute of Art and Design, Vancouver, British Columbia, Canada**
<http://www.eciad.bc.ca/>
Institute includes a variety of programs in visual and media arts, with entrance possible via a Prior Learning Assessment. Allows highly individualized studies through cooperative learning, student exchange programs, internships, and directed studies.

**HerStory**
<http://www.herstory-hffu.org/>
Interdisciplinary, activity-oriented curriculum captures the 150-year struggle of American women for the vote; includes cooperative learning, awareness activities, writing, art, music, and drama.

**MeasureNet Technology Ltd**
<http://www.measurenet-tech.com/index.html>
Encourages cooperative learning for laboratories using Teaching/Learning Aid - Learning equipment.

**Molholm Elementary School**
[http://204.98.1.2/elem/molholm/](http://204.98.1.2/elem/molholm/%20)
Educational methods include cooperative learning, team building, and the well-known Success For All reading program.

**Virginia DeBolt's Web Site**
<http://www.vdebolt.com>
Virginia DeBolt is the author of four books for teachers published by Kagan Cooperative Learning. The books contain writing lessons and ideas using cooperative-learning activities. Her site provides further information.

**WPI Career Development Center: Cooperative Education Program**
<http://www.wpi.edu/Admin/CDC/Coop/>
This program involves non-credit, paid work opportunities in which students practice developing technical skills.

**CONTRUCTIVISM**

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| Welcome to **Constructivism as a Paradigm for Teaching and Learning**. Start with the Explanation section to gain a good understanding of the CONCEPT of constructivism. Then go on to Demonstration, where we move from CONCEPT TO CLASSROOM!  |
| **http://www.thirteen.org/edonline/concept2class/images/icon_dot.gifWhat is constructivism?**[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifHow does this theory differ from traditional ideas about teaching and learning?**](http://www.thirteen.org/edonline/concept2class/constructivism/index_sub1.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifWhat does constructivism have to do with my classroom?**](http://www.thirteen.org/edonline/concept2class/constructivism/index_sub2.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifExpert interview**](http://www.thirteen.org/edonline/concept2class/constructivism/index_sub3.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifWhat is the history of constructivism, and how has it changed over time?**](http://www.thirteen.org/edonline/concept2class/constructivism/index_sub4.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifWhat are some critical perspectives?**](http://www.thirteen.org/edonline/concept2class/constructivism/index_sub5.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifWhat are the benefits of constructivism?**](http://www.thirteen.org/edonline/concept2class/constructivism/index_sub6.html)http://www.thirteen.org/edonline/concept2class/images/line.gif**What is constructivism?**Constructivism is basically a theory -- based on observation and scientific study -- about how people learn. It says that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. When we encounter something new, we have to reconcile it with our previous ideas and experience, maybe changing what we believe, or maybe discarding the new information as irrelevant. In any case, we are active creators of our own knowledge. To do this, we must ask questions, explore, and assess what we know. In the classroom, the constructivist view of learning can point towards a number of different teaching practices. In the most general sense, it usually means encouraging students to use active techniques (experiments, real-world problem solving) to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing. The teacher makes sure she understands the students' preexisting conceptions, and guides the activity to address them and then build on them. Constructivist teachers encourage students to constantly assess how the activity is helping them gain understanding. By questioning themselves and their strategies, students in the constructivist classroom ideally become "expert learners." This gives them ever-broadening tools to keep learning. With a well-planned classroom environment, the students learn HOW TO LEARN.http://www.thirteen.org/edonline/concept2class/constructivism/images/spiral_ill.gifYou might look at it as a spiral. When they continuously reflect on their experiences, students find their ideas gaining in complexity and power, and they develop increasingly strong abilities to integrate new information. One of the teacher's main roles becomes to encourage this learning and reflection process. For example: Groups of students in a science class are discussing a problem in physics. Though the teacher knows the "answer" to the problem, she focuses on helping students restate their questions in useful ways. She prompts each student to reflect on and examine his or her current knowledge. When one of the students comes up with the relevant concept, the teacher seizes upon it, and indicates to the group that this might be a fruitful avenue for them to explore. They design and perform relevant experiments. Afterward, the students and teacher talk about what they have learned, and how their observations and experiments helped (or did not help) them to better understand the concept.Contrary to criticisms by some (conservative/traditional) educators, constructivism does not dismiss the active role of the teacher or the value of expert knowledge. Constructivism modifies that role, so that teachers help students to construct knowledge rather than to reproduce a series of facts. The constructivist teacher provides tools such as problem-solving and inquiry-based learning activities with which students formulate and test their ideas, draw conclusions and inferences, and pool and convey their knowledge in a collaborative learning environment. Constructivism transforms the student from a passive recipient of information to an active participant in the learning process. Always guided by the teacher, students construct their knowledge actively rather than just mechanically ingesting knowledge from the teacher or the textbook.Constructivism is also often misconstrued as a learning theory that compels students to "reinvent the wheel." In fact, constructivism taps into and triggers the student's innate curiosity about the world and how things work. Students do not reinvent the wheel but, rather, attempt to understand how it turns, how it functions. They become engaged by applying their existing knowledge and real-world experience, learning to hypothesize, testing their theories, and ultimately drawing conclusions from their findings. The best way for you to really understand what constructivism is and what it means in your classroom is by seeing examples of it at work, speaking with others about it, and trying it yourself. As you progress through each segment of this workshop, keep in mind questions or ideas to share with your colleagues. **How does this theory differ from traditional ideas about teaching and learning?** As with many of the methods addressed in this series of workshops, in the constructivist classroom, the focus tends to shift from the teacher to the students. The classroom is no longer a place where the teacher ("expert") pours knowledge into passive students, who wait like empty vessels to be filled. In the constructivist model, the students are urged to be actively involved in their own process of learning. The teacher functions more as a facilitator who coaches, mediates, prompts, and helps students develop and assess their understanding, and thereby their learning. One of the teacher's biggest jobs becomes ASKING GOOD QUESTIONS. And, in the constructivist classroom, both teacher and students think of knowledge not as inert factoids to be memorized, but as a dynamic, ever-changing view of the world we live in and the ability to successfully stretch and explore that view.The chart below compares the traditional classroom to the constructivist one. You can see significant differences in basic assumptions about knowledge, students, and learning. (It's important, however, to bear in mind that constructivists acknowledge that students are constructing knowledge in traditional classrooms, too. It's really a matter of the emphasis being on the student, not on the instructor.)

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| http://www.thirteen.org/edonline/concept2class/constructivism/images/traditional-tab.gif | http://www.thirteen.org/edonline/concept2class/constructivism/images/constructivist-tab.gif |
| Curriculum begins with the parts of the whole. Emphasizes basic skills. | Curriculum emphasizes big concepts, beginning with the whole and expanding to include the parts. |
| Strict adherence to fixed curriculum is highly valued. | Pursuit of student questions and interests is valued. |
| Materials are primarily textbooks and workbooks. | Materials include primary sources of material and manipulative materials. |
| Learning is based on repetition. | Learning is interactive, building on what the student already knows. |
| Teachers disseminate information to students; students are recipients of knowledge. | Teachers have a dialogue with students, helping students construct their own knowledge. |
| Teacher's role is directive, rooted in authority. | Teacher's role is interactive, rooted in negotiation. |
| Assessment is through testing, correct answers. | Assessment includes student works, observations, and points of view, as well as tests. Process is as important as product. |
| Knowledge is seen as inert. | Knowledge is seen as dynamic, ever changing with our experiences. |
| Students work primarily alone. | Students work primarily in groups. |

**What does constructivism have to do with my classroom?**As is the case with many of the current/popular paradigms, you're probably already using the constructivist approach to some degree. Constructivist teachers pose questions and problems, then guide students to help them find their own answers. They use many techniques in the teaching process. For example, they may:* prompt students to formulate their own questions (inquiry)
* allow multiple interpretations and expressions of learning (multiple intelligences)
* encourage group work and the use of peers as resources (collaborative learning)

