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ABSTRACT

This study utilized the Teams-Games-Tournament (TGT) concept, an educational technique employing team competition within the classroom. The hypothesis was that mediating TGT's effects on academic performance is a change in the relationship between academic performance and sociometric status of students. Subjects were 232 seventh grade students incorporated into a 2x2 design varying both competition (team vs. individual) and practice (individual vs. group) modes. Team competition changed the peer group norms as predicted, creating a positive relationship between academic performance and sociometric status, whereas no such relationship existed for students in the individual competition. Implications for the sociology of education are discussed. It was concluded that this study goes beyond a description of effects of successful academic performance on peer group status and offers a means of changing peer group consequences of academic success. (Author/BW)

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INDIVIDUAL VS. TEAM COMPETITION: THE INTERPERSONAL CONSEQUENCES OF ACADEMIC PERFORMANCE

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Introductory Statement

The Center for Social Organization of Schools has two primary objectives: to develop a scientific knowledge of how schools affect their students, and to use this knowledge to develop better school practices and organization.

The Center works through three programs to achieve its objectives. The Schools and Maturity program is studying the effects of school, family, and peer group experiences on the development of attitudes consistent with psychosocial maturity. The objectives are to formulate, assess, and research important educational goals other than traditional academic achievement. The School Organization program is currently concerned with authority-control structures, task structures, reward systems, and peer group processes in schools. The Careers program (formerly Careers and Curricula) bases its work upon a theory of career development. It has developed a self-administered vocational guidance device and a self-directed career program to promote vocational development and to foster satisfying curricular decisions for high school, college, and adult populations.

This report, prepared by the School Organization Program, compares the effects of individual and team competition in a classroom on the sociometric choices of students.

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Abstract

Peer group norms have been shown to influence individual performance in industry, schools, and in daily life. Coleman (1959) and Bronfenbrenner (1970) have suggested that schools should mobilize peer support for effective academic performance by the use of team competition around academic tasks. Research on Teams-Games-Tournament, an educational technique employing team competition at the within-class level, has shown positive effects on academic achievement. The present study hypothesized that mediating TGT's effects on academic performance is a change in the relationship between academic performance and sociometric status of students. Two hundred thirty-two seventh grade students were incorporated into a 2 X 2 design, varying both competition (team vs. individual) and practice (individual vs. group) modes. Team competition changed the peer group norms as predicted, creating a positive relationship between academic performance and sociometric status, whereas no such relationship existed for students in the individual competition.

Introduction

Peer group norms influence individual behavior. This observation has been made with regard to restriction of work output (Roethlisberger and Dickson, 1939), voting behavior (Berelson, Lazarsfeld, and McPhee, 1954), and even bowling behavior (Whyte, 1939), to name some well known studies. If peer group norms in an organization are consonant with the organization's goals, then one would expect those goals to be achieved more effectively than if the opposite were the case. Seashore (1954) demonstrated that productivity in a heavy manufacturing company was strongly related to the peer group norms of cohesive work groups; cohesive groups whose norms were supportive of the institutional goals had high productivity, while those groups whose norms opposed the company's goals had low productivity.

In schools, peer norms also appear to be important. Coleman (1960) presents data which indicate that in those schools where level of academic achievement does not contribute to social status, students with the highest IQ's are not well represented among those who make A's and A-'s. That is, the most able students in these schools appeared to be turning their efforts in other directions. On the other hand, in schools where academic performance is positively associated with social status, the students who have the highest IQ's in the school are those who receive A's and A-'s. The work of McDill and Rigsby (1973), Coleman (1959), and others indicate that in American high schools, academic excellence is rarely a social asset and is often a social liability. McDill and Rigsby have also found an anti-academic social climate to have a deleterious effect on individual achievement in the classroom.

Group competition has been proposed as a means to mobilize peer group support for academic performance (Bronfenbrenner, 1970; Coleman, 1959; Spilerman, 1971). The processes believed to underlie the effectiveness of group competition as a technique for increasing academic performance have been described but not systematically studied. The present paper describes a study which sheds some light on the effects of individual and group competion on the development of peer group norms supportive of academic success. More specifically, it examines the consequences of effective performance in an academic game on the sociometric status of students engaged in team as opposed to individual competition. Variations on a particular classroom organization, known as Teams-Games-Tournament (TGT), were employed to contrast the effects of individual and team competition on the interpersonal consequences of performance.

Teams-Games-Tournament (TGT)

Teams-Games-Tournament (TGT) is a classroom instructional technique developed primarily by David DeVries and Keith Edwards at the Center for Social Organization of Schools, The Johns Hopkins University. It is an actualization of Coleman's (1959) and Bronfenbrenner's (1970) beliefs that team competition should be used in schools to give education the kind of appeal that sports and other peer-supported activities have enjoyed. Its principal features are:

Teams

Students are assigned to four or five-person teams which are heterogeneous on academic ability, sex, and race. Teams are also equivalent in terms of the average ability level of their members so as to insure equitable

competition across teams. Team members do not compete as a group, but as individuals in competition with members of other teams whose level of achievement is comparable to their own. Each student's individual game score is added to that of his teammates to form a team score. Emphasis is placed on team, as opposed to individual success.

