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# EFFECTS OF CHUNKED READING AMONG LEARNING DISABLED STUDENTS: AN EXPERIMENTAL COMPARISON OF COMPUTER AND TRADITIONAL CHUNKED PASSAGES

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**ABSTRACT**

Previous studies have indicated that chunking/phrasing of sentences into smaller groups of meaningfully related words enhances retention and comprehension. This investigation was designed to assess the effects of two methods of presenting chunked reading. Thirty learning disabled tenth- and eleventh-grade students were assigned to three groups. One training group received chunked passages displayed on the screen using computer assisted instruction (CAI); the other was administered chunked passages in the traditional mode. The control group used CAI with non-chunked passages. A posttest revealed that the CAI chunked group showed higher gains. However, the CAI chunked group's mean score was not significant when compared to the traditional chunked group. Both chunked groups were superior to the CAI non-chunked group. Thus, it was concluded that separation of reading material into meaningfully related words does significantly enhance reading comprehension and the method of presentation is not significant.

Various techniques have been employed to improve the reading abilities of poor readers. One such method is "chunking." Chunking is the grouping of words in a sentence into short meaningful phrases (usually three to five words). This process prevents word-by-word reading which can cause lack of comprehension, since students forget the beginning of a sentence before they get to the end. Thus, by grouping words or the recoding of information into fewer, more manageable units, comprehension is far more attainable to a reader. It should be noted that there are no firm rules for chunking reading material.

Chunking is necessary because the mind cannot reliably hold in short-term memory more than about four to seven separate items/words [1]. Chunking

words into phrasal units allows a reader/listener to transfer information from short-term memory (where thoughts/information is first received) to long-term memory (where comprehension is made possible). The limits of short-term memory do not allow the integration of "unchunked" information and a crucial part of meaning is lost to poor memory. Simply stated, poor readers are unable to effectively activate a method of chunking thus comprehension never takes place. Conversely, good readers automatically deploy chunking and are able to develop sentence structure in a rapid meaningful manner.

Smith assessed chunking as the largest meaningful combination of units that can be placed in short-term memory [2, p. 49].

In a study of elementary children, Amble and Kelly concluded that separating textual information into chunk/phrase induced larger gains in perception and reading comprehension [3]. Chunk/phrase reading development training has been shown to be an effective supplement to the regular language arts-reading rate and reading comprehension [3].

An investigation conducted by Stevens found that when reading in the chunked mode of presentation high school students read significantly better than when reading in the regular mode of presentation [4].

The research by Gerrell and Mason indicated that fifth graders comprehended computer-displayed chunk passages better than passages displayed in the traditional format [5].

In their fifty-one independent studies or meta-analysis of computer-based teaching of secondary students, Kulik, Bangert, and Williams drew the following conclusions [6]:

1. computer-based teaching was at least as effective as traditional instruction and sometimes resulted in substantial savings in student time;
2. student attitudes were significantly improved using computer-based instruction; and
3. most importantly, computer-based teaching raised final examination scores by a significant margin.

Spring and Perry noted that students in computer-assisted instruction (CAI) reading programs often have higher achievement in reading than do those students who are taught in a program that uses only a traditional basal reader approach [7]. The following paper seeks to investigate the effects of two presentations of chunked reading.

## METHOD

### Subjects

A total of thirty tenth and eleventh grade learning disabled students participated in this investigation.[1] The three groups (two training, one control) were comprised of eighteen girls and twelve boys. Ages ranged from fifteen

[1] The treatment of participants was in accordance with the ethical standards of the APA.

years, six months to seventeen years, three months, and 7.1 to 8.3 constituted the range on the reading section of the California Test of Basic Skills (CTBS), revised 1979. The IQs ranged from eighty-eight to ninety-five as revealed on school records. It was felt that the general reading skills of the students were adequate for this investigation. The students' academic classification (learning disabled) had been previously assigned by the local school system psychologists, evaluators, and testing team.