More information on the above processes is covered in other workshops in this series. For now, it's important to realize that the constructivist approach borrows from many other practices in the pursuit of its primary goal: helping students learn HOW TO LEARN.In a constructivist classroom, learning is . . . Students are not blank slates upon which knowledge is etched. They come to learning situations with already formulated knowledge, ideas, and understandings. This previous knowledge is the raw material for the new knowledge they will create. Example: An elementary school teacher presents a class problem to measure the length of the "Mayflower." Rather than starting the problem by introducing the ruler, the teacher allows students to reflect and to construct their own methods of measurement. One student offers the knowledge that a doctor said he is four feet tall. Another says she knows horses are measured in "hands." The students discuss these and other methods they have heard about, and decide on one to apply to the problem. The student is the person who creates new understanding for him/herself. The teacher coaches, moderates, suggests, but allows the students room to experiment, ask questions, try things that don't work. Learning activities require the students' full participation (like hands-on experiments). An important part of the learning process is that students reflect on, and talk about, their activities. Students also help set their own goals and means of assessment.Examples: A middle-school language arts teacher sets aside time each week for a writing lab. The emphasis is on content and getting ideas down rather than memorizing grammatical rules, though one of the teacher's concerns is the ability of his students to express themselves well through written language. The teacher provides opportunities for students to examine the finished and earlier drafts of various authors. He allows students to select and create projects within the general requirement of building a **portfolio** 1. Students serve as peer editors who value originality and uniqueness rather than the best way to fulfill an assignment. **1.** In a history class, asking students to read and think about different versions of and perspectives on "history" can lead to interesting discussions. Is history as taught in textbooks accurate? Are there different versions of the same history? Whose version of history is most accurate? How do we know? From there, students can make their own judgments. Students control their own learning process, and they lead the way by reflecting on their experiences. This process makes them experts of their own learning. The teacher helps create situations where the students feel safe questioning and reflecting on their own processes, either privately or in group discussions. The teacher should also create activities that lead the student to reflect on his or her prior knowledge and experiences. Talking about what was learned and how it was learned is really important.Example: Students keep journals in a writing class where they record how they felt about the class projects, the visual and verbal reactions of others to the project, and how they felt their own writing had changed. Periodically the teacher reads these journals and holds a conference with the student where the two assess (1) what new knowledge the student has created, (2) how the student learns best, and (3) the learning environment and the teacher's role in it.The constructivist classroom relies heavily on collaboration among students. There are many reasons why collaboration contributes to learning. The main reason it is used so much in constructivism is that students learn about learning not only from themselves, but also from their peers. When students review and reflect on their learning processes together, they can pick up strategies and methods from one another. Example: In the course of studying ancient civilizations, students undertake an archaeological dig. This may be something constructed in a large sandbox, or, as in the Dalton School's "Archaeotype" software simulation, on a computer. As the students find different objects, the teacher introduces classifying techniques. The students are encouraged to (1) set up a group museum by developing criteria and choosing which objects should belong, and (2) collaborate with other students who worked in different quadrants of the dig. Each group is then asked to develop theories about the civilizations that inhabited the area.The main activity in a constructivist classroom is solving problems. Students use inquiry methods to ask questions, investigate a topic, and use a variety of resources to find solutions and answers. As students explore the topic, they draw conclusions, and, as exploration continues, they revisit those conclusions. Exploration of questions leads to more questions. (See the CONCEPT TO CLASSROOM workshop [Inquiry-based Learning](http://www.thirteen.org/edonline/concept2class/inquiry/index.html)) Example: Sixth graders figuring out how to purify water investigate solutions ranging from coffee-filter paper, to a stove-top distillation apparatus, to piles of charcoal, to an abstract mathematical solution based on the size of a water molecule. Depending upon students' responses, the teacher encourages abstract as well as concrete, poetic as well as practical, creations of new knowledge.Students have ideas that they may later see were invalid, incorrect, or insufficient to explain new experiences. These ideas are temporary steps in the integration of knowledge. For instance, a child may believe that all trees lose their leaves in the fall, until she visits an evergreen forest. Constructivist teaching takes into account students' current conceptions and builds from there.What happens when a student gets a new piece of information? The constructivist model says that the student compares the information to the knowledge and understanding he/she already has, and one of three things can occur:* The new information matches up with his previous knowledge pretty well (it's **consonant** with the previous knowledge), so the student adds it to his understanding. It may take some work, but it's just a matter of finding the right fit, as with a puzzle piece.
* The information doesn't match previous knowledge (it's **dissonant**). The student has to change her previous understanding to find a fit for the information. This can be harder work.
* The information doesn't match previous knowledge, and it is **ignored**. Rejected bits of information may just not be absorbed by the student. Or they may float around, waiting for the day when the student's understanding has developed and permits a fit.

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| interactivity |
| http://www.thirteen.org/edonline/concept2class/images/icon_mod_interactive.gif |

Example: An elementary teacher believes her students are ready to study gravity. She creates an environment of discovery with objects of varying kinds. Students explore the differences in weight among similarly sized blocks of Styrofoam, wood, and lead. Some students hold the notion that heavier objects fall faster than light ones. The teacher provides materials (stories, posters, and videos) about Galileo, Newton, etc. She leads a discussion on theories about falling. The students then replicate Galileo's experiment by dropping objects of different weights and measuring how fast they fall. They see that objects of different weights actually usually fall at the same speed, although surface area and aerodynamic properties can affect the rate of fall.**What is the history of constructivism, and how has it changed over time?**As long as there were people asking each other questions, we have had constructivist classrooms.  Constructivism, the study of learning, is about how we all make sense of our world, and that really hasn't changed. - Jaqueline Grennon Brooks (1999)The concept of constructivism has roots in classical antiquity, going back to Socrates's dialogues with his followers, in which he asked directed questions that led his students to realize for themselves the weaknesses in their thinking. The Socratic dialogue is still an important tool in the way constructivist educators assess their students' learning and plan new learning experiences.In this century, **Jean Piaget** 1 and **John Dewey** 2 developed theories of childhood development and education, what we now call Progressive Education, that led to the evolution of constructivism.**1** Piaget believed that humans learn through the construction of one logical structure after another. He also concluded that the logic of children and their modes of thinking are initially entirely different from those of adults. The implications of this theory and how he applied them have shaped the foundation for constructivist education.Dewey called for education to be grounded in real experience. He wrote, "If you have doubts about how learning happens, engage in sustained inquiry: study, ponder, consider alternative possibilities and arrive at your belief grounded in evidence." Inquiry is a key part of constructivist learning.Among the educators, philosophers, psychologists, and sociologists who have added new perspectives to constructivist learning theory and practice are **Lev Vygotsky** 3, **Jerome Bruner** 4, and **David Ausubel** 5.**3.**Vygotsky introduced the social aspect of learning into constructivism. He defined the "zone of proximal learning," according to which students solve problems beyond their actual developmental level (but within their level of potential development) under adult guidance or in collaboration with more capable peers.Bruner initiated curriculum change based on the notion that learning is an active, social process in which students construct new ideas or concepts based on their current knowledge.**Seymour Papert's** 6 groundbreaking work in using computers to teach children has led to the widespread use of computer and information technology in constructivist environments. Modern educators who have studied, written about, and practiced constructivist approaches to education include **John D. Bransford** 7, **Ernst von Glasersfeld** 8, **Eleanor Duckworth** 9, **George Forman** 10, **Roger Schank** 11, **Jacqueline Grennon Brooks** 12, and **Martin G. Brooks** 13. **What are some critical perspectives?**Constructivism has been criticized on various grounds. Some of the charges that critics level against it are:http://www.thirteen.org/edonline/concept2class/images/num_s1.gif. It's elitist. Critics say that constructivism and other "progressive" educational theories have been most successful with children from privileged backgrounds who are fortunate in having outstanding teachers, committed parents, and rich home environments. They argue that disadvantaged children, lacking such resources, benefit more from more explicit instruction.http://www.thirteen.org/edonline/concept2class/constructivism/images/w2-quote-4.gifhttp://www.thirteen.org/edonline/concept2class/images/num_s2.gif. Social constructivism leads to "group think." Critics say the collaborative aspects of constructivist classrooms tend to produce a "tyranny of the majority," in which a few students' voices or interpretations dominate the group's conclusions, and dissenting students are forced to conform to the emerging consensus. http://www.thirteen.org/edonline/concept2class/images/num_s3.gif. There is little hard evidence that constructivist methods work. Critics say that constructivists, by rejecting evaluation through testing and other external criteria, have made themselves unaccountable for their students' progress. Critics also say that studies of various kinds of instruction -- in particular **Project Follow Through** 1, a long-term government initiative -- have found that students in constructivist classrooms lag behind those in more traditional classrooms in basic skills. **1**Constructivists counter that in studies where children were compared on higher-order thinking skills, constructivist students seemed to outperform their peers. **What are the benefits of constructivism?**http://www.thirteen.org/edonline/concept2class/images/teacher_take.gif1**. Benefit** Children learn more, and enjoy learning more when they are actively involved, rather than passive listeners. **2. Benefit** Education works best when it concentrates on thinking and understanding, rather than on rote memorization. Constructivism concentrates on learning how to think and understand.http://www.thirteen.org/edonline/concept2class/images/num_s3.gif**. Benefit** http://www.thirteen.org/edonline/concept2class/constructivism/images/ill_finish_line.gifConstructivist learning is transferable. In constructivist classrooms, students create organizing principles that they can take with them to other learning settings. http://www.thirteen.org/edonline/concept2class/images/num_s4.gif**. Benefit**Constructivism gives students ownership of what they learn, since learning is based on students' questions and explorations, and often the students have a hand in designing the assessments as well. Constructivist assessment engages the students' initiatives and personal investments in their journals, research reports, physical models, and artistic representations. Engaging the creative instincts develops students' abilities to express knowledge through a variety of ways. The students are also more likely to retain and transfer the new knowledge to real life. http://www.thirteen.org/edonline/concept2class/images/num_s5.gif**. Benefit** By grounding learning activities in an authentic, real-world context, constructivism stimulates and engages students. Students in constructivist classrooms learn to question things and to apply their natural curiousity to the world. http://www.thirteen.org/edonline/concept2class/images/num_s6.gif**. Benefit** Constructivism promotes social and communication skills by creating a classroom environment that emphasizes collaboration and exchange of ideas. Students must learn how to articulate their ideas clearly as well as to collaborate on tasks effectively by sharing in group projects. Students must therefore exchange ideas and so must learn to "negotiate" with others and to evaluate their contributions in a socially acceptable manner. This is essential to success in the real world, since they will always be exposed to a variety of experiences in which they will have to cooperate and navigate among the ideas of others.**Inquiry-based Learning**

