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ABSTRACT

This paper focuses on methods to improve the reading abilities of college students. A list of five elements college instructors (who are not reading specialists) should establish in a content reading agenda is offered; (1) an instructional basis for the reading process which will work for them; (2) content literacy environments; (3) insights into the skill level characteristics of readers; (4) working relationships with the campus reading program; and (5) inclusion of reading strategies in their content instruction. Stating that students must know the purpose of the course and understand what is to be done with the information provided through lectures and textbook reading assignments to successfully interact with the text, the paper offers methods of establishing the five elements suggested. Also addressed are the unique challenges of social science, mathematical, and scientific reading instruction. The paper concludes with a brief summary and suggestions for collaboration between the content specialist and the reading staff. (Contains 55 references.) (CR)

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Improving Student Reading

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"... the assumption that students will transfer skills learned in college skills classes (such as reading and writing) to academic course requirements cannot be taken for granted."
(Fairbanks & Elliot, 1983, p. 4)

Problems and Directions

Since the 1970's, it has been apparent that college students need help in applying their reading skills to content area textbooks. Even when marginal or poor general reading achievement is discounted, it is clear that *many* students do *not* have the skills to process, interpret, and apply textbook information on their own. Campuses have been further challenged by changing demographics in the form of increasing numbers of under-prepared students and non-traditional students (Johnson, 1989).

On the surface, the "reading problem" is a mismatch between college students' reading ability and the difficulty level of their textbooks and other readings. Reading achievement of college freshmen has been declining since 1965, while college textbooks have become more difficult to read (Sheridan, 1982). The fact that most college students do *not* know how to learn from textbooks on their own (Simpson, 1983), further compounds the problem.

Although most instructors are specialists in their content areas, they do *not* know much about the reading process in general nor even about *reading* in their content area. They sometimes resent the suggestion that they may have to give reading guidance to students who cannot read their textbooks (Dupuis, 1984).

Does this mean that content specialists should become reading teachers? No. However, they can take several steps toward furthering their students' content reading ability by developing a mental framework for a content reading agenda.

Content Reading Agenda

College instructors should consider five elements in a content reading agenda: 1) establishing an instructional basis for the reading process which will work for them, 2) establishing content literacy environments, 3) developing insights into the characteristics of skilled, marginally-skilled, and unskilled readers, 4) establishing working relationships with the campus reading program, and 5) including reading strategies in their content instruction.

The Reading Process

Rather than seeing the teaching of reading as one in which a student labors towards mastering a long list of reading skills, content instructors should **view reading as a process where readers conduct transactions with writers as they read textbooks**. Using this definition, content teachers need only be concerned about the interaction between reader and text.

When a student reads a chemistry text, s/he directly deals with the chemist who wrote the textbook and tries to understand the chemistry information. To do this, the student needs to summon all that s/he knows about the subject at hand. The student then applies this knowledge as a key to unlocking the information provided by the writer. The quality of the student's knowledge of chemistry's language and the student's purpose for reading the text are critical factors in determining how much s/he will learn from the text.

Students must know why they are taking a certain course. They must know the purpose of the course and understand what the instructor intends to do with the information s/he provides through lectures and the textbook reading assignments. The students can successfully interact with the text only if the instructor creates a larger purpose for reading the textbook. Without this larger purpose, there is no reason for the students to be concerned about reading the textbook. Thus, the instructor's beliefs about the content and the teaching environment are fundamental to establishing a reading agenda.

Establishing Content Literacy Environments

Reading instruction in content alone will *not* dramatically improve student learning. Classrooms in which content literacy environments are provided through social interaction among students, as in cooperative learning (Slavin, 1989), are needed to provide students with motivation and guidance in content learning. In such supportive learning communities, students will become competent in reading, writing, and applying content knowledge. **Teaching and learning are really just special forms of communication**.

Content instructors have the primary responsibility for planning a content literacy environment in their classrooms. Therefore, they should know how to build such an environment. They should also know which elements contribute to its success and which factors are under their control.

To do so, they must first **be aware of the wide range of reading ability among the students** in the class and that a literacy environment affects these differences (Tierney & O'Flavahan, 1989). Second, college instructors can *directly* intervene through teaching content knowledge which contributes to students' background knowledge.

