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Improving reading comprehension through the formation of mental images

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Improving reading comprehension through the formation of mental images

Abstract

This literature review explores recent research to support the hypothesis that training students to form mental images will facilitate comprehension and enable the reader to find more enjoyment while engaged in the reading process. There is a relationship between forming mental images and age. Beginning readers need illustrations to enhance comprehension; however, by the third grade level many students are able to improve their comprehension when instructed in forming mental images. Among poor comprehenders mental imagery was shown to be effective as a memory and comprehension device. The findings of this review suggest to educators that the training of self-generated mental imagery should be given greater importance in the elementary school curriculum.

**Improving Reading Comprehension
through the Formation of Mental Images**

**A Graduate Review
Submitted to the
Division of Elementary Education
Department of Curriculum and Instruction
in Partial Fulfillment
of the Requirements for the Degree
Master of Arts in Education**

UNIVERSITY OF NORTHERN IOWA

**by
Betty A. Young Schmidt
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This Review by: Betty A. Young Schmidt

Titled: Improving Reading Comprehension through the Formation of
Mental Images

has been approved as meeting the research requirements for the
Degree Master of Arts in Education.

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Abstract

This literature review explores recent research to support the hypothesis that training students to form mental images will facilitate comprehension and enable the reader to find more enjoyment while engaged in the reading process. There is a relationship between forming mental images and age. Beginning readers need illustrations to enhance comprehension; however, by the third grade level many students are able to improve their comprehension when instructed in forming mental images. Among poor comprehenders mental imagery was shown to be effective as a memory and comprehension device. The findings of this review suggest to educators that the training of self-generated mental imagery should be given greater importance in the elementary school curriculum.

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Improving Reading Comprehension Through the Formation of Mental Images

Introduction

In my third grade classroom, each year there are only two or three students who do a lot of independent reading. These are the same students who comprehend well. Why are so few students motivated to do independent reading for pleasure?

By the time students enter the doors to kindergarten, they have viewed thousands of hours of television and videos. It would seem reasonable to expect them to be as visually-prepared to learn as they are verbally-prepared to learn. Having seen millions of visual images it would seem that they would be able to form mental images easily in their minds. They should be able to form mental images while reading, or listening to, the printed word. To do this, however, requires the student to reflect upon the words, using such skills as analyzing, synthesizing, and evaluating the new knowledge, as well as drawing on prior knowledge and past experiences.

Statement of the Problem

Are so few students in classes becoming independent readers because they prefer the instant gratification they get from visual images on the television screen more than the mental images which they have to form while reading? Is it possible to help children gain the ability to form mental images as they read? Can improving their ability to *image* become the key to improved comprehension? The question this review of literature addresses is the following: does training students to form mental images improve their reading comprehension and result in more independent reading?

The Need of the Study

Several teachers in the Riverside School have suggested that our reading program needs to focus on aiding students in becoming self-motivated readers. It would be wonderful to see students as interested in reading a book as they are in watching television. If they could picture in their minds the scenes from the stories they read, perhaps the printed word would begin to draw their interest. This consideration leads to the hypothesis that there is merit in training students to form mental images.

Method of Review

It is not feasible for a classroom teacher to conduct experiments to determine if training students to form mental images aids comprehension in reading. Such a study would require clinical conditions which are not appropriate in a classroom setting. However, quality research has been conducted, and it documents well the formation of mental images during the process of learning. The purpose of this paper is to gather and synthesize these research findings and to apply them to a search for a practical approach to improving reading comprehension.

Sources for this literary review were identified and located through the ERIC system, using *forming mental images* and *reading comprehension* as descriptors. The review process included: (a) reviewing the studies, (b) noting pertinent details relating to the research questions stated above, and (c) applying those ideas to practical classroom approaches.

Definition of Terms

complete picture: a picture that depicts the complete contents of each sentence of the story.

comprehender: one who comprehends what he/she reads

dual coding: occurs with respect to verbal (print) and visual (images) processing of information

imagery organization: the ability to organize images in one's mind

interactive imagery: to make a cumulative picture in which a mental picture of each new item was added to interact with the mental pictures of previous items

paired-associative recall: to form a mental picture of each individual member of each pair presented

partial pictures: depicted only a portion of the contents of each sentence of the story

single item recognition: make a picture in one's head of each individual item presented

Analysis and Discussion

Two types of poor readers were identified by Wiener and Cronin (1967) as the deficit poor reader and the difference poor reader. A deficit poor reader is assumed to comprehend poorly because he is lacking certain necessary prerequisite skills (e.g. decoding or vocabulary knowledge). A difference poor reader is assumed to possess the prerequisite skills, but nonetheless experiences comprehension problems because his spontaneous reading habits differ from those of good readers.