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| Welcome to **Inquiry-based Learning**. Start here in the "Explanation" section, which is all about the CONCEPT. Then go on to "Demonstration" and the following sections, where we move from CONCEPT TO CLASSROOM! |
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| http://www.thirteen.org/edonline/concept2class/images/icon_dot.gif | **What is inquiry-based learning?** |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**How does it differ from the traditional approach?**](http://www.thirteen.org/edonline/concept2class/inquiry/index_sub1.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**What does it have to do with my classroom?**](http://www.thirteen.org/edonline/concept2class/inquiry/index_sub2.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**What are the benefits of inquiry-based learning?**](http://www.thirteen.org/edonline/concept2class/inquiry/index_sub3.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**How has inquiry-based learning developed since it first became popular?**](http://www.thirteen.org/edonline/concept2class/inquiry/index_sub4.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**Another perspective**](http://www.thirteen.org/edonline/concept2class/inquiry/index_sub5.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**What are some critical perspectives?**](http://www.thirteen.org/edonline/concept2class/inquiry/index_sub6.html) |
| **http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gif** | [**How can I use inquiry-based learning in conjunction with other educational techniques?**](http://www.thirteen.org/edonline/concept2class/inquiry/index_sub7.html) |

http://www.thirteen.org/edonline/concept2class/images/line.gif**What is inquiry-based learning?** An old adage states: "Tell me and I forget, show me and I remember, involve me and I understand." The last part of this statement is the essence of inquiry-based learning, says our workshop author **Joe Exline** 1. Inquiry implies involvement that leads to understanding. Furthermore, involvement in learning implies possessing skills and attitudes that permit you to seek resolutions to questions and issues while you construct new knowledge.**1.**

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| http://www.thirteen.org/edonline/concept2class/inquiry/images/poster_p1-1.jpg | http://www.thirteen.org/edonline/concept2class/inquiry/images/poster_p1-2.jpg |
| **Part 1 of 2** | **Part 2 of 2** |

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| Tim O'Keefe, a teacher at the Center for Inquiry elementary school in Columbia, South Carolina, explains why he thinks inquiry is a much more effective teaching strategy than traditional chalk-and-talk. |

"Inquiry" is defined as "a seeking for truth, information, or knowledge -- seeking information by questioning." Individuals carry on the process of inquiry from the time they are born until they die. This is true even though they might not reflect upon the process. Infants begin to make sense of the world by inquiring. From birth, babies observe faces that come near, they grasp objects, they put things in their mouths, and they turn toward voices. The process of inquiring begins with gathering information and data through applying the human senses -- seeing, hearing, touching, tasting, and smelling.**A Context for Inquiry**Unfortunately, our traditional educational system has worked in a way that discourages the natural process of inquiry. Students become less prone to ask questions as they move through the grade levels. In traditional schools, students learn not to ask too many questions, instead to listen and repeat the expected answers.Some of the discouragement of our natural inquiry process may come from a lack of understanding about the deeper nature of inquiry-based learning. There is even a tendency to view it as "fluff" learning. Effective inquiry is more than just asking questions. A complex process is involved when individuals attempt to convert information and data into useful knowledge. Useful application of inquiry learning involves several factors: a context for questions, a framework for questions, a focus for questions, and different levels of questions. Well-designed inquiry learning produces knowledge formation that can be widely applied.**Importance of Inquiry**Memorizing facts and information is not the most important skill in today's world. Facts change, and information is readily available -- what's needed is an understanding of how to get and make sense of the mass of data.Educators must understand that schools need to go beyond data and information accumulation and move toward the generation of useful and applicable knowledge . . . a process supported by inquiry learning. In the past, our country's success depended on our supply of natural resources. Today, it depends upon a workforce that "works smarter."Through the process of inquiry, individuals construct much of their understanding of the natural and human-designed worlds. Inquiry implies a "need or want to know" premise. Inquiry is not so much seeking the right answer -- because often there is none -- but rather seeking appropriate resolutions to questions and issues. For educators, inquiry implies emphasis on the development of inquiry skills and the nurturing of inquiring attitudes or habits of mind that will enable individuals to continue the quest for knowledge throughout life.Content of disciplines is very important, but as a means to an end, not as an end in itself. The knowledge base for disciplines is constantly expanding and changing. No one can ever learn everything, but everyone can better develop their skills and nurture the inquiring attitudes necessary to continue the generation and examination of knowledge throughout their lives. For modern education, the skills and the ability to continue learning should be the most important outcomes. The rationale for why this is necessary is explained in the following diagrams.

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| http://www.thirteen.org/edonline/concept2class/inquiry/images/diagram01.gif |
| Illustration developed by Joe Exline  |
| This figure illustrates how human society and individuals within society constantly generate and transmit the **fund of knowledge 2**.  |

**2.** Human society and individuals within society constantly generate and transmit this fund of knowledge. Experts, working at the boundary between the known and the unknown, constantly add to the fund of knowledge. It is very important that knowledge be transmitted to all the members of society. This transmission takes place through structures like schools, families, and training courses.Certain attributes are necessary for both generating and effectively transmitting the fund of knowledge. The attributes that experts use to generate new knowledge are very similar to the qualities essential for the effective transmission of knowledge within the learners' environment. These are the essential elements of effective inquiry learning:

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| http://www.thirteen.org/edonline/concept2class/images/num_s1.gif**.**  | Experts see patterns and meanings not apparent to novices.  |
| http://www.thirteen.org/edonline/concept2class/images/num_s2.gif**.**  | Experts have in-depth knowledge of their fields, structured so that it is most useful.  |
| http://www.thirteen.org/edonline/concept2class/images/num_s3.gif**.**  | Experts' knowledge is not just a set of facts -- it is structured to be accessible, transferable, and applicable to a variety of situations.  |
| http://www.thirteen.org/edonline/concept2class/images/num_s4.gif**.**  | Experts can easily retrieve their knowledge and learn new information in their fields with little effort.  |

(The list above was adapted from "[How People Learn](http://www.thirteen.org/edonline/concept2class/w6-resources.html#bransford)," published by the National Research Council in 1999.)

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| http://www.thirteen.org/edonline/concept2class/inquiry/images/cube.gif |
| Illustration developed by Joe Exline  |
| This figure illustrates the attributes necessary for both generating and effectively transmitting the fund of knowledge.  |

We propose that the attributes experts use to generate new knowledge are very similar to the attributes essential for the effective transmission of knowledge within the learner's environment -- the essentials of effective inquiry learning. Inquiry is important in the generation and transmission of knowledge. It is also an essential for education, because the fund of knowledge is constantly increasing. The figure below illustrates why trying to transmit "what we know," even if it were possible, is counterproductive in the long run. This is why schools must change from a focus on "what we know" to an emphasis on "how we come to know."

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| http://www.thirteen.org/edonline/concept2class/inquiry/images/diagram3.gif |
| Illustration developed by Joe Exline  |
| This chart illustrates that while knowledge is constantly increasing, so is the boundary of the unknown.  |

An effective and well-rounded education gives individuals very different but interrelated views of the world. All disciplines have important relationships that provide a natural and effective framework for the organization of the school curriculum, as shown in the chart below. The subject matter of disciplines can be set in the larger context of a **conceptual framework 3**. This framework is crucial for understanding change and also for the organization of the discipline and its application to the natural and human-designed worlds.**How does it differ from the traditional approach?**

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In general, the traditional approach to learning is focused on mastery of content, with less emphasis on the development of skills and the nurturing of inquiring attitudes. The current system of education is teacher centered, with the teacher focused on giving out information about "what is known." Students are the receivers of information, and the teacher is the dispenser. Much of the assessment of the learner is focused on the importance of "one right answer." Traditional education is more concerned with preparation for the next grade level and in-school success than with helping a student learn to learn throughout life. Traditional classrooms tend to be closed systems where information is filtered through layers to students. In general, the use of resources is limited to what is available in the classroom or within the school. Use of technology is focused on learning about the technology rather than its application to enhanced learning. Lesson plans are used to organize the various steps in the learning process for the whole-class approach. On-target questions that would tend to cause deviations from the plan are met with, "We will get to that later." The inquiry approach is more focused on using and learning content as a means to develop information-processing and problem-solving skills. The system is more student centered, with the teacher as a facilitator of learning. There is more emphasis on "how we come to know" and less on "what we know." Students are more involved in the construction of knowledge through active involvement. The more interested and engaged students are by a subject or project, the easier it will be for them to construct in-depth knowledge of it. Learning becomes almost effortless when something fascinates students and reflects their interests and goals.

