Applying Lessons from Text Research to Extension Educational Media

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Texts used in classroom settings have been the subjects of a rich history of research. Studies have analyzed elements that improve learning from these publications. Although these studies are not related directly to nonformal settings, such as those in which Extension and other educational organizations operate, their findings can be used to improve educational publications used in nonformal settings. In an era when information is becoming more accessible to the general public, educational organizations, such as Extension, need to make their products truly educational.

Introduction

The dominant resource in the world currently is information, and the scope, magnitude and dynamics of this Information Age make education a difficult task (Lanham & Cowen, 1990). The backbone of educational media in this age is still print media. Although enthusiasm grows concerning the potential of electronic technology, the reality exists that many learners prefer a hard copy and eventually print the electronic transmission prior to reading it. Thus, even for electronically transmitted material, the printed publication serves as the standard and the pattern (Boone & Smith, 1996).

Much of education is delivered through text (Rodriguez, 1987). In fact, text is such a ubiquitous part of the teaching/

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learning environment that its design often is not given consideration in the facilitation of learning (Stewart, 1988). Indeed, print has had a long history of impact in education. As Salomon (1985) wrote:

> "Print may have indeed freed humans from the constraint of memory, induced and cultivated the ability to distinguish between what has been said and what has been intended, or the ability to be highly explicit and rational" (p. 26).

Text/Learner Interactions

As a cognitive process, reading involves the declaration of purpose by the reader, reasoning, and judging the propositions of the material. (Stauffer, 1969). Simply put, comprehension and remembering of text are functions of the structure of the text and knowledge of the individual (Voss & Bisanz, 1985). Initially, a reader minimally processes information and grades its importance. Then elements that the learner identified as more important are given more attention, and these elements subsequently are learned and remembered better (Anderson & Pearson, 1984). Comprehension of reading demands nine basic skills of a learner, according to Davis (1983). These skills include:

1. knowing word meanings,
2. selecting appropriate word meanings given context,
3. following organization and identifying antecedents,
4. identifying the main idea of a passage,
5. correctly responding at a remembering level of cognition to questions for which answers are provided in the passage,
6. correctly responding at a processing level of cognition to questions that are answerable from the text but in different words,
7. drawing inferences from a passage,
8. recognizing the literary devices used in a passage, and
9. determining a writer's intent and viewpoint.

Making textbooks more cognitively oriented has been pursued for a few decades, but few authors have attempted to develop general theories for text design. Stewart's theory (1988) of text design rested on three components: 1) reading is an interactive process between reader and texts, 2) characteristics of the text and the reader contribute to the process,

and 3) knowledge in the reader's memory is highly organized and structured. Based on these tenets, Stewart's theory states that text can be designed so that the existing knowledge of the reader will be activated and will assimilate new knowledge. Thus, including information and references known by local residents (such as referring to a popular lake in the area) may help them learn new information (concept and boundaries of the watershed). Stewart's theory further maintains that comprehension of the new knowledge also rests on the appropriate manner of presentation. The presentation should be structured and organized as well as appropriately highlighted with verbal and typographic cuing and visual illustration. Stewart (1989) wrote that text in general should follow a generative approach (Wittrock, 1978), which holds that the meaningfulness of text content can be increased for learners when associations, pictures and elaborations are presented.

As we look closer at a learner, we see that a body of text operates on macro and micro levels. At a macro level, the patterns of subject matter and procedural knowledge (called schemata patterns) that are used to organize the text should be apparent to the reader. On the micro level, individual propositions that comprise the body of text should be understandable to the reader. These macro and micro levels should support each other to provide appropriate organization (Rodriguez, 1987). Consistent organization of text is a key element. Organization should emphasize the formal components of the text and aid the reader in developing a schema (knowledge pattern) similar to the text's schema. In some situations, information presented earlier in the text can have a primacy effect, resulting in greater impact with the learner (Cowen, 1984). However, consistent structure may overcome primacy. When structural elements, such as adjunct questions, appear consistently in the same area of the page or screen and in the same manner, they help identify relationships in text (Rodriguez, 1987).

Stewart (1988) proposed that reading is an interactive process between text-based ideas and reader-based schemata. With greater correspondence between the two, comprehension is more efficient. Although reader variables, such as purpose, world knowledge, cognitive and metacognitive skills, and imagery ability, are not under the control of the text presenter, design aspects of text can be controlled in a way so that they

facilitate comprehension (Stewart, 1988). Some particularly important elements of textual design and display are noted below.

Elements of Textual Design and Display

Graphic Organizers

Graphic organizers are any mixtures of verbal and graphic symbols relating to the structure of text, such as a concept map or graphics that highlight key ideas in the text (Stewart, 1989). These are used to activate schema, indicate emphasis, place verbal and image information together for greater retention, and facilitate comprehension of the structure of text. Graphic organizers can be author-provided or reader generated; the latter generate greater cognitive processing than the former (Stewart, 1989). Reader-generated graphic organizers may be particularly important to lower skilled readers, whereas author-generated graphic cues are more efficient and important for comprehension by better readers (Backman, Lundberg, Nilsson, & Ohlsson, 1983).

