KNOWLEDGE-BASED INTERVENTIONS FOR PROMOTING CONSERVATION BEHAVIOR: STORIES AS REPLACEMENTS FOR DIRECT EXPERIENCE

A REVIEW OF THE RESEARCH LITERATURE

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ABSTRACT

A sustainable planet is not possible without patterns of conserving behavior. Society's resource-costly lifestyles present a historic challenge. Never before have so many behaviors needed to change in so short a time. More challenging is that they must stay changed. This report discusses a potentially effective technique for achieving such goals, the use of knowledge-based narratives. The report begins by developing a theoretical framework for understanding this technique, then presents the important elements of such interventions and ends by providing examples of the use of the technique.

INTRODUCTION

Environmental realities will soon force us to change the resource-costly behavior patterns so common today. We face not one but simultaneous challenges to our prosperity: climate stress, water shortage, air pollution, food insecurity, energy constraints, and massive amounts of waste. We need to rethink how to warm our homes, transport ourselves, fuel our industries. And we need to accomplish these activities in a sustainable manner.

The changes now envisioned are qualitatively different from those considered just a few decades ago. Because environmental stresses are occurring with unprecedented rapidity, never before have so many individual behaviors needed to change in so short a time. More challenging is that the behaviors, once changed, must stay changed. For many reasons, the techniques commonly used to promote conservation behavior among citizens are more reliable at modulating short-term behavior than at achieving durable change. Clearly, the urgency of environmental problems makes immediate behavior change a major concern. But of equal importance is the durability of behavior once changed (De Young, 1993). Consequently, one challenge of conservation behavior research is to develop techniques that help *change and maintain individual behavior while minimizing the need for repeated intervention.*

This report outlines one approach to this challenge. It discusses an advanced form of environmental education based upon a new theoretical conceptualization of how humans perceive, process and use information. This new model is called *clarity based decision making* and will be introduced in the next section. Following that will be the introduction and development of the knowledge-based intervention technique referred to as *story*. Emerging from the work on clarity based decision making, *story* is now seen as a potentially powerful behavior change tool. This report outlines the major elements comprising an effective *story*. Attached to this report is a full list of literature cited in the text followed by annotations of the major research articles on *story*.

CLARITY BASED DECISION MAKING

The Role of Knowledge

The rational economic model of decision making is widely used in environmental education, conservation behavior and resource policy development, though it has long been acknowledged as an extremely poor description of human behavior. A more descriptive model of human decision making has been developed by Kaplan (1991) and is based on what is known about human cognition and behavior. This model incorporates economic incentives as but only one factor in the decision making process. Major emphasis is placed on the role of knowledge in the human decision making process.

People prefer situations that make use of what they currently know. They will want to feel they have knowledge sufficient to deal with unexpected events. Likewise, the model predicts that people will strongly dislike and tend to avoid behavior settings and decisions in which they have insufficient knowledge to guide their behavior. Furthermore, possessing sufficient relevant knowledge produces a positive feeling and encourages action. Ignorance produces the opposite effect. From an adaptive point of view, these preferences would have greatly benefited our ancestors by supporting gainful activity while discouraging involvement in behavior where danger due to incompetence was high.

The importance of knowledge and the impact of ignorance (i.e., lack of knowledge) has been documented in numerous studies of conservation behavior. In a study of recycling De Young (1988-89) found that known recyclers and non-recyclers did not differ in their attitudes, feelings or motives toward the behavior but did differ significantly in their procedural knowledge. A lack of clarity about the recycling process was a strong predictor of non-recycling behavior. In another study of recycling behavior Kahlgreen and Wood (1986) showed that recycling behavior and attitudes towards recycling were associated only for those individuals who had knowledge of specific recycling-related experiences.

Research has also shown that mere acceptance of a goal is not sufficient to influence behavior; it is necessary that individuals also have sufficient knowledge of appropriate behavior needed to reach that goal (Cook and Berrenberg, 1981). Furthermore, new behavior patterns are rarely adopted unless individuals feel they are competent, that is, until they have been trained to be effective (Wiegel and Amsterdam, 1976). Without adequate knowledge an individual may not know how to achieve a desired goal (Levanthal, 1970) nor have the confidence to act (Ehrlich, 1969). Confusion about a situation has been shown to have serious negative effects, causing people to give up on a problem (Halford and Sheehan, 1991) or show defensive avoidance of an issue (Janis and Mann, 1977). In short, clarity about one's knowledge is a necessary condition to behavior change.

Clarity from Direct Experience

Because the presence or absence of knowledge is closely linked to a willingness to take action, it may seem that changing behavior is a simple matter of transferring knowledge. However, the acquisition of knowledge can be problematic. Learning is very selective and is strongly biased towards certain informational characteristics. Many of these characteristics are found in situations that allow for *direct experience* with the target issue or behavior. It is thought that these experiences (e.g., trial periods, demonstration project, action projects, field trips) contain many elements which are inherently interesting and engaging and result in greater learning than might otherwise occur. Studies conducted and reviewed by Fazio and Zanna (1981) point to the importance of direct experience in learning and suggest that there is a difference between indirect and direct experience with respect to how information is processed and retrieved. Their findings indicate that attitudes and knowledge developed through direct experience are much better predictors of future behavior than are attitudes and knowledge formed without behavioral experience (e.g., gained through reading a brochure filled with factual information). These attitudes are also held with greater confidence and the knowledge is more well-defined. Both are more resistant to change than those formed without direct experience.

Others (see for instance Ramsey, Hungerford, and Tomera, 1981) claim that direct experience is the most effective way to teach environmental problem solving skills.

Direct experience, however may not always be the best strategy (Monroe and Kaplan, 1988) nor may it always be possible. There are a number of problems associated with using direct experience to promote behavior change:

1. **Coordination is often expensive and difficult** – Field trips, action projects, demonstration projects, and other activities can be prohibitively expensive for promoting many new behaviors. Clearly, when dealing with education in non-formal settings (e.g., citizen behavior, employer-based carpooling program, consumer behavior) coordination problems and potential unwillingness of the participants are major negative factors.

2. **Single-intervention efforts don't give sufficient variability** – Without a sufficient variety and number of experiences, developing clarity about an idea or concept is very difficult. Without a variety of instances to learn from, it is unlikely that the information gained can be applied in future situations. Resnick (1983) emphasizes the need for repeated exposure when teaching mathematics and science concepts. Decision scientists (see for instance Tversky and Kahneman, 1982; Nisbett and Ross, 1980) also point to the large influence of familiarity (prior-experience) in the decision making process. Unfortunately, due to coordination and expense issues, learning must be based upon single instances of exposure.

3. **Direct experience need not always be positive** – When one learns, knowledge is accompanied by an affective code. That knowledge which is associated with negative codes will tend to be recalled along with the negative affect. People will tend to avoid situations that recall or require the use of knowledge having such negative affect (Kaplan, 1991). It follows, then, that if the direct experience is negative it may lead to the avoidance of similar situations - exactly the opposite of the effect intended. This avoidance is especially powerful when experience with that situation is limited. There is some evidence that negative affect developed during the initial experience with a behavior

remains more durable than a positive affect. Thus, with the best of intentions, there is a risk of doing harm with first time direct experience.

4. **Direct experience is not always possible** – There are many environmental issues where direct experience is not possible. This is particularly the case with large-scale environmental issues such as acid deposition and climatic change. For instance, in the case of global warming, the signal-to-noise ratio (i.e., of long term global climatic change to short term, daily and seasonal change) is so low that it escapes human perception. Another factor is the time-lag between behavior and noticeable environmental change; when the effect of one's behavior does not directly follow, behavior associations between the two can be difficult to make (Pawlik, 1991; Brewer, 1992). Because the physical parameters of large scale environmental change often cannot be processed or responded to directly, knowledge about the problem and appropriate behavioral remedies must be learned indirectly.

Stories – Substitutes for Direct Experience

Direct experience may not be a feasible nor even a preferred behavior change strategy in many environmental situations. Unfortunately, finding substitutes for direct experience has not been a priority in the field of conservation behavior. In fact, when knowledge-based interventions are utilized, most programs have relied on text-based documents that, while factual, are nonetheless dull and uninteresting (Stern and Aronson, 1984). Information presented in an uninteresting format is unlikely to be internalized. Lack of such internalization is a major contributing factor to the failure of individuals to adopt many technically and economically feasible programs.

The use of case-studies or narratives (or "stories" as they will be referred to in this report) which provide interesting and mentally engaging information has been suggested as an effective substitute for direct experience (Monroe and Kaplan, 1988). The characteristics of a good story

readily encourage a depth of cognitive processing which makes it likely that the information will be used when making future decisions about the behavior in question.

A CULTURAL BIAS AGAINST STORY

Before introducing the elements that make stories work, it is necessary to examine a potential cultural bias against the use of stories in education and behavior change. This bias is discussed by Sarbin (1986) who explains it using a theory of "root metaphors." The "root metaphor" theory proposes that every culture has a unique mental framework which helps it's members to organize and make sense of occurrences in the environment. Sarbin describes the Western metaphor as one of "mechanism." Our educational model, based on the metaphor of "mechanism," is biased to account for and explain natural occurrences through the movement of external forces, one against another. This mechanistic explanation of environmental occurrences tends to emphasize raw facts and declarative knowledge over narrative or historical explanations. Its main educational tools are objective, expository information-intensive educational curricula, text and news articles to the exclusion of the story.

There is also a direct bias against stories. Stories and storytelling are most often associated with fantasy and pretending. They are viewed as primitive, non-scientific, or only for children (Rosen, 1985). Some scientists and educators may be skeptical of their use and favor instead the use of factsheets and textbooks (Kearney, 1992).

THE USE OF STORIES

Stories as a Traditional Means of Communication

Stories are an inherent part of culture. All people, young and old, of all cultures are familiar with stories. They have been used traditionally to explain natural phenomena, convey morals and values, mold culture-appropriate behavior, preserve cultures and resolve personal problems (Stein, 1982). Oral stories were often the only records of a culture as they were passed

down from generation to generation. Because of their importance, stories were told with great care and storytellers were shown respect (Baker and Greene, 1977).

Stories as Modern Means of Communication

Stories enrich life by stimulating imagination, clarifying emotions, and suggesting solutions to problems (Bettleheim, 1975). They are successful in doing so because they simplify complex situations, a prerequisite to coping with information overload. This has been most often accomplished by including typical rather than atypical characters, with which people can more readily identify (Bettleheim, 1975). It has been suggested that stories are a particularly appropriate medium for formal educational settings because they present history in subjective form that is closer to the way people explain themselves and the world (Freeman and Levstick, 1988). Stories can be a particularly useful medium for learning in children in that stories help them acquire expectations of what the world is like without distracting them with what is real and what is make-believe. Eventually, it is argued, the fictional characters and places are rejected, but the values and morals that are part of the message of the story are retained (Applebee, 1978).