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| http://www.thirteen.org/edonline/concept2class/inquiry/images/poster_p4-1.jpg | http://www.thirteen.org/edonline/concept2class/inquiry/images/poster_p4-2.jpg |
| **Part 1 of 2**  | **Part 2 of 2**  |

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| Tim O'Keefe of the Center for Inquiry elementary school in Columbia, South Carolina, uses a hands-on, inquiry approach to excite his students about a botany unit.  |

Assessment is focused on determining the progress of skills development in addition to content understanding. Inquiry learning is concerned with in-school success, but it is equally concerned with preparation for life-long learning. Inquiry classrooms are open systems where students are encouraged to search and make use of resources beyond the classroom and the school. Teachers who use inquiry can use technology to connect students appropriately with local and world communities which are rich sources of learning and learning materials. They replace lesson plans with facilitated learning plans that account for slight deviations while still keeping an important learning outcome in focus. They meet on-target questions with, "How do you suggest we investigate that question?" Another issue regarding inquiry-based learning has to do with a misconception about when to do inquiry. Inquiry is not only done in laboratory or group work -- it can also be done in lectures that provoke students to think and question. Teachers often discount the fact that when they are giving talks or lectures to students, the students, if engaged, are applying listening and observing skills -- using their senses. If teachers focus more on "how we come to know" by presenting evidence and information and encouraging student questioning, then talks can even become powerful inquiry models for students. Collaborative meaning-making can take place through discourse. For example, when discussing the internal structure of the earth, a teacher will often give the students information about just the names and sizes of these earth layers, or the "what we know." But what really is important and intriguing for the student is the "how do we know?" about these structures. No one has been down there, and physical probes have only scratched the surface. To enhance inquiry learning, the teacher should explain that indirect scientific evidence, mainly the transmission and reflection of different kinds of earthquake waves, provides much of our understanding about the internal structure of the earth. This approach provides the student with the opportunity not only to learn the names and sizes of the structures but, more importantly, to ponder and question the nature of indirect scientific evidence as well. Thus, an inquiry approach can help students connect science with the scientific method. Students learn to apply the method to various fields of study while coming to understand their content. Perhaps a good way to summarize the important difference between traditional learning and inquiry learning is: Traditional learning focuses more on LEARNING ABOUT THINGS, while inquiry learning focuses more on LEARNING THINGS! Another useful way to contrast the two might be: Thinking WHAT as opposed to thinking HOW.

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| http://www.thirteen.org/edonline/concept2class/inquiry/images/diagram4.gif |
| Illustration developed by Joe Exline  |
| This chart illustrates that skills for processing information are similar across all disciplines.  |

**3. The habits of mind 4**, values, or "ground rules" of a particular discipline provide that discipline's unique perspective. The sciences, for example, demand verification of data, while the study of literature often relies on opinions and subjective interpretations as a source of information. Habits of mind vary in their rigidity across disciplines. This doesn't mean that one is right and the other is wrong, but simply that the "ground rules" are different. **4.** **The Application of Inquiry**While much thought and research has been spent on the role of inquiry in science education, inquiry learning can be applied to all disciplines. Individuals need many perspectives for viewing the world. Such views could include artistic, scientific, historic, economic, and other perspectives. While disciplines should interrelate, inquiry learning includes the application of certain specific "ground rules" that insure the integrity of the various disciplines and their world views.**Outcomes of Inquiry**An important outcome of inquiry should be useful knowledge about the natural and human-designed worlds. How are these worlds **organized**? How do they **change**? How do they **interrelate**? And how do we **communicate** about, within, and across these worlds? These broad concepts contain important issues and questions that individuals will face throughout their lives. Also, these concepts can help organize the content of the school curriculum to provide a relevant and cumulative framework for effective learning. An appropriate education should provide individuals with different ways of viewing the world, communicating about it, and successfully coping with the questions and issues of daily living.While questioning and searching for answers are extremely important parts of inquiry, effectively generating knowledge from this questioning and searching is greatly aided by a conceptual context for learning. Just as students should not be focused only on content as the ultimate outcome of learning, neither should they be asking questions and searching for answers about minutiae. Well-designed inquiry-learning activities and interactions should be set in a conceptual context so as to help students accumulate knowledge as they progress from grade to grade. Inquiry in education should be about a greater understanding of the world in which they live, learn, communicate, and work.There are several variations on inquiry-based learning. Among the most widely used are the **Future Problem Solving Program 5** and the **Problem-based Learning Approach 6**. See the "[Resources](http://www.thirteen.org/edonline/concept2class/w6-resources.html#problem)" section for more on these approaches.**What does it have to do with my classroom?**Most of our schools focus on teaching a set of basic skills that do not serve the needs of modern society. Traditionally, schools stressed the accumulation of information, and did not emphasize skill development or nurturing inquiry-based habits of mind. This approach to education was adequate when the United States was a largely rural society, depending on unskilled labor. Our modern society is faster paced, globally networked, technologically oriented, and requires workers who can problem solve and think critically. Today, much learning, if not most, occurs after formal schooling. Our schools must change their approach to education to produce students who can thrive in the modern world.The traditional focus of education is no longer appropriate. The world has changed: local apprenticeships are rare, and young people must master new ways of acting and thinking. illustrationOur society is becoming increasingly larger and more complexly diverse. Young people must develop an understanding for the complexities of modern life and be able to grapple with new ethical and practical issues. We must educate our young so they can participate as responsible members in contemporary society. They also need to be given the chance to grow and develop fulfilling personal identities in settings that are relatively free of risk. Inquiry learning can turn information into useful knowledge. It stresses skill development and nurtures the development of good habits of mind. Information, lacking a useful context, often has limited applications beyond passing a test. Learning plans and teaching materials need to include a relevant context for new information to lead to broader understandings. It is often hard for students to understand the connections between activities within a particular subject. This confusion is heightened when students struggle to understand the connections between different subjects within traditional schools.Many traditional schools lack a coherent and simplified process for interrelating subject material between grades. There is little emphasis on planning across subjects. And not enough effort is spent defining the ultimate goals of education -- the skills and abilities students should have when they complete high school. While many subjects share information-processing skills, much more can be done to enhance the connections among them. "Habits of mind" should be an important goal, or outcome, in education. These habits can produce a world view that incorporates different disciplines or subjects. They can be thought of as the "ground rules" for a particular discipline, and include, but are not limited to, verification and respect for data in science, the importance of beauty and desirability in art, and the role of belief and faith in religion. http://www.thirteen.org/edonline/concept2class/inquiry/images/gardner_quote.gifillustrationWe are not suggesting that these habits of mind should be taught -- or even that they can be taught. They are best nurtured through appropriate modeling and experiences. Nor is it suggested that one world view is right in comparison to another, but rather the different disciplines can offer different and important perspectives. However, it is important that habits of mind are nurtured and valued for the particular discipline being studied. Habits of mind are nurtured through questioning and reflection. Questions like: How do you (I) know? Can we (I) ever know that? What is the evidence? How did you (I) arrive at that decision? Questions, whether self-initiated or "owned," are at the heart of inquiry learning. While questions are also a part of the traditional classroom, the sources, purposes, and levels of questioning are quite different. In the traditional classroom, the teacher is frequently the questioner. Questions are usually intended to provoke feedback about a reading or activity assignment. In an inquiry classroom, the teacher asks questions that are more open and reflective in nature. Appropriate questioning techniques are important in an inquiry-based classroom, especially in the lower grades where they become a foundation for self-initiated questioning. Dennie Palmer Wolf, in [THE ART OF QUESTIONING](http://www.thirteen.org/edonline/concept2class/w6-resources.html#art), published by Academic Connections in 1987, suggests that there are four major types of questions: inference questions, interpretation questions, transfer questions, and questions about hypotheses.http://www.thirteen.org/edonline/concept2class/images/ding_math.gif**INFERENCE QUESTIONS.** These questions ask students to go beyond immediately available information. For example, a high-school photography teacher held up a black-and-white portrait of a machinist taken by Paul Strand and asked, "What do you know by looking at this photograph?" Through careful questioning and discussion, his students realized the image contained hints that implied a whole network of information: clues to content (where and when the photograph was taken), technique (where the photographer stood, where the light sources were located), and meaning or attitude (what Strand felt about industry and workers). To push beyond the factual in this way is to ask students to find clues, examine them, and discuss what inferences are justified. http://www.thirteen.org/edonline/concept2class/images/ding_eye.gif**INTERPRETATION QUESTIONS.** If inference questions demand that students fill in missing information, then interpretive questions propose that they understand the consequences of information or ideas. One day, when her English class was struggling to make sense of Frost's poem "The Silken Tent," a teacher asked, "Imagine if Frost compared the woman to an ordinary canvas tent instead of a silk one. What would change?" Faced with the stolid image of a stiff canvas tent, students suddenly realized the fabric of connotations set in motion by the idea of silk -- its sibilant, rustling sounds; its associations with elegance, wealth, and femininity; its fluid motions. In a similar spirit, during a life-drawing class, a teacher showed his students a reproduction of Manet's "Olympia" and asked them, "How would the picture be different if the model weren't wearing that black tie around her neck?" A student laid her hand over the tie, studied the image and commented, "Without the ribbon, she doesn't look so naked. She looks like a classical model. With the ribbon, she looks undressed, bolder." http://www.thirteen.org/edonline/concept2class/images/ding_strategy.gif**TRANSFER QUESTIONS.** If inference and interpretation questions ask a student to go deeper, transfer questions provoke a kind of breadth of thinking, asking students to take their knowledge to new places. For example, the final exam for a high-school film course contained this question: "This semester we studied three directors: Fellini, Hitchcock, and Kurosawa. Imagine that you are a film critic and write a review of "Little Red Riding Hood" as directed by one of these individuals." http://www.thirteen.org/edonline/concept2class/images/ding_science.gif**QUESTIONS ABOUT HYPOTHESES.** Typically, questions based on what can be predicted and tested are thought of as belonging to sciences and other "hard" pursuits. But, in fact, predictive thinking matters in all domains. When we read a novel, we gather evidence about the world of the story, the trustworthiness of the narrator, the style of the author, all of which we use to predict what we can expect in the next chapter. Far from letting their students simply soak in the content of dances, plays, or fiction, skilled teachers probe for predictions as a way of making students actively aware of their expectations.