Learning Objectives and Adjunct Questions

The combination of a learning objective and an adjunct question results in deeper processing than either presented independently (Stewart, 1989). If learning objectives are stated prior to target text, the reader will be more likely to adopt the appropriate approach to the text (Stewart, 1989). When objectives are presented, students learn better from reading while keeping objectives in mind (Anderson & Pearson, 1984). Adjunct questions are questions posed separately from the target text. Low cognitive level questions, such as asking the reader to identify parts of an animal, demonstrate the same results with learners when they are presented both before and after the target material, but higher level questions, such as asking the learner to analyze a given situation, result in better comprehension when presented before the material (Stewart, 1989).

Perspective

People tend to read using a perspective, and they can be asked to adopt a perspective that is outside of themselves for specific intent. For example, in a study, students were instructed to read a passage about a home from different perspectives assigned to each of them (realtor, homeowner, burglar, etc.). The students remembered different details that

were more important to their particular roles (Anderson & Pearson, 1984). Perspective can be manipulated to better enhance comprehension (Clark & Salomon, 1987).

Advance Organizers

Advance organizers are devices used to activate schemata before the reader moves into the text. The manner of the text, or how it is written, affects the nature of the advance organizer (Stewart, 1989). Advance organizers can range from a single word to a brief discourse and act to bridge old by combining familiar information with new material. They are introduced deliberately before the text (Anderson & Pearson, 1984). Although advance organizers can be helpful to learners, the reader may not have the required knowledge, purpose, strategies, or metacognitive skills to benefit from them (Stewart, 1989).

Textual Display

Textual display is how text is presented on a page or in a unit of study (Duchastel, 1982), and it can influence comprehension to a certain degree (Price, 1990). Generally, more moderate text displays, as opposed to very simple or very complex displays, promote greater comprehension (Price, 1990; Ross & Morrison, 1989). It is important to note that moderate text display is the most common method (Price, 1990), which may be why it results in better comprehension. In addition, moderate displays may be most popular because very simple displays (text heavy, isolated graphics) can be boring to readers, while very complex displays (busy, lack direction for the reader) can be confusing.

Reader Skills

Although many of these specific elements may improve comprehension, more-skilled readers still tend to outperform less-skilled readers. Less-skilled readers tend to skip material they do not understand initially (Garner & Reis, 1981) and answer inferential questions posed to them after reading with much less success than more-skilled readers (Wilson, 1979). In addition, more skilled readers rely more on deduction and logic in answering inferential questions, whereas less-skilled readers tend to use more intuition (Wilson, 1979). Good readers tend to better grasp the author's schema and to use schemata to clarify meaning and relationships among the information presented (Rodriguez, 1987).

One bright note reported by Holmes (1987) is that less-skilled readers performed much better when exposed to printed text with pictures than to printed text alone. Rothkopf's mathemagenic process (1980) also can help learners, particularly lower-skilled learners, when they work with text. Through the mathemagenic process, graphic or verbal elements are used to indicate the most relevant and important portions of a passage. Application of the mathemagenic process has been promising in computer-assisted instruction, because the program mediates the reading process to a certain degree (Salomon, 1985).

Another obstacle for both more- and less-skilled readers is perceived difficulty and impression of the amount of mental effort they will need to invest to comprehend a passage (Salomon, 1981). Learners use different criteria in their perceptions of media. The preconceptions of the media are tied to the learner's knowledge of his/her own characteristics and preferences as well as characteristics of the task (Cennamo, 1993). Learners are concerned with the perceived difficulty of the task and the perceived difficulty of the medium. However, learner preferences for medium generally are not correlated with performance (Clark & Salomon, 1987).

Lessons for Research and Communicators

Clark and Salomon (1987) outlined lessons that should be learned from past research and applied to future study in this field. First, research has demonstrated that no medium enhances learning more than any other medium, regardless of learning task, learner traits, symbolic elements, subject matter content or setting (see also Thomas L. Russell's, The "No Significant Difference" Phenomena, at http://tenb.mta.ca/phenom/). Also, learners likely will perform better using any new technology, because better instructional materials generally accompany it and its novelty is engaging. Third, the questions and context of cognitive science should be applied to media research. Fourth, researchers must ask not only how and why a medium functions in instruction, but why it should be used at all (Clark & Salomon, 1987). Finally, Thompson and Jorgensen (1989) noted that the most important element of research in this field is the learner's role, because all of the work pivots on it.

For communicators working with educational media, these studies point to practical and useful techniques that can enhance the medium in such a way as to improve resulting learning. Although these studies have concentrated on textbooks and formal, classroom settings, many of the findings can be applied to media used in nonformal learning situations, such as those encountered through Extension and many other educational organizations. Learning objectives and local references were shown to enhance cognition among Extension clients in a study conducted in Ohio (Boone & Conklin, 1995). However, effects of more techniques need to be analyzed systematically working with audiences in nonformal education settings.

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