Background knowledge is the foundation on which content literacy is built (Anders & Lloyd, 1989). Linking background knowledge of content with reading and writing requires a content literacy environment. Instructors can **help their students make connections by giving them guidance in writing their reports** following a science experiment, by going through math word problems, followed by small group discussions culminating in collaborative writing of the solution, or by watching a history videotape that entails discussions and written responses. Both Berger (1989) and Glatthorn (1989) provide extensive discussions and elaborate strategies for activating background knowledge and linking it with literacy environments.

In terms of reading, Henrichs (1989) attributes *differences in students' comprehension abilities* to **factors which are *internal* to the students** such as, self-control, motivation, and purpose for reading. Risko, Fairbanks, and Alvarez (1991) also mention self-regulation of study efforts, development of organizational strategies, and maintenance of flexible approaches to reading as important factors internal to the students.

There are also ***external* factors** which students must cope with when reading text for learning content. Risko, Alvarez, and Fairbanks (1991) have emphasized that external factors such as time management (time needed in learning, time spent studying in relation to quality of instruction, and procrastination), student environment (where they study, who they study with, noise distraction, and the ability to focus on the study task), and library use are determining factors in student success. Some of these factors are under the control of the content specialist (the instructor), some are not. Motivation, purpose, and quality of instruction can be influenced by content specialists.

In creating a content literacy environment, instructors should realize that they cause students to read and learn content through the kinds of questions they ask, the way they guide discussions, their method of lecturing, and the types of reading assignments they make. Content specialists should review their teaching skills with an eye toward building content literacy environments in which all aspects of communication (reading, writing, listening and speaking) are emphasized. Previous IDEA papers (Cashin, 1985; Goulden, 1991; Osterman, Christensen, & Coffey, 1985) provide advice about lecturing and speaking skills. Hyman (1982) provides the basics for instructors' essential questioning skills. Osterman, Christensen, and Coffey (1985) along with Wales and Nardi (1982) give examples of instruction carried out in communication environments. Cashin and McKnight (1986) cover the basics of guiding students' discussions. Student listening skills are discussed in Newton (1990).

Given the interconnectedness of the communications processes, content specialists should **think of classrooms as places where students learn to communicate in the content areas.**

Reader Characteristics

Once the instructor makes a commitment to building a content literacy environment, it is necessary that s/he understands the types of readers which are found in content classrooms: 1) skilled readers, 2) marginally-skilled readers, and 3) unskilled readers. Skilled readers *actively* engage the text while those who are less skilled are passive readers. Although both skilled and marginally-skilled readers are proficient in reading the text aloud—this is a simple task—they differ in their comprehension of text because of the way they approach reading. Smith (1988) tells us that language has a "surface" or visual structure, and a "deep" or meaning structure. Meaning can only be found in the head of the reader. Thus, readers bring meaning to the spoken or written word by applying their prior knowledge to it. Unskilled readers get stuck at the surface level, struggling with individual words, trying to decode letters and sounds, while skilled readers go to the deep structure and find meaning between and beyond the lines of text.

Skilled readers: These readers process information in the deep structure of the text and have an overall command of the language. They are **capable of analyzing, synthesizing, and evaluating** what they read. Also, they **predict subsequent ideas and words** by inferring from word to word, sentence to sentence, and paragraph to paragraph (Devine, 1986). The skilled readers **reconstruct in their minds another "text"** similar to the text the writer had in mind (DeSanti, 1983).

First, to get ready they **mentally search and find appropriate background knowledge to the topic**. Next, they **make predictions or guesses at the meaning** as they read. They then **confirm or reject these predictions** by checking whether they understand what they are reading. They **draw conclusions** based on their predictions and inferences. In the end, they **mentally summarize** what they have read to ensure that they have understood the content.

Since skilled readers go to the deep structure for the main ideas of the text, they should be **given guidance in ways to make appropriate connections among the main ideas**. Surprisingly, **they may also benefit from vocabulary instruction**. This is because they typically plunge past this surface structure information in seeking meaning from the deep structure. Also, content instructors should be aware that **students with good general reading ability may lack the background knowledge for learning the subject.** It is very important that content instructors build background for the skilled readers and require them to build linkages to readings with written summaries.