One does not have to go far to observe the pervasiveness of stories in our culture. Much of the information we get in our lives is in narrative form and, through this form, our understanding of the world is shaped (Schank, 1990a). Gudmundsdottir (1991a, 1991b) reports that traditional midwives share stories with each other to help aid in the technical diagnosis of problems and to identify appropriate remedies. The same is true for electromechanical machines (e.g., photocopiers) where stories are used to describe problems and propose solutions. Stories have also been shown to be significant in decision making situations (Schank, 1990a; Halford and Sheehan, 1991). A study by Neutstadt and May (1986) showed that government officials tend to make decisions based on stories. These officials commonly used stories of what had happened to them in similar situations. In fact, they relied on stories more than they relied on a rational, objective decision-making process.

Another example of the successful use of stories in a technical area is discussed by Armstrong (1992). Recognizing the ageless appeal of stories, Armstrong decided to use stories to explain core values and visions of a corporation's future as well as to celebrate its successes. It turned out to be an amazingly effective form of communication and motivation. Eventually, Armstrong reports, stories replaced the company's policy manual.

A Human Bias for Stories

Regardless of the current educational bias in favor of expository, factual and information-intensive text, people have been shown to have a natural bias toward thinking, perceiving and imagining according to a narrative structure. If shown two or three unrelated pictures and asked to remember what was seen, participants will make up a story to explain the pictures and how they relate. And in a study where participants were shown two or more triangles on a computer screen in random motion, they almost always described the movements in a narrative way (Sarbin, 1986). Even the most rational and objective scientists sometimes use narratives to explain their findings. For instance, Marshack (1991) uses a story to explain the meaning of a Mesolithic bone fragment with markings on it.

Stories as a Means of Environmental Education

Many researchers are arguing for an increased role of stories as vehicles of knowledge (Rosen, 1985; Sarbin 1986). DiPardo (1990) suggests that the best teaching occurs with meeting learners on their own turf with the narrative functioning as a starting point. Within the field of environmental education there is a strong and growing awareness of the value of stories. Monroe and Kaplan (1988) argue that the use of stories (i.e., case studies) and talking about what others are doing to solve environmental problems may be as or even more effective than the traditional approach of "learning while doing." Monroe (1991) has shown a significant association between interesting stories and attitudes toward taking conservation actions. Schank (1990b) has effectively employed computer simulations containing databases of stories as

teaching tools. Yates and Aronson (1983) found that using stories of "super-conservers" were a particularly effective means of promoting energy conservation.

INTEREST

The willingness of environmental educators to explore stories is not commonplace. For the most part the cultural bias against stories is consistent with, if not the basis for, our faith in the "issue comprehension" based behavior change model. This model predicts that as soon as people are fully aware of the facts and understand the logical causes and consequences of their environmentally destructive behaviors, they will take immediate and appropriate actions to improve matters and, hopefully, convince others to do the same. Thus, to achieve environmental protection and restoration, this model argues, one need only provide more and better facts, distribute these to more of our citizens who will then comprehend the issue and act.

The error of this approach lies not in its faith in the power of information, for that is something shared by most education and behavior change strategies. Its error is to focus on only one type of information. There is much evidence that informational programs fail, not because individuals are incapable of awareness or have difficulty understanding the causes and consequences of their actions, but because the informational material simply does not hold the audience's attention, engage their intellect or present the material in a meaningful way (Dennis et al., 1990; Ester and Winett, 1982).

With daily information overload it is easy to understand why much of it is ignored. With the possible exception of students, who are most often required to read material, one cannot force people to read what is given to them. Because different information competes for people's attention, one must create documents that are either so simplistic as to take no effort to get through or so interesting as to grab and hold their attention despite the competition. The key, then, is to provide information that is interesting and cognitively engaging.

It is important, however, to distinguish between two types of interest: topic interest and interestingness (Schiefele, 1990). These are often confused in the research literature. Topic

interest involves what one already knows and feels about the topic. Most research is focused on topic interest (Asher, 1980). Interestingness focuses on the actual construction of the story and is independent of the topic being covered. The elements of a good story, as discussed in the next section, are aimed at manipulating interestingness.

Topic Interest and Prior Knowledge

The topic of a story may, by itself, engage one's attention (Bank, 1986). Furthermore, if we accept that understanding a story is an explanation-driven process, it follows that people will not be able to understand a story's plot or a character's action unless they can find a plausible explanation for why such an action occurred in the first place (Wilensky, 1978). Thus, a certain degree of prior knowledge about themes, goals and plans must exist before the reader can understand the story and identify its topic. If this background information is lacking, readers will remember and reorganize the material to fit into whatever are their current expectations and interpretations (Bartlett, 1932). The existence of background information depends quite a lot on the readers prior knowledge of the topic. Studies have shown that high prior knowledge of a topic leads to better comprehension of a passage (Entin and Klare, 1985) and higher recall (Kintsch, 1980). However, topic interest is independent of and additive to one's prior knowledge (Baldwin, Peleg-Bruckner and McClintock, 1985; Entin and Klare, 1985).

It is important, however, to realize that one's prior knowledge about a topic may not always result in a story about that topic being perceived as interesting. One's prior knowledge may be recalled with negative affect; familiarity may breed contempt. Topic interest can be negative. Furthermore, there are many topics for which one has no prior knowledge. In both of these instances, one can expect either negative or neutral topic interest.

When concerned with topic interest, it's important to know the audience. The importance of personalizing the content of a story so that it relates to the prior knowledge of the audience cannot be overstated. Fortunately, catching people's attention and engaging their

intellect is often a function of whether the *story is interesting* than of whether they perceive the *topic as interesting*. The issue becomes one of the "interestingness" of the story.

Interestingness

Interestingness is a construct. It is composed of those qualities of a story that makes it engaging and enjoyable to read. If we contend that learning is an active process, then it is logical to assume that material must be mentally engaging, or hold the reader's attention long enough to be assimilated into existing mental structures. Stories tend to engage a reader better than other mediums because one of their main purposes is to entertain (Kintsch, 1980). For this reason, that stories are proposed as an effective teaching method (Monroe and Kaplan, 1988; Schank, 1991). In numerous studies, stories have been rated to be more interesting than expository text on the same topic (Hidi, 1990; Kintsch, 1980; Hidi and Baird, 1988, 1986; and Entin and Klare, 1985). Interestingness has also been positively associated with comprehension and understanding (Kintsch, 1980) and the affective enjoyment of the material (Schiefele, 1991). In a study where young people were asked to read passages of similar content written in three different styles - narrative, expository or a mixture of the two - recall of important ideas was the best from the pure narrative. Expository was second. Mixed texts scored the lowest, making the authors believe that mixing styles confuses the reader thereby lessening the recall of the material (Hidi, et al., 1982). Sadoski et al. (1990) report that readers of an interesting story not only developed powerful mental images from the text but were able to integrate the information presented in the text to the degree that their own elaborations were recalled as being part of the original text.

Attention

Attention is the means by which we are able to focus on selected information (e.g., the components of a story) and to ignore others. James (1892) distinguishes two types of attention:

involuntary and voluntary (or directed) attention.[1] *Involuntary attention* is based on fascination and interest. It is spontaneous and effortless and can easily inhibit competing thoughts. Involuntary attention is either drawn by things having innate interest for our species (James listed "strange things, moving things, wild animals, bright things, pretty things, metallic things, words, blows, blood, etc ..." and called this form of attention *innate involuntary attention*) or is based upon interests that we have developed over an extended amount of time (called *learned involuntary attention*). Examples of learned involuntary attention include the riveting interest an ecologist shows upon seeing an unusual species on their favorite hiking path or the fascination of an expert chess player in a unique game strategy (Kearney, 1993). It is argued that the automatic nature of involuntary attention is adaptive, it makes certain that objects and processes, important in an evolutionary context, will be quickly noticed. Classic as well as popular literature has often relied on techniques for manipulating the interestingness of text for the purpose of maintaining the attention and fascination of readers. These techniques often invoke involuntary attention. Interesting stories are thought to engage and hold a reader's fascination by drawing on involuntary attention (Hidi and Baird, 1986). A study by Schank (1979) confirms that certain components, such as life or death situations, danger, unexpected events or personal relevance of stories, always catch the reader's attention and associate highly with interestingness.

The second category of attention is called d*irected* (voluntary) *attention*. This form of attention is useful in working with important yet intrinsically uninteresting or non-fascinating objects or events (Cimprich, 1990). Using directed attention allows for purposeful, directed behavior and thought even when the focus of such behavior or thought is uninteresting. This ability to attend to the uninteresting comes with a significant mental cost. Sustained directed attention requires significant mental effort. Such attention is neither spontaneous nor effortless and is thus subject to fatigue (Kaplan and Kaplan, 1982). Due to the energy required and fatigue associated with directed attention, stories that rely primarily upon this form of attention will be

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[1] These are not the only types of attention (Kaplan and Kaplan, 1982) but are the two most relevent types to consider in the promotion of conservation behavior.

perceived as burdensome to read. Textbooks containing declarative information (e.g., facts, technical explanations), and little else, are an extreme example.

Irrelevant Details

Not all issues naturally contain aspects that evoke involuntary attention. In fact, many environmental issues are so filled with technical facts as to be dreadfully boring. Without being intrinsically interesting such topics require readers to employ their directed attention to complete the text. If they complete the text! To improve the willingness of readers to complete the text, writers have long combined elements that invoke involuntary attention as a means to make the important, but boring information more palatable. This practice is sometimes called the "seductive detail" ploy. This turns out to be a misuse of involuntary attention.

Stories that included seductive details are indeed rated as more interesting than stories without (Garner et al., 1989; Graves et al., 1991). Unfortunately, the increased interest did not translate to higher recall or comprehension scores. The same effect was shown in a study by Garner, Gillingham and White (1989) where adults who read stories with seductive details were less adept at remembering the main ideas as compared to the control group. Another study attempted to improve a classroom text on the war in Vietnam by giving journalists free reign. Versions of the text that used seductive details such as "leech infested jungles" and "razor bamboo sticks" were, in fact, judged to be interesting, but recall of the main ideas decreased significantly.

