

INSTRUCTIONAL PRACTICES TO SUPPORT PROJECT-BASED LEARNING



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Habits of Mind *in Brief*



Art Costa's "Habits of Mind" (a.k.a. "Intelligent Behaviors") provide a powerful set of research-based behaviors that effective people exhibit when they are acting intelligently. Below is a list of the habits along with abbreviated definitions, taken from "Discovering and Exploring Habits of Mind," Arthur Costa and Bena Kallick, ASCD, ©2000, p. xvii For more on Costa's work, visit www.habits-of-mind.net.

1. Persisting.

Stick to it. See a task through to completion, and remain focused.

2. Managing impulsivity.

Take your time. Think before you act. Remain calm, thoughtful, and deliberate.

3. Listening with understanding and empathy.

Seek to understand others. Devote mental energy to another person's thoughts and ideas. Hold your own thoughts in abeyance so you can better perceive another person's point of view and emotions.

4. Thinking flexibly.

Look at a situation another way. Find a way to change perspectives, generate alternatives, and consider options.

5. Thinking about thinking (metacognition).

Know your knowing. Be aware of your own thoughts, strategies, feelings, and actions – and how they affect others.

6. Striving for accuracy.

Check it again. Nurture a desire for exactness, fidelity, and craftsmanship.

7. Questioning and posing problems.

How do you know? Develop a questioning attitude, consider what data are needed, and choose strategies to produce those data. Find problems to solve.

8. Applying past knowledge to new situations.

Use what you learn. Access prior knowledge, transferring that knowledge beyond the situation in which it was learned.

9. Thinking and communicating with clarity and precision.

Be clear. Strive for accurate communication in both written and oral form. Avoid overgeneralizations, distortions, and deletions.

10. Gathering data through all senses.

Use your natural pathways. Gather data through all the sensory paths: gustatory, olfactory, tactile, kinesthetic, auditory, and visual.

11. Creating, imagining, and innovating.

Try a different way. Generate novel ideas, and seek fluency in originality.

12. Responding with wonderment and awe.

Let yourself be intrigued by the world's phenomena and beauty. Find what is awesome and mysterious in the world.

13. Taking responsible risks.

Venture out. Live on the edge of your competence.

14. Finding humor.

Laugh a little. Look for the whimsical, incongruous, and unexpected in life. Laugh at yourself when you can.

15. Thinking interdependently.

Work together. Truly work with and learn from others in reciprocal situations.