Games

Students in TGT compete on games which are simple in structure, containing course content-relevant material. The games used are either commercial games or games designed by teachers according to a framework provided in the TGT manual (DeVries, et al., 1973).

Tournament

The TGT tournament structure is designed to equalize each student's probability of success at the game. Students compete weekly at three-person "tournament tables." Students at each table are matched on ability and compete as representatives of each of their teams. When students win at their tables, they are moved to tables with higher performing students for the next round of play (where competition is likely to be more difficult), and when they lose, they move to tables with lower performing students. Every table winner, regardless of table rank, brings six points to his team; middle scorers bring four, and low scorers two. In this way all students, regardless of ability, have an equal chance of contributing six points to their team score. A class "tournament newsletter" announces the results of the weekly tournaments, and reinforces both successful teams and table winners.

Team Practice

On the day before "Tournament Day" each team receives copies of the game materials with which to practice. Team members study the materials as a group, and are encouraged to help each other prepare for the tournament.

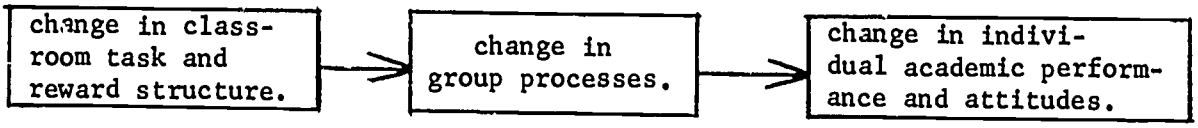
A typical TGT week consists of three days of traditional teaching (in which teachers lecture and students complete worksheets), one day of team practice and one day of tournament.

TGT has been found to have positive effects on the mathematics achievement of junior high school students (Edwards, DeVries and Snyder, 1972; Edwards and DeVries, 1974) and on the language arts achievement of elementary school students (DeVries and Mescon, 1974). In addition, TGT has had positive effects on attitudes toward subject matter (Edwards and DeVries, 1972; Edwards and DeVries, 1974; DeVries, Edwards, and Wells, 1974a).

TGT's effects on classroom process and climate have been especially strong and consistent. TGP has increased cross-race and cross-sex helping and friendship choice (DeVries and Edwards, 1974), frequency of peer tutoring (DeVries and Edwards, 1973; Edwards and DeVries, 1974), and frequency of on-task behavior (DeVries, Edwards, and Wells, 1974a). Most importantly for the present study, TGT has had consistent impact on peer group mutual concern (DeVries and Edwards, 1973; Edwards and DeVries, 1974), importance to peers of individuals doing well (Edwards and DeVries, 1974), and class cohesiveness (Edwards and DeVries, 1974). These group process and normative climate findings give some indication of the means by which TGT has had impact on achievement and attitudes. They suggest that the team component of TGT increases peer pressure to do well and the general concern of students for each other's academic performance.

The Present Study

The academic-change model implied in the literature on team competition can be represented as follows:



Previous research on TGT has demonstrated the impact of a particular task and social structure on academic achievement and student attitudes, and has produced some information on group process changes as evidenced in questionnaire responses. The present study examines changes in group process as evidenced in the sociometric choices of participating students. The following hypotheses were put forward: (1) success in an academic game will be more positively associated with increase in sociometric choice status (i.e., number of sociometric choices received on a posttest minus the number received on a pretest) in a team reward contingency than in an individual reward contingency. More simply, popularity and game success will be more positively correlated in a team reward contingency than in an individual one, and (2) practice mode will not affect the relationship between game success and sociometric status. In order to test these hypotheses the present study varied two dimensions in a classroom game setting: reward (individual vs. team), and practice (individual practice vs. practice in small groups).

Method

Design

The present study employed a 2 X 2 factorial design. Factor A was

practice (individual practice vs. group practice), and Factor B was reward (individual reward vs. team reward). Eight intact seventh grade mathematics classes were randomly assigned to the four treatment cells, such that the two teachers were represented in the design in a counter-balanced fashion, as below:

Figure 1: Experimental Design

		Reward: Individual	Reward: Team
Practice: Individual		Teacher I 2 classes	Teacher II 2 classes
Practice: Group		Teacher II 2 classes	Teacher I 2 classes

Because of the complete confounding of teacher and interaction effects, the interaction effect was computed but not interpreted.

Subjects

The subjects were 232 (M = 119, F = 113) seventh graders, representing eight mathematics classes at a white working class middle school in the Baltimore area. Two female teachers with similar amounts of teaching experience participated in the study.

Independent Variables

All classes involved in the study experienced the game and tournament components of TGT. The game represented a modification of the math game TUF (Avalon-Hill Company, Baltimore, Md.) in which students combine numbers

and operations to make equations. In this case, students earned points based on the length of the equations they formed. Thus feedback on performance was immediate, and visibility of student performance was high. The students competed at three-person "tournament tables" each week for ten weeks. The top scorer at each tournament table moved "up" to a table with more able students, and low scorer moved "down" to a table with less able students.