Such studies show that material is not made more memorable merely by adding irrelevant seductive details. Efforts to hold the reader's interest at any cost can, in fact, divert their attention from the important information (Garner, 1992). The challenge, as outlined by Wade and Adams (1990) is:

> ... to develop alternative strategies for creating (written) material so that
> important information will be made more memorable. Rather than focusing
> on topics that arouse emotional interest, strategies are needed to increase

cognitive interest. Cognitive interest may occur when learners are able to relate new information to their background knowledge and when they believe they are learning something new and worthwhile.

THE ELEMENTS OF A GOOD STORY

The challenge is to find effective substitutes for direct experience which makes salient important yet sometimes abstract issues. An examination of those characteristics that have been shown to create interestingness and draw attention involuntarily is an appropriate place to start. Anderson et al. (1987), in a study of interesting sentences, have suggested four elements that contribute to interestingness: life themes, character identification, novelty and activity level. Life themes and novelty are elements that evoke involuntary attention (see, for instance, Schank, 1979). Character identification is a component of a larger element, characterization, discussed below. It is interesting to note that advertising agencies have long puzzled over what makes certain ads and commercials popular. In a recent study of successful commercials five elements were identified (DDB Needham, 1992):

1. **A simple concept** – It was critical for the consumer to be able to recall and explain the concept being presented.

2. **A story line** – There is a need for a beginning, a middle and an end to enhance recall.

3. **Humor** – Humor, particularly when including a surprise or a twist, was important.

4. **Many layers** – This allows new aspects to be discovered after the first exposure.

5. **Popular celebrities** – Well known figures have a positive affect on popularity of ads.

These five elements also showed up among the major elements we have identified in the research literature. The elements described below are by no means a definitive list; research in this area is ongoing and is likely to discover other important elements for increasing the perceived interestingness of text.

Coherence

In order for a story to be engaging, it must first be understood; it must be coherent. It has been suggested that cohesion among a story's events is based to a large degree on the causal cohesion among its events (Stein and Glenn, 1979). If there is no causal relation or coherence between the events of a story, a reader will have a difficult time making associations between events, get discouraged and lose interest. Information in a story must hang together well enough so that the reader can see how the various parts of the story relate (Kintsch, 1980).

One way in which coherence in stories is achieved is through a sense of movement through time. Text that has a beginning, a middle and an end (preferably in that order) is easier to process mentally and easier to remember. A related issue here is the concept of a "story line." Understanding is significantly aided by arranging these actions around a particular goal thus allowing the reader to put the actions together in a meaningful way (Gergen and Gergen, 1986). Also, stories that have either a positive or negative goal as compared to a neutral goal are better remembered (Omanson et al., 1978).

Coherence is also created by the reader as they work through a passage. Readers use titles, paragraph headings and first sentences to get the main idea of a text and attempt to fit each succeeding sentence into what they perceive to be the structure of the main idea. That is, people process the text in an attempt to develop and maintain coherence. If this attempt fails, main ideas are reconsidered and adjusted, often leading to confusion and loss of interest (Kieras, 1980).

Problem Resolution

Problem resolution moves beyond the concept of a story line by including a dilemma, problem or paradox (either stated or assumed) that becomes resolved within the story. Beyond having a beginning, middle and end, a story's interestingness is enhanced by having it progress from a problem statement, through certain complications, to a satisfactory resolution (Bower, 1982; Iran-Nejad, 1987; Jose and Brewer, 1984; Mandler and Johnson, 1977).

Mystery

One of the most well documented elements that makes a story engaging is mystery. Because there is uncertainty as to how the story will end, the enjoyment comes from the process of getting there (Rabkin, 1973). It has been discovered that cognitive engagement of the reader will increase if he or she must predict or anticipate what will happen next (Kintsch, 1980; Schank, 1979). Creating suspense (Rabkin, 1973) or introducing surprise (Brewer, 1983; Jose and Brewer, 1990) can also heighten interest. The presence of mystery can turn the reading process in to a problem-solving task where the reader can match the unfolding events against his or her expectations (Black and Bowler, 1980). As Dewey (1916) states it, "self and the world are engaged with each other in a developing situation." The reader becomes engaged in the text, experiencing the story as it happens; all the while cognitive structure is being built.

Cognitively Challenging

It is incongruity that leads to learning (Kintsch, 1980). Materials that contain small deviations from expectation and misfits between prior and current knowledge hold a reader's interest longer than reading about something known or expected. It is for this reason that it is more interesting to read about something being disproved as opposed to reading about further support for the known (Frick, 1992). This notion is consistent with the findings of Omanson et al. (1978) where characters that had positive or negative goals were more easily remembered than characters that had run-of-the-mill or neutral goals.

Characterization

One of the ways that a good story involves the reader is through the use of a character (Anderson et al., 1987). A character is an element with whom the reader can identify (Hidi and Baird, 1986), can care about and track through the story. Research has found that familiar information has a larger influence during decision-making than concepts that are less familiar (Tversky and Kahneman, 1982). Thus, characters that are familiar to a reader, either in being popular celebrities or historical figures, will be more engaging. It has also been suggested that

identification with a character improves interest in a story. In addition, this interest is related to the gender and goodness of the character and independent of character age (Jose, 1989; Jose and Brewer 1984).

Concreteness

People tend to recall material expressed using concrete examples better than generalized or abstract material (Hidi and Baird, 1986). Furthermore, images for concrete words are created spontaneously and effortlessly while mental images for abstract words take longer, if they can be imagined at all (Clark and Paivio, 1987). Research has found that the concrete-abstract dimension is a key determinant of the ease with which one forms a clear mental image. In a study involving word-pairs, Paivio and Yuille (1969) found that imagery was reported for 62% of the concrete word-pairs and only 26% for the abstract word-pairs. A striking example of how concrete examples can aid in understanding is found in a study by Hudson (1983) exploring how students solve word problems in mathematics. The problem was presented in two different forms: the first read, "There are 5 birds and 3 worms. How many more birds are there than worms?" and the second read, "There are 5 birds and 3 worms. How many birds will not get a worm?" The second instance involving a concrete, real-life example was answered correctly 40% more often than the more abstract first answer.

Human decision making is also affected by the concreteness of the information provided (Nisbett and Ross, 1980; Nisbett et al., 1976). While people are not willing or able to apply population base rates to predictions about the behavior of a particular individual, they are willing to generalize from the observed behavior of two individuals to the behavior of an entire populations. Information derived from concrete, specific cases has much greater effect during human decision making than information derived from a larger population.

Using metaphors can aid in the process of linking concrete examples with abstract concepts and help generalize already learned material into novel problem solving situations

(Evans and Evans, 1989). The ability to link the concrete and the abstract is an invaluable tool in the realm of environmental issues, where the problems are often complex and abstract.

Imagery

Bardwell (1991) reports that imagery is an important element in helping readers to understand how a problem can be solved. Imaging techniques have long been used to improve memory (Paivio, 1979; Thorndyke and Stasz, 1980; Reed, 1982). Sadoski et al. (1988) document a strong relationship between the mental imagery induced by a story and the stories interestingness. A related issue is providing instances of success. People often understand the problem and have the necessary knowledge to change their behavior and yet still feel hopeless (Bardwell, 1991). By including success stories one helps people to imagine what their role in solving a problem might look like. Success stories are particularly needed in the environmental fields where people often feel that their efforts will not make a difference.

A study using success stories of "super-conservers" was shown to be an effective method for promoting conservation behavior because the examples gave people the imagery necessary to see that their actions could make a very real difference (Yates and Aronson, 1983). As Bardwell (1991) points out, success stories "hold promise in terms of helping people build more adequate models about environmental problems and their roles in addressing them."

Vividness

Recall of stories was improved when stories had vivid details (Tulving, et al., 1965; Bower, 1979). It is believed that vividness is effective in promoting recall because people tend to respond to vivid text in a way identical to actual emotional situations (Vrana et al., 1986). Although the reader knows that the details in the story are not occurring at that moment in the "real world," the vivid material aids in accessing their mental knowledge. In addition to increasing recall, vivid detail in a story can also increase the perceived power or importance of the message. A study by Sherer and Rogers (1984) showed that while concrete information

increased recall, the addition of vivid details also had a positive effect on attitudes and increased one's willingness to change behavior.

Other Factors

There are other factors that researchers in the field believe may increase the interestingness of a story, but have yet to be fully examined. Hidi and Baird (1986) suggest that *well-formed text, affective response, abnormality,* and *omission of important background information* may all help to increase the interestingness of stories. Others suggest that *novelty, relevant life theme* and *activity level* are what is important (Sawyer, 1991).

CONCLUSION

Informing people about environmental issues has proven much harder than first imagined. Changing their behaviors has proven even more difficult. Environmental problems are often complex, abstract and overwhelming. The behavior needed to improve matters are often unfamiliar and inconvenient. This can lead to outright avoidance sometimes coupled with reactions of denial, frustration or feelings of helplessness. Even more depressing is that these widespread reactions to environmental problems are, in part, caused by our well-intended attempts to inform the public about the magnitude of the problems being faced. With the best of intentions we often do harm by discouraging the average citizen.

Fortunately, there may be a means of educating and changing behavior that is welcomed by the public. The new behaviors may still be burdensome and demanding, but the means of informing people about the reasons for these behaviors won't contribute to the problem. Using stories in an environmental education and behavior change capacity could have positive effects, not only in conveying facts about environmental problems but in giving people the necessary imagery and concreteness to approach the problem in a confident and forthright way. The challenge now is two fold. First to turn the descriptions of important elements presented above into specific guidelines useful to environmental practitioners. Second to conduct research to further examine the known elements and discover new elements.

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APPENDIX A – ANNOTATIONS OF SELECTED ARTICLES

The Cognition of Stories

Black, J. B and Bowler, G. H (1980) Story Understanding as Problem Solving, *Poetics.* 9:223-250.

> This article discussed how people understand and recall simple stories. Meaning derived from a text is not a simple mapping of the semantic structures from the text to the reader's memory. Rather, it involves the reader's prior knowledge, her goals, biases, and interests and the character the reader decides to identify with. The article also considers the idea of story grammars as theories of a readers' memory of a story. The authors argue that a hierarchical state transition (HST) network, in which actions are viewed as succeeding or failing to bring about changes is more successfully remembered than stories following the story grammar approach, in which the plot is a series of episodes, each one of which is a subgoal state, one or more events, and an outcome. An example of a story grammar is the following: story = setting + theme + plot + resolution.

Brewer, W. F. and Lichtenstein, E. H. (1982) Stories are to Entertain: A Structural-Affect Theory of Stories. *Journal of Pragmatics.* (6):473-486.

