EFFECTS OF TEACHER PREPARATION AND STUDENT AGE ON AN ALCOHOL AND DRUG EDUCATION CURRICULUM

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ABSTRACT

An alcohol/drug education curriculum was tested in twenty-five Nebraska junior high schools involving 1,800 students in grades seven to nine. Using teacher training and student age as independent variables, gains in knowledge and decision-making ability were assessed. There was an interaction between age level and training, with older students taught by fully trained teachers making significantly greater gains in knowledge and decision-making ability than students who were exposed to the curriculum via untrained teachers and those not exposed to the curriculum at all. Teacher training was shown to be a critical variable in curriculum innovation, especially for older students.

Two issues, student age and teacher training are of significant importance in studying the effects of alcohol education. Conventional wisdom suggests that a product especially designed for a specific purpose would be more effective than one designed for a more general purpose. A review of available alcohol and drug education curricula suggests, however, that general utility outweighs specificity.

Most curricula are described as suitable for a range of age/grades and specific teacher training is rarely specified as a requirement before a new curriculum is introduced. Considering the significant changes in the learning styles and potentials of students in the kindergarten through twelfth grades, or even grades six through twelve, and the difficulty of teaching alcohol and drug education, this lack of attention to specificity is of concern.

The relationship of the student's age or grade level and the effects of alcohol and drug education was one focus of an extensive four-year investigation by Blum [1]. In this definitive longitudinal study which used drugs as one dependent variable, the sixth grade was found to be a "critical period" for alcohol and drug education. Sixth grade students, according to Blum, could be judged to be in a stage of maximum vulnerability to information from the environment about alcohol and drugs. This vulnerability to information appeared to hold for didactic, knowledge-based programs and for "process" centered programs focusing on decision-making skills or value clarification. The impact of either kind of program for students younger or older than the sixth grade was less than for those in the sixth grade. However, comparison of Blum's findings with other studies [2] indicates that California students seemed somewhat precocious in the knowledge and use of drugs, so the introduction of

overcoming the impact of alcohol and drug education programs [3]. Pipher and Rivers specify that "the way that alcohol is already a part of the student's life provides the context for incorporating any (new) information presented."

There are a number of studies which assess the impact of knowledge based (didactic) alcohol and drug education curricula on the knowledge levels of children below sixth grade [4] or describe curricula for students from kindergarten through high school [5]. Empirical studies of the effects of these curricula are, however, difficult to locate. The vast majority of the evaluation literature describes the effects of programs on students in the sixth grade or above. This is especially true for programs that include "process" components such as decision-making and value clarification [6,7]. The differential effects of age or grade level on the outcomes of curricula are rarely discussed.

Similarly, the effect of teacher training in drug and alcohol education is rarely mentioned in the descriptions of evaluations of various curricula. Rose and Duer, using students in the sixth, seventh and eighth grade to test the effects of a curriculum on cognitive and attitudinal outcomes, reported teacher training to be pivotal in achieving the objectives of the curriculum [8]. Trained teachers using the curriculum effected the best outcomes, and trained teachers without

the curriculum effected better outcomes than teachers in the control group who had no training or curriculum.

Most of the literature emphasizing teacher training focuses on the effects of the training on the attitudes of the teachers. Work by Slaven [9], DiCicco [10], and Fiman, et al. [11], suggests that the attitude of the teachers becomes less negative and less judgmental with training. There is little else reported in the literature that suggests a concern with the effects of training on the degree of learning that occurs in the student population.

CURRICULUM DEVELOPMENT

Background

In the course of developing Nebraska's new alcohol and drug education curriculum, its effectiveness was tested with approximately 1,800 students in grades seven through nine in twenty-five Nebraska schools. This curriculum aimed specifically at increasing students' knowledge about alcohol and drugs and improving decision-making skills. The curriculum consisted of six units and was taught for a total of ten class periods in whichever subject matter class the

teachers had participated in a special three-day workshop and used the curriculum document in conducting the drug and alcohol education classes. Students in these classes were designated "full experimental" (FE). Students from five schools were taught by teachers who used the same curriculum document as the full experimental teachers, but who did not participate in a special teacher training workshop. These students were designated "partial experimental" (PE). Teachers from six schools received neither the curriculum nor the special training and carried out their normal alcohol and drug education activities. Students taught by these teachers were designated "control" (C).

