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ABSTRACT

This study investigated whether stating the instructional objectives at the beginning of instruction would help students structure their own learning. Data came from 24 lessons taught by 13 secondary school teachers to 684 urban and rural adolescent students. Teachers taught different subject lessons in different classes. Students were exposed to four appropriate instructional objectives for one-third of each lesson. They were encouraged to use the objectives by being told that they were for that lesson. However, one randomly positioned objective was not used in that lesson. At the end of each lesson, students were asked to recall the four objectives and identify which one was not used. Of the 235 students who remembered all four instructional objectives, 70 could not identify which instructional objective had not been used. The results suggest that memorization of all four objectives, without the ability to identify which one was not used during instruction, indicates that the instructional objectives were not being used as advance organizers for instruction by those 70 students with the highest recall ability. (Contains 40 references.) (SM)

Memorization Of Objectives: An Indication Of An Individual's Learning Organisation

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Overview

It has long been believed that stating the instructional objectives at the beginning of instruction will help the individual learners to structure their own learning (Ausbal, 1968). From the instructor's perspective this seems plausible because s/he has meaningfully categorised the content in terms of these objectives. However, the objectives have meaning as generalising categories for the instructor because s/he has been able to abstract this meaning in hindsight from previous knowledge of the content. It is questionable whether a learner, who has not yet experienced the content, will find sufficient prior meaning in these objectives to use them as meaningfully for categorising content yet to be learnt. This is questionable from two points of view, from bottom-up constructivist perspective of learning and also from findings about primacy/recency interference effects on memory.

This belief has been difficult to test because of research design problems in measuring any higher learning that might have been facilitated by the objectives while also controlling for the complex interactions of many other variables that could influence learning - such as prior understanding, learning style, content area and content difficulty, etc.

This paper presents the results of a research design that has allowed this belief to be tested. Eight teachers each taught two different subject lessons to two independent classes (16 lessons). The research design required the students (n=492, aged 13-19 yrs) to be exposed to four appropriate instructional objectives for one-third of each lesson (exposure/recall time = 0.3). Students were encouraged to use the objectives by being told that they were for that lesson. However, one randomly positioned objective was not used in that lesson. At the end of each lesson the students were asked to recall the four objectives and identify which one was not used. The belief was then tested using a binominal test statistic: identification/non-identification. The premise was that if a student had made use of the objectives, regardless of her/his success, then s/he would be able to identify the objective they had *not* used.

Background

Common use of Advance Organizers

It has been common practice for classroom teachers, trainers and presenters to state their objectives at the beginning of their lessons, workshops or presentations in the belief that these objectives act as Advance Organisers (Ausubel, 1968) that will make their material easier to comprehend. "Advance Organizers present information before a lesson to make the lesson content more meaningful and easier to understand. The information in the Advance Organizer is presented at a higher level of abstraction and generality than the lesson content to aid the learner in subsuming or integrating the new material." (Dembo, 1991. p. 291). The pre-stated instructional objectives, reflecting the lesson content at a higher level of abstraction and generality, are used as the advance organisers. The popularity of AO can be illustrated by the work of Agnes Downing (1994). She advocates the improvement of presentational methods of teaching and expository learning, based on David Ausubel's theory of Meaningful Verbal Learning and its derivative, the Advance Organizer Model of Teaching. Downing states that this approach to teaching enables teachers to convey large amounts of information as meaningfully and efficiently as possible, while allowing for student acquisition and retention of that information. He says the Advance Organizer Model provides teachers with a method for improving their presentations and enhancing students' abilities to learn from them (Downing, 1994).

Studies of Advance Organizers

Many researchers have studied the affects of advance organisers in content areas ranging from Languages to science, and with subjects ranging in age from pre-schoolers to older adults (Chiquito, 1995; Corkill, 1988a, 1988b; Dame, 1995; Groller, 1991; Harvey & Jahns, 1988; Healy, 1989; Kooy, 1992; LeSourd, 1988; Maier, 1993; Relan, 1991; Tajika, 1988). Some researchers have found that advance organisers improve aspects of learning such as recall, comprehension or transfer; yet others have found that advance organisers make no significant difference.