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| **In this simplified model the outcomes are:** |
| 1. | content of subjects; |
| 2. | content in a larger conceptual framework; |
| 3. | information processing skills; and, |
| 4. | nurtured habits of mind. Teachers need to keep these four things in mind while developing plans for learning. These four outcomes are the essence of inquiry learning and should be the "essence outcomes" for modern standards of education. |

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| http://www.thirteen.org/edonline/concept2class/inquiry/images/interactivity2.gif |
| Concept by Joe ExlineIllustration by Sabina Daley  |
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**Click on the interactive button to the left to see a dynamic representation of how the known and the unknown interact.** An inquiry classroom is quite different from a traditional classroom. These differences become increasingly pronounced as the teacher and students become more comfortable and experienced with inquiry learning. It can often be difficult to locate the teacher in an inquiry classroom, because she is rarely found in the traditional spot: behind the teacher's desk. Students also move around the classroom as they interact with others and locate the appropriate materials and resources for their work.**STUDENTS DOING INQUIRY LEARNING** What does inquiry-based learning look like? Much of what is said about science and inquiry learning can be applied to all subjects. The following list describes some of what inquiry learning looks like in practice.

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| icon | **Students view themselves as learners in the process of learning.** |
|    | * They look forward to learning.
* They demonstrate a desire to learn more.
* They seek to collaborate and work cooperatively with teacher and peers.
* They are more confident in learning, demonstrate a willingness to modify ideas and take calculated risks, and display appropriate skepticism.
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| icon | **Students accept an "invitation to learn" and willingly engage in an exploration process.** |
|    | * They exhibit curiosity and ponder observations.
* They move around, selecting and using the materials they need.
* They confer with classmates and teacher about observations and questions.
* They try out some of their own ideas.
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| icon | **Students raise questions, propose explanations, and use observations.** |
|    | * They ask questions (verbally and through actions).
* They use questions that lead them to activities generating further questions or ideas.
* They observe critically, as opposed to casually looking or listening.
* They value and apply questions as an important part of learning.
* They make connections to previous ideas.
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| icon | **Students plan and carry out learning activities.** |
|    | * They design ways to try out their ideas, not always expecting to be told what to do.
* They plan ways to verify, extend, confirm, or discard ideas.
* They carry out activities by: using materials, observing, evaluating, and recording information.
* They sort out information and decide what is important.
* They see detail, detect sequences and events, notice change, and detect differences and similarities.
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| icon | **Students communicate using a variety of methods.** |
|    | * They express ideas in a variety of ways, including journals, drawing, reports, graphing, and so forth.
* They listen, speak, and write about learning activities with parents, teacher, and peers.
* They use the language of learning, apply the skills of processing information, and develop their own "ground rules" appropriate for the discipline.
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| icon | **Students critique their learning practices.** |
|    | * They use indicators to assess their own work.
* They recognize and report their strengths and weaknesses.
* They reflect on their learning with their teacher and their peers.
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This is a modified list based on "Inquiry-Based Science, What Does It Look Like?" published in CONNECT MAGAZINE, March-April 1995. **TEACHER'S ROLE IN AN INQUIRY CLASSROOM: FACILITATOR OF LEARNING.**

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| icon | **The teacher reflects on the purpose and makes plans for inquiry learning.** |
|    | * He plans ways for each learner to be actively engaged in the learning process.
* She understands the necessary skills, knowledge, and habits of mind needed for inquiry learning.
* He understands and plans ways to encourage and enable the learner to take increasing responsibility for his learning.
* She insures that classroom learning is focused on relevant and applicable outcomes.
* He is prepared for unexpected questions or suggestions from the learner.
* She prepares the classroom environment with the necessary learning tools, materials, and resources for active involvement of the learner.
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| icon | **The teacher facilitates classroom learning.** |
|    | * The teacher's daily, weekly, monthly, and yearly facilitation plans focus on setting content learning in a conceptual framework. They also stress skill development and model and nurture the development of habits of mind.
* She accepts that teaching is also a learning process.
* He asks questions, encouraging divergent thinking that leads to more questions.
* She values and encourages responses and, when these responses convey misconceptions, effectively explores the causes and appropriately guides the learner.
* He is constantly alert to learning obstacles and guides learners when necessary.
* She asks many Why? How do you know? and What is the evidence? type of questions.
* He makes student assessment an ongoing part of the facilitation of the learning process.

This list was developed by Joe Exline.  |

Ultimately, the importance of inquiry learning is that students learn how to continue learning. This is something they can take with them throughout life -- beyond parental help and security, beyond a textbook, beyond the time of a master teacher, beyond school -- to a time when they will often be alone in their learning.**What are the benefits of inquiry-based learning?**One of the important missing pieces in many modern schools is a coherent and simplified process for increasing knowledge of a subject from lower grades to upper grades. Students often have difficulty understanding how various activities within a particular subject relate to each other. Much more confusion results when the learner tries to interrelate the various subjects taught at school.

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| **Part 1 of 2**  | **Part 2 of 2**  |

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| TranscriptLisa Nyberg, a third- and fourth-grade teacher at [Brattain Elementary School](http://www.sps.lane.edu/schools/brattain.html) in Springfield, Oregon, says exposure to a concept from different angles cements kids' understanding in a way a single kind of exposure does not.  |

Too little effort is devoted to defining important outcomes at the end of high school and planning backwards and across subjects. Inquiry-based learning can help make these connections. Specific content such as photosynthesis has much more relevance for the learner if set in a larger context of understanding the **interrelationship** of the sun, green plants, and the role of carbon dioxide and water. Social studies content, such as industrial development, set in the context of **interrelating changes** in the human-designed world can add new perspectives to this important natural process. Students can still learn content of both science and social studies, but through a series of well-planned experiences, they will grasp the larger conceptual context and gain greater understanding. Within a conceptual framework, inquiry learning and active learner involvement can lead to important outcomes in the classroom. Students who actively make observations, collect, analyze, and synthesize information, and draw conclusions are developing useful problem-solving skills. These skills can be applied to future "need to know" situations that students will encounter both at school and at work. Another benefit that inquiry-based learning offers is the development of habits of mind that can last a lifetime and guide learning and creative thinking. **How has inquiry-based learning developed since it first became popular?**Inquiry has always been a part of education. It predates Socrates and his method of leading students to self-knowledge through agressive questioning. **John Dewey** 's 1 reform of the educational system led to the first inquiry-based learning methods in the United States. Dewey advocated child-centered learning based on real-world experiences. For a deeper look at the history of inquiry-based education, which is deeply intertwined with the history of Constructivism, see our [Constructivism workshop](http://www.thirteen.org/edonline/concept2class/constructivism/index.html). **1.** In 1961, the Educational Policies Commission published a position paper on the central purpose of American Education. The commission suggested that students needed to develop "ten rational powers." These were: **recalling and imagining; classifying and generalizing; comparing and evaluating; analyzing and synthesizing; and deducing and inferring.** These are also some of the fundamentals of inquiry learning. imageSpurred by fears that the Russians were gaining a technological and military advantage over the U.S. in the fifties, the educational establishment became particularly interested in helping students become creative problem-solvers. Then, in the sixties, there was a movement toward the so-called alphabet soup curricula. These had such titles as Biological Sciences Curriculum Study (BSCS), the Chemical Education Materials Study (CHEM Study), the Science Curriculum Study (SCIS), the Elementary Science Study (ESS), and the Physical Science Study Committee (PSSC Physics) -- hence the name "alphabet soup." These efforts seriously attempted to turn the traditional "cookbook" approach to science education into hands-on involvement with a focus on developing reasoning abilities. Unfortunately, the hands-on approach never fully turned into a truly engaging approach to learning. Critics charged that students were spending too much time "messing around" with materials and too little time on analysis. These problems were due in great part to the nature of the school-community system into which these programs were introduced. Then, too, they focused mainly on only one element of the school-community system: the teacher. While these programs did not bring about the change anticipated in the era in which they were introduced, they did produce other fallout and unanticipated changes. They brought significant change in the ways that science, mathematics, and social studies textbooks were developed. Textbook publishers began to give more consideration to ways to actively involve students in the learning process. The **Whole Language** 2 movement was a very positive development in the history of inquiry-based learning. The recognition of the roles that reading and writing play in learning began to change attitudes and practices in the schools. **2.** Systemic change is the latest and most significant effort that has the potential to impact inquiry learning. In 1984, a conference at the National Academy of Sciences brought together top scientists, educators, business leaders, politicians, parents, and others, in direct response to a report entitled "Nation at Risk" that detailed the failings of American schools. This conference led to what was to become an attempt to reform the U.S. system of education in order to achieve a status of "first in the world by near the end of the twentieth century." Much of this effort was and still is directed toward getting students involved in the process of learning and meeting the needs of modern society by changing the educational system. If one examines critically the evolution of frameworks set forth for education, it becomes evident that many of the ideas in these frameworks are still valid in today's educational efforts. It's now really a matter of doing more to implement the ideas, rather than reinventing them. The efforts toward systemic reform in particular have much promise, but there are also a number of factors that promote resistance to them. There are at least two important factors in the systemic-reform effort that make it difficult to implement in the current climate. One of these factors is that the effort is focused almost exclusively on mathematics and science education. It will be difficult to change a school-community system that is focused on only two disciplines in the school curriculum. A second factor is that many educators have little experience in evaluating the important systemic elements and aligning them with outcomes for students. For example, when students do not perform well on statewide tests, we generally react with attempts to "fix students" by demanding that they try harder, rather than fix the system. But lack of student motivation is often symptomatic of a larger systemic problem. **A Systemic Alignment Model**