These schools were selected at random from a specific geographic area. Schools ranged in size from student populations of 170 to schools with a total enrollment of 850.

Test Instrument

The student test instrument measured two variables: 1) drug and alcohol related knowledge and 2) decision-making skills. These were the two principal areas of focus of the curriculum and the two focal points of this evaluation.

Thirty multiple choice questions were developed from the behavioral objectives included in each of the units of the curriculum. This 30-item test was refined from a first draft 40-item test which was earlier administered to a group of 120 seventh graders who had not and would not participate in the project. Three sources of information were considered in selecting questions for the final instrument: feedback from students and teachers suggesting ambiguity or confusion in the wording of the questions; time limitations for administration of the tests; and information from an item analysis of test results.

Discrimination and difficulty levels for each item were established. The answers of students scoring in the top, middle and bottom thirds of the group on the entire test were compared for each item. Items which did not discriminate between high and low scoring students and items which discriminated positively but weakly, with an index of less than .40, were eliminated or rewritten.

Difficulty level scores were examined. All the items in the final instrument discriminated positively among students scoring in the top and bottom third on the test.

The test as a whole could be judged "fairly difficult" by students unfamiliar with the curriculum, but difficulty remained within the normal range. Ten of the final items were judged "difficult" with a difficulty index below .3; 14 as "medium" with difficulty indexes between .3 and .8; and six as "easy" with a difficulty index above .8. Throughout the selection process, effort was made to retain a variety of items sufficient to sample all areas covered by this curriculum's objectives. Half of the thirty multiple-choice items in the final test measured information about alcohol and drugs and half measured decision-making skills as taught by the curriculum.

Independent Variables

Two independent variables were considered. The first was teacher preparation, the second the age of the students. Students under the age of twelve and over the age of fifteen were not analyzed since an insufficient number were distributed across the three teacher preparation conditions. The twelve-fifteen year olds were divided into two groups. One group consisted of twelve to thirteen year olds and the other of fourteen to fifteen year olds.

Thus, the independent design utilized in the analysis was a 3x2 factorial design. Other groupings of the independent variables were analyzed but the results are not reported here since the findings did not conflict or contribute any critical data to the 3x2 analysis.

Dependent Variables

The dependent measures used in this study were the pre- and posttest scores on the multiple choice test described earlier. This repeated measure design matched students' pre- and posttest scores by means of a unique number

Table 1. Means and Standard Deviations for Age Levels and Treatment Conditions on Pre- and Post-Total Scores

	12-13 Years Old			*14-15 Years Old*		
	n	$\bar{x}$	*SD*	*n*	$\bar{x}$	*SD*
		FULL EXPERIMENTAL				
Pretest Total:	410	15.65	4.14	278	16.39	4.67
Posttest Total:		18.89	5.04		20.22	5.36
		PARTIAL EXPERIMENTAL				
Pretest Total:	30	15.13	4.61	93	18.31	4.58
Posttest Total:		18.03	5.50		19.80	4.09
		CONTROL				
Pretest Total:	306	15.43	4.56	76	16.86	4.63
Posttest Total:		17.69	5.55		17.05	4.93

Possible high score: 30

generated by each student as they responded to a set of identification questions such as "What is the last digit of your telephone number? . . . your mother's middle initial? . . . the first digit of your street address?" etc. The total scores for each student were determined as was a decision-making score and a knowledge about alcohol and drugs score.

Analysis

The impact of the treatment conditions (FE, PE, C) and age levels (12-13 years, 14-15 years) on the three types of scores (total, knowledge and decision-making) across time were analyzed through repeated measures ANOVA procedures. The results of these analyses and the means and standard deviations are presented in Table 1.

Table 2 shows several between-group and within-subject effects on total scores. When pre and post total scores were collapsed and treated as a single dependent variable, as is the case in the between-group analysis, the older students had significantly higher total scores than the younger students (F=12.58, $p < .001$). The treatment condition also had a significant impact on total scores (F=5.45, $p < .01$). No significant interaction of condition and age level was reported for the between-group analysis.