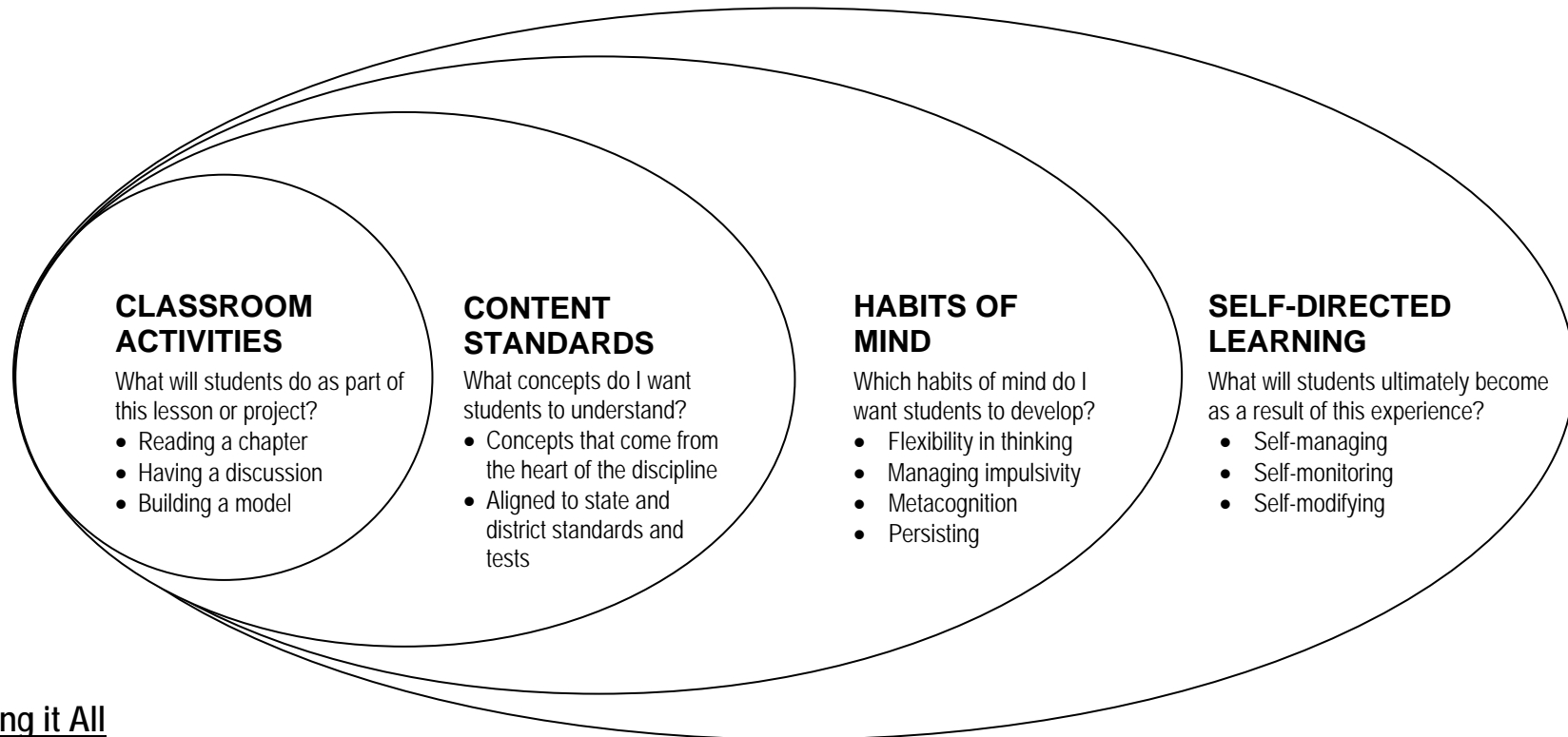
16. Remaining open to continuous learning.

Learn from experiences. Be proud – and humble enough – to admit that you don't know. Resist complacency.

Simultaneous Outcomes in the Classroom



This diagram, adapted from the work of Art Costa and Bena Kallick, shows some of the multiple levels of understanding that teachers must balance and attend to through the design and delivery of classroom instruction.



Doing it All

At the most basic level, teachers engage students in CLASSROOM ACTIVITIES that get students to DO something during their time in school. Ideally, these activities help students learn CONTENT STANDARDS so that they KNOW key concepts and skills. It must be noted that the current national frenzy around accountability, testing, and standards puts tremendous pressure on teachers to emphasize – and stay – at this level of instructional design, despite the essential learning that lies in the next two outcome levels. The third outcome level accounts for the HABITS OF MIND, which are the ways that intelligent people THINK and BEHAVE. Teachers and university scholars often cite as the most critical outcomes of all. Finally, the outmost level contains SELF-DIRECTED LEARNING and the learning skills that students can TRANSFER to all aspects of their life. This complex overview of learning outcomes provides a powerful argument for the use of sophisticated instructional methods such as project-based learning.

KEY PBL COMPONENTS

PROJECT DESIGN

- Simultaneous Outcomes
- Mapping to Standards
- Six A's of PBL

PROJECT IMPLEMENTATION

- Scaffolding
- 9 Steps of PBL
- Marzano's Essential 9

PROJECT ASSESSMENT

- Products & Performances
- Feedback Strategies
- Authentic Audiences

Learning Community

Real-World Context

The Six A's of Designing Projects



The Six A's constitute a powerful list of features that are present in high quality classroom projects. Many teachers use these six factors as a quality check during the project design process. Developed by Adria Steinberg, Jobs for the Future. Used by permission.

AUTHENTICITY

- ▶ Project emanates from a problem or question that has meaning to the student.
- ▶ Project problem or question is actually tackled by adults at work or in the community.
- ▶ Students produce something that has personal and/or social value beyond the classroom.