In 1973 Levin conducted a study in which he found that instructions to use visual imagery were relatively more facilitative for the difference poor readers ($p < .025$) than for the deficit poor readers. This suggests that imagery organization facilitates comprehension when the students have adequate vocabulary skills. The deficit poor readers produced 2% fewer correct responses when given imagery instructions than did the difference poor readers.

This evidence suggests that the reader must have built a vocabulary appropriate for his/her age in order to use instructions effectively in forming mental images while reading. Prior knowledge and experience in the reader's *image store* are drawn upon when engaging in the formation of mental images.

To explore further the relationship of forming mental images and improving reading comprehension, consider the research entitled "Imagery instructions and the comprehension of text", conducted by Kulhavy and Swenson (1975). In this study half of the subjects were instructed to form mental images of the text during reading. The students in the control group were simply told to read carefully. The analysis of scores showed significantly better performances by students who were given imagery instruction. These results were obtained through delayed testing, as well as through immediate testing. The results suggest that grade school students remember more from a text if they try to form mental images while reading. The pooled-delay scores showed that imagery instructions act to increase text-content learned over time. The implication is that if one can supply learners with an efficient memory strategy, more is likely to be remembered from the study of a text.

In 1976, Pressley hypothesized that mental imagery helps eight-year-olds remember what they read. In this study the experimental group received a short training session on forming mental images of what they read; they were instructed to form mental images after reading a page of text. The control group was told: "Do whatever you can or have to in order to remember". The analysis of data showed the experimental group remembered significantly more of the text than did the control group. This suggests that we may be able to improve the memory of easily imagined story

parts if we (a) tell them to use mental imagery to facilitate their memory and (b) give them practice in forming mental images as they read. We should not instruct them to read and image at the same time; they should form their mental images after having read a portion of text. This research suggests that mental imagery can be easily taught in the classroom and can improve students' memory of passages they read.

The author speculated that because the difference between experimental and control conditions was relatively small, and the control subjects were instructed to do whatever necessary to remember, then it is possible that many of the control subjects were also imaging. Also, it could well be that skilled readers process prose so well spontaneously that the imagery strategy may not greatly improve their information processing.

In 1977, Guttman, Levin, and Pressley conducted a study involving children from the kindergarten, first, and second grade levels. Kindergartners were chosen to study because earlier research suggested they would benefit from complete pictures, but not from simple imagery instructions. The researchers' suspected that at the second grade level a positive effect of partial pictures might be demonstrated. The third grade level was chosen to represent an age at which all three types of conditions (complete picture, partial picture and imagery, plus a control condition) would be beneficial.

The results showed that for kindergarten subjects only the complete condition was facilitative; the complete-picture subjects surpassed students in all the other three conditions. In the third grade, all three *picture* conditions surpassed the control condition; however, there was no statistical difference among the three picture conditions. The second grade results found only the complete picture-condition facilitated performance, as compared to both image and control conditions. This study suggests that there are

developmental differences in the ability to profit from a complete self-generated imagery strategy and that children can benefit from experimenter-provided clues to generate imagery.

In 1981, Gambrell conducted a study in which the primary hypothesis was that mental imagery facilitates access to prior knowledge and therefore enhances the ability to infer and make relevant test predictions. She found no statistically significant differences at the first grade level on the number of facts recalled or the number of predictions made between the experimental and the control groups. The third grade results showed statistically significant differences in favor of the induced mental imagery group (the number of recalled facts and the number of predictions). This study supports Pressley's (1976) conclusion that induced mental imagery facilitates reading comprehension for students at the third grade level and above. Both studies, however, indicate that induced mental imagery does not enhance reading comprehension for beginning readers.

Cramer (1981) conducted two experiments with first grade and fifth grade subjects. The purpose of the first investigation was (a) to determine the relationship between learning performance and self-reported use of imagery in conditions in which the subjects either have or have not received imagery instructions, (b) to provide information about the effects of induced imagery on single-item recognition, and (c) to determine whether different kinds of imagery instructions affect different aspects of the learning process. The first experiment was designed to test effects of imagery instructions on single-item recognition and paired-associative recall in the two age groups.

In single-item learning, fifth graders with interactive imagery instructions gave significantly more correct responses than fifth graders with neutral instructions. The responses of fifth graders with separate imagery

instructions did not differ from those with neutral imagery instructions. Among the first graders, there was no difference between either imagery condition and the neutral condition.

The results of this experiment indicate that statistically significant instructional effects on learning can occur when fifth graders are given interactive imagery instructions, these instructions seem to facilitate both single-item and paired-associative learning. Separate imagery instructions had no significant effect on single-item learning in either grade. The study showed that performance on paired-associative tasks was related to the use of interactive imagery. In both first and fifth grades, subjects using interactive imagery had significantly higher recall scores than subjects not reporting the use of imagery.