> The authors argue that stories are a subclass of narratives that have entertainment as their primary discourse force, or overall purpose. Although many story researchers will argue this point (see *The Definition of a Story* by Nancy Stein), the authors base this conclusion on various studies they have undertaken and which are mentioned in the article. In context with the entertainment assertion, Brewer and Lichtenstein examine some fundamental structural properties stories should have which lead to interest. These three major discourse structures are: surprise, suspense, and curiosity. So, if the writer wishes a story to be entertaining, it should include one of the above mentioned structures.

DiPardo, A. (1990) Narrative Knowers, Expository Knowledge - Discourse as a Dialectic. *Written Communication.* 7(1):59-95.

> The author argues that there is a schism between the narrative writing and that of exposition. People tend to believe that narrative, or stories, are something one "outgrows" as cognitive maturity allows "abstract, reasoned, depersonalized exposition to emerge". Narrative today is seen as preliminary to the mainly expository writing and is underestimated in many other ways as well. Most writing classes start with "personal" modes of description and then move towards the supposedly more sophisticated areas of exposition and argument. DiPardo argues that this is a result of Western Cultural bias that favors objectified, depersonalized knowledge, often at the expense of any sense of engagement or exploration. As a result, storytelling, which is "fueled by a will to redeem

bits of experience from the indistinguishable stream, to craft them into formal, meaningful wholes with beginnings, middles, and ends", has been underestimated in their role as a vehicle for knowledge. She argues that a narrative component to an expository text can make that text more engaging and easier to visualize, allowing readers to take various perspectives and activate background knowledge. The article promotes the idea of the narrative as a way of learning more about students' subjective worlds, an opportunity to meet them on their home turf, and thus build a school environment in which differing worlds can productively meet. DiPardo concludes that the best teaching does occur with meeting students on their own turf, and the narrative can function as a starting point. She argues that to "deny...narrative knowing is to rob students of personal meaning; to fail to help them grasp its place in the larger human experience is ultimately to trivialize both." Thus, this article suggests that narrative be brought back into the classroom and recognized as the valuable tool that it is. Narrative or stories will enrich the learning process for both the student and the teacher.

Freeman, E. B. and L. Levstik (1988) Recreating the past: historical fiction in the social studies curriculum. *The Elementary School Journal.* 88(4):329-337.

Stories are an appropriate medium for introducing history to students. Story presents history in a subjective form that is closer to the way in which young adults explain themselves and understand the world.

Hayes-Roth, B. and P. W. Thorndyke (1979) Integration of Knowledge from Text. *Journal of Verbal Learning and Verbal Behavior.* 18:91-108.

Three experiments investigated factors influencing the integration of facts acquired from texts. An important assumption was that people do not acquire sets of unrelated facts, but rather integrate the facts they acquire into meaningful conceptual structures. The first two experiments showed that material that was identical (rather than paraphrased) and were in close proximity in the text were more easily recalled.

Jose, P. E. (1989) The role of Gender and Gender Role Similarity in Readers' Identification with Story Characters. *Sex Roles.* 21(9/10):697-713.

This study was conducted to see whether similarity of gender role orientation between the reader and the story character might influence the degree to which a reader might identify with the character, i.e. would a reader more easily identify with a character that behaves in a congruent gender role manner, regardless of the character's biological gender. The study used 142 undergraduate students, 69 males and 73 females. The study used stimulus stories that featured either a male or female main character who behaved in either a stereotypically male or female manner. The reader could either identify on the basis of similarity of gender, gender role orientation, or on both bases. The results supported the following hypotheses:

1. Androgynous and undifferentiated subjects would identify equally with both masculine and feminine story characters.
2. Masculine subjects would identify more strongly with story characters who behaved in a masculine gender role fashion.
3. Feminine subjects would identify more strongly with feminine story characters.

A surprising result of the study showed that similarity of gender role orientation was more important than similarity of biological gender for reader identification, although this may have been due to the nature of the stories and the fact that the research used adults. Most other gender identification research has used children. The author explained that "adult readers are more flexible in choosing self-referential dimension of a character" than children. It is worth noting the importance of knowing your audience when writing or telling a story. It is necessary to have characters that the readers, both male and female, can readily identify with.

Kintsch, W. (1980) Learning from Text, Levels of Comprehension or Why Anyone Would Read a Story Anyway. *Poetics.* 9:87-98.

The author believes that entertainment is the primary motive for reading a story, as opposed to the gathering of information. This article discusses the nature of cognitive interest and its role in text comprehension. Cognitive interest is assumed to be determined by the three following factors: (1) how much the reader already knows about the subject matter, (2) the uncertainty the story generates in the reader, and (3) the postdictablility of the parts of the test in the text as a whole. All of these factors depend on the reader's knowledge structure in the comprehension process. If the reader know little of the story subject, cognitive interest will be low, because we don't care about something that we don't know. It is change, incongruity and surprise that leads to new learning. Relatively small deviations from expectations, misfits between prior knowledge and new information are interesting and provide the right conditions for learning. A story may also be interesting not so much because of what is said, but how it is said. Style is considered important in provoking interest. The author concludes that the operation of control schemata must be given a greatly expanded role as different control schemata allow for different levels of comprehension, thus greatly increasing the potential usefulness of the model.

Mandler, J. M. and N. S. Johnson (1977) Remembrance of Things Parsed: Story Structure and Recall. *Cognitive Psychology.* 9:111-151.

This report analyzes the underlying structure of simple stories and suggests that "story schemas" (e.g., internal representations, frameworks) explain the parts of a story and the relationship among the parts. It is offered that readers use this type of a schema to guide comprehension, encoding and recall of material. "To be successful, the theory must provide a clear and unambiguous parsing system which can be used to divide a story into structurally important units. To be interesting, it should also be able to predict

which of those units people will tend to remember and which they will tend to forget" (p. 111).

This study is also based on the assumption that "story schemas" are constructed from two sources. The first source is acquired from experience with many stories and learning the knowledge of the typical sequence of events from beginning to end. The second source comes from experience and knowledge of causal relations and action sequences. However, the units that form the schema are only the "perceptions, feelings, actions and events" which relate to the plot (p. 112). Evidence which seems to support this is that stories that stem from an oral tradition (e.g., folk tales, fables, myths) all seem to have similar and clear structural characteristics compared with written down prose, presumably due to memory restrictions. Results of a recall experiment show that both children and adults are encode and recall stories by schemas, but that there are developmental differences. Retrieval is dependent upon the schema operative at the time.

Monroe, M. (1992) Alternatives to traditional text in the communication of environmental information. Unpublished manuscript. Under review by the *Journal for Environmental Education*.

Although environmental educators have become adept at using tricks such as photographs, graphics, charts, tables and eye catching headlines to relay complex information, little has changed in the way of the text. It continues to be an expository explanation with little color or flair, nothing to grab and/or keep the reader's interest. This type of text is not easy to understand nor remember. This type of interestingness is a text-based interest that comes from the writing style of the piece and not the topic covered.

This paper suggests that interesting text has many advantages over traditional text. Because it is interesting, the reader expends less effort to understand the material, to read it in the first place, and to comprehend it better (Ascher, 1980; Cecil 1984; Estes and Baughan 1973 and Sacks 1990).

This study involved over 500 seventh and eighth grade student who rated short one-page articles on both environmental and non-environmental themes and then rated them for interest and familiarity. Some of the stories were written in expository form and some were written in story form. One week later the students were tested on the material contained in the stories. Results showed that stories that were written in a story format were judged to be more interesting than those in traditional expository form. Results also showed that a high interest score on a story correlates to a high knowledge score later on.

Rosen, H. (1985) *Stories and Meanings*. David Green Printers, Ltd: Northamptonshire, England.

The first section of this article argues the value of narratives. The persistent message in our society is that stories are for children, but "given the least prompting we are disposed to arrange around people and things a meaningful sequence of events" - a story. Rosen asks without the stories we've heard and told, reported and invented,

traditional and spontaneous, what is left of us? The stories of our ancestors, of one's parents, are what shape our identity. The unfortunate fact is that stories are not taken very seriously and are generally disregarded as one gets older, especially in the classroom. Rosen says: "We might be disposed to take stories much more seriously if we perceived them first and foremost as a product of the predisposition of the human mind to narratize experience and to transform it into findings which as social beings we may share and compare with those of others. We do almost everything in the narrative - dream, remember, learn, anticipate, hope..." The author goes on to say that just to perceive and invent a story, however, is not enough - it must be told.

There are two essential features of telling a story. The first is that stories are told in the sense of "playing the game according to the rules." There are informal but expected norms of what a story has to do. Even a seven-year old will demonstrate this by starting a story with "Once upon a time there was a witch..." Secondly, stories are intertextual, in other words, stories are as they are only because others exist. Rosen notes that stories are everywhere we turn. Even chemical reactions are stories compressed into the confines of an equation. And when children learn, they construct their explanations based on stories. The author then categorizes narratives into four scales:

1. The scale of spontaneity or degree of improvisation, i.e. a joke, a traditional tale, or a spur of the moment blurting of events.
2. The scale of fiction or the degree to which the events are invented - from fantasy to true stories.
3. The scale of embedding or degree to which a story stands on its own.
4. The scale of economy or how much is left to the hearer.

These scales apply mainly to oral narratives, but can also be used for just about any type of narrative.

The article points out that, in the classroom realm, the higher we go up, the less likely that narratives will be allowed comfortably into the flow of talk. Rosen then argues, and this is the main thesis of this work, that learners should be given back their story rights so that the narrative can be heard again in the classroom - "when the pie was opened the birds began to sing". He believes that the narrative must become a more acceptable way of saying, thinking, and presenting. The remainder of the article is an argument stressing the need to return storytelling to the classroom. This article is purposeful in that it points the usefulness and value of stories. It shows how prevalent the narrative actually is in our cultures, and argues for the increased use of stories in classrooms and all types of learning situations.

Sarbin, T. R. [Ed.] (1986). *Narrative Psychology: The Storied Nature of Human Conduct.* New York: Praeger Publishers.

For the purposes of this work, narrative is coterminous with story (p. 3), with a story being a "symbolized account of actions of human beings that has a temporal dimension: beginning, middle and end, or as Kermode (1987) suggests, a sense of ending, held together by recognizable patterns of events called plots." Central to the plot structure are human predicaments and attempted solutions.