Of greater interest are the changes across time, between the pre- and posttests, due to condition and/or age level. Table 2 shows that all groups of students showed significant change in total scores between pre- and posttest (F=138.39,

Table 2. Results of Repeated Measures ANOVA for Age Levels and Treatment Conditions on Pre and Post Total Scores

	DF	*MS*	*F*
Between:			
A (condition)	2	197.49	5.45**
B (age level)	1	456.33	12.58***
AB (interaction)	2	71.74	1.98
Error	1187	36.27	
Within:			
T (time)	1	1455.82	138.39****
TA (conditions across time)	2	248.00	23.58****
TB (age levels across time)	1	62.89	5.98*
TAB (A x B across time)	2	86.81	8.26***
Error	1187	10.52	

* $p < .05$
** $p < .01$
*** $p < .001$
**** $p < .0001$

$p < .0001$). Reference to Table 1 indicates that the total scores of all groups of students increased between the pre and post measurements.

Table 2 shows significant main effects for conditions across time (F=23.58; $p < .0001$) and age levels across time (F=5.98; $p < .05$). The presence of all of these main effects for the within-subject analysis is not surprising since the interaction of condition and age level across time is highly significant (F=8.26; $p < .001$). Table 2 and Figure 1 show that the gains in total scores were greatest for students who were taught from the curriculum by trained instructors (FE condition) and smallest for students who were not taught from the curriculum at all (C condition). But, the difference in the gains across these conditions depended on the age level of the student. Decreasing teachers' exposure to the curriculum had a significantly more negative impact on the fourteen- to fifteen-year olds than the twelve- to thirteen-year-old students. The fourteen- to fifteen-year olds in the C condition made a mean gain of .19 as compared to 1.49 for students of the same age in the PE condition and 3.33 for those in the FE group. The mean total score of the twelve- to thirteen-year olds in the C condition increased 2.26, 2.90 in the PE condition, and 3.25 in the FE condition.

The analysis of the items that reflect knowledge of alcohol and drugs reiterates to a large degree the results of the analysis of the total scores. As shown in Table 3 in the between-group analysis, the main effects for treatment condition and age level on knowledge are significant (F=9.77; $p < .0001$;

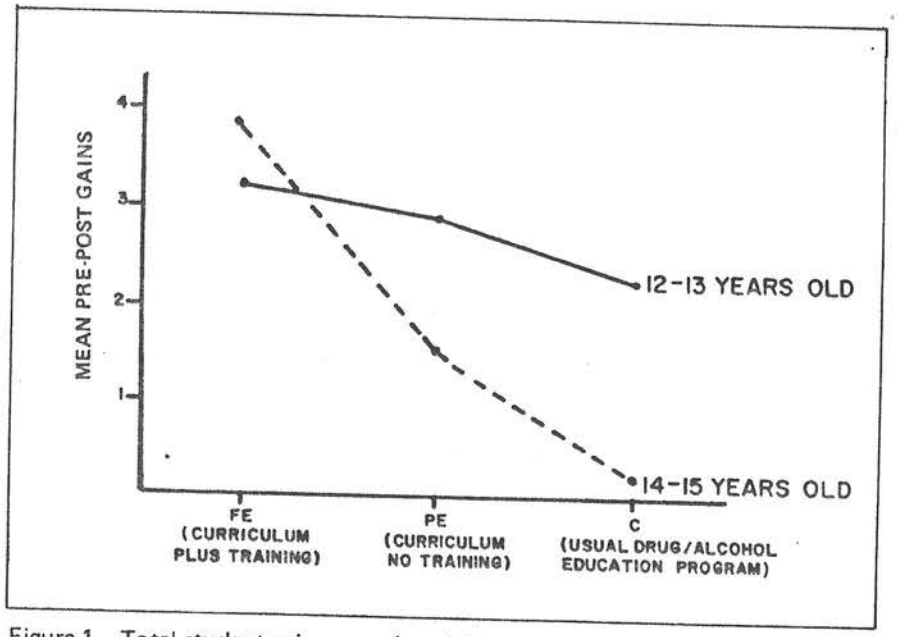

Figure 1. Total student gain scores (combining knowledge and decision-making).

