Integrating graphic aids into content area instruction: The graphic information lesson

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Reading in content area subjects often requires more than the ability to acquire information from written text. Textbooks frequently contain a variety of graphic aids, and students must develop skills for acquiring information from maps, charts, tables, pictures, and diagrams.

Effective use of graphic aids often depends on the reader's ability to integrate graphic information with that found in the text. In other words, an ability to acquire literal information from a graphic aid may not be sufficient. Students must be able to expand their knowledge and draw inferences by connecting information from the graphic aid, the text, and their prior knowledge.

The need for instructional activities which help students develop these skills is clear. Graphic aids have been identified as an important variable in reading comprehension (Jenkins and Pany, 1981), yet many students ignore or only superficially attend to them (Vacca, 1981). Although some textbooks contain lessons on graphic aids, these frequently focus on skills needed to acquire literal information from a particular type of aid. Making inferences or thinking divergently about graphic displays and their relationship to information in the text is seldom addressed. Finally, many content area teachers may perceive that graphic aids instruction interferes with teaching their subject.

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The Graphic Information Lesson

The Graphic Information Lesson (GIL) described in this article has been used successfully with middle school students during their regular content area instruction. A distinguishing feature is that the GIL helps students discover how graphic aids can enhance reading comprehension while it helps them review and interpret important information in the text. This characteristic makes the GIL an appealing alternative for content area teachers, since they can highlight the value of graphic aids without sacrificing the subject being taught.

The GIL is designed to be used occasionally as a postreading activity with text which contains one or more graphic aids. Ideally, the graphic aids should make a significant contribution to comprehension of the text at the inferential, generalized, and evaluative levels of understanding (Singer & Donlan, 1980). In the classroom the GIL is divided into three consecutive stages: determining graphic information, integrating and synthesizing information, and reinforcing and applying graphic information. A description of these stages and suggestions for implementing them are outlined here. Although the procedures and examples described relate to a content area classroom, the GIL could easily be adapted for use by secondary developmental/remedial reading teachers.

Determining graphic information

The GIL's first stage is to determine what graphic information is contained in a particular text. After students have read the text, the teacher leads a discussion which addresses the following question: What information is found in the graphic aids and how does it relate to information in the text?

Initially, students will probably focus on literal information found in the graphic, and this is acceptable. The teacher, however, attempts to model higher level inferences and connections between text and graphics. The teacher also reinforces students' attempts to operate at this level.

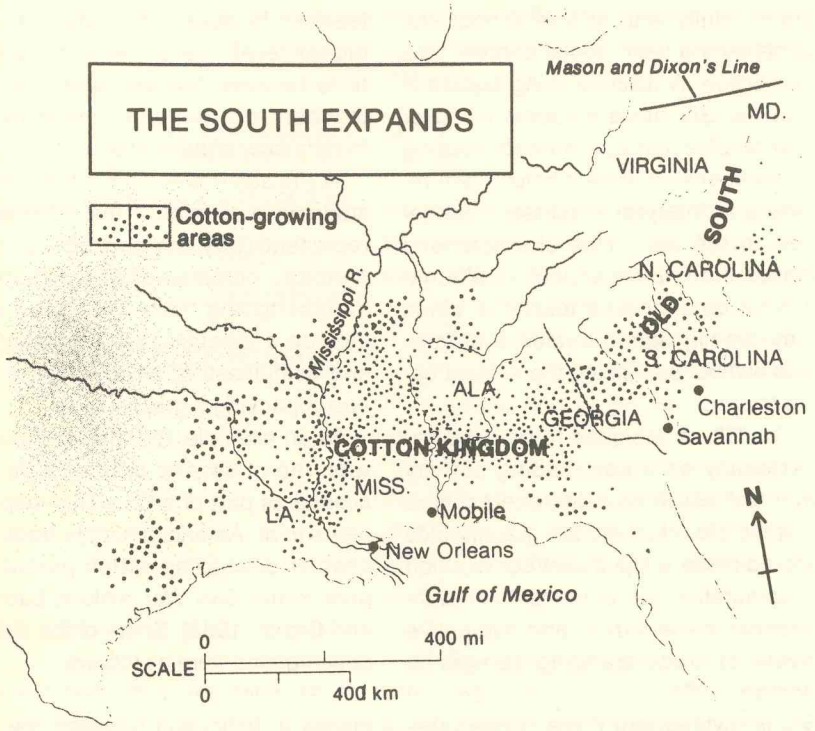
At the same time, the teacher helps students determine if the information represented by the graphic aid is redundant, complementary, or supplemental to the text. This may also include a discussion of the purpose and usefulness of any caption or title accompanying a graphic aid.