ACADEMIC RIGOR

- ▶ Project leads students to acquire and apply knowledge central to one or more discipline or content area.
- ▶ Project challenges students to use methods of inquiry central to one or more discipline (e.g. to think like a scientist).
- ▶ Students develop higher order thinking skills and habits of mind (e.g. searching for evidence, taking different perspectives).

APPLIED LEARNING

- ▶ Learning takes place in the context of a semi-structured problem, grounded in life and work in the world beyond school.
- ▶ Project leads students to acquire and use competencies expected in high performance work organizations (e.g. teamwork, problem solving, and communications).
- ▶ Work requires students to develop organizational and self-management skills.

ACTIVE EXPLORATION

- ▶ Students spend significant amounts of time doing field-based work.
- ▶ Project requires students to engage in real investigation, using a variety of methods, media, and sources.
- ▶ Students are expected to communicate what they are learning through a formal exhibition.

ADULT RELATIONSHIPS

- ▶ Students meet and observe adults with relevant expertise and experience.
- ▶ Students have an opportunity to work closely with at least one adult.
- ▶ Adults collaborate on the design and assessment of student work.

ASSESSMENT PRACTICES

- ▶ Students reflect regularly on their learning using clear project criteria that they have helped to set.
- ▶ Adults from outside the classroom help students develop a sense of real world standards for the work.
- ▶ Opportunities exist for regular assessment of student work through a range of methods, including exhibitions and portfolios.

The “Essential Nine”: Research-Based Instructional Strategies

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Researchers at Mid-continent Research for Education and Learning (McREL) have identified nine instructional strategies that are most likely to improve student achievement across all content areas and across all grade levels. These strategies are explored in the book *Classroom Instruction That Works* by Robert Marzano, Debra Pickering, and Jane Pollock, and are briefly detailed below.

The “Essential Nine” Instructional Strategies

1. Identifying Similarities and Differences
2. Summarizing and Note Taking
3. Reinforcing Effort and Providing Recognition
4. Homework and Practice
5. Nonlinguistic Representations
6. Cooperative Learning
7. Setting Objectives and Providing Feedback
8. Generating and Testing Hypotheses
9. Cues, Questions, and Advance Organizers

1. IDENTIFYING SIMILARITIES AND DIFFERENCES

The ability to break a concept into its similar and dissimilar characteristics allows students to understand (and often solve) complex problems by analyzing them in a more simple way. Teachers can either directly present similarities and differences, accompanied by deep discussion and inquiry, or simply ask students to identify similarities and differences on their own. While teacher-directed activities focus on identifying specific items, student-directed activities encourage variation and broaden understanding, research shows. Research also notes that graphic forms are a good way to represent similarities and differences.

Applications:

- Use Venn diagrams or charts to compare and classify items.
- Engage students in comparing, classifying, and creating metaphors and analogies.

2. SUMMARIZING AND NOTE TAKING

These skills promote greater comprehension by asking students to analyze a subject to expose what's essential and then put it in their own words. According to research, this requires substituting, deleting, and keeping some things and having an awareness of the basic structure of the information presented.

Applications:

- Provide a set of rules for creating a summary.
- When summarizing, ask students to question what is unclear, clarify those questions, and then predict what will happen next in the text.

Research shows that taking more notes is better than fewer notes, though verbatim note taking is ineffective because it does not allow time to process the information. Teachers should encourage and give time for review and revision of notes; notes can be the best study guides for teens.

Applications:

- Use teacher-prepared notes.
- Stick to a consistent format for notes, although students can refine the notes as necessary.

3. REINFORCING EFFORT AND PROVIDING RECOGNITION

Effort and recognition speak to the attitudes and beliefs of students, and teachers must show the connection between effort and achievement. Research shows that although not all students realize the importance of effort, they can learn to change their beliefs to emphasize effort.

Applications:

- Share stories about people who succeeded by not giving up.
- Have students keep a list of their weekly efforts and achievements, reflect on it periodically, and even mathematically analyze the data.

According to research, recognition is most effective if it is contingent on the achievement of a certain standard. Also, symbolic recognition works better than tangible rewards.