All students were from a middle-class suburban area, with a high school population of about 1400 (grades ten through twelve).

None of the thirty students had prior knowledge of information presented in a chunked manner or had used a computer in a reading program.

The learning disabled student is basically the student that shows evidence of normal intellectual ability, associated with a significant discrepancy between the expected level of academic performance (as determined through individually administered intelligence tests) and actual levels of achievement in major areas of academic endeavor (as reflected in individual and group achievement test indices) [8].

## Material

A total of thirty-five chunked passages were designed for this investigation, with only thirty used statistically. Five passages were used in a "warm up" procedure to standardize pretesting conditions. The thirty chunked style passages were presented as follows: fifteen used in pretesting and fifteen in posttesting. Each passage contained approximately 920-965 words. Passages, both chunked and unchunked, were displayed with twenty-five multiple-choice questions. In chunking of passages, three extra spaces were used to separate chunks. (It was felt that dashes and slash marks might be confusing to the reader.) The general guideline was that no chunk should be shorter than two words or longer than five words. Inventory revealed that 70 percent of chunks contained three to four words. Phrases chunked into four to five words are considered average.

Passages were edited and designed to have a readability level of 7.0 to 8.5 because of the previous stated means reading level of the thirty students on standardized CTBS tests. To validate readability levels between 7.0 and 8.5, the formulas established by Fry and Raygor were used [9, 10].

Three computers and a printer (to duplicate passages from computer) were used in the investigation.

Information concerning musical entertainers was used because of a high interest level previously exhibited by students.

The following is an example of a passage presented in a chunked format that was used in this investigation:

> Michael Jackson's album, "Thriller," is the largest seller in the history of the musical world. "Thriller" has sold over 39 million copies. Six songs from the album made their way into the top-20 chart. The single, "Billy Jean," was the biggest seller.

## Design and Procedure

This investigation was designed to assess the effects of two training methods of chunk reading and determine which of the two methods presented would significantly improve readability levels. The control group served as a baseline to assess practice effects on the tests. Students were randomly chosen and assigned to one of three groups (which contained ten students per group). Two training groups and the control group were designed in the following manner. One training group received chunked passages displayed on the screen using computer-assisted instruction (CAI), while chunked passages were administered in the traditional paper/text style to the other training group. The control group was administered non-chunked passages with CAI rather than paper. It was felt that the control group using CAI would dispel the possibility that higher scores attained by the CAI training group were due to the newness or novelty of using computers.

To measure the effects of students' pretest and posttest achievement scores, the following hypothesis was tested. Chunked styled presentation (CAI or traditional) would increase reading comprehension as seen through test scores with the possibility that CAI results would be more noticeably higher.

Two special education teachers and one teacher's assistant helped with procedures which took place in one resource room five hours a day, four days a week (Monday through Thursday). Friday was used for evaluation and student make-up work. All groups started and completed at the same time.

The investigation was conducted over a period of seven months. Students in each group received equal passages in pretest and posttest phases. The following schedule was used for testing of each group:

1. pretesting of groups consisted of using fifteen unchunked passages from the pool and administering them to each student;
2. five warm-up passages were dispensed to each group in their assigned training format; this phase took place in February and was not used statistically in the study; and
3. posttesting phase consisted of administering the last fifteen chunked passages to each group in their previous stated format (posttesting required several weeks to complete).

Overall, the task consisted of administering thirty-five passages to each student in each of the three groups over the period of study.

No more than two passages were available to a student at any given period. Students were encouraged to work at their own pace. Students were allowed to re-read a passage before attempting to answer the questions; however, once the students started answering the questions (in all designs), they were not permitted to stop and re-read the passage. Correct/incorrect answers to questions were displayed on screen. Only number grades were used. All passages, regardless of design, were presented in both upper and lower case.

To help insure motivation, each student was assured his/her scores would be used as a daily grade. A daily log was kept to monitor each student's academic output, daily comments, and attitudes.