As an example, the map in Figure 1 was one of several graphic aids discussed as part of a GIL. This map appears in an American history book in a chapter discussing cotton production prior to the Civil War (Wilder, Ludlum, and Brown, 1983). Some of the class's observations were as follows:

1. As mentioned in the text, this map makes a distinction between the Old South and the new Cotton Kingdom. The explanation for this distinction is found only in the text.
2. The Mason-Dixon Line shown on the map was explained in a previous chapter.
3. The density of dots indicates more cotton being grown.
4. The clustering of dots around rivers may be explained by the need for efficient means of transporting crops to market. This information is not explicit in either the text or the graphic.

These observations illustrate the range of responses which may emerge during discussion in the first stage of the GIL. Items 1 and 3 are at a literal level. Items 1 and 2 show graphic information dependent on the text. Item 4 illustrates a logical inference which goes beyond information in either the

Figure 1
A graphic aid discussed in stage 1 of the Graphic Information Lesson (GIL)



text or the graphic. Thus, item 4 provides the teacher with an opportunity to point out that readers need to invoke their background knowledge to make full use of the information from graphics.

Depending on students' abilities and the graphic aid being discussed, this step also lets the teacher highlight characteristics of graphic aids that convey information (e.g., scale, color, shading, and perspective, see Fry, 1981). In this stage teachers will also discover how well their students can read and interpret graphic information, and they can informally teach necessary skills when appropriate.

Integrating and synthesizing new information

In the second stage of the GIL, the teacher presents several examples of graphic information related to but not included in the text read. These *pseudographics* are invented by the teacher. Some of them are designed to be consistent with information in the text; others are purposefully inconsistent. It is not important that these pseudographics be entirely accurate, but only that they be believable or unbelievable when compared with legiti-

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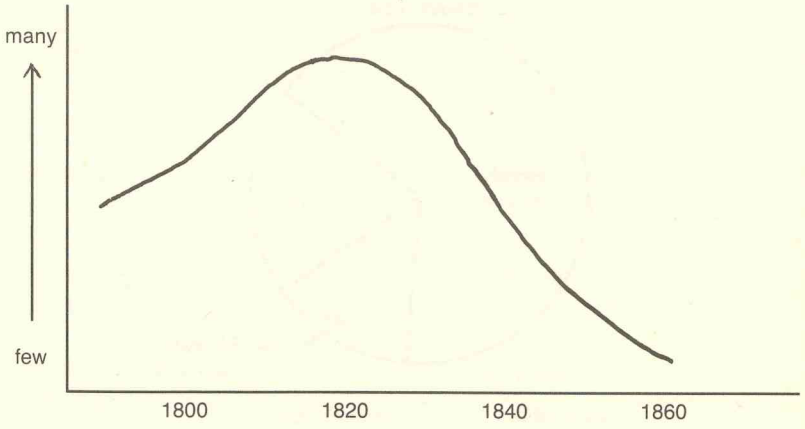
Figure 2
Two examples of a teacher's pseudographics

A.

Number of Acres Planted in Cotton
(Old South—Virginia, North and South Carolina)



believable _____ unbelievable _____
page(s) _____

B.

Ad in a Virginia
Newspaper 1790

FOR SALE
Used cotton
gin
Owner moving
South to Alabama

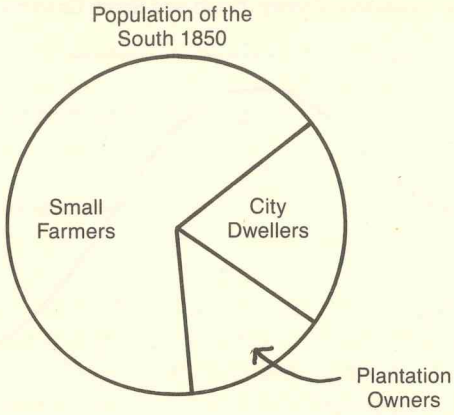
believable _____ unbelievable _____
page(s) _____

mate information.