Created in Stephen Pepper's work *World Hypothesis* (1946), the "Root Metaphor" provides for a mental framework for organizing occurrences in the world that states, "when a person confronts a novel occurrence for which no ready-made category or class is available, the occurrence remains uninstated, unclassified, or unassimilated until a class or category is located or invented. The recognition of partial similarity on some dimension or construct provides the basis for analogy...Once the metaphor is expressed by the speaker and decoded by the listener, actions and properties related to the chosen metaphor serve as the source of auxiliary and supporting metaphors." (p.4). Furthermore, once the metaphor has done its job of making sense of the outside world, it loses its metaphoric properties and the user may treat it as literal, thereby forming the foundation of a belief system that guides action.

Pepper further states that there are six root metaphors which serve as the foundation for a majority of human's belief systems: formism, mechanism, animism, organicism and contextualism. Formism stresses that the organization of the world is based on the similarities and differences between entities. Mechanism, which is dominant in Western society, views events in nature as the products of transmittal of forces, usually physical forces. Organicists view the world as one single large organism and contextualists judge all actions through a historical context.

According to Sarbin, mechanism is the dominating metaphor in Western society and because of this the use of narratives or stories has been long neglected in the psychology and other human sciences. However, using narrative as an organizing principle can be very useful in that there is evidence that people think, perceive, imagine and make moral choices according to narrative structures. For example if you present 2 or 3 pictures to someone, they will connect them in a meaningful way to create a story. A study by Michotte (1946 and 1963) showed that when persons viewing two or more rectangles in motion on a computer screen assigned meaning to the motions and described their movements in a narrative way. For example, "It is as if A's approach frightened B and B ran away." Even more telling is an experiment by Heider and Simmel (1944), where subjects were told to describe what they saw in the random movement of 3 geometrical figures. The following is a quote from one of the subjects.

A man has planned to meet a girl and the girl comes with another man. The first man tells the second to go; the second tells the first and he shakes his head. Then the two men have a fight and the girl stars to go into the room...She apparently does not want to be with the first man. The first man follows her into the room after having left the second in a rather weakened condition leaning on the wall outside the room. The girl gets worried and races from one corner to the other in the far part of the room...The girl gets out of the room in a sudden dash, just as man number two gets the door open. The two chase around the outside of the room together, followed by man number one, both they finally elude him and get away. The first man goes back and tries to open his door, but he is so blind by rage and frustration that he cannot open it.

Even in everyday work narrative is used to explain the human condition. In Marshack's 1991 book *The Roots of Civilization*, the meaning of a Mesolithic bone fragment with markings on it is explained with a story, in that a conclusion was formed through pieced together data that the markings denoted a lunar calendar which seemed

to be consistent with the agricultural calendar of tilling, planting and harvesting. From this we could conclude that prehistoric human understood time. This is useful information to uphold the hypothesis that stories are a good way to teach people because, in reality, their whole lives are stories.

Stein, N. L. (1982) The Definition of a Story. *Journal of Pragmatics.* 6:487-507.

This literature review is divided into many segments. The author first discusses the various functions of a story, which are:
1. to preserve the culture of a civilization
2. a means of instructing others and to convey predominant social and moral codes of a society
3. resolution of personal social problems
4. conveyance of intensely personal information and values to children

She contradicts the statement that storytelling serves mainly an entertainment function. She argues that stories create both pleasure and pain and the goals of a story are as "varied as those which underlie human behavior." The author then discusses the different scholarly definitions of what a story is. She outlines the four major categories that definitions fall into: (1) State-Event-State Changes without the necessity for goal directed behavior, (2) stories reflect goal directed behavior, (3) those that criticize existing goal directed behavior and argue for more detailed definitions and, (4) those that believe there is no one unique set of features used to define a story. This is a good review of competing theories on defining stories for the interested reader. She concludes that the basic issue may not revolve around which definition is the best, but whether there is just one set of features used to define a story. The set of features may also be dependent upon the context in which the story occurs. Stein then goes on to discuss differing responses to the same story to highlight the role of the comprehender in whether or not a story is judged as good. Overall this is a good article for the person who is interested in the various theories thought concerning a story's functions and definition.

Vitz, P. C. (1990) The use of stories in moral development. *American Psychologist.* 45(6):709-720.

Narrative material is an essential component of effective moral education. In order to demonstrate their particular validity, narrative thought presents concrete human and interpersonal situations. The story mode requires imagination, an understanding of human intention and an appreciation of the particulars of time and place, while narratives focus on people and on the causes of their actions: their intentions, goals, and subjective experience. The properties of character, setting and action are central to the narrative mode. Narrative is an organizing principle for human action. Where practical choice and action are concerned, stories are better guides than rules or maxims. Rules and maxims state significant generalizations about experience but stories illustrate and explain what those summaries mean.

Wilensky, R. (1978) Why John Married Mary: Understanding Stories Involving Recurring Goals. *Cognitive Science.* 2:235-266.

Understanding stories, both written and oral, is a explanation driven process. People understand stories through the need to explain them. For example, a reader cannot understand a character's actions unless she can find a plausible explanation of why he/she took such an action. For example,

John wanted Bill's bicycle. He walked over to Bill and asked him if he would give it to him. Bill refused. Then John told Bill he would give him five dollars for it, but Bill would not agree. John told Bill he would break his arm if he didn't let him have it. Bill let John have the bicycle.

Suppose a reader were asked why Bill gave John the bicycle. To answer this question, the reader would have had to make the inference that Bill gave John the bicycle to avoid getting hurt. Such an inference is an example of an explanation (p.235).

This explanation driven theory gave birth to story understanding system, Wilensky calls Plan Applier Mechanism (PAM) whereby a great deal of knowledge about themes, goals and plans must exist before a reader can make the inferences needed to understand the story. Sometimes actions cannot be explained by a single goal, but rather revolve around a set of goals. The concept of *goal subsumption* was created to explain such situations. Goal subsumption is a manner in which a reader can plan for the possibility of many goals simultaneously. For example, "John was feeling lonely. He decided to get married."

The outline of goal subsumption in this case is outlined in the article as follows: being married to someone subsumes John's reoccurring goal of alleviating loneliness by providing John with a companion. To alleviate loneliness, a person can use a plan that entails social interactions with other people. Social interaction has the precondition that a person be available with whom one can interact. Marrying someone assures that the person married will be available for social interaction over a fairly long period of time (p. 243). Thus, the story could only be understood if the reader had the capability to make these inferences.

This theory is important for environmental education in that in seeking to explain the causes, effects, and consequences of human activity on the natural environment, one must have the necessary background material to make the causal inferences.

The Elements of a Good Story

Anderson, R. C., J. W. Pichert and L. L. Shirey. (1983) Effects of the reader's schema at different points in time. *Journal of Educational Psychology.* 75:271-279.

In two experiments, subjects were instructed to take a distinctive point of view while reading and recalling a story. Perspectives assigned before reading, shortly after reading and long after reading all had substantial effects on recall. Two experiments were completed. In the first, test subjects were 111 male and 104 female public high school sophomores and juniors. The subjects read a narrative from a specific perspective —

burglar or home buyer — and then were given an unrelated vocabulary test. Following the test, half the subjects were asked to recall the narrative, while the other half were told to think about the story in a new perspective and to write down everything, especially exact wording, they were able to recall from the story. In the second experiment the subjects were 14 male and 57 female college sophomores, juniors and seniors. Two findings from these experiments were that readers make inferences consistent with their schemata and they recall more text information important to their schemata. What is unclear following these experiments is precisely why readers make inferences consistent with their schemata and recall more text that is important to their schemata. Further studies need to be completed, however, these experiments tell us that people generally recall information better when it is consistent with prior knowledge and frameworks.

Asher, S. R. (1979) Influence of Topic Interest on Black and White Children's Reading Comprehension. *Child Development*. 50:686-690.

This study shows that both white and African-American children comprehend high-interest material more readily than low-interest material. Material was rated high-interest if it scored highly on a 1-7 interest scale. The children were shown 25 color slides and asked to rate each slide on how interesting it was, or whether it was something they liked and wanted to find out more about. An analysis of children's topic preferences indicates that there is considerable cross-race similarity of interest. Also, boys relate highly to masculine sex-typing and negatively with feminine sex-typing. Girls' interests were only moderately sex-typed. This study suggests that stories can be written that will appeal to the diverse culture of the United States as long as the subject is one that would be considered universally appealing

Bardwell, L. (1991) Success Stories: Imagery by Example, *Journal of Environmental Education*. 23(1):5-10.

Individuals active participation in their environment depends on three major factors, (1) concern, or how one understands and responds to an issue, (2) competence, or whether one feels capable of addressing the issue and (3) imagery, or what ideas or alternatives one has for what to do.

Concern about one's environment is stored in the form of cognitive maps, or groups of associations in the brain that help people organize their world in meaningful chunks. Because anything outside these associations promotes confusion, people tend to respond better to information that is familiar. Linking the larger cause to something familiar and accessible in the cognitive map may help people to see the connection and show genuine concern.

Empowering the concerned person requires that persons feel that he or she is marginally competent to make a decision regarding the issue or knowing what to think, knowing what to do, knowing what to expect and not feeling the fool. Imagery helps build these competencies. Stories are a good medium by which to gain this competence in that they help people make sense of their world through their familiar human context,

engagement and emotional involvement. Success stories are an even better medium because they offer imagery by giving concrete examples with which individuals can begin to create alternative approaches and they are engaging.

Bettleheim, B. (1975) *The Uses of Enchantment: The Importance and Meaning of Fairy Tales*. NY: Alfred A Knopf, Inc.

This book suggests that cultural heritage is one of the main things that gives meaning to people's lives. When children are young, literature carries the information of cultural heritage best. In order to enrich a life, a story must stimulate the child's imagination, clarify emotions, and suggest solutions to problems which perturb him/her. The author believes that the folk fairy tale is one of the best mediums for accomplishing the above goals. A fairy tale teaches about the inner problems of human beings, of the right solutions to their predicaments in any society, and offers examples of both temporary and permanent solutions to pressing difficulties. Fairytales are successful stories because they simplify situations, the figures are clearly drawn and the characters are typical rather than unique. Children can identify with story characters and take guidance and confidence in their actions. The author goes through a variety of fairytales in detail, discussing each one's particular message and usefulness.

Bill, J. M. (1986) Recall from single versus dual theme texts. *British Journal of Educational Psychology*. 56:286-293.

In the experiment discussed in this article 146 girls from six all girl primary 6 classes (average age was 10 years) were tested for their coping ability with a double theme text. Three variations were tested.

All text structure models assume that stories have a characteristic organization, or deep structure, which specifies, and governs the relationship among the story elements, such as setting, theme, plot and resolution. Pre-existing information that a reader has helps them employ superior processing strategies. The reader's experience with particular text types, such as imaginative prose, information texts, will also play a major part in determining the type of processing activity employed.