Table 3. Results of Repeated Measures ANOVA for Age Levels and Treatment Conditions on Pre and Post Knowledge Scores

	DF	*MS*	*F*
Between:			
A (condition)	2	131.18	9.77****
B (age level)	1	97.92	7.29**
AB (interaction)	2	94.78	7.06***
Error	1187	13.41	
Within:			
T (time)	1	670.81	107.82****
TA (conditions across time)	2	82.12	13.20****
TB (age levels across time)	1	54.10	8.70*
TAB (A x B across time)	2	54.19	8.71***
Error	1187	6.22	

* $p < .05$
** $p < .01$
*** $p < .001$
**** $p < .0001$

F=7.29, $p < .01$ respectively) when the pre- and posttest scores are treated as one dependent variable. Additionally, Table 3 shows an interaction between condition and age level on knowledge.

The changes in knowledge scores across time due to condition and/or age level are also similar to those reported for the total scores, but this analysis offers further clarification of the differences between age levels. Once more, condition and age level have significant main effects on change in knowledge between the pre- and posttest. And a significant interaction between treatment condition and age level across time was reported (F=8.71; $p < .001$).

Table 4 and Figure 2 show that while this treatment condition did not appear to affect the knowledge of twelve- to thirteen-year-old students, it had a significant impact on the fourteen- to fifteen-year olds. The older students in the FE condition made a mean gain in knowledge of 2.44 while those in the PE condition a gain of .88, and those in the C condition a gain of only .07. Their counterparts, the twelve- to thirteen-year olds, showed a gain of 2.24 in the FE condition, 1.77 in the PE condition, and 2.06 in the C condition. All of the twelve- to thirteen-year-old students made gains in knowledge between the pre- and posttest regardless of whether they were exposed to the curriculum or not. Meanwhile, the fourteen- to fifteen-year olds exposed to the curriculum by a trained instructor made significantly greater gains in knowledge about alcohol and drugs than students of the same age level who had no exposure to the curriculum (C) or students who participated in the curriculum without a trained teacher (PE).

Table 4. Means and Standard Deviations for Age Levels and Treatment Conditions on Pre and Post Knowledge Scores

	12-13 Years Old			*14-15 Years Old*		
	n	$\bar{X}$	*SD*	*n*	$\bar{X}$	*SD*
		FULL EXPERIMENTAL				
Pretest Total:	410	7.96	2.47	278	8.48	2.78
Posttest Total:		10.20	2.97		10.90	3.05
		PARTIAL EXPERIMENTAL				
Pretest Total:	30	7.90	2.73	93	10.03	2.48
Posttest Total:		9.67	3.03		10.91	2.51
		CONTROL				
Pretest Total:	306	7.81	2.76	76	8.30	2.91
Posttest Total:		9.87	4.84		8.37	3.18