The second experiment was conducted to determine the reliability of the relation between the reported use of imagery and learning performance found in the first experiment. The results of the two experiments were consistent. The only statistically significant effects of imagery instruction on learning occurs with fifth graders who were given interactive instructions.

Despite the lack of effect of imagery instructions for the first graders as a group, further analyses indicated that the reported use of imagery by these subjects was related to learning. In both experiments, the first graders who reported using interactive imagery showed better pair-associative learning than those not using imagery.

Fifth graders using interactive imagery were consistently superior in their recall to those reporting no imagery. There is an interaction between age and effect of imagery instructions, and between age and the effects of the type of imagery used.

In 1982, Oliver conducted three experiments in a study designed to determine whether an instructional set for visible imagery would facilitate reading comprehension of elementary students (third through sixth grade levels). The results of the three experiments suggest that better readers at the elementary level can improve their reading comprehension by developing a strategy in which they intend to visualize from what they read.

Gambrell and Koskinen (1982) conducted a study of mental imagery and the reading comprehension of below average readers; they investigated situational variables and sex differences. Since mental imagery appeared to be associated with efficient learning and remembering, they reasoned that it may provide a critical link for the reader moving from a novice to a sophisticated comprehender level of ability. It may well be that for below average comprehenders, forming mental images while reading may add an additional processing burden which may actually inhibit comprehension. They proposed that instruction to induce mental imagery at the conclusion of the text reading would not require dual coding to occur simultaneously, but might serve as a summarization or rehearsal strategy for the below average comprehenders. The study was designed (a) to investigate the effectiveness of instructions to form mental images prior to reading text and at the conclusion of the reading, and (b) to determine possible differences in the ability of below average sixth grade readers to form mental images.

The findings of the study indicate that mental imagery instructions given prior to text reading facilitates the retention of literal comprehension of the expository text. The findings also suggested that males benefited more from instruction to induce mental imagery than did females.

The results of the study are in agreement with the theory that instructing readers to induce mental imagery enhances their comprehension of

expository text. There was a significant difference with respect to literal comprehension in favor of instructions given prior to the reading of expository text. The hypothesis that dual, simultaneous processing of print in formation of mental imagery may inhibit reading comprehension for below average comprehenders was not supported. The findings do, however, support the hypothesis that mental imagery instructions given prior to text reading induces dual coding of the incoming text, resulting in increased comprehension.

The below average male subjects recalled significantly more than the below average female subjects on the free recall and cued recall questions. The sixth grade boys were more proficient at inducing mental imagery than the sixth grade girls and this resulted in superior reading comprehension by the boys; this suggests that mental imagery may be a reading process strategy particularly effective for males.

In 1991 Oakhill and Patel conducted a study to determine whether imagery training might help children who have comprehension problems. Three different types of questions, (factual, inferential, descriptive) were asked of the 9-10 year old subjects after they had read a passage. An effect of comprehension skill was seen, with the good comprehenders answering more questions correctly than the poor comprehenders ($p < .01$). A main effect of the training condition was that the students given imagery training performed better than the control group ($p < .01$).

By comparing the effects of training for the two groups, as predicted, the poor comprehenders receiving the imagery training showed marked improvement in memory of the passage and performed significantly better on the test questions than the control group of poor comprehenders ($p < .001$). There was no such difference with the good comprehenders.

The results suggest that imagery training is especially effective for students without adequate comprehension skills. It had an impact on their performance and did not differentially affect their retention of information of different types. Poor comprehenders may benefit from imagery training because it enables them, or forces them, to integrate information in the text in a way that they would not normally integrate it. It may help them overcome some of the limiting factors in their comprehension skills.

In 1993, Gambrell conducted and published a study designed to answer the following questions. Which is more effective in enhancing elementary students' comprehension of stories, attending to illustrations or generating mental images? Does the combined strategy of attending to illustrations and generating mental images hinder or enhance reading comprehension relative to either strategy alone?

The results showed the performance of students in the imagery + illustration group to be superior to all other treatment conditions. Also there were statistically significant differences between the performance of subjects in the imagery-only condition and that of subjects in the control condition, in favor of the imagery-only group.

A major finding in the study was that comprehension performance was enhanced when the students received instructions to induce mental imagery and to attend to the illustrations. The results suggest that when readers combine the two strategies something happens apart from that which occurs when imagery or illustrations are used alone. Gambrell stated that future research needs to be done to determine if the findings will be generalizable to other stories, types of illustrations and text structures, as well as age groups and types of readers. She also stated that perhaps the imagery-only instructions were not as effective because the students were not clear about

what to image. In the combined group, the illustrations may have provided concrete representations; this may have allowed the students to make more elaborate mental images and to encode more efficiently encode the ideas into their memory, thus making it easier to retrieve and manipulate.