Cawelti, J. G. (1976) *Adventure, Mystery, and Romance: Formula Stories as Art and Popular Culture*. Chicago: The University of Chicago Press.

This book is a study of popular story formulas. The author's thesis is that formulaic stories (such as mysteries and westerns) are artistic constructions created for the purpose of enjoyment and pleasure. A definition is in order here. The literary formula is a structure of narrative or dramatic conventions employed in a great number of individual works. The two main factors involved in a literary formula are:
1. A conventional way of treating some specific thing or person which is usually specific to a culture , for example, cultural stereotypes.
2. General plot types (i.e., boy meets girl, boy loses girl, they get back together).

In order for the general plot patterns to work and to appeal to their audience, they must be embodied in "figures, settings, and situations that have appropriate meanings for the culture which produces them." For example, an adventure story will not be successful if the character type is one the culture cannot conceive in heroic terms (i.e., a plumber, a janitor).

The book definitely takes the approach that stories are to entertain and then goes on to explore what standard ingredients are the most appealing. It applies to our current study in that it discusses some basic guidelines of what makes a story successful. Following is a list of some of the most important aspects of a good story.

1. Familiar storylines - "audiences find satisfaction and basic emotional security in a familiar form." It gives them the sense of what to expect, which increases their capacity of understanding and enjoying the work. A good example of this type of work would be an Agatha Christie book.
2. Originality, but only to the degree that it intensifies the expected experience without fundamentally altering it. For example, we enjoy a new performance of Hamlet, as long as the actor sticks to our previous interpretations of the role.
3. Intense and immediate kinds of excitement and gratification as opposed to deep and complex analyses of what has just been read.
4. Suspense
5. Identification
6. Creation of a slightly removed, imaginary world - for example, Margaret Mitchell's *Gone With the Wind*. One reason the book remains continuously popular is because it allows the reader to escape to another world.

The main usefulness of this book lies in its ingredients for creating a successful story that is enjoyable and pleasure full. The book also examines the popularity of the classical detective story, popular formulas in different cultures, and the evolution of formulas over time.

Entin, E. B. and G. R. Klare (1985) Relationships of Measures of Interest, Prior Knowledge, and Readability to Comprehension of Expository Passages. *Advances in Reading/Language Research.* 3:9-38.

This article reviews the research of three elements of stories, topic interest, prior knowledge and readability, and explores their interactions in a study involving 266 first year university students.

Past studies show that passages with more interesting topics are better comprehended by both grade school and college students for both written and spoken text than those with less interesting topics. Also, Shank (1978) shows that certain components stable attributes catch our attention and correlate positively with interest. They are (1) life-death situations (or at least high danger), (2) an unexpected event, and (3) personal relevance.

A study by Royer and Cunningham (1978) states that the "act of comprehension must entail an interaction between an incoming linguistic message and a reader's world knowledge" (p.3) and that many between student differences attributed to reading ability

are really a function of differences in prior knowledge. Furthermore, studies show that high prior knowledge of a topic helps people to pick out more important aspects than low prior knowledge.

This study used a questionnaire to assess both prior knowledge and interestingness and a pencil and paper test to measure comprehension and passages were prepared including combinations of all three variables (e.g., high prior knowledge-interesting-readable) for a total of 48 passages. Results showed that interesting passages were significantly more understood than uninteresting passages and the standard reading level material was significantly more understood than the difficult reading level passages. High prior knowledge also led to significant positive differences in comprehension of the passage. The authors suggest that when interest is high, comprehension is not improved by more readable material, but when interest is low, comprehension is improved by more readable material. However, when interest is either high or low, comprehension is improved by reading material being presented at the appropriate grade level. This study shows the importance of all three variables, interest, prior knowledge and readability in the comprehension of reading materials.

Evans, R. D. and Evans, G. E. (1989) Cognitive Mechanisms in Learning from Metaphors. *Journal of Experimental Education.* 58(1)5-19.

Three different theories have been presented to explain how metaphors aid in the learning process: concretizing, structuring and assimilating. The concretizing function suggests that "metaphors provide a vivid and concrete instance of a concept that overcomes the limitations of literal language... so that abstract concepts can be expressed" (p. 5). If this were an adequate explanation, metaphors would aid the learner in understanding new concepts of a similar nature, but not be able to generalize across the board to different types of situations.

The assimilation explanation suggests that "learning is a process of integrating new information with old information that exists already in memory" (p. 6), thereby destroying some of the details of both the new and the old information. Because of this metaphors (and models, flow charts, etc.) aid in learning in that they organize material in advance. In this model, generalization would be aided, but because some of the details were destroyed, errors in specifics would occur in recall tasks.

The final, and most all-encompassing theory, structuring, asserts that an interaction between "domains" explains the learning process. "Domains" are "conceptually related systems of knowledge that are stores as semantic networks such as the domain for social relationships" (p. 7). The first relationship with a metaphor is called *within-domain similarity* which is said to be high when two objects or concepts are parallel in their relationship with other objects in their respective domains. For example, "the room was orange with warmth." The color orange is similar in describing warmth as blue is for describing cold. The second relationship with learning from metaphors is *between-domain-similarity* in which objects or concepts in two different domains are being compared. The structure theory would predict that errors in details would exist, especially for those not directly addressed by the metaphor. Because structuralism

explains learning through the creation of distinct knowledge schema while learning new material, there is less of a chance of confusing new material with old, cutting down on technical errors.

The actual experiment contained 43 subjects divided into two groups, one who received a lecture on hypothesis testing containing metaphors, the other the same lecture without metaphors. These were followed by several tests of content and comprehension, including types of errors made. Results support the theory that metaphors are useful and effective learning aids, with the metaphor group scoring higher on comprehension and reusing the previously taught material. Furthermore, it was shown that students who got the metaphors scored higher than the control group on the tasks requiring general transfer, using their ability to make inferences. Also, as the inferences became more abstract, the metaphor group held its ground where the control group fell behind, indicating that metaphors aided students in situations beyond the subject matter of the metaphor. This supports the structuring theory.

The findings suggest that metaphors are a useful tool in aiding learning, especially making inferences from metaphor to other abstract concepts. This could be very useful in environmental education, considering the complex nature of many environmental problems. However, instructors should take care to use metaphors with low between-domain similarity as these led to learning without the confounding of technical errors and high within-domain similarity.

Frick, R. W. (1992) Interestingness. *British Journal of Psychology.* 83:128-133.

"Changing Beliefs" hypothesis holds that interestingness occurs when an outcome changes beliefs or changes the amount of confidence one has in a belief (i.e., disproving a prominent theory). Interestingness is not a direct function of either amount of background knowledge not likelihood, but a combination.

Garner, R. (1992) Learning from school texts. *Educational Psychologist.* 27(1):53-63.

It is often difficult to learn from textbooks. The author labels this phenomenon "seductive detail effect." Through a series of studies this effect was demonstrated. When interest and importance are separated within a text, the information found interesting is more often recalled. Important information is not more easily remembered merely by adding irrelevant detail to text in the hope of inducing attention. But rather when detail is added it often diverts attention from important information to the interesting detail.

A line of inquiry that needs greater investigation is a learners' strategic activity over time. As students move from regulation to self-regulation would their strategies need to be modified? Would attempts to reduce cognitive load result in a reduction of effectiveness of performance, or would students create effective individual routines? The author suggests further investigation is needed to understand how students alter or disregard instructed strategies for learning from school texts to make better informed efforts to teach strategies designed to enhance learning.

Garner, R., M. G. Gillingham and C. S. White (1989) Effects of "Seductive Details" on Macroprocessing and Microprocessing in Adults and Children. *Cognition and Instruction.* 6(1):41-57.

This study also gives a good outline of an expository text processing strategy that suggests that "readers first extract the content of individual propositions and then derive a passage macrostructure or gist through processes of deletion, generalization and construction. Readers use titles and thematic first sentences to guess at the main ideas of texts, the ideas that might occur in a succinct summary of the entire text.. If the first sentence is generally accepted as a macroproposition, readers then attempt to fit or subsume each succeeding sentence into the provisional main idea. If this attempt fails, revisions of the main idea are considered, Kieras (1980) suggests, "When the main idea is not explicitly stated in the first sentence--readers change their minds about the gist frequently" (p. 42).

The researchers assume that macroprocessing (the gist) will be better understood if the details (microprocessing) are also understood. Also, that if the main idea statement is absent, readers are more likely to confuse irrelevant material with main ideas. The researchers also predict that highly interesting details can also confuse the reader whereas he/she will confound interesting and important information.

The purpose of this study was to examine the effect of "seductive details" (interesting, but unimportant information) on recall of information of a text to try to tease out the relationship of interesting details and important information. Twenty adults were asked to read a three-paragraph expository text about insects. Half of the subjects received a text including "seductive details" and half without. Later, a series of recall tests were performed.

Results showed that the "seductive details" group was significantly less adept at recalling the three main ideas. Adults who read the text with the "seductive details" recalled 43% of the ideas rated the most important, but the control group recalled 93% of the ideas rated most important. The "seductive details" group recalled a mixture of important and interesting details, thereby showing that interesting, yet irrelevant details hinders the learning of vital information.

A second similar study was performed with seventh graders and, regardless of condition, students had a difficult time recalling the main ideas of the text. Results such as these should caution curriculum and textbook developers against the possible danger of including unrelated, interesting details simply for the sake of keeping students attention, as it has been shown not to have a positive effect on main idea recall. However, this study says nothing about interesting and related details.

Garner, R., P. A. Alexander, M. G. Gillingham, J. M. Kulikowich and R. Brown (1991) Interest and Learning from Text. *American Educational Research Journal.* 28(3):643-659.

This study is based on prior research that suggests that attempting to make texts interesting for students who would otherwise not be interested in them does not increase the recall of the material (Asher, 1980, Garner et al., 1989 and Wade, et al. 1989). At

times superfluous interesting material can even hinder the reader's ability to retain important information (Hidi and Baird, 1988).

Forty-eight undergraduate students were randomly assigned to one of four treatment conditions in a paragraph about Stephen Hawking's illness:

1. interesting detail presented as an aside with interesting text
2. interesting detail presented as an aside in generally uninteresting text
3. interesting detail embedded in an interesting paragraph
4. interesting detail embedded in an uninteresting paragraph

For treatment 1 and 3, information was given ahead of time regarding Hawking's scientific work, prior to the text about his illness. Subjects were then given recall tests similar to those in the 1989 study. Results showed that interesting details were highly memorable and important generalizations were not. It was also shown that information of moderate interest/moderate importance or high interest/low importance was recalled better than information of low interest/high importance, showing that interest was a better predictor of recall than importance. Placement of interesting detail had no significant effect.