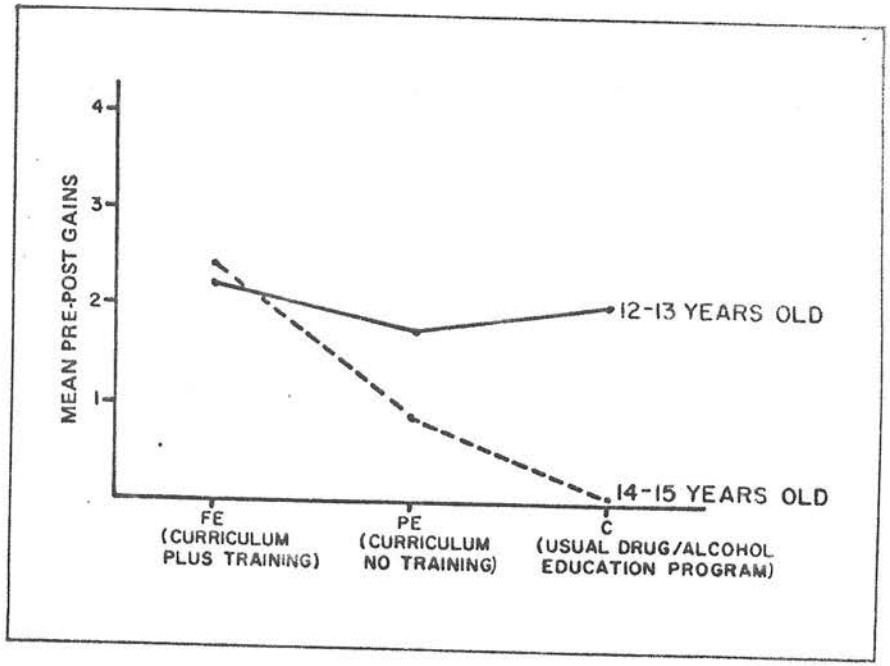

Figure 2. Knowledge gain scores.

The impact of the three treatment conditions and two age levels on decision-making skills is presented in Table 5. Table 6 shows that in the between-groups section of the analysis age level does have a significant main effect on the decision-making score when the pre- and post-test scores are collapsed and treated as a single dependent variable. This is not surprising since it would be expected that older students would have better decision-making skills than younger students.

In the pre and post analysis, no significant impact for age level is reported. The amount of change in decision-making skills between the pre- and posttest was similar for both age groups. Table 6 does show a significant change across the pre- and posttest for all groups (F=29.50; $p < .0001$) and reference to Table 5 and Figure 3 shows that all groups of students gained in decision-making skills between the pre- and posttest. Also reported in Table 6 is a significant impact for treatment condition across time (F=4.42; $p < .05$). Table 5 shows that students who participated in the curriculum with a trained instructor made the greatest gains in decision-making followed by those whose teachers used the curriculum but did not have special training and then those who were not exposed to the curriculum at all.

Table 5. Means and Standard Deviations for Age Levels and Treatment Conditions on Pre and Post Decision-Making Scores

	12-13 Years Old			14-15 Years Old		
	n	$\bar{X}$	*SD*	*n*	$\bar{X}$	*SD*
FULL EXPERIMENTAL						
Pretest Total:	410	7.70	2.57	278	7.91	2.71
Posttest Total:		8.70	2.76		9.31	2.89
PARTIAL EXPERIMENTAL						
Pretest Total:	30	7.23	2.25	93	8.28	2.83
Posttest Total:		8.36	2.80		8.88	2.49
CONTROL						
Pretest Total:	306	7.62	2.86	76	8.55	2.43
Posttest Total:		8.32	5.11		8.68	2.66

Table 6. Results of Repeated Measures ANOVA for Age Levels and Treatment Conditions on Pre and Post Decision-Making Scores

	DF	*MS*	*F*
Between:			
A (condition)	2	4.92	0.37
B (age level)	1	102.47	7.67**
AB (interaction)	2	4.29	.32
Error	1187	13.36	
Within:			
T (time)	1	184.75	29.50****
TA (conditions across time)	2	27.66	4.42*
TB (age levels across time)	1	3.68	0.59
TAB (A x B across time)	2	12.57	2.01
Error	1187	6.26	