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| http://www.thirteen.org/edonline/concept2class/inquiry/images/interactivity1.gif |
| Concept by Joe Exline Illustration by Sabina Daley Click here to see how a variety of systemic elements work to support inquiry based learning  |

The diagram to the left shows the relationship between inquiry learning (outcome for student) and the systemic elements that should surround and support inquiry learning. The center of this model represents student outcomes. The center determines the alignment of the various systemic elements, which in turn surround and support the student outcomes. Inquiry-based learning today, however, can be integrated into your classroom and school system gradually -- as teachers, principals, parents, and other community members become aware of its importance in preparing students for the postmodern world.**What are some critical perspectives?**imageEducation is not preparing students for a world that is static and fixed. Rather, education must prepare learners to cope with changes that will increase in complexity throughout their lives and many of which cannot be foreseen at this time. Most learners will probably deal with several job changes, move to several different locations, be involved in complex social changes, and other such issues. Education cannot give learners all the information that they need to know, but rather it must provide the tools for continuing to learn.In a society in which education has focused on transmitting "what we know," it is a challenge to develop a widespread view that "how we come to know" is very important in modern society. There is a very deeply held view on the part of many educators, parents, and other members of society that inquiry learning takes too much time and that it is much more efficient for students simply to be given the information they need to know. This point of view is strongly reinforced by the kinds of things students are expected to know to pass the majority of tests they are given. There are those educators and discipline experts who feel they have known and continue to know what knowledge is most important.There are also those who feel strongly that there is a "core knowledge," or elements of cultural literacy, that should be the emphasis of education. E. D. Hirsch, a noted literary analyst and educator, strongly advocates a sequenced K-12 curriculum in which students cover a larger number of specific topics and concepts for each year of school. **Howard Gardner** 1 describes this approach in [THE DISCIPLINED MIND](http://www.thirteen.org/edonline/concept2class/w6-resources.html#disciplined): "At other schools, often in the same neighborhood as efforts like the Key School, students work on a core curriculum, perhaps one inspired by E. D. Hirsch or the privately funded Edison Project. At each age and grade level, there are prescribed lists of concepts, words, and spheres of knowledge that children should know or acquire. Youngsters are regularly tested on this information, rewarded when it has been acquired, and encouraged to study harder when their familiarity with it proves spotty."**1.** Many, especially older, people have not mentally moved past the time when our country was an industrial, or even an agrarian, place. Those were times that moved more slowly and did not require workers and companies to constantly "work smarter" to stay ahead of global competitors. Older members of society learned that it was important to study hard -- which often meant the memorization of content -- to get good grades, graduate, get a job, work hard, and move up a relatively stable career ladder to achieve success. This general approach has much merit still today, but the focus on what to "work harder" on has shifted.Most people -- those graduating from high school and from colleges and those who will not graduate -- eventually will enter the world of work. Even for the small number who do not enter the workforce, all will have to resolve ever increasingly complex problems throughout life. The business world is fast recognizing that to be successful in modern society it is essential to work smarter. The attributes, described earlier, that are essential for life-long learning have to be the emphasis in education. Surveys of business communities regarding workforce skills reveal interesting findings. Workforce skills are not specific job skills but rather more broad understandings that provide one the abilities to quickly adapt to new job-skill demands. Some examples of skills essential for the modern workforce are:* The work requires one to research possible causes of problems.
* The work requires one to isolate factors that are possible causes of problems.
* The work requires one to arrive at resolutions to problems by brainstorming with other people.
* The work requires one to search for information stored in computer files by using electronic data research skills.
* The work requires one to write clearly to convey complex information to other people to describe situations or events and to make recommendations.
* The work requires one to interpret correlations by comparing two sets of data.

Several dozen more examples could be stated. You will notice there is very little stress on knowing specific kinds of content information. This omission is probably influenced by the fact that content knowledge is changing very rapidly, and little content knowledge is retained if it is not constantly used. However, the workforce skills competencies deal with attributes that permit one to continue to learn.**Multiple Intelligences**Welcome to **Tapping into Multiple Intelligences**. Hopefully, you'll tap into a few of your own intelligences to learn about this important theory. Start here in the **Explanation section**, which is all about the CONCEPT. Then go on to **Demonstration**, where we move from CONCEPT to CLASSROOM! http://www.thirteen.org/edonline/concept2class/images/icon_dot.gif**What is the theory of multiple intelligences (M.I.)?**[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifHow does this theory differ from the traditional definition of intelligence?**](http://www.thirteen.org/edonline/concept2class/mi/index_sub1.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifWhat do multiple intelligences have to do with my classroom?**](http://www.thirteen.org/edonline/concept2class/mi/index_sub2.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifHow has M.I. theory developed since it was introduced in 1983?**](http://www.thirteen.org/edonline/concept2class/mi/index_sub3.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifWho are the critics of this theory and what do they say?**](http://www.thirteen.org/edonline/concept2class/mi/index_sub4.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifWhat are some benefits of using the multiple intelligences approachhttp://www.thirteen.org/edonline/concept2class/images/spacer.gifin my school?**](http://www.thirteen.org/edonline/concept2class/mi/index_sub5.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifHow can applying M.I. theory help students learn better?**](http://www.thirteen.org/edonline/concept2class/mi/index_sub6.html)[**http://www.thirteen.org/edonline/concept2class/images/icon_red_arrow.gifHow can I find out more about M.I. theory?**](http://www.thirteen.org/edonline/concept2class/mi/index_sub7.html)http://www.thirteen.org/edonline/concept2class/images/line.gif

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| **What is the theory of multiple intelligences (M.I.)?**An intelligence is the ability to solve problems, or to create products, that are     valued                    within one or more cultural settings.Howard Gardner claims that all human beings have multiple intelligences. These multiple intelligences can be nurtured and strengthened, or ignored and weakened. He believes each individual has nine intelligences:1**Verbal-Linguistic Intelligence** -- well-developed verbal skills and sensitivity to the sounds, meanings and rhythms of words2**Mathematical-Logical Intelligence** -- ability to think conceptually and abstractly, and capacity to discern logical or numerical patterns3**Musical Intelligence** -- ability to produce and appreciate rhythm, pitch and timber4**Visual-Spatial Intelligence** -- capacity to think in images and pictures, to visualize accurately and abstractly5**Bodily-Kinesthetic** **Intelligence** -- ability to control one's body movements and to handle objects skillfully6**Interpersonal Intelligence** -- capacity to detect and respond appropriately to the moods, motivations and desires of others.7**Intrapersonal Intelligence** -- capacity to be self-aware and in tune with inner feelings, values, beliefs and thinking processes8**Naturalist Intelligence** -- ability to recognize and categorize plants, animals and other objects in nature9**Existential Intelligence** -- sensitivity and capacity to tackle deep questions about human existence, such as the meaning of life, why do we die, and how did we get here.**Howard Gardner**1 defined the first seven intelligences in FRAMES OF MIND (1983). He added the last two in INTELLIGENCE REFRAMED (1999). Gardner is a psychologist and Professor at Harvard University's Graduate School of Education, as well as Co-Director of [Harvard Project Zero](http://www.thirteen.org/edonline/concept2class/w1-resources.html#zero).**1.** Based on his study of many people from many different walks of life in everyday circumstances and professions, Gardner developed the theory of multiple intelligences. He performed interviews with and brain research on hundreds of people, including stroke victims, prodigies, autistic individuals, and so-called "idiot savants." According to Gardner, * All human beings possess all nine intelligences in varying amounts.
* Each person has a different intellectual composition.
* We can improve education by addressing the multiple intelligences of our students.
* These intelligences are located in different areas of the brain and can either work independently or together.
* These intelligences may define the human species.

To help understand how you learn best, take this short Multiple Intelligences Self-Inventory. There are just a few questions to answer, which should take approximately five minutes to complete.

