Intellectual Demands

Determining sources/testing the reliability/validity of information and sources

Determining causal factors

Analyzing/comparing/contrasting/drawing conclusions

Understanding causal factors/prediction

Activities like this one can be used to help students delve more deeply into statements of fact. We tend to take them at face value without, for example, asking critical questions such as, "Who said so? Can we believe them? How do we know? How is this important now? In the future?" One significant aspect of PBL is knowing what kinds of critical thinking questions we need to ask in order to understand a situation or statement.

TEACHERS' QUALITY RESPONDING

Sigel (personal communication, May 1990) of Educational Testing Service in Princeton, New Jersey, once suggested that how a teacher responds to students' comments and questions may be more important than the questions the teacher asks. After a career of investigating how to develop students' intellectual abilities, Sigel concluded that the teacher's tone of voice, the teacher's way of attending to the students, and the teacher's interest in the students' ideas could communicate a great deal that would contribute to creating the invitational environment.

If the question is "What metaphors can you imagine that compare the relationship of England and the thirteen colonies before the Revolutionary War?" one student response could be, "It's like a kid breaking away from home." One good teacher response would be, "How interesting! Help me understand how you arrived at that comparison." Another teacher response, less likely to foster in-depth reflection would be, "That's crazy! I've never heard of anything as far-out in my life!"

Stop and Think

How would you respond to this student?

Most responses can be classified under these categories:

Empathize with feelings: "I feel the same way at times. Can you share with us what brought about these feelings?"

Elicit good reasons: "Interesting! How do you see these two as similar?"

Elaborate upon an idea: "Please tell me more about your thinking/your ideas."

Provide more specific information or examples: "Can you give us more details about this comparison? Can you give us some examples?"

Clarify: "It isn't quite clear to me how parental imposition of house rules, like 'Be home at 12 o'clock,' is similar to what England did. Can you help me understand?"

Relate to others' comments: "How do your ideas relate to Jennifer's?"

Build upon others' ideas: "Can you add to what Jennifer has said?"

Reflect metacognitively: "I wonder how you thought of that comparison. Could you tell us please?"

The aim is to communicate genuine interest in knowing more about the student's thoughts and feelings. By tone of voice, physical attitude toward the person (distance, leaning toward the student), and facial expressions, teachers communicate their concern and desire to know more about what the student said. One student once said about her teacher, "Just watch his eyebrows if you want to know what he thinks!"

GENERATING PEER INTERACTION AND DISCUSSION

In an article titled "Research on Questioning and Discussion," Dillon (1984) suggested there is a variety of verbal interaction in the classroom. At one end of the spectrum is what he refers to as the quiz show (i.e., guess what's on the teacher's mind). At the other end of the spectrum is genuine discussion in which different points of view are presented openly with the intention of arriving at a conclusion.

During a quiz show the student's role is to figure out the correct answer, very often known only to the teacher. Sometimes, teachers need to highlight the importance of a fact (e.g., Bill Gates was president of Microsoft) or define a principle (e.g., one of Newton's three laws of motion). There is nothing wrong with the quiz show, unless teachers rely on it as their only or primary strategy.

A good discussion, on the other hand, focuses on a complex question or issue. Participants attempt to reason toward their own and perhaps a general conclusion based on evidence while listening to a wide diversity of points of view. A question such as, "What will Bill Gates's company be doing in 40 or 100 years?" generates this kind of intense involvement where there are multiple responses that are possible and reasonable.

Thus, quiz shows and discussions have different roles to play in the classroom, with the latter being very important for creating the invitational environment.

Here are some suggestions for creating genuine discussions:

- Ensure that everyone knows the names of all classmates from the very beginning
- Encourage students to respond to each other's comments and not just to the teacher's (e.g., a third-grade teacher can tell students to address the previous speaker when responding: "David, I agree/disagree with your ideas, because. . . ." She learned this technique from Lipman's Philosophy for Children program [Lipman, Sharp, & Oscanyan, 1980].)
- Use good follow-up responses (e.g., "Nick, what do you think of Carriann's comment? Kelly, do you agree with Mike's thinking? Why or why not?")
- When a student asks a question, respond by asking other students for an answer (e.g., "Who has an answer to Jessica's question?" This is an attempt to get the whole class involved and to move away from the model of the coach throwing the ball out to each player and receiving it back from him or her. The intellectual ball should be thrown among the players as it is during a real game. In the classroom the students should be the players!)
- Ask students what the components of a good discussion are, post their ideas, and use them as guidelines; then ask, "How well are we doing in our discussions?"
- Use small groups to help students become less shy about participating, and sit in on these discussions while they are being held
- Create a modeling situation with students, perhaps from another class or grade, to show your students what a good discussion can look like (e.g., a first-grade teacher can ask some fourth graders to present a negative model, then her children can create their own guidelines for good discussions)
- Model good listening and eye contact, and attend to everyone's comments
- Write in Reflective Journals and answer questions such as, "How well do you think our discussion went today? How can we improve on our performance?"

Stop and Think

How can you use these strategies to generate genuine discussions with your students? What else can you do to encourage genuine discussions with your students?

STUDENTS' REFLECTIVE JOURNALS

Plato, through the voice of Socrates, once observed that, "The unexamined life is not worth living" (Cooper, 1977, p. 38). Dewey (1963) noted that, "Thinking is the accurate and deliberate instituting of connections between what is done and its consequences" (p. 151). For Dewey, it is reflection on activities that

make them meaningful experiences. One way to organize these reflections is by writing about them after they have occurred with an attempt to make the connections Dewey mentioned.

Journals provide such opportunities, and the writing and subsequent sharing of reflections can contribute significantly to developing a community of inquiry.

Two journal formats might be helpful here. One, a formal entry, consists of responding to questions such as, "What was my problem to solve? How did I go about solving it? (Describe your thought processes, not the answer.) How would I evaluate my problem-solving processes? What might I do differently next time and why?" (Barell, 1995).

This formal entry is suitable for both mathematical/scientific problems with convergent answers and for more open-ended, complex situations such as those suggested with the Bill Gates questions.

More informal entries provide several writing options such as the stems in Figure 2.4.

Stop and Think

Select one of the informal journal stems and reflect on your experiences with PBL.

WHY THE ENVIRONMENT IS IMPORTANT TO PBL

Teachers modeling, asking different kinds of questions, engaging in Observe, Think, and Question exercises weekly with situations drawn from the subject, making quality responses, generating peer interaction and discussion, and using Reflective Journals are just some ways to foster an invitational environment. These strategies create an environment where students feel comfortable contributing, taking the risk of asking a "weird" question, or contradicting something the book or the teacher says. Without a solid foundation in good listening and having respect for everyone's ideas, teachers cannot establish the kinds of partnerships and communities of inquiry that are the foundation of any PBL strategy.

> The more safe/fair I make it to ask, make a mistake, take a chance, the better the kids feel about asking any of their questions and the more honest the inquiry. (Karen Kenny, Denver)

SENTENCE STEMS FOR REFLECTIVE JOURNALS

What seems important here is. . . .

What I would like to know more about is. . . .

I wonder. . . .

The important ideas/conclusions here are. . . .

This reminds me of. . . .

This relates or is connected to. . . .

What surprises/fascinates me is. . . .

What if. . . .

I feel. . . .

My tentative conclusions are. . . .

What I am learning about the subject, inquiry, and my own thinking processes. . . .

Figure 2.4

? What's My Thinking Now

Reflection

Comments

Questions