* $p < .05$
** $p < .01$
*** $p < .001$
**** $p < .0001$

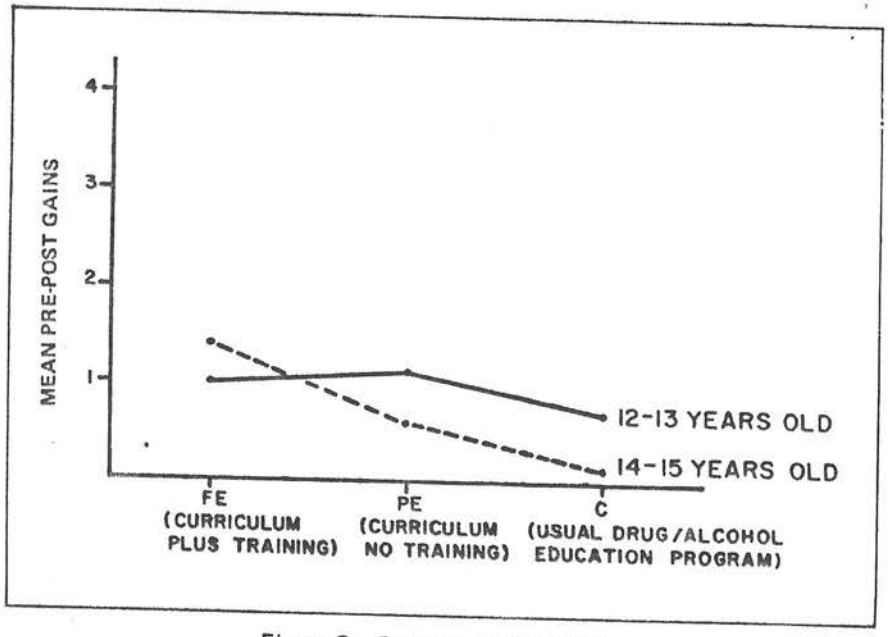

Figure 3. Decision-making skills.

Summary of Results

Repeated measures analyses using knowledge scores and total pre- and posttest scores showed an interaction for treatment condition and age level. Exposure to the curriculum had a significant impact on gains in knowledge and total score between the pre- and posttest for the fourteen- and fifteen-year-old students but not for the twelve- to thirteen-year-old students. The older students who were exposed to the curriculum taught by trained teachers made significantly greater gains in knowledge and total scores than older students who had not been exposed to the curriculum at all. The gains of the older students, exposed to the curriculum without a trained instructor (PE), fell between those who received the complete program (FE) and those whose teachers carried on their traditional drug and alcohol education activities not using the curriculum at all (C).

DISCUSSION

Gains in Knowledge

These results indicate that the curriculum did significantly affect gains in knowledge, but these effects varied with age and implementation of the curriculum.

Specifically, the type of implementation was critical in determining the level of learning for the fourteen- to fifteen-year-old students. Older students who received the curriculum from trained instructors (FE condition) made significantly greater gains in knowledge between the pre- and posttest than the older students who received the curriculum from untrained teachers (PE condition) and those not exposed to the curriculum (C condition) but who received their school's regular drug and alcohol education program. These data strongly suggest the need for trained instructors when dealing with older students.

The gains in knowledge of the younger students (12–13 years old) were similar regardless of whether (or how) they received the curriculum (FE, PE, or C). Two interpretations of this finding seem plausible. Administration of the pretest itself in the schools may have stimulated discussion which resulted in knowledge gains. On the other hand, it is also likely that students at this age level are now encountering stimuli (through direct experiences, peer experiences, or other formal instruction) which are contributing to their knowledge of alcohol and drugs.

Gains in Decision-Making Skills

The results of the statistical analysis of the impact of the curriculum on decision-making skills appear to be much simpler to interpret. Students who received the curriculum from a trained instructor made greater gains in decision-making than those who did not receive the curriculum at all. There were no significant differences between the decision-making scores of students in the FE and PE conditions. The impact of the curriculum on decision-making does not appear to vary with age, although the pretest scores of the older students were higher than those of the younger students. Statistically, there was no significant interaction between treatment condition and age level on decision-making ($p < .13$) although Figure 3 offers some descriptive support for the contention that the curriculum may be affecting the decision-making of the younger and older students differently. The decision-making skills of the older students may be affected by the curriculum to a larger degree than those of the younger students.

A critical question is why the curriculum would have greater impact on the decision-making skills of the older students? One possible explanation might be that younger students, who also had lower knowledge scores prior to the curriculum, were simply not yet cognitively ready for decision-making. Another interpretation suggests that for the majority of the younger students decision-making skills may not be especially relevant because their peer experiences with alcohol and drugs are as yet limited. It is likely that decision-making dilemmas will not be taken seriously or stimulate real learning of new ways to solve problems until students actually encounter the problems.

Conclusions

The fully implemented curriculum had a positive impact on the knowledge and decision-making skills of the fourteen- to fifteen-year-old students regarding alcohol and drugs. The results of the study did not support the utilization of this curriculum with twelve- to thirteen-year-old students, since neither knowledge or decision-making skills were affected. To be effective with fourteen- to fifteen-year-old students, it is critical that the curriculum be taught by trained teachers.

It does appear that age and teacher training are critical variables in curriculum innovation, and curriculum developers should focus on these variables in curriculum development activities and specify the effects of each when distributing new curricula.

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