Research indicating Advanced Organizers do work

Multi-media advance organizers have been widely used in language teaching (Chung, 1996). For example, Julia Hanley (1995) compared video with pictures and teachers' narrative as advance organisers in language classes as did Carol Herron (1995) for teaching French. Advance Organizers have been found to improve content memory. Advance organizers had been successfully used in learning computing. Sook-Hi Kang (1997) found advance organizers made a significant difference in facilitating learning in a computer simulation environment and Loretta Cardinale (1991) found advance organisers facilitated learning for pre-service teachers in an introductory microcomputer class. Advance organisers seem to have been most successfully used to improve the recall of textual material, again, mainly in foreign language teaching. For example, Carol Herron, (1994) found that advance organizers consisting of several short sentences, written in French, that summarised chronologically the events in the video, facilitated student listening comprehension, and Herman Teichert (1996) found that the use of advance organizers (with video- and audiotapes) developed superior listening skills in German classes. Steven Rinehart working with Mary Alice Barksdale-Ladd in 1991 found advance organisers worked to improve text recall by 30 seventh grade students who had reading problems. The following year Steven Rinehart, then working with William Welker (Rinehart & Welker, 1992) again reported that advance organizers did improve text recall by seventh grade students. In a study of 35 middle school students Jim Snapp and John Glover (Snapp & Glover, 1990) also found that advance organisers helped recall. They found that students who read and paraphrased an advance organizer prior to study, correctly answered significantly more lower-order study questions than did students not encountering the advance organizer.

Contradictory research indicating that Advance Organizers do not work

In contradiction to the above findings, many researchers have found that advance organisers make no significant difference. For example in science education, Elizabeth Bricker (1989) found advance organisers had no significant effect in her comparative study of students results in second, third, and fourth grader science programs. Similarly, in an experiment by Kirkland (1995) four teachers developed 15 lessons plans, each covering a different science topic in eighth grade science. These were presented to 317 students. Post-presentation tests showed that the presence or absence of advance organizers had no affect and that the comprehension of 68 special education students in the group was actually adversely affected by the presence of advance organizers. Houshmand Saidi (1994) found that advance organizers did not improve students' achievement in computer-assisted video instruction. Similarly, Moon K. Chang (1992) used advance organisers to aid students' learning by watching a film, yet found that the advance organisers had no significant effect. Joseph Lawton and Ann Johnson, (Lawton & Johnson 1992) used advance organisers to teach music to pre-schoolers and also found that found they had no significant effect upon the children's learning. Again, in two separate studies (n=33 and n=66) David Lane (1988) found advance organisers had no significant effect on the test performance of undergraduate students.

Doubts about the theory of Advance Organizers

With so much evidence for and against we might ask if advance organisers work or not. It is obvious that presenters, trainers and teachers use instructional objectives to post-organise their knowledge. However, its does not seem plausible that an instructional objective that is not understood could be used to categorise information as it is presented by a teacher. This

dependence of the advance organiser on prior knowledge was supported in reviews of the topic by Thomas Williams and Earl Butterfield, (Williams & Butterfield, 1992a , 1992 b) which showed that the effects of advance organizers do on comprehension depend on the subject's previous knowledge. For example, verbal advance organizers assisted text comprehension of children with strong prior knowledge, while the addition of a pictorial component aids comprehension of children with weak prior knowledge (Townsend & Clarihew, 1989). Classical memory experiments on the 'recency effect' by Herman Ebbinghaus, replicated by Mary Calkins in the 1890's and many others since (Bolhuis & Van Kampen, 1988; Madigan & O'Hara, 1992; Murray, 1976) have shown that the traditional sequencing of advance organisers before the learning to which they apply can be expected to reduce their effect. Experiments by John Glover (Glover, 1990) support this 'recency effect' expectation: Namely, that the inevitable long delay between the first advance organizers and the content to which they apply is unlikely to enhance the effects of these earlier advance organizers.