Marginally-Skilled Readers: Such readers have generally mastered surface structure features of text. Most have *no* problems with reading the words off the page. They **may be short on background knowledge and lack the ability to integrate and synthesize** information. This inability to deal with the deep structure features of text causes them to misunderstand text and they are left confused. These readers **need refreshers on vocabulary**

instruction which includes the building of concept maps. The primer for concept map instruction is Heimlich and Pittleman's (1986) monograph which provides detailed information on how to construct concept maps. Through the building of concept maps, marginally-skilled readers can come to understand the related ideas in the text. This can be reinforced with **text outlining instruction**, and with time, the marginally-skilled readers will come to master **written summarization of text**.

Unskilled Readers: Unskilled college readers function *at or below the tenth grade level equivalent in reading achievement*. Unskilled readers do not read much at all. They find the task difficult and unrewarding. These students often **perceive reading as a threat** and **try to avoid the task**. Even if they have considerable background knowledge in the content area, they find it difficult to learn more about the content through reading texts. Gentile and McMillan (1988) point out several stress characteristics in unskilled readers, such as, **lack of focus, lack of cooperation with others, and lack of self-esteem**.

Thus, *troublesome* students are often those students who do *not* read well. They cannot sustain interest in class discussions for long. When asked to write a summary of the readings from text, they show signs of impatience. These students may also be chronic procrastinators.

Fishel (1984) reports that unskilled readers **may *not* have adequate background knowledge about the content area** and this further affects their poor reading performances. They do ***not* know how to relate and connect diverse concepts** into one large overriding concept, nor do they mentally summarize text. Davey (1986) points out that **unskilled readers take much longer to complete tests**. They **do better on multiple choice questions** than on free response questions. They also **do *not* benefit from looking back at passages**—as skilled readers do—unless the answers are stated directly. They **cannot reason or infer answers from the text**. It may not occur to them to integrate what they already know about a subject area to what they learn about it through reading, for they **lack inferential strategies**.

Though difficult, it is possible for instructors to teach content to unskilled readers. In fact, **some *unskilled* readers may be active listeners and good participators in *hands-on* learning experiences**. For reading purposes, content instructors should **heavily emphasize vocabulary instruction** since unskilled readers have not mastered surface structure. **Question guides** also help the unskilled readers find and interpret ideas embedded in the deep structure of text. **Pairing unskilled readers with skilled readers** is another option, but this should be done with care and with the advice of campus reading specialists.

Working with the Campus Reading Program

Once content instructors perceive the differences between skilled, marginally-skilled, and unskilled readers, they must expand the classroom literacy environments to include outside reading support services. Instructors should learn about campus reading programs and what they have to offer content instructors. Of specific interest are the following services that the reading program can offer: 1) help with unskilled readers, 2) support to content instructors through instructional collaboration, and 3) help with evaluating the difficulty level of reading materials and assessing students' reading abilities.

Helping the Unskilled Reader

It is possible that some marginal and unskilled readers are beyond the help of content instructors and need extra guidance. A student's disruptive behavior in class, uncooperative attitude towards others, disinterest in learning activities, and above all, poor course performance may signal that the student has weak reading ability. The instructor should **schedule a private meeting** with the student and ask if the reading assignments are being completed. If these are not, some gentle probing may reveal that the student has a reading problem.

At this point, the instructor may wish to **model and talk through a learning strategy** such as the steps in solving a math word problem. This allows the instructor to estimate if the student is receptive to additional content instruction. A second method is to **review the textbook** with the student in order to determine if the student is willing or able to read the text. Schumm, Leavell, and Haager (1990) provide an elaborate scheme for teaching the structure of text. The instructor would leaf through the text with the student and question the student over the important text features such as headings and subheadings, chapter summaries, index and glossary. The instructor may also check for unstated main ideas, fact/opinion, hierarchical structure of ideas, etc.

The content specialist should *not* be surprised if the failing student reveals *other* problems in addition to poor reading achievement. S/he should be **referred to reading services and to additional support services** for other problems s/he may be experiencing. Three critical services here are, **counseling, financial aid, and student health**. It will be helpful if the content specialist knows the director of reading services and enlists her/his help when making the referral.

