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USING R A D A R TO ZERO-IN ON CONTENT AREA CONCEPTS

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Teachers are always faced with the problem of making concepts encountered during reading meaningful to their students. One technique often suggested is to relate the new information to something with which students are already familiar (Smith, 1975; Pearson and Johnson, 1978). Examining analogies is an excellent way to accomplish this task. In addition, their use in concept learning encourages students to take an inquiring, creative approach to what they read by having them apply the information presented in many different ways.

RADAR is a strategy in which students build analogies that take advantage of their own knowledge in order to develop and reinforce concepts taught in the content areas. Using RADAR, students establish analogous relationships between the concept they are studying and a seemingly unrelated concept. While examining these analogies, they relate the new material to an old concept, something with which they are familiar. In the process of comparing the new to the known they are forced to pay attention not only to the details of the concept being presented, but also to the dynamics of the concept--the processes involved in its workings.

The RADAR technique consists of the following steps:

R—READ:

In the first step students read a passage on a given topic, for example, the problems of water pollution. If teachers wish to focus on a specific analogy, students may be asked to read for the purpose of explaining the analogy: "How is the problem of water pollution analogous to the problem of a messy bedroom?" or "In what ways are the problems of a messy bedroom similar to the problems of water pollution?" If teachers plan to work with several analogies, a more general purpose for reading should be given: "Read to find out as much as you can about the problems of water pollution."

If students have not previously worked with analogies or are uncomfortable with comparing apparently dissimilar concepts, some warm-up exercises may be in order before beginning RADAR. These should be designed to free students from stereotypical thinking which might keep them from discovering commonalities among concepts.

An approach which has proven successful is to begin with concepts which are very similar and gradually extend the activity to more and more divergent concepts. For example, students can be asked to think of all the things that a bicycle and a tricycle have in common both in the way they look and operate. Teachers can record students' responses on the chalkboard. It is important that teachers establish an open, nonthreatening atmosphere where students feel free to volunteer answers without the fear of being wrong. Accordingly, students' answers should not be questioned at this stage. All answers should be accepted. Finally, after the class has exhausted its supply of answers, the teacher may then call for the explanation of those responses that are difficult to understand.

This process would continue with the students exploring commonalities between more and more dissimilar concepts. How is a bicycle like a car? How is a bicycle like a football team? How is a bicycle like having a friend?

Warm-up should be spread over several days so as not to tire students of the activity. The exercise can also be used even after students are familiar with the process to increase their knowledge of a content area before reading. By attending to the range of responses given by the students, the teacher can get a good idea of how much background needs to be built prior to reading a lesson.

A- ANALOGIZE:

Following the reading step, students are asked to explain the analogous relationship which is presented to them. When introducing the procedure, it is best to work with the whole class or in large groups. In this way, the strategy can be modeled and students can benefit from each others' responses while trying to generate their own. The teacher should record the responses on the chalkboard for future reference. Later students may work in small groups or individually, reporting to the class after the relationships have been listed. A good way to get started well is to begin all responses with a common stem: "A messy bedroom is like the water pollution problem in that ...". This is useful with those students who are reluctant to volunteer answers.

Teachers should be sure to look for responses that not only describe the physical relationships ("They are both dirty" "They are not nice to look at" "They can both smell"), but also describe processes that are similar to both ("They may take a while to really get bad" "It often takes much effort to clean both").

D- DISCUSS:

In the discussion step, the class comments on elements of the analogy which they liked best or which they felt brought out important points about the concept being studied. Edward de Bono (1970) suggested three areas which should be discussed when exploring analogous relationships:

1. The number of different ways the analogy is related to the problem. How many different approaches were taken?
2. The consistency in the development of the analogy. Was a certain element of the analogy always related to the same element of the concept?

3. The details of the analogy. How did the details of the analogy add to the understanding of the concept?

Teachers serve a very important role in the discussion phase of RADAR. As with any technique that depends on students' responses, teachers may need to guide students so that major elements of the concepts are not ignored. This is best done through questioning. For instance, assume that the class' responses have centered upon the physical similarities between pollution and messy rooms, and have failed to bring out points concerning the possible consequences of both. Teachers can prompt their students to respond in this area by asking simple questions: "What happens to you at home when your bedroom is messy? How might that relate to the water pollution problem?"

A- APPLY

Once the analogy has been firmly established through the listing of common characteristics and the discussion of their relationships, the class can use new insights to approach specific problems related to the concept under study. "How might water pollution be controlled?" or "What are some things that prevent its control?"

Once again, students are instructed to study the analogy and the analogous problem. "What are some things that prevent my bedroom from staying clean?" Solutions to these analogous problems are then related to the problem originally posed.

R- RESEARCH or REVIEW:

Points about the concepts being studied which were brought out during the first four steps of RADAR provide an excellent source for research topics. Research may be undertaken individually or in small groups. These projects can revolve around aspects of the analogy which students found particularly interesting or deal with the actual problems posed in the "APPLY" step of the lesson.

Research activities could include the development of new analogies for the original concept, certain aspects of the concept, or problems related to the concept. Groups or individuals could then report back to the class and discuss their findings.

If research is not desired at this stage of the lesson, or as a follow-up activity to research reports, the final step in RADAR would involve the review of points discussed in the previous steps. Charts might be made which illustrate the relationships between the analogous concepts. Teachers might also decide to use this final step as an introduction to the next reading selection by relating what has been discussed to what will be read, for example: How the chemical industry controls water pollution.

Once students are familiar with the strategy, they enjoy proposing their own analogies for use in the procedure. Teachers may ask for a set of possible analogies from which they can select ones that they or their classes would like to explore for the remainder of the lesson. Analogies can also be presented in the form of short stories. These stories should bring out specific points about the concept which the teacher feels are important.

Later students may be asked to select stories which they feel are analogous to the concepts being taught. In this way different content areas can be related and integrated with language arts.

A final note concerning the selection of analogies to be used with the RADAR procedure—it is not important that the analogies chosen directly parallel the concepts being taught. When using RADAR, teachers might remember that the objectives of the procedure are twofold: 1) to try to relate the new to the known, thus establishing a basis for concept learning; and 2) to attempt to help students to break away from stereotypic thinking and learning of concepts. By relating things that are commonly thought not to be related, students are encouraged to take an inquiring, creative approach to learning from text. Accomplishing the second objective will be hindered if the analogy is too parallel to the concept. In fact, selecting analogies that do not readily fit is desirable because students must exert an effort to relate the analogy to the problem, and, from the effort can arise new ways of looking at problems (de Bono, 1970).

RADAR has been presented as a valuable classroom activity for using analogies to teach new concepts and take new looks at old ones. Applying the technique, teachers can integrate new materials with those previously learned while encouraging their students to become creative thinkers. The imaginative teacher can also see many opportunities to use RADAR to relate concepts across different subject areas. It is hoped that, through these learning experiences, students will become more active readers who will independently integrate materials while reading.

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