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ABSTRACT

This study assessed whether word processing can be taught conceptually so that students can decontextualize concepts from a specific program setting and thus achieve a greater level of learning and far transfer. The sample for this study consisted of 38 students at Central Wyoming College enrolled in word processing classes--two sections during Spring 1991 and two sections during Fall 1991. In a pilot study 18 college students were given approximately 6 weeks training in basic word processing. Students in the pilot treatment group were taught using the conceptual abstracting instructional method and were exposed to word processing with two software programs. Students in the pilot control group were only exposed to one word processing program. Both pilot groups were asked to take a transfer posttest in a new program, as well as a test of the program studied. Pilot study results led the researcher to modify the conceptual abstracting instructional method to help students guide their thinking. The study was then conducted with 38 college students as the pilot study had been. Results support the conclusion that the conceptual abstracting instructional method increases both learning and transfer by a small amount. Results also support the use of conceptual frameworks to enhance transfer of computer skills. One figure illustrates an analogy and generic framework for merge operations. (SLD)

THE EFFECTS OF CONCEPTUAL ABSTRACTING ON TRANSFER OF LEARNING IN WORD PROCESSING

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Technology has increased the pace of change in today's office. The need to teach for transferability of skills is greater than ever. Lambrecht (1989) pointed out the need to teach students "how to use software on their own as independent professionals" (p. 25), rather than just teaching operation of particular software packages. She emphasized the need to teach problem-solving rather than using a "cookbook" approach that tells students every command and key they should use.

The Policies Commission for Business and Economic Education (1989) also views problem-solving, along with decision-making skills, as requirements for skill transfer. Learning more about transfer of skills is crucial in order to prepare students for the amount of change occurring in today's office.

Purpose

The purpose of this study was to determine if word processing can be taught conceptually so that students can decontextualize concepts from a specific program setting and thus achieve a greater level of both learning and far transfer. The study focused on the following research questions:

1. To what extent does the conceptual abstracting instructional method increase transfer of word processing skills to new word processing software?

2. To what extent does the conceptual abstracting instructional method increase learning of word processing skills?

Theoretical Framework

Perkins and Salomon (1989; Salomon, 1988; Perkins & Salomon, 1988) have proposed two roads of transfer--the low road and the high road. On the low road to transfer, practice of a particular skill leads to automaticity. When an appropriate perceptual cue is encountered in a new situation, the skill is transferred to the new situation. On the high road to transfer, learners deliberately decontextualize the main rule or strategy through abstraction with mindful effort and apply the rule or strategy to a new situation (Perkins & Salomon, 1989; Salomon, 1988).

In low road transfer, learners need extensive and varied practice in order for the skill to become automatic. This means much practice in a large variety of situations. In high road transfer, learners

need to promote the active decontextualization of knowledge through deliberate mindful abstraction or abstraction from prior experiences (Perkins & Salomon, 1989).

Research has shown that providing some sort of strategy or thinking frame can help promote transfer (Benderly, 1989; Alexander & Judy, 1988; Perkins, 1987). Use of analogies has also been shown to promote transfer (Derry, Weaver, Liou, Barker, & Salazar, 1990; Brown, 1988; Clark & Voogel, 1985). Self-awareness of one's own thinking processes also seems to aid in transferring skills (Perkins & Salomon, 1989; Brown, 1988; Perkins, 1987; Clark & Voogel, 1985).

Methods and Data Sources

The sample for this study (n=38) consisted of students at Central Wyoming College enrolled in word processing classes--two sections during Spring 1991 and two sections during Fall 1991 (a pilot study was also conducted during the Fall 1990 Semester, n=18). Because of the inability of the researcher to randomly assign students to treatments, the treatment was randomly assigned to one class during each semester.

All students in the study completed a survey instrument designed to collect data to rate students on prior computer training, hands-on computer practice, computer work experience, home computer practice, typing training, and typing work experience. Prior to the administration of the pretest, a five-minute timed writing was administered to both groups and was used to rate students on typing speed. The t-test statistical analysis procedure was used to compare the means on each of these ratings for the control and the treatment groups. Any variables which showed a significant difference were to be used as covariates to help adjust for the varying word processing history of the subjects. However, when the t-tests were run, no statistically significant differences between the two groups were found on these variables (this was also true for the pilot study).