The study also showed that higher rated interest was a particularly good predictor of high recall when the prior knowledge of the material is low (as is the case for many instructional texts). The authors suggest that trying to make something interesting might not be the solution, but rather finding something in the subject that is of interest. They close with a quote by Dewey (1913):

> *I know of no more demoralizing doctrine--when taken literally--than the assertion of some of the opponents on interest that after subject-matter has been selected, then the teacher should make it interesting. This combines in itself two thoroughgoing errors. On one side, it makes the selection of subject matter quite independent of the question of interest--that is to say of the child's native urgencies and needs; and further, it reduces method in instruction to more or less external and artificial devices for dressing up the unrelated materials, so that they will hold some attention. (p.23).*

Garner, R. and M. G. Gillingham (1990) Topic Knowledge, Cognitive Interest, and Text Recall: A Microanlaysis. *Journal of Experimental Education*. X:310-319.

The premise of this study was an important study by Kintsch (1980) that argued that everything else being equal, cognitive interest of a text is determined by the degree of prior knowledge one has about a topic. Kintsch suggested that cognitive interest is low with little or no knowledge, higher with more knowledge and then drops again with much knowledge (when the reader learns little from the text).

To test this theory, this study involves a descriptive text on the topic of Stephen Hawking and his scientific work. Thirty-six undergraduates were divided into two groups. Each group received a five-paragraph text, one containing "seductive detail" and one not. Each subject was then measured for topic knowledge, cognitive interest and text recall. Results supported Kintsch's theory that cognitive interest and recall of a text is determined by how much a reader knows about the topic. "Moderate topic knowledge is associated with high cognitive interest. High interest, in turn, is associated with high

recall (both free and structured)" (p.317).

The implications of this are that if low topic knowledge is associated with low interest which is then associated with low recall, providing a text on a subject in an attempt to inform low-prior-knowledge students may be futile. "A better instructional tactic may be to provide some background information on a topic before it is presented" (p. 318).

Graves, M. F., M. C. Prenn, J. Earle, M. Thompson, V. Johnson and W. H. Slater (1991) Improving instructional text: Some lessons learned. *Reading Research Quarterly.* 26:110-122.

This study was an attempt to replicate an earlier study (Graves et al., 1988) where 400 word passages were rewritten by linguists, composition instructors and Time-Life writers from an 11th grade history text to make them are understandable and memorable. Results of the initial study indicated that the revisions made by the Time-Life staff increased recall significantly, where those of the linguists and composition instructors.

Results of this follow-up study and other replications failed to show this same effect, but showed that the composition instructors' revisions were the most effective for producing recall. Explanations of the differences include the possibility that in the second study the interesting (yet irrelevant) information in the Time-Life revisions hampered the learning of important information. Success of the composition instructor's revisions in the first study could have been caused by the fact that the composition instructors added interesting information, but information that was germane to the main ideas of the passage and not simply emotionally interesting (i.e., "seductive detail"). Sadoski, a noted psychologist, also noted the informal style of the composition instructors' revision that has a "noticeably more conversational tone that brings the reader in closer" using vivid metaphors (p. 118).

In an attempt to further explore these criticisms, the authors analyzed the passages for interest-creating material (e.g., death, danger, sex , other topics that create absolute interest) and material that includes dramatic verbs, personal pronouns (tend to draw the reader in), character identification, fast action, concrete detail, and novelty. Results of the tallies of interesting factors in the passages also uphold the criticisms. In the first study composition instructors propositions judged to be interesting at 33% and Time-Life at 42%, while in the second study composition instructors' received 49% and Time-Life 48%. In the second study it was also judged, upon further examination, that Time-Life revisionist's "seductive details" such as "leech infested jungles," "razor sharp bamboo sticks" and the like drew attention away from main events.

Gudmundsdottir, S. (1991) Story-maker, story-teller: narrative structures in curriculum. *Journal of Curriculum Studies.* 23(3):207-218.

The author compares the use of narratives in two high-school social-studies classrooms. Over a period of four months, the teachers were interviewed five and six times, and observed teaching twenty and twenty-two times. Conclusions drawn from the

experience are that teaching is a way of "making meaning." Teachers must translate their private meanings into a form they think their students will understand. To do this they need a knowledge-base: pedagogical content knowledge. To make meaning for teachers involves the creation of narratives, curriculum stories, and shorter stories.

Narrative ordering makes individual events comprehensible by identifying the whole to which they contribute and the effect one has on another. In narratives, the combinative dimension moves the story along, and the selective dimension selects significant or important elements out of an unorganized or semi-organized experience.

The author defines a good story as one that enables the instructor to make connections and help learners detect relationships. If an event has no significance to something that happens later in the story it does not belong in the narrative. A series of events without consequential significance is not a story.

Hare, V. C., M. Rabinowitz and K. M. Schieble. (1989) Text effects on main idea comprehension. *Reading Research Quarterly.* XXIV(1, Winter):73-88.

In two studies the effects of selected text features on students' main idea comprehension was examined. Seventy-five fourth grade, 78 sixth grade and 107 eleventh grade students in the United States participated. In the first study, subjects were asked to identify the main ideas of two kinds of text with a listing structure: contrived instructional texts and less constrained texts such as those in content area textbooks. In the second study, the same subjects identified the main ideas of texts of four different structures: listing, sequences, cause/effect and comparison/contrast. In half of the texts of each structure the main idea was explicit while in the other half, it was implicit. In both studies the authors found a number of ways in which the subjects' identification of the main idea of a text is affected by text content. Their findings also indicate that both comparison/contrast and cause/effect texts, but not sequence texts, did pose greater difficulty for subjects than texts of the same or similar structures. Subjects also experienced greater difficulty identifying implicit main ideas in texts of all structures. This difficulty should be taken into consideration when writing stories in which it is important to convey a conservation message.

Hidi, S. and W. Baird (1986) Interestingness -- A Neglected Variable in Discourse Processing. *Cognitive Science.* 10:179-194.

This article is largely a review article of the literature on interestingness in text. Citing other authors, Hidi and Baird argue that interest and affect are important factors in comprehension, learning and recall of discourse along with the traditional structural and organizational models as they are crucial to "motivation" and "memorability" in that if dull, they will never be able to deliver their message.

Important factors that make stories interesting: suspense, well-formedness, affective response, abnormality or non-normativeness, violations from schema-congruent

expectations when schema-relevant information is omitted, background knowledge and "absolute interests" such as death, danger, power or sex.

Hidi, S. , W. Baird and A. Hildyard (1982) That's Important, but is it Interesting? Two factors in Text Processing. In Flammer and Kintsch [Eds.] *Discourse Processing.* (Pp. 63-75).

This study examines the three types of texts that children most generally encounter in the classroom: expository, narratives and mixed expository/narrative in an attempt to uncover the relationship between interestingness and recall. Twenty-seven grade 5 children and twenty-eight grade 7 children were asked to read passages with one type of text style (expository, narrative or mixed) and then asked to free recall immediately and then again a week later.

Immediate recall results showed that narratives seem to be recalled the best. Delayed recall results show an interaction between age and text type. Grade 5 children show little difference between recall of different text types, although recall of narratives was superior. Larger differences were found for the Grade 7 children with essential material being recalled more in narratives than in mixed texts. Recall of expository text was approximately half-way in between the narrative and mixed for the seventh graders.

For both ages greater essential ideas were recalled for the narratives and the expository texts than for the mixed texts, suggesting that retention of essential ideas may be hindered by mixing essential and interesting information in an unrelated manner. These findings support previous research that suggests that texts are harder to comprehend and more easily forgotten if they violate structural expectations of the genre (Bower, 1976; Thorndyke, 1977). It has also been suggested that this mixing of styles confuses a readers ability to employ his/her problem solving strategies for understanding the text.

Hidi, S. and W. Baird (1989) Strategies for increasing text-based interest and students' recall of expository texts. *Reading Research Quarterly.* 23:465-483.

Although somewhat ignored in the past, recent studies have shown that interest is an important concept in increasing comprehension and recall of school texts. This study used three different strategies to create text-based "interestingness" that would improve a student's recall. The first strategy involved a text that included the following attributes: (1) character identification, (2) novelty, (3) life theme, and (4) activity level. The second story strategy used the same base text as in study number one, but inserted information that elaborated on the central ideas of the text. The third strategy introduced a resolution concept to the base story. Subjects were asked to read each story and were tested on their recall of key points immediately following reading the text, and one week later. They were also asked to rate how interesting the story was. The authors concluded that the last two strategies increased readers' subjective interest, but recall was not significantly different from that of standard texts for the important content. However, the interest-evoking strategies were most effective in increasing students' recall of concrete, specific,

or personally involving information, but not that of abstract, general or scientific information.

Iran-Nejad, A. (1987) Cognitive and affective causes of interest and liking. *Journal of Educational Psychology*. 79(2):120-130.

In two experiments subjects read randomly selected stories and rated the degree of surprisingness, interestingness, liking and resolvedness of the story ending. The subjects, 168 female and 72 male undergraduate students, rated high-surprise story ending with more resolve relatively more interesting than those with post-surprise incongruity. The results supported the author's hypothesis that interest and liking arise from different outcomes. Overall, surprise had no effect on liking but did influence interest. Outcome valence was the only factor that had clear and substantial influence on liking, but it had no effect on interest. These findings suggest that stories are rich in motivational factors and if one wants to increase information's ability to arouse interest, stories may be a way to do so.

Jose, P. E. (1988) Liking of Plan-Based Stories: The Role of Goal Importance and Goal Attainment Difficulty. *Discourse Processes*. 11:261-273.

This study tests the hypothesis that narratives involving important goals will be more likable than ones involving a trivial goal. This study also researched the importance of how difficult it is to reach the particular goal. The experiment used grade school children and college students to test the hypothesis. The reason for the age diversity was the belief that as we grow older, the importance of the goal itself becomes more important than goal attainment in deciding whether a story is likable or not. The results showed that there was a bias in subjects as to their judgment of goal importance and goal attainment difficulty -- the two factors were expected to occur together in a story. This expectation was stronger in the adult subjects, suggesting that a person's schema evolves from grade school to college. The author also suggests that prior research has failed to take into account that the primary function of stories is to entertain, thus underestimating the role of affect in reader's response to stories.

Kirkland, J. (1976) Interest: phoenix in psychology. *Bulletin of British Psychology*. 29:33-41.