The informal session with the student may not be sufficient to enable the instructor to determine if the student is an unskilled reader and needs extra-class reading instruction. Simpson (1983) suggests that the interview could be expanded to **include classroom observations and students' self-reported study habits**. Further, a weak ACT score in a specific content area reinforces the instructor's suspicions that a student is deficient in content background knowledge. The new version of the ACT battery includes a reading score in its test profile.

Instructors may wish to use even more **direct assessment strategies**. Roe, Stoodt and Burns (1991) give directions on constructing **cloze test** (text passage with words omitted for students to fill in), and informal reading inventories. These can be easily made by the instructor and used immediately in the classroom. Commercially made tests can also be administered for reading assessment. Flippo, Hanes, and Cashen (1991) provide up to date information on college standardized tests.

Instructional Collaboration

Success in reading instruction cannot be achieved in isolation from the content classroom. Therefore, it is important that instructors not only work with reading personnel for collaborative assessment, but also for collaborative instruction. Reading support services are

available in two-year and four-year colleges, and also in technical schools. These services continue to expand rapidly (Cranney, 1987; Flippo & Caverly, 1991b).

Collaborative instruction has proved to be successful. Simpson (1983) reported success with a faculty outreach program in which reading instructors helped content specialists by making **tailored presentations to their students on "how to study."** These presentations were based on extensive discussion with the content specialists and visits to the content area classes.

A second form of collaboration is seen in **adjunct reading/study seminars** (Fairbanks & Elliot, 1983), and **supplemental instruction** (Blanc, DeBuhr, & Martin, 1983). For example, reading personnel or the adjunct staff members attend the particular content courses they have been assigned to, take notes, and hold one hour seminars twice weekly for six to twelve weeks. They provide students with organized and structured information in order to assist them with learning the course content. In most cases, student attendance is *voluntary*, though in some courses participation can be part of the course grade. Fairbanks and Elliot (1983) cite several studies that show those students who attended adjunct seminars performed significantly better in their content courses than those who did *not* attend. The addition of adjunct or supplemental instruction to subject matter classes targets course grade improvement. Reading skill improvement per se, is a secondary consideration.

A third collaboration with reading personnel is through establishing a **peer tutoring program**. Cranney (1987) points out that peer tutoring is a successful way of dealing with large classes. It also encourages high ability students to take leadership roles. Reading personnel should be enlisted to establish this model in the subject area classroom.

Evaluating Materials

Content specialists should develop **basic competence in evaluating text material for word difficulty and sentence complexity**. They should also draw on the help of reading personnel in interpreting the results of text difficulty estimates.

The **Fry Index** (Fry, 1977) is an easy to apply readability formula which is suitable for most general texts. Fry (1990) has also developed a means for assessing the difficulty of short passages. Roe, Stoodt, and Burns (1991) suggest microcomputer readability evaluations of text through *Fry Reading Program*, *Readability Analysis Program*, or *Reading Level Analysis*. Other available programs are *Writer's Workbench* and *MacProof* (Pederson, 1987).

The first group of computer programs above are **computer readability programs**, while the last two programs are writing evaluation programs which include readability formulas. Some caution is in order in using readability programs since they are concerned only with text characteristics per se. They do not consider the readers background knowledge. The previously mentioned cloze procedure is a more valid measure of text difficulty since it measures reader's capabilities for given text material. An accepted practice is to estimate the difficulty level of material with a readability formula and then verify the estimate with a cloze test.

Specialized assessments for determining the difficulty level of **mathematics word problems** are covered by Nolan (1984) and O'Mara (1981). For the evaluation of **science texts**, Armbruster (1991) and Meyer (1991) offer sound advice. For detailed information on measuring the readability and complexity of **other subject area materials**, including foreign language assessment, see Zakaluk and Samuels (1988). This book is a basic, up-to-date primer on measuring text readability. In any event, content instructors should call on reading personnel for help in interpreting estimates of text difficulty. Finally, Flippo and Caverly (1991a) and Flippo and Caverly (1991b) have written current monographs on **college reading**. These have numerous practical suggestions for both content instructors and reading specialists.