The Pilot Study

After approximately six weeks of basic instruction in word processing (WordPerfect 5.1), all students in the pilot study were given a transfer pretest in DisplayWrite 4. The test covered the concepts of merging and document assembly. The treatment phase of the pilot study ran for three weeks. Students in the treatment group were taught using the conceptual abstracting instructional method. At the time, they were not given the framework for a particular word processing operation at the beginning of instruction. Instead, they saw it demonstrated in WordPerfect 5.1 and experienced hands-on practice both in class and as a homework assignment. During the next class period, they saw the same word processing operation demonstrated in MicroSoft Word. They were then asked to do backward abstracting--separated into groups, they determined the similarities between the two software programs and came up with a framework. They were then assigned hands-on homework on the same operation in the new software package. Students in the control group were taught the same word processing operations in the traditional manner using only WordPerfect 5.1. Students in this group actually covered more word processing operations. Both groups spent approximately the same amount of time on instruction and homework, with the control group covering more concepts.

At the end of the three-week treatment period, all students were administered a learning exam (WordPerfect 5.1) and then a transfer posttest (DisplayWrite 4). The transfer posttest was identical to

the transfer pretest. The learning exam was an identical test except that it used WordPerfect 5.1. Analysis of covariance on the transfer posttest with the transfer pretest as covariate showed a significant difference between the two groups in favor of the control group at the .05 alpha level. However, analysis of covariance on the learning exam with the transfer pretest as covariate showed no significant difference between the two groups.

Adjustments to the Conceptual Abstracting Method

After analyzing the results of the pilot study, the researcher decided to modify the conceptual abstracting instructional method. One possible explanation of the pilot study findings on the transfer posttest in favor of the control group may have been that the treatment did not provide enough of the appropriate conditions for transfer. For high road transfer to occur, teachers must promote active abstraction from prior experiences and decontextualization of frameworks (Perkins and Salomon, 1989). During the pilot study, the researcher observed a high level of frustration in the treatment subjects. This frustration appeared to be caused by doing homework in a new word processing system. Students had not yet associated a particular command with the appropriate software. When they used an incorrect command from another software program, they became frustrated when they could not get the word processing operation to work. It seemed as though they were trying to remember too many commands and had not yet had sufficient practice to obtain an understanding of the word processing operation so that they could decontextualize the framework and not use software commands in the framework. Some students did not appear to be thinking about what they were doing, but were simply following the sequence of commands listed in their book.

The conceptual abstracting method was modified to help guide students in their thinking processes. The conceptual abstracting method should help students to **think** about what they are doing, rather than just performing a sequence of commands.

Students were given an appropriate analogy and a framework for each concept at the beginning of instruction on that concept (see Figure 1). After demonstrating the concept's framework within a familiar context (WordPerfect 5.1), the instructor guided students through hands-on practice in that context and assigned hands-on homework in that context. Students were asked to correct their own homework to help them think about the reason for any errors made. The next class period, students were shown the generic framework in another context (WordStar). Students worked in pairs during class to relate the concept's generic frame to the new context, with one student reflecting aloud and another student operating the machine. Students were not asked to do homework in the new context (WordStar), but were asked to list the concept's generic framework and point out the constant and the variable attributes determined by the context. By modifying the conceptual abstracting method in this manner, students were able to experience the framework in more than one context without associating frustration or inexperience with the new software.

Conducting the Study

After approximately six weeks of basic instruction in word processing (WordPerfect 5.1), all students were given a transfer pretest in MicroSoft Word. The test covered the concepts of merging, document assembly, tables, columns, sorting, and selecting (DisplayWrite 4 was used for the pretest and posttest during the pilot study, which only covered merging and document assembly. The software was changed to facilitate keystroke recording in macros).

The treatment phase of the study ran for approximately six weeks. Word processing concepts taught to both control and treatment groups included merging, document assembly, tables, columns, sorting, selecting, and other topics. Students in the treatment groups were taught using the conceptual abstracting instructional method described above. In addition, one day was spent teaching domain-specific strategies for problem solving, like searching for messages and prompts on the screen.