## RESULTS AND DISCUSSION

This investigation which sought to discover the effects of two methods of chunking or organizing reading material into phrased units and to determine which presentation (CAI or traditional) was more comprehensible netted the following results.

The analysis-of-variance included two "between" factors (the training groups and ability levels) and a "within" factor (pretest and posttest).

The analysis showed a significant interaction associated with CAI chunked, traditional chunked, and CAI non-chunked groups and test periods ($p < .001$). The character of this interaction is shown in Table 1. Examination of the means indicated that the interaction resulted from the CAI chunked reading group and the traditional reading group's marked initial gains in reading comprehension when compared with the CAI non-chunked group who was administered non-chunked passages. This observation can be substantiated by examination of the mean scores. The mean and standard deviations of the groups were: CAI chunked mode, $M = 87.58$ ($N = 10$, $SD = 4.58$); traditional chunked mode, $M = 85.95$ ($N = 10$, $SD = 2.57$); and CAI non-chunked mode, $M = 81.90$ ($N = 10$, $SD = 5.31$).

A $t$-test results of the groups indicated that on the posttest, the CAI chunked group's performance was better than the other two groups ($p < .001$). However, the differences in performance between the two groups using chunked passages was not educationally significant ($p < .01$). Notwithstanding is the fact that the traditional chunked group showed a significant gain over the CAI group using non-chunked passages.

Within each ability group, the mean was significantly higher for the chunked mode as shown on posttest indices.

The statistical data in this investigation indicated that reading of passages in a chunked style format produces educationally significant gains in reading comprehension.

These results are somewhat parallel to the findings of Gerrell et al. who found no significant evidence to support the fact that computer (cathode-raytube) chunked passages produce higher gains than traditional text chunked passages [5]. They did conclude, however, that chunked/phrased test is easier to read in any presentation. This investigation is also in agreement with Amble et al., who found that phrased/chunked reading presented in two different modes improved comprehension, rate of reading, and grade levels on posttest and post-posttest [11]. (Amble, et al. did not use CAI.)

Table 1. Means, Standard Deviations, and Ranges for Comprehension of CAI Chunked, Traditional Text Chunked, and CAI Non-Chunked Passages at Test Periods (in Percent Correct)

| *Groups* | *N* | | *Pretest* | *Posttest* |
|---|---|---|---|---|
| CAI Chunked | 10 | *M* | 79.70 | 87.58 |
| | | *S.D.* | 4.33 | 4.58 |
| | | *R* | 72-86 | 78.93 |
| Traditional Chunked | 10 | *M* | 78.47 | 85.95 |
| | | *S.D.* | 5.24 | 2.57 |
| | | *R* | 68-84 | 79.88 |
| CAI Non-Chunked | 10 | *M* | 78.65 | 81.90 |
| | | *S.D.* | 4.95 | 5.31 |
| | | *R* | 69-85 | 72-89 |

**Note:** Maximum score equals 100 points.

## CONCLUSIONS

The results of this study can be summarized as follows. When presented with chunked reading material, tenth- and eleventh-grade learning disabled students comprehend better than those students receiving non-chunked passages. As revealed on the posttest data, practice in chunked reading does significantly enhance reading performance. The CAI training group using chunked passages did reveal somewhat larger gains over the traditional group using chunked passages; however, the difference was determined not to be educationally significant in any direction and very well could be associated with a new device (computer). Both training groups (CAI and traditional) produced larger gains on the posttest performance when using chunked passages. The control group which received CAI training with non-chunked passages showed no significant gains on the posttest when compared with the training groups, but did produce a small gain which could be associated with CAI training.

These findings suggest that the usage of a chunking device (spatial separation of reading material into meaningful related groups of words) will produce superior gains and improve the reading comprehension of high school readers with learning disabilities. The method used to present chunked material was determined not to be significant. Finally, teachers may be able to improve the reading comprehension of their students with aid of a chunking procedure.

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