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**How does this theory differ from the traditional definition of intelligence?**Gardner's multiple intelligences theory challenged traditional beliefs in the fields of education and cognitive science. According to a traditional definition, intelligence is a uniform cognitive capacity people are born with. This capacity can be easily measured by short-answer tests. According to Howard Gardner, intelligence is: * The ability to create an effective product or offer a service that is valued in a culture;
* A set of skills that make it possible for a person to solve problems in life;
* The potential for finding or creating solutions for problems, which involves gathering new knowledge.

An educational system based on national standards and efficient, relatively cheap, universal multiple choice testing is central to the traditional concept of intelligence. In practice a student's score on an **I.Q.**2 test or **WISC**3 ranks his or her strengths and weaknesses. It qualifies students for special services (such as programs for the gifted or for those with learning disabilities). An unfortunate use of IQ tests in schools is that it often results in labeling students. **2.**http://www.thirteen.org/edonline/concept2class/images/icon_mod_buzz.gif  **3.**http://www.thirteen.org/edonline/concept2class/images/icon_mod_buzz.gifMany educators, researchers, students and parents have long rejected multiple choice testing as a measure of intelligence. Multiple intelligence theory has served as a rallying point for a reconsideration of the educational practice of the last century.

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| Traditional view of Intelligence | Multiple Intelligences Theory |
| Intelligence can be measured by short-answer tests:Stanford-Binet Intelligence QuotientWechsler Intelligence Scale for Children (WISCIV)Woodcock Johnson test of Cognitive AbilityScholastic Aptitude Test  | Assessment of an individual's multiple intelligences can foster learning and problem-solving styles. Short answer tests are not used because they do not measure disciplinary mastery or deep understanding. They only measure rote memorization skills and one's ability to do well on short answer tests. Some states have developed tests that value process over the final answer, such as PAM (Performance Assessment in Math) and PAL (Performance Assessment in Language) |
| People are born with a fixed amount of intelligence. | Human beings have all of the intelligences, but each person has a unique combination, or profile. |
| Intelligence level does not change over a lifetime. | We can all improve each of the intelligences, though some people will improve more readily in one intelligence area than in others. |
| Intelligence consists of ability in logic and language. | There are many more types of intelligence which reflect different ways of interacting with the world |
| In traditional practice, teachers teach the same material to everyone. | M.I. pedagogy implies that teachers teach and assess differently based on individual intellectual strengths and weaknesses. |
| Teachers teach a topic or "subject." | Teachers structure learning activities around an issue or question and connect subjects. Teachers develop strategies that allow for students to demonstrate multiple ways of understanding and value their uniqueness. |

**What do multiple intelligences have to do with my classroom?** There are numerous ways to express oneself, and probably even more ways to gain knowledge and understand the universe. Individuals are capable, the theory of multiple intelligences advocates, of deep understanding and mastery in the most profound areas of human experience. Even long before the theory emerged and was named in 1983 by Howard Gardner, numerous teachers fostered the intelligences of their students. Think of it this way: J.K. Rowling, Richard Feynmann, Lauryn Hill, Julian Schnabel, Mia Hamm, Colin Powell, Deepak Chopra, Jane Goodall, and Gary Larson are students on your seating chart. Multiple Intelligences Classroom* J.K. is writing the next Harry Potter adventure on scraps of paper.
* Richard is daydreaming the equations enabling a quantum computer.
* Lauryn softly hums the tunes for the sequel to "The Miseducation of Lauryn Hill."
* Julian has painted brilliant fall leaves on each windowpane.
* Mia can't wait to get to PE.
* Colin has organized the school's charity fund drive.
* Deepak provides in-class spiritual counseling.
* Jane adds a new animal to the class menagerie daily.
* Gary scrawls witty absurdities in the margins of his notebook.

The next time you have a chance to reflect on your class, imagine your students as individuals who have fully realized and developed their intelligences.**How has M.I. theory developed since it was introduced in 1983?**Multiple intelligence theory has evolved and been embraced widely. After the publication of FRAMES OF MIND in 1983 (See our [Resources](http://www.thirteen.org/edonline/concept2class/w1-resources.html#garder)), Howard Gardner became a celebrity among many teachers and school administrators. In addition to writing many more books and articles on multiple intelligences theory, Gardner has served as a consultant to a variety of school districts. The multiple intelligences movement now includes publishers, symposiums, Web sites, "how-to" manuals, educational consultants who consider themselves "M.I. specialists", as well as a number of critics.**Howard Gardner and others have revised and expanded the theory**Howard Gardner, formulator of the theory, continues to be its chief spokesperson. He has been acclaimed as the most influential educational theorist since **John Dewey**4. **4.**http://www.thirteen.org/edonline/concept2class/images/icon_mod_buzz.gifGardner has written and published 18 books and hundreds of articles. Chief among them are: * FRAMES OF MIND (1983) introduced the theory of multiple intelligences.
* THE DISCIPLINED MIND: WHAT ALL STUDENTS SHOULD UNDERSTAND (1999) proposes a pedagogical approach centered around profoundly important topics and shows how they might be taught with a "multiple intelligence" approach.
* INTELLIGENCE REFRAMED: MULTIPLE INTELLIGENCE FOR THE 21st CENTURY (1999) reports on the evolution of and revisions to the theory of multiple intelligences.

Among the many prominent professors, teacher educators, consultants and expert teachers who have made valuable contributions to the field of multiple intelligences are: **Stephen Jay Gould**, Vincent Astor Research Professor of Biology at NYU, most recently authored FULL HOUSE: THE SPREAD OF EXCELLENCE FROM PLATO TO DARWIN. His National Book Award-winning THE PANDA'S THUMB, and National Critic's Award-winning THE MISMEASURE OF MAN are among his many other distinguished works in the areas of science, evolution and human intelligence. **Robert J. Sternberg**, IBM Professor of Psychology and Education at Yale University proposes a Triarchic Theory of Intelligence, which is complementary to M.I. His book in the area of cognitive psychology is BEYOND IQ: A TRIARCHIC THEORY OF INTELLIGENCE. **Carolyn Chapman** is a consultant and trainer who has authored IF THE SHOE FITS . . . : DEVELOPING MULTIPLE INTELLIGENCES IN THE CLASSROOM and co-authored MULTIPLE ASSESSMENTS FOR MULTIPLE INTELLIGENCES. She and Lynn Freeman, another consultant, wrote MULTIPLE INTELLIGENCES CENTERS AND PROJECTS. **Ellen Weber**, Director of Secondary Education at Houghton College, is one of this workshop's experts. She is the author of recent works STUDENT ASSESSMENT THAT WORKS: A PRACTICAL APPROACH and ROUNDTABLE LEARNING: BUILDING UNDERSTANDING THROUGH ENHANCED M.I. STRATEGIES. **Thomas Armstrong** is an author and speaker whose books include MULTIPLE INTELLIGENCES IN THE CLASSROOM, AWAKENING YOUR CHILD'S NATURAL GENIUS, and AWAKENING GENIUS IN THE CLASSROOM. **Jane Carlson-Pickering** developed the M.I.Smart! Program for the Chariho Regional School District. She teaches a graduate course about multiple intelligences at Rhode Island College. She is also one of this workshop's experts. **Countless educators have incorporated multiple intelligence theory into their work.**The multiple intelligences approach encourages teachers to regard intellectual ability more broadly. Teachers are able to see that visual arts, music and dance can be just as valuable to students' understanding of the world they live in as traditional academic subjects. Numerous teachers and administrators have applied aspects of multiple intelligence theory in their classrooms and schools. Through the serious and in-depth study of just a few subjects, rather than a minimal amount of attention to many subjects, Howard Gardner believes that students will develop a passion for exploring truly profound ideas. **Who are the critics of this theory and what do they say?**E.D. Hirsch Jr., author of CULTURAL LITERACY: WHAT EVERY AMERICAN NEEDS TO KNOW (1988), and others have argued that multiple intelligence theory doesn't encourage educators to teach "core knowledge" -- a common collection of "essential facts that every American needs to know." Hirsch and Gardner most recently "debated" the state of education today in the New York Times (9/11/99). Each submitted an article responding to the issue of what and how students should be taught. You can find information about the article in the [M.I. Resources](http://www.thirteen.org/edonline/concept2class/w1-resources.html) section of this workshop.Responding to advocates of core cultural knowledge, Gardner proposes that the K-12 curriculum be organized around the most fundamental questions of existence. Possible courses of study that he recommends would examine in depth profound topics such as Darwin's theory of evolution and the Holocaust. In his book THE DISCIPLINED MIND: WHAT ALL STUDENTS SHOULD UNDERSTAND, Gardner writes, "students should probe with sufficient depth a manageable set of examples so that they come to see how one thinks and acts in the manner of a scientist, a geometer, an artist, an historian."Advocates of psychometric evaluation who criticize M.I. include Linda S. Gottfredson, Richard Lynn, Hans Eysenck, and Charles Murray. Linda Gottfredson, a sociologist by training, is currently professor of educational studies at the University of Delaware. She states that most mainstream psychologists have concluded that there is such a thing as "g", or general intelligence. In other words, Gottfredson argues that all of us do differ in intelligence and this difference can be scrupulously measured. Critics of the theory say that: * **It's not new**. Critics of multiple intelligence theory maintain that Gardner's work isn't groundbreaking -- that what he calls "intelligences" are primary abilities that educators and cognitive psychologists have always acknowledged.
* **It isn't well defined**. Some critics wonder if the number of "intelligences" will continue to increase. These opposing theorists believe that notions such as bodily-kinesthetic or musical ability represent individual aptitude or talent rather than intelligence. Critics also believe that M.I. theory lacks the rigor and precision of a real science. Gardner claims that it would be impossible to guarantee a definitive list of intelligences.
* **It's culturally embedded**. M.I. theory states that one's culture plays an important role in determining the strengths and weaknesses of one's intelligences. Critics counter that intelligence is revealed when an individual must confront an unfamiliar task in an unfamiliar environment.
* **It defeats National Standards**. Widespread adoption of multiple intelligence pedagogy would make it difficult to compare and classify students' skills and abilities across classrooms.
* **It is impractical**. Educators faced with overcrowded classrooms and lack of resources see multiple intelligence theory as utopian.