The control groups were not specifically taught domain-specific strategies for problem solving, nor were they given any frameworks. Rather, they discussed the terms to be covered in the lecture, were taught word processing concepts within a context (WordPerfect 5.1) without being taught a specific generic framework, were given homework within the context (WordPerfect 5.1), and did not correct their own homework. All groups spent approximately the same amount of time on instruction and homework. However, the control groups covered more concepts.

At the end of the six-week treatment period, all students were administered a learning exam and then a transfer posttest. The transfer posttest was identical to the transfer pretest (MicroSoft Word). The learning exam was an identical test except that it was completed in the familiar context, WordPerfect 5.1.

Results

Data gathered from the transfer pretest, the transfer posttest, and the learning exam were analyzed statistically through the use of Analysis of Covariance (ANCOVA). The transfer pretest was the only covariate used in this analysis. Analysis of covariance on the transfer posttest with the transfer pretest as covariate showed a significant difference between the two groups in favor of the treatment group at the .01 alpha level ($n=38$, $F=8.03$, adjusted means: treatment=58.11, control=55.52). Using the transfer pretest as a covariate ($n=38$, $F=6.59$), the treatment group scored significantly higher ($p=.01$) on the learning exam ($X=71.89$) than the control group ($X=69.83$).

Discussion

The results seem to support the conclusion that the conceptual abstracting instructional method increases both learning and transfer by a small amount. The study results support the use of conceptual frameworks to enhance transfer of computer skills and suggest that results of previous transfer research are applicable to the field of computer applications.

The use of differing contexts or software to teach computer skills is one method of decontextualizing concepts and getting students to think more about what they are doing. This may be considered cost prohibitive and difficult to accomplish in reality. However, with constantly changing versions of software, especially with the environmental interface differences of MS DOS vs. Windows, instructors usually find themselves with more than one software context available for instruction.

MERGE ANALOGY: A FORM LETTER

FRAMEWORK FOR A GENERIC MERGE

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1. **Determine variable information**

2. **Group into categories or fields**

3. **Create a primary file showing constant text and field location**

4. **Create a secondary file containing variable information**

5. **Merge the two files and print**

Figure 1: An analogy and generic framework for merge

References

Alexander, P. A., & Judy, J. (1988). The interaction of domain-specific and strategic knowledge in academic performance. Review of Educational Research, 58(4), pp. 375-404.

Benderly, B. L. (1989, September). Everyday intuition. Psychology Today, pp. 35-40.

Brown, A. L., & Kane, M. J. (1988). Preschool children can learn to transfer: Learning to learn and learning from example. Cognitive Psychology, 20, pp. 493-523.

Clark, R. E., & Voogel, A. (1985). Transfer of training principles for instructional design. ECTJ, 33(2), pp. 113-123.

Derry, S., Weaver, G., Liou, Y., Barker, J., & Salazar, E. (1990, April). Inducing analogical transfer in novice problem solvers: Effects of three instructional treatments. Paper presented at the American Education Research Association, Boston, MA.

Lambrecht, J. J. (1989, February). Research questions related to teaching software. In Robert A. Ristau (Ed.), Forum feature: Action research in business education. Business Education Forum, pp. 25-28.

Perkins, D. N. (1987). Thinking frames: An integrated perspective on teaching cognitive skills. In J. Baron & R. Sternberg (Eds.), Teaching thinking skills: Theory and practice. New York: Freeman, pp. 41-61.

Perkins, D. N., & Salomon, G. (1989, January-February). Are cognitive skills context-bound? Educational Researcher, pp. 16-25.

Perkins, D. N., & Salomon, G. (1988). Teaching for transfer. Educational Leadership, 46(1), pp. 22-32.

Policies Commission for Business and Economic Education. (1989). This we believe about the impact of change due to information technologies. Business Education Forum, 44(1), pp. 5-6.

Salomon, G. (1988). Two roads to transfer; two roads of transfer. Paper presented at the Annual Meeting of the American Educational Research Association.