Applications:

- Find ways to personalize recognition. Give awards for individual accomplishments.
- “Pause. Prompt. Praise.” If a student is struggling, pause to discuss the problem, then prompt with specific suggestion to help her/him improve. If the student’s performance improves as a result, offer praise.

4. HOMEWORK AND PRACTICE

Homework provides students with the opportunity to extend their learning outside the classroom. However, research shows that the amount of homework assigned should vary by grade level and that parent involvement should be minimal. Teachers should explain the purpose of homework to both the student and the parent/guardian, and teachers should try to give feedback on all homework assigned.

Applications:

- Establish a homework policy with advice – such as keeping a consistent schedule, setting, and time limit – that parents and students may not have considered.
- Tell students if homework is for practice or preparation for upcoming instruction.
- Maximize the effectiveness of feedback by varying the way it is delivered.

Research shows that students should adapt skills while they are learning them. Speed and accuracy are key indicators of the effectiveness of practice.

Applications:

- Assign timed quizzes for homework and have students report on their speed and accuracy.
- Focus practice on difficult concepts and set aside time to accommodate practice periods.

5. NONLINGUISTIC REPRESENTATIONS

According to research, knowledge is stored in two forms: linguistic and visual. The more students use both forms in the classroom, the more opportunity they have to achieve. Recently, use of nonlinguistic representation has proven to not only stimulate but also increase brain activity.

Applications:

- Incorporate words and images using symbols to represent concepts and relationships.
- Use physical models and physical movement to represent information.

6. COOPERATIVE LEARNING

Research shows that organizing students into cooperative groups yields a positive effect on overall learning. When applying cooperative learning strategies, keep groups small and don’t overuse this strategy – be systematic and consistent in your approach.

(Essential Nine Instructional Strategies continued...)

Applications:

- When grouping students, consider a variety of criteria, such as common experiences or interests.
- Vary group sizes and objectives.
- Design group work around the core components of cooperative learning – positive interdependence, group processing, appropriate use of social skills, face-to-face interaction, and individual and group accountability.

7. SETTING OBJECTIVES AND PROVIDING FEEDBACK

Setting objectives can provide students with a direction for their learning. Goals should not be too specific; they should be easily adaptable to students' own objectives.

Applications:

- Set a core goal for a unit, and then encourage students to personalize that goal by identifying areas of interest to them. Questions like “I want to know” and “I want to know more about...” get students thinking about their interests and actively involved in the goal-setting process.
- Use contracts to outline the specific goals that students must attain and the grade they will receive if they meet those goals.

Research shows that feedback generally produces positive results. Teachers can never give too much; however, they should manage the form that feedback takes.

Applications:

- Make sure feedback is corrective in nature; tell students how they did in relation to specific levels of knowledge. Rubrics are a great way to do this.
- Keep feedback timely and specific.
- Encourage students to lead feedback sessions.

8. GENERATING AND TESTING HYPOTHESES

Research shows that a deductive approach (using a general rule to make a prediction) to this strategy works best. Whether a hypothesis is induced or deduced, students “should clearly explain their hypotheses and conclusions.”

Applications:

- Ask students to predict what would happen if an aspect of a familiar system, such as the government or transportation, were changed.
- Ask students to build something using limited resources. This task generates questions and hypotheses about what may or may not work.

9. CUES, QUESTIONS, AND ADVANCE ORGANIZERS

Cues, questions, and advance organizers help students use what they already know about a topic to enhance further learning. Research shows that these tools should be highly analytical, should focus on what is important, and are more effective when presented before a learning experience.

Applications:

- Pause briefly after asking a question. Doing so will increase the depth of your students' answers.
- Vary the style of advance organizer used: Tell a story, skim a text, or create a graphic image. There are many ways to expose students to information before they “learn” it.

Adapted from Classroom Instruction That Works

Conditions that Support PBL

Classroom, school, and community-level supports must be in place for a Project-Based Learning approach to truly thrive. Below are key factors from each level.

CLASSROOM CONDITIONS THAT SUPPORT PBL

Conditions within the classroom itself have the greatest impact on successful project design and implementation. Key factors include:

Safe, respectful learning environments

The physical and intellectual safety of all learners must be protected so that students can take the learning risks demanded by complex project situations. Teachers must set clear behavioral boundaries and encourage an atmosphere where competing ideas can coexist respectfully.