Method

Difficulties in trying to test if Advance Organizers do work

In 1990 a review by John E. McEneany of four studies conducted by the originator of the concept Ausubel, raised serious doubts about the efficacy of advance organizers under a variety of circumstances. In addition, this review questioned the adequacy of the definition of 'advance organizer'. However, there are many problems in designing fundamental research on the concept of advance organizers that may have inhibited study, but not use, of the concept since 1990. For example, the learning product that would be assessed as resulting from the way the advance organizer was used might depend on other variables that could be even more complex to control and assess - prior learning, learner motivation, complexity of the topic, quality of teaching, learning/teaching style, etc. Even, equating criterion standards of learning products across content areas and age of learners and linking them to use of the advance organiser is a daunting task.

Simple, replicable research design focussing on falsifying a necessary component of the process

This research uses a simple replicable design that cuts across the difficulties involved in using the traditional approach of designing controls to justify inference of a learning process from an assessed product. It focuses on a necessary condition of the process, regardless of the success of the learning outcome. This is a falsifying design in which, for added rigour, the effects to be falsified are enhanced by the design. Simply, subjects were shown 4 instructional objectives for the first 10 minutes of a 30 minute instruction period. To draw their attention to the importance of these objectives as advance organizers, subjects are told that they will be used in the lesson. This gives better than 1:3 exposure:recall time. However, one randomly positioned objective was not used in that period. At the end of the instruction the subjects were asked to recall the four objectives and identify which one was not used. The premise was that if a learner had made use of the objectives as advance organizers, then regardless of her/his success, s/he would be able to identify the objective they had *not* used. The falsification criterion is: The non-identification of an instructional objective not used in the lesson is taken as evidence that a subject has not used the instructional objectives as advance organisers. Hence, any subject that can remember all the instructional objectives, but cannot identify the one that was not used, could not have used the objectives as advance organizers. The teacher/instructor was blind to the true purpose of the experiment and this was checked by a content analysis of the teacher/instructor explanation of the outcome of the experiment. This design allowed for replication across content areas at different levels and across teacher/instructors and subjects of varying abilities.

Subjects and results

Data and analysis

The data for this experiment were gathered in secondary schools in Fiji. 13 teachers each in a different school gave one or two lessons in which the data was gathered. 24 lessons were given in all and these covered eight curriculum subject areas - basic Science, Biology, Chemistry, English, Geography, History, Mathematics, and Physics. 684 students took part,

568 from urban schools and 116 from rural schools. The average class size was 31. The average age of the students was 16 years and ranged from 12 to 19 years. There were 382 males and 302 females. Table 1 gives the main result.

Main results showing 29.8% of subjects with best recall did not use instructional objectives as advance organizers

N3 Missing objective by MI Memory Index - objectives remembered

Page 1 of 1

N3	Count / Exp Val / Row Pct / Col Pct / Tot Pct	MI 0	1	2	3	4	Row Total
0		43	54	94	189	70	450
Not identified		28.3	36.8	66.4	163.8	154.6	65.8%
		9.6%	12.0%	20.9%	42.0%	15.6%	
		100.0%	96.4%	93.1%	75.9%	29.8%	
		6.3%	7.9%	13.7%	27.6%	10.2%	
1		0	2	7	60	165	234
Was Identified		14.7	19.2	34.6	85.2	80.4	34.2%
		.0%	.9%	3.0%	25.6%	70.5%	
		.0%	3.6%	6.9%	24.1%	70.2%	
		.0%	.3%	1.0%	8.8%	24.1%	
Column Total		43 6.3%	56 8.2%	101 14.8%	249 36.4%	235 34.4%	684 100.0%

Chi-Square	Value	DF	Significance
Pearson	225.76536	4	.00000
Likelihood Ratio	249.46094	4	.00000
Mantel-Haenszel test for linear association	173.26589	1	.00000

Minimum Expected Frequency - 14.711

Table 1. Subjects who remembered the objectives but could not identify which was not covered - disproving the use of instructional objectives as advance organizers.

The main result is that of the 235 subjects who remembered all 4 instructional objectives, 70 (28.9%) could not identify which instructional objective was not used. Hence, these subjects could not have used the instructional objectives as advance organizers.

Simple conclusion

Conclusion

The memorisation of all four objectives, without the ability to identify which one of the four was not used during the instruction, proves that the instructional objectives are not being used as advance organisers for the instruction by at least 29.8% of the students with the highest recall ability.

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