Figure 2 shows two examples of a teacher's pseudographics which were displayed on an overhead projector as part of the American history GIL mentioned. The teacher omitted the actual values on the graph's vertical axis in Figure 2,A, because they were unknown. The teacher might have included reasonable if not totally accurate values to add reality to the graph. This literary license is necessary to enable the teacher (and later students) to quickly create additional graphic aids.

Students, individually or in groups, are asked to determine whether each example is believable or unbelievable, based on information in the text or from their background knowledge. If key in-

Figure 3
Example of a student-made pseudographic



believable _____ unbelievable _____
page(s) _____

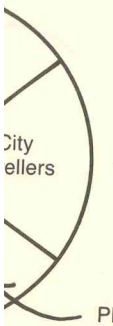
formation is found in the text, page numbers must be listed.

For example, when considering the graph in Figure 2,A, students identified pages which discussed the invention of the cotton gin and the fertility of the soil after intensive farming to justify the rise and fall of the number of acres planted in cotton. Likewise, students found that the date was inaccurate in Figure 2,B, so this illustration was unbelievable. These two examples also illustrate that the teacher can manipulate the difficulty of each pseudographic by focusing on either literal information (Figure 2,B) or information requiring inferences (Figure 2,A).

Students seem to enjoy the gamelike nature of this activity. They are challenged to evaluate critically every aspect of the graphic aid and test it for its credibility on a number of levels. Lively debates are a characteristic of this stage and students frequently scour the text for support for their responses or crucial information missed by others. They also benefit from discussing what aspects of the pseudographic may have been invented, or deciding to pursue other information to increase the veridicality of the graph (e.g., filling in the appropriate number of acres in Figure 2,A).

The purpose of this stage, therefore, is to have students synthesize information learned in the text and use it to evaluate typical graphic aids. This stage is important because students review and process the text's information. The teacher, therefore, can address content goals while highlighting the importance of graphic aids. In the example, students are processing important historical information even though the focus of the lesson is on

pseudographic



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graphic aids. At the same time, the student is moving from a literal awareness of this information to more interpretive and applied levels. The activity in this stage also simulates the way good readers evaluate and integrate information they find in graphic aids.

Reinforcing and applying graphic information

The final stage provides closure to the activities in the first two stages and gives students an opportunity to work independently with graphic aids and a text. Activities in this stage must require students to make decisions about graphic aids in relationship to the text.

For example, students could create additional pseudographics. (See Figure 3 for an example of one created by a small group of students.) These could be shared with the class and used by the teacher with other classes. Students seem to be more motivated to complete this kind of activity when they have seen several of the teacher's examples and when they know their work may have an audience.

Other possibilities include having students defend their choice of the most relevant, important, or key graphic aid in the text. This works well when a reading assignment contains varied graphics. As students defend their choice, they are again processing content as well as practicing interpretive skills. The teacher could also ask students to elaborate on a relationship between two or more graphic aids. Students might, for example, see a connection between a picture and a map because of information given in the text. More capable students might be asked to critique the author's use of graphic aids, and to make suggestions for what additional graphic aids may have been useful or which of those included may be redundant or confusing.

Similar activities which extend students' awareness and use of graphic aids could be used at this stage, and teachers should be creative. Some students will need straightforward activities focused more on acquiring literal information from graphics, but eventually repeated use of the GIL should permit all students to attain a more sophisticated awareness of graphic aids and their relationship to text.

Conclusion

Research is needed to determine if this type of lesson increases students' awareness and use of graphic aids while reading. Preliminary observations suggest that the GIL heightens interest in graphics and helps students move beyond the literal level in their understanding of graphic displays.

To paraphrase Summers (1965), we need to make students "graphic aid thinkers" not just "graphic aid readers." The purpose of the GIL is not only to help students become proficient in acquiring information from graphic aids, but to help them experience how graphics can expand comprehension when used in conjunction with text.

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