There is evidence in the study that mental imagery was more effective as a memory and comprehension device than attending to illustrations only. The students in the imagery-only recalled more story structure elements than the control group. There was, however, no statistically significant difference between the illustrations-only group and the control group. In the imagery-only group 58% of the students wrote complete stories compared to 40% in the illustrations-only group. These results suggest that instructions to induce mental imagery may be superior to attention to text illustrations as a strategy for holistic story comprehension.

This study supports the hypothesis that induced mental imagery may facilitate the reader's entry into a secondary world of the story, resulting in greater depth of processing and increased story comprehension and recall.

Conclusions

The major finding in this literature review is that training students to use mental imagery does facilitate reading comprehension. Research shows that there is a relation between age and the ability to self-generate mental images, and that most students do not have the ability to use mental imagery until third grade level. Cramer (1981) found that some first graders in the group did use mental imagery and showed better pair-associative learning than those not using imagery. Guttman, Levin and Pressley (1977) produced evidence that kindergarten students showed reliability in improved reading comprehension only when using complete pictures. Relative to both image and control conditions, the second graders found only the complete picture

condition facilitated comprehension. At the third grade level the picture conditions and the imagery condition surpassed the control condition. Gambrell (1981) found that first graders showed no evidence of aid to comprehension when using mental imagery; however the third grade results show statistically significant differences in favor of induced mental imagery in recalling facts and making predictions. Oakhill and Patel (1991) found that poor comprehenders in a group of 9-10 year old subjects given imagery training showed marked improvement over the group of poor comprehenders receiving no imagery training.

From this data, educators can conclude that a prerequisite to forming mental images is a broad experience of guided viewing of picture books and illustrations in the preschool through second grade levels. To form mental images, the students must reflect upon what they have read or heard, as well as draw upon their imagination. When the student has a rich store of images to retrieve and manipulate, self-generated mental imagery will result. With such a background, students at the third grade level are more successful when using imagery strategies to remember prose materials. Gambrell (1993) states that something occurs when students use imagery plus illustrations; something enhances comprehension more than when imagery or illustrations are used alone.

Levin (1973) found that deficit readers (lacking skills e.g. decoding, vocabulary) did not benefit from induced mental imagery. However, Oakhill (1991) observed that poor comprehenders with imagery training surpassed the poor comprehenders of the control group in memory of passages and performance in answering questions. The conclusion can be drawn, therefore, that students with reading comprehension difficulties do benefit from instruction in attending to illustrations and in self-generating mental

images. This should be an important consideration when developing a curriculum for remedial readers.

Gambrell and Koskinen (1982) found that giving students instruction in forming mental images before they start to read facilitates comprehension of the text. This information coupled with the finding that poor comprehenders may benefit most from the imagery plus illustration condition (Gambrell, 1993), suggests that beginning a lesson by studying the illustrations, and giving students instructions regarding the formation of mental images, and then following this with having the students read the text results in the students remembering more of what they read.

Recommendations

This body of research supports the theory that training students to form mental images will aid their reading comprehension. Since improved comprehension is likely to result in more interest and enjoyment for the readers, this writer recommends that reading lessons regularly include instruction in visual imaging.

Training students to form mental images is not a time-consuming task. Pressley (1976) provided training on forming mental images with third graders in one 20 minute time period. It seems that these same procedures could be used in the classroom. Each student was given a booklet, told to read the first page, and then told to turn to the blank page and make a picture in his/her head of what was read. Then the students were shown a picture depicting the content of the first page. They were told that their pictures did not have to look exactly like the one shown, but that it should contain all the same elements. This was repeated with five segments of a short story. It appears that when students are given practice in forming mental images and are provided with illustrations to reinforce the appropriate elements in their

mental picture, this self-generated mental imagery helps facilitate their comprehension.

Many published reading programs do not give top priority to developing self-generated mental imagery. The school curriculum needs to build a sequential plan within the reading program. At the preschool or kindergarten level, the children should be immersed in guided studies of quality picture books, so they can build a rich store of images. As they move on through first and second grade, considerable attention should still be given to illustrations and we should begin to encourage the students to make pictures in their heads about what they hear or read. Comparing their mental pictures with models of good mental pictures will aid in the development of self-generated mental imagery. In third grade, instructions to use mental imagery should be used frequently whenever the student is engaged in reading. Continuing this practice through sixth grade would result in more students with improved reading comprehension.

Educators should continue to review future research in the area of mental imagery and reading comprehension. More research might produce data allowing us to generalize the present findings to a variety of texts, and illustrations, as well as to other ages and types of reading achievement in students.

In conclusion, this literature review finds that it is possible to improve reading comprehension through the training of students to develop mental imagery. Better comprehension is the short-term result, but the long-term effect is that the reader finds more enjoyment while engaging in the reading process. Therefore, the development of self-generated mental imagery is a reading process that should be given greater importance in the elementary school reading curriculum.

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