Teaching with Reading Strategies

Once content instructors begin to recognize the importance of having a content reading agenda, they can incorporate content reading instruction into their teaching strategies. Lapp, Flood and Farnan's (1989) anthology is an excellent source for getting started on building literacy environments. For teaching basic content reading strategies in mathematics, science, and social science, we provide the following.

Mathematical Reading

Mathematics is a precise, language-based science that is expressed in a highly compact manner (Curry, 1989; Nolan, 1984). To initiate math reading instruction, the following specific sources are recommended:

1. See Chisko (1985) for instructions **on establishing a basic mathematics literacy environment** through confronting students' math anxiety and negative attitudes, through building analytical skills, and through initiating reading, writing and speaking instruction in mathematics.
2. See Curry (1989) **for methods to activate background knowledge through math vocabulary instruction**. She includes lessons for teaching math prefixes, suffixes and root words.
3. See Curry (1989) and *Curriculum and Evaluation Standards for Mathematics School* (1989) for basic instruction in understanding of **mathematical concepts**, in learning and applying math procedures, and in building fluency in explaining and evaluating math concepts.
4. See Nolan (1984) for the instruction of **specific math vocabulary**, for gaining fluency in reading mathematics texts, and for solving word problems.

Scientific Reading

Three different types of science literacy environments can be established in science classrooms (Alvermann & Hichman, 1991; Baker, 1991, Champagne & Klopfer, 1991, Padilla, Muth, & Padilla, 1991). These are textbook-based literacy environments, inquiry-based literacy environments, and science-literacy environments—a combination of science text with science inquiry.

Scientific information is communicated in a compact language full of highly technical terminology. Scientific misconceptions are the biggest learning block in science

reading. Even if students do have sufficient background knowledge, it is often in conflict with new scientific information. For science reading strategies useful in science literacy environments:

1. See Santa and Alvermann's (1991) anthology for a complete **guide for teaching the processing and application of scientific information.**
2. See *Journal of Research in Science Teaching*, volume 27 (December 20, 1990) for a series of articles on **concept mapping instruction.**
3. See Santa, Havens and Harrison (1989) for **tips on teaching communication processes and problem solving skills in science classrooms.**

Social Science Reading

The social science classroom represents a natural setting for building a literacy environment. However, there are unique challenges posed by the nature of social science experience. The information is historical or virtually impossible to replicate as concrete experience, unlike the experience found in mathematics and science.

Building vicarious experiences in the social studies classroom is fairly simple to do through the introduction of simulation games, computer simulations, films, and videos as well as through role playing. Once the experience is established, social science instructors should follow through with reading and writing assignments which flow from the experience. In this way, students make the important language and experience connections for building literacy in the social sciences. For additional guidance on building social science literacy environments:

1. See Haye's and Peter's (1989) examples of the **interactive social science processing guide.** It is used to guide students through text reading assignments, and it requires students to make compare/contrast, cause/effect, and problem/solution relationships.
2. See, Laughlin, Hartoonian, and Sanders' (1989) **classroom model for the electronic processing of social science information.** They include the use of computer data-bases and the electronic retrieval of information. This is a logical setting in which to incorporate reading and writing in the social sciences.

Summary and Suggestions

Most college teachers—content specialists—are *not* aware that their students have trouble reading and comprehending their assigned textbooks. This is partly due to students' weak reading ability and partly due to difficult textbook structure. Instructors can help students improve their reading achievement if the instructors themselves understand the reading process, and help create literacy environments in their classrooms which nurture learning.

Instructors should also know about the characteristics of skilled, marginally-skilled, and unskilled readers in order to provide needed guidance, either individually, or by referral to the campus reading program. Joint efforts in establishing the appropriate instructional climate is possible through the adjunct or supplemental instruction carried out by the reading personnel. The content specialist in collaboration with the reading staff can assess the extent of students' prior knowledge and reading ability, can implement instructional strategies, and can refer the student to other services. Students will benefit from direct instruction of specific vocabulary items. Prereading, during-reading, and post-reading activities, such as concept mapping, reinforced by written summarizations are proven reading strategies.

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