Personalized teacher-student relationships

Skillful teachers get to know their students well enough to be able to customize (or “differentiate”) project instruction to the needs and interests of individual learners. This requires intentional relationship-building with students; active, respectful listening on the part of teachers; and real opportunities for students to co-create their learning environment.

Productive peer relationships

The advanced teamwork skills that most projects require of students call for a classroom environment where students know, trust, and value each other and are ready to engage in intense collaborative situations. Skillful PBL practitioners also know how to limit and redirect standard competitive urges students may exhibit and instead build a true community of learners.

Transformed teacher roles

PBL transforms the role of the teacher from content provider to learning coordinator. As a result, teachers spend less time lecturing and leading and more time planning, observing, listening, coaching, and facilitating.

Intensified teacher engagement and commitment

In a PBL environment where teachers ask students to engage fully in their own learning and exhibit their work beyond the classroom, teachers must reciprocate and model an elevated level of commitment in return. This means going the extra mile for students, responding to individual needs, maintaining expectations of success for all, and refusing to let students “hide” or get by with halfhearted efforts. Teaching in this way is not for the faint of heart, but it is deeply rewarding. Ultimately, students do not care how much teachers know until they know that they care.

Best Practices of Instruction

Since PBL is essentially an umbrella strategy that provides the context and framework for student learning, the daily teacher practice that supports and scaffolds successful project work must reflect best practices of classroom instruction. Bob Marzano’s “Essential 9” represents a nice set of research-based strategies that teachers can use as they teach the supporting content and skills necessary for the project.

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SCHOOL-LEVEL CONDITIONS THAT SUPPORT PBL

Beyond the classroom, PBL works best when the broader school environment provides numerous supports. Schools can foster PBL through:

Supportive school structures

Schools that most successfully personalize instruction tend to be small or feel small, often by grouping students into cohorts of around 100 students. Small schools and small learning community programs allow teachers to team up on project design and implementation and provide ideal settings for curricular integration. In addition, schools that provide daily schedules with extended blocks of instructional time are well suited to the use of PBL as an instructional strategy.

Common intellectual mission

Teachers engaged in the heavy lifting of integrated project design benefit greatly from schoolwide learning frameworks that emphasize a core set of skills, competencies, or “habits of mind” that clearly define student learning priorities. These school-based “intellectual missions” are often the result of collaborative processes that map and align curriculum standards to national frameworks such as the 21st Century skills or the Standards for Success. With these elements in place, teachers can then drill down to include key course content in their project designs.

Professional collaboration

With or without teacher teaming, PBL benefits from quality collaboration between teachers. The ability to share project ideas, strategies, resources, and results can make a tremendous difference for educators, particularly during the early stages of their careers or PBL efforts.

Administrative support

The active support of principals and other building-level leaders is essential if teachers and students are to sustain their PBL efforts over time. Tangible supports that administrators can provide include funding for project materials, staff development opportunities, and verbal and written support for teachers using PBL strategies.

COMMUNITY-LEVEL CONDITIONS THAT SUPPORT PBL

The broader local community is the final piece of the PBL support puzzle. Potential supports that exist beyond the school grounds include:

Engaged employer partners

It turns out that the old adage is true – it really does take a village to raise a child. Community organizations, employer partners, and institutions of higher education can support classroom PBL efforts in a multitude of ways. Some of these partners can provide the impetus for a project by “subcontracting” students to solve real problems for their school, business, or organization. Others can work with classroom teachers to provide adult mentors, project directors, content experts, and exhibition panels. The three key components of PBL—project design, implementation, and assessment—provide potential onramps for partner involvement.

Parent involvement in learning

Parents can play a key role in supporting PBL by engaging with their students in the inquiry process, providing additional resources to the classroom, and serving as audience members for public exhibitions of student learning. Some teachers even train parent teams to provide formative assessment feedback to students on draft project work. The authentic nature of well-designed projects helps teachers move parental involvement beyond the bake sale into truly meaningful engagement in learning.