What are some benefits of using the multiple intelligences approach in my school?1**Benefit** You may come to regard intellectual ability more broadly. Drawing a picture, composing, or listening to music, watching a performance -- these activities can be a vital door to learning -- as important as writing and mathematics. Studies show that many students who perform poorly on traditional tests are turned on to learning when classroom experiences incorporate artistic, athletic, and musical activities. Take music, for example. As educator, David Thornburg of the Thornburg Institute notes, "The mood of a piece of music might communicate, clearer than words, the feeling of an era being studied in history. The exploration of rhythm can help some students understand fractions. The exploration of the sounds of an organ can lead to an understanding of vibrational modes in physics. What caused the great scientist Kepler to think of the motions of planets in musical terms? Astronomy students could program a synthesizer to play Kepler's 'music of the spheres' and explore history, science, math and music all at once." * **Benefit** You will provide opportunities for authentic learning based on your students' needs, interests and talents. The multiple intelligence classroom acts like the "real" world: the author and the illustrator of a book are equally valuable creators. Students become more active, involved learners. **3Benefit** Parent and community involvement in your school may increase. This happens as students demonstrate work before panels and audiences. Activities involving apprenticeship learning bring members of the community into the learning process. **4Benefit** Students will be able to demonstrate and share their strengths. Building strengths gives a student the motivation to be a "specialist." This can in turn lead to increased self-esteem. **5Benefit** When you "teach for understanding," your students accumulate positive educational experiences and the capability for creating solutions to problems in life.

**How can applying M.I. theory help students learn better?**Students begin to understand how they are intelligent. In Gardner's view, learning is both a social and psychological process. When students understand the balance of their own multiple intelligences they begin * To manage their own learning
* To value their individual strengths

Teachers understand how students are intelligent as well as how intelligent they are. Knowing which students have the potential for strong interpersonal intelligence, for example, will help you create opportunities where the strength can be fostered in others. However, multiple intelligence theory is not intended to provide teachers with new IQ-like labels for their students. Students approach understanding from different angles. The problem, "What is sand?" has scientific, poetic, artistic, musical, and geographic points of entry. Students that exhibit comprehension through **rubrics**5, **portfolios**6, or demonstrations come to have an authentic understanding of achievement. The accomplishment of the lawyer is in winning her case through research and persuasive argument, more than in having passed the bar exam.  Students become balanced individuals who can function as members of their culture. Classroom activities that teach to the intelligences foster deep understanding about the essential questions of life, such as: Where do we come from? What's the world made of? What have humans achieved? What can we achieve? How does one lead a good life?**Multiple Intelligences Resources** [Page-up](http://www.thirteen.org/edonline/concept2class/w1-resources.html%22%20%5Cl%20%22top)BooksAllen, David, ed. with foreword by Howard Gardner. ASSESSING STUDENT LEARNING: FROM GRADING TO UNDERSTANDING. NY: Teachers College Press, 1998.Leading educators advocate new assessment methods that shift the focus from raw test scores to authentic student work. Suggestions for strategies and activities, such as visual work, portfolios, etc., to implement collaborative and reflective examination are provided for elementary through high school levels. Armstrong, Thomas. AWAKENING YOUR CHILD'S NATURAL GENIUS. 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[Page-up](http://www.thirteen.org/edonline/concept2class/w1-resources.html#top)Web Sites**ALPS: Active Learning Practices for Schools**<http://learnweb.harvard.edu/alps/>Project Zero's site about implementing ideas into classroom practice. **American Memory**<http://memory.loc.gov/ammem/today>Library of Congress's collection of over fifty extensive multimedia collections available to students for study and use. **Banded Peak Elementary (Alberta, Canada)**<http://www.rockyview.ab.ca/bpeak/>**Capitol School, The (Alabama)** <http://www.capconnect.com/>**The Chariho Regional School District (Rhode Island)**http://www.chariho.k12.ri.us **Family Education.com**[http://www.familyeducation.com/quiz/0,1399,3-2740,00.html](http://www.familyeducation.com/quiz/0%2C1399%2C3-2740%2C00.html) On this site, parents test their child's intelligence. Results are informative and concise. **Harvard Project Zero** <http://pzweb.harvard.edu/>This site provides information about Project Zero, an educational research group at the Harvard Graduate School of Education, led by Howard Gardner and his colleagues. Project Zero seeks to understand and enhance learning, thinking, and creativity in the arts, as well as humanistic and scientific disciplines, at the individual and institutional levels. **Key Elementary School and Key Renaissance School (Indianapolis)**<http://www.ncrel.org/sdrs/areas/issues/students/atrisk/at6lk69.htm>**Mesa Elementary School (New Mexico)**<http://www.cms.k12.nm.us/mesa/index.html>**M.I. Links** <http://www.chariho.k12.ri.us/curriculum/MISmart/mi_links.htm>Jane Carlson-Pickering's page of M.I. lists links, articles, Web sites, and books. **M.I. Smart! Program**<http://www.chariho.k12.ri.us/curriculum/MISmart/mi_smart.htm>Linked to the Sands of the World site, this site illustrates all nine of the intelligences. **MITA (Multiple Intelligence Teaching Approach)**<http://www.houghton.edu/personnel/eweber/ellen.html>This site presents Ellen Weber's MITA for school reform for high school as well as higher education, including a lesson bank and assessment tasks. **Multiple Intelligences**<http://www.chariho.k12.ri.us/curriculum/MISmart/MImapDef.HTM>A helpful graphic on Jane Carlson-Pickering's M.I. Smart! Program Web site that clarifies all of the multiple intelligences. **The National Educational Technology Standards**http://cnets.iste.org A writing team composed of classroom teachers and representatives from each of the professional organizations. **The New City School (Missouri)** <http://www.newcityschool.org/index.html>**Report to the President on the Use of Technology to Strengthen K-12 Education in the United States** <http://fargo.itp.tsoa.nyu.edu/~panzier/future/teach2.htm>**The Ross School (New York)**<http://www.ross.org>**San Jose Elementary School (Florida)**<http://world.std.com/~mkjg/>**Sands of the World**<http://www.chariho.k12.ri.us/curriculum/MISmart/ocean/sands.htm>This site presents an example of M.I. application in the classroom through a specific learning task about sand from all over the world. The site was created along with her fourth grade class. The M.I. Smart Web site, which illustrates all seven of the intelligences, is linked to this page. **Teaching to the Seven Multiple Intelligences and Lesson Plans**<http://www.mitest.com/>Educators will likely be eager to assess their own learning preferences. Interactive quizzes for adults and students give both groups an opportunity to discover which of the intelligences they use the most. **ThinkQuest**<http://www.thinkquest.org>A yearly competition for teams of students led by teacher/coaches. The competition offers exciting awards in many categories. It is divided into two flights: grades 4-7 and grades 8-12. [Page-up](http://www.thirteen.org/edonline/concept2class/w1-resources.html#top)Videos**ABC News: "Common Miracles: The New American Revolution in Learning" (1993).**http://www.academicinnovations.com/miracles.html Peter Jennings and Bill Blakemore go into schools to interview teachers, parents, administrators, and students to talk about new options in education. ABC News MPI Home Video. Available through IRI Skylight Publishing, Inc. Arlington Heights, Illinios. **Connections. A Spiral Pictures and The Ross Institute production.**For information about this and other productions of the Ross School, visit their Web site.<http://www.ross.org>**Shop PBS for Teachers**<http://teacher.shop.pbs.org/>Go beyond the classroom to take learning to a higher level. PBS' rich educational video resources allow students to explore content from different points of entry. Visit [PBS Teachers](http://www.pbs.org/teachers/) to find lesson plans that integrate PBS video. **TeacherNet: Inquiry into Sharks, a production of Thirteen/WNET Educational Resources Center. 1999.** [Page-up](http://www.thirteen.org/edonline/concept2class/w1-resources.html#top)Materials**Bright Ideas. What a Bright Idea, Inc., P.O. Box 1034, Concord, MA 01742.**In-home educational software. **Dr. Brain.**This educational CD-ROM based on the theory of multiple intelligences develops children's problem-solving skills. **Exploring Our Multiple Intelligences. Produced by Marcia D'Arcangelo and Kathy Checkly. Association for Supervision and Curriculum Development, 1703 N. Beauregard St., Alexandria, VA 22311-1714.**Educational CD-ROM about multiple intelligences.  |

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