This paper surveys relevant literature and suggests that the essential psychological concept with which to handle intense cognitive involvement is interest. Interest is defined as the voluntary application of a skill. A model is discussed which depicts an assumed progression of three other related concepts culminating in interest. The constituent elements in the complete progression are attention, curiosity, skill and interest. The progression depicted in the model shows, briefly, that curiosity is triggered by attention to an environmental anomaly; sustained and persistent effort applied to resolve curiosity leads to skill development and, finally, application of this skill to solve other problems. This sequence can be arrested at any point and interest thwarted. The

author suggests that interest has an affect on human behavior. Perhaps interest is an essential element when developing stories which are created to change behavior.

Omanson, R. C., W. H. Warren and T. Trabasso (1978) Goals, Inferential Comprehension, and Recall of Stories by Children. *Discourse Processes.* 1:317-354.

Inferential comprehension and recall of stories by children, 5 and 8 years of age, were studied varying the protagonist's motivation (negative, positive or neutral goal) and other material crucial to understanding in an attempt to understand if one or another lead to better understanding. Results showed that the inclusion of motivational and referential information in regards to setting led to increases in both qualitative and quantitative answers to questions measuring inference. This effect was particularly prominent in the case of negative goals. This study shows that stories in which the protagonist has either negative or positive goals are more easily understood.

Sadoski, M., E. T. Goetz and S. Kangiser (1988) Imagination in Story Response: Relationships Between Imagery, Affect and Structural Response. *Reading Research Quarterly.* 23(3):320-336.

Current debate in literary criticism and reading theory focus on the relative importance of the fixed language of a text and the reader's disposition as factors influencing communality and variation of reader response. The authors used both quantitative and qualitative methods to investigate the convergence and divergence of several aspects of reader response to selected short stories read in a classroom setting. Thirty-nine college students read three short stories with similar plot structures and rated each story by paragraph according to one of three criteria: the degree of mental imagery evoked, the degree of emotion evoked and the degree of importance of the paragraph to the story as a whole. Paragraphs that received high ratings on all three scales were identified, and students were subsequently asked to explain the reasons for their high ratings for these paragraphs, using a free-response reporting format. Significant convergence was found in both the quantitative ratings and the qualitative reports, but interesting divergence was also found, particularly in the imagery reports. Nonlinguistic processing, i.e. mental imagery evoked by the passage, played a large role in how interesting a story was and the overall experience of reading stories. Imagery in stories may be a unifying comprehension strategy.

Sawyer, M. H. (1991) A review of research in revising instructional text. *Journal of Reading Behavior.* 13(3):307-333.

Readers' expectations can override a text's underlying logic. In 1975, for example, Spiro found that recall errors could be induced when subjects were presented with readings that contradicted their expectations. A number of researchers have hypothesized that if a text was interesting, students would find it easier to recall.

Anderson, Shirey, Wilson and Fielding have suggested four attributes that appear to contribute to sentence interest and perhaps subsequent recall. These include:
1. Character Identification: people are more interested in characters with whom they readily identify,
2. Novelty: novel or unusual content will enhance interest,
3. Life theme: people are interested in what is important to them, and
4. Activity Level: material that describes intense actions and feelings is more interesting than static scenes and less intense states.

Using these guidelines, Hidi and Baird, 1988, tested how interestingness affected fourth and sixth graders' recall of a history textbook passage. They incorporated three of the four attributes, excluding life theme, to make a base text. Results showed that the recall of the text which included these attributes were significantly higher than for a standard text.

Schiefele, U. (1991) Interest, learning and motivation. *Educational Psychologist.* 26(3/4):299-323.

The focus of this article is on two forms of individual interest, that of interest as a latent characteristic and as an actualized characteristic. Individual interest is defined as a relatively enduring preference for certain topics, subject areas, or activities; relatively long-term orientation of an individual toward a type of object, an activity, or an area of knowledge. Two components of individual interest are feeling-related and value-related valences. Feeling-related valences are feelings associated with a topic or an object while value-related valences are the attribution of personal significance to an object. It is proposed that objects of interest are preferred because involvement with them creates strong feelings of excitement, while other objects are preferred mostly because of the strong personal meaning they have. Actualized interest is when a person is in a state of being interested in a certain topic and wants to learn about (or become involved with) that topic for its own sake; for example passing an exam.

Four studies compared the comprehension of high-interest and low-interest learners to reflect the varying degrees of depth processing. Measures of intelligence and prior knowledge were used as control variables in order to examine the contribution of interest independently. The results of the studies indicate that interest is a significant factor for the depth of text comprehension, the use of learning strategies, and the quality of the involvement, enjoyment and concentration while learning. In addition, there is evidence that these dimensions of experience were also related to the level of comprehension. This article suggests that interest is an important mental resource for learning.

Thorndyke, P. (1979) Knowledge Acquisition from Newspaper Stories. *Discourse Processes.* 2:95-112.

This study was done to assess the effect of various information organizations, or ways of presenting information in the narrative, on the learning of meaningful texts to

see whether or not an optimal organization could be identified. Newspaper stories were used as the source of materials for the experiment. The author suggests that the standardized organization (most important facts first, followed by less important facts) of a news story is not the most comprehensible for the learner attempting to learn the facts. Results showed that subjects learned little of the irrelevant and redundant information of the newspaper story as compared to the other information in the story. The author concluded that people most likely have available a set of schemata for text organization. Different schemata will be used depending on the content of the text. For example, when the significance of an event is dependent upon knowledge of its historical context, then arranging the facts in a narrative organization might be the most optimal for someone wanting to learn the facts. However, if narrative information is only incidental but not central to the main point, another form, such as an expository essay, might be more appropriate. The lesson here is that it is important to know who your audience is and what it is you want them to understand.

Vrana, S. R., B. N. Cuthbert, and P. J. Lang. (1986) Fear imagery and text processing. *Psychophysiology.* 23(3):247-253.

People respond to vivid text in a manner similar to actual emotional situations. The experiment described in this article instructed sixty-four undergraduate students to imagine and silently repeat fearful and neutral sentences that either included or excluded information about bodily responses to the image. Heart rate accelerated more during fear imagery than during neutral imagery or silent repetition of either type of sentence. From the experiment, three variables were thought to influence heart rate response during the processing of vivid text. These variables include a mode of processing, context of text and response information included in text. The studies supports the hypothesis that the imagery of an event reaches a memory network which contains both semantic and response information.

Wade, S. E. and R. B. Adams (1990) Effects of Importance and Interest on Recall of Biographical Text. *Journal of Reading Behavior.* 22(4):331-353.

The purpose of this study was to investigate two characteristics of text -- structural importance and text-based interest and to what degree they affect reading recall. Two experiments were conducted. In the first experiment, college students rated sentences in a biographical text for both interest and importance, which were found to be positively related. Four categories of sentences were established: high importance/high interest (main ideas), high importance/low interest (supporting details), low importance/high interest (seductive details) and low importance/low interest (common events unrelated to the main idea). The second experiment had a similar group of students read the passage and then recall it immediately and a week later.

Results showed that interest had a powerful effect on recall with the both high interest categories (main ideas and seductive details) having the highest recall for both good and poor readers for both immediate and delayed recall tests.

"Therefore, researchers and educators need to develop alternative strategies for creating textbook materials so that important information will be more memorable. Rather than focusing on topics that arouse emotional interest, strategies are needed to increase cognitive interest. Cognitive interest may occur when learners are able to relate new information to their background knowledge and when they believe they are learning something new and worthwhile" (p. 348). Another important tactics to help aid in learning information from text could be making students aware of the signals in texts that aid in learning (e.g., previews, summaries, discussion questions, chapter headings, paragraph headings).

Yussen, S. R. (1982) Children's Impressions of Coherence in Narratives. *Advances in Reading/Language Research.* 1:245-281.

Structural Salience - What elements in a text are salient for the reader/listener? One experiment with adults, second, fourth and sixth graders showed that with increasing age there was an increase that subjects would identify a pattern of story containing all key categories of stories (Initiating, Event, Action and Consequence) as the major elements. "Theory and past research suggest that in simple narratives, the basic sense of a story can be conveyed by knowing what precipitated a character's action. However, young elementary school children did not appreciate this fact, while older ones do a significant part of the time" (p. 253).

Story Production - Analyzing the production of stories children tell can be useful in discovering 1) what social themes they believe to be important, 2) how they view character motivation, 3) how they develop one or more episodes, logically, and 4) information that they seem necessary to share with their audience. The most important characteristic noted is that of a highly structured content. The children's stories showed a remarkable lack of character motivation including lack of internal motivation, goals or feelings. Relevance of these studies for understanding children's understanding of stories is that younger children do not readily spot what is most important in a story.

An Example of Stories in Use

Armstrong, D. (1992) *Managing by Storying Around – A New Method of Leadership.* NY: Doubleday.

David Armstrong knew that people like to hear stories and he himself loved the idea of telling a story to get a point across. He decided to tell stories in his company, Armstrong International. These stories would be about the company's goals and objectives and would explain core values and visions of the future, and would celebrate their victories. It turned out to be an amazingly effective form of communication. There are many reasons why the author advocates management through storytelling. Following is a list of some of major points as expressed in this book.

1. It's simple – anyone can tell a story.
2. They're timeless and fad-proof.
3. Stories are demographic proof – the nature of your work force will change over time, but you can always use storytelling as a communication device.
4. Stories are an excellent way to pass along corporate traditions. Through a company's stories you get to find out what a company is like.
5. It's a superior form of training – it lets people know what will get them fired or promoted.
6. Stories are a way to empower people.
7. It's a wonderful form of recognition – people love to hear and read about people, especially themselves.
8. A great way to spread the word.
9. Fun.
10. A great recruiting and hiring tool.
11. Memorable.

The main premise of this book is that telling stories changes the way you manage. You become a different type of leader. Armstrong, Int. has found stories to be so effective that stories have replaced the policy manual. Storytelling promotes self management by giving people guidelines and then leaving it up to them. Armstrong says: " Telling a story, where you underline the moral, is a great way of explaining to people what needs to be done without saying 'do this". Stories get people to listen and that makes teaching easier and understanding more likely. According to Armstrong, an effective story should include the following:

1. The story should underscore the point you are trying to make.
2. You should know your audience and tailor your story accordingly.
3. Storytelling today has to be based on truth to have credibility.
4. Keep things as simple as possible.

The book also includes many of the stories that Armstrong uses in managing his company and their accompanying morals. The last chapter of the book contains a detailed checklist of how to write a story according to the author. This book is very important in the context of our current research as it is documented evidence that stories do work.