Design variable A, Practice, varied the conditions under which students practiced for the tournament, i.e., individually or in groups. In individual practice, students were not permitted to help each other; in group practice, students were encouraged to work with each other on the classroom tasks. Design variable B, Reward, varied the reward of game scores. In the individual reward condition, game scores were published in a newsletter which emphasized individual achievement. In the team reward condition, individual students' scores contributed to the score of a four to five-member team. The tournament newsletter emphasized team performance, and team success. Note that the Team Reward/Group Practice cell in the experimental design is TGT as described above. Also note that students in all four cells competed individually at the tournament tables. The factors which were varied were: (1) the way students prepared for the competition, in groups or alone, and (2) the disposition of student scores, reported as an individual score or contributed to a team score.

Dependent Variables

The dependent variables of interest in this study were increase in sociometric status and game success. Increase in sociometric status was determined from student responses on a pre- and posttest to the question

"Name five students in this class you would most like to work with on math problems." The sociometric status of an individual was the number of choices he received on the posttest minus the number he received on the pretest. The sociometric status measure used in this study conforms to Moreno's (1934) prescriptions in that it (1) delineates the group from which choices may be made; (2) offers specific criteria for acceptance or rejection (work with on math problems); (3) is actually used to restructure the group (on the pretest); and (4) was completed in private. The respondants were asked to make five choices. The measure of game success used was the level of performance at a student's original table placement (which was made according to student ability on previous tests) as compared to the level of performance at his final table placement (at end of ten-week period). Thus, a student who was originally assigned to a low-ability table and ended the tournament at a high-ability one was considered "successful", as to move "up" in table assignment required consistent game success.

The principal dependent variable used for this analysis was the correlation between change in sociometric status and change in game table placement (game success). This variable was seen as a class-level characteristic, a relationship within a class of game performance and sociometric choices received. A high correlation coefficient for a class was taken to indicate a class "normative climate" that rewarded effective game performance with increased sociometric status.

Results and Discussion

The class level correlations generated by the methods outlined above were used as the dependent variable in a 2 X 2 analysis of variance. The interaction effect was computed but ignored, as it is completely confounded

with the teacher effect. Table 1 presents the analysis of variance model. Cell entries are correlation coefficients; the number following them indicates the N on which the correlations were based.

Table 1

Classroom Level Correlations Between Game Success and Change in Sociometric Status

Practice	Reward: Individual	Reward: Team
Individual	.080 (26) -.114 (30)	.150 (22) .154 (29)
Group	-.313 (29) .028 (31)	.245 (33) .310 (32)

A significant reward main effect was observed ($F = 8.74$; $df = 1,4$; $P < .05$; $\omega^2 = .50$), which is due to a significantly higher correlation between sociometric status and game success in the team reward condition than in the individual reward condition. No effect of practice was observed ($F < 1$; $df = 1,4$; n.s.), and the confounded teacher and reward X practice interaction effect was non-significant ($F = 1.67$; $df = 1,4$; n.s.).

The results support the hypothesis that the relationship between game success and change in sociometric status is greater when reinforcement is at the team rather than the individual level. In addition, the expectation that practice condition (individual or group) would have no effect on this relationship was borne out. These results demonstrate the effects of an important mediating variable in the relationship between

team reward and increased academic achievement. The findings present quasi-behavioral evidence (as opposed to questionnaire responses) of the impact of classroom reward structure on at least one important dimension of school climate, namely the development of peer group norms supportive of academic goals and the conferring of high status to those who attain them.

While the former analysis was based on classroom-level correlation coefficients, it is also instructive to consider the overall correlations between game success and sociometric status in the team and individual reward conditions. In the team reward condition, there was a low but significant correlation ($r = .195$; $z = 2.10$, $N = 112$, $P < .05$) between game success and change from pre- to posttest in sociometric status, while in the individual reward condition the correlation was in the opposite direction ($r = -.084$; $z = -0.89$, $N = 115$). Students in the team reward condition who performed well on the academic tasks employed in this study received peer reinforcement (in terms of status or liking), while those in the individual reward condition who performed well did not. In sum, academic success was positively related to sociometric status only in the team reward condition. This suggests that, in a team reward contingency, individual performance is actually reinforced by peers. Students who bring back points to their team experience increases in sociometric status. This is the process assumed by Coleman (1959) and Bronfenbrenner (1970), but never before measured in a classroom application of a team reward contingency.

The present results may also be viewed in the context of other major findings from the same study. Hulten (1974) found a team effect on mathematics achievement ($F = 5.44$; $df = 1,225$; $P < .05$); the importance, or

incentive value, students attached to game success ($F = 5.44$; $df = 1,209$, $P < .05$), and students' perception of peer group pressure to do well at the game ($F = 119.25$; $df = 1,209$; $P < .001$). Individual vs. group practice had no effect on achievement or peer pressure, but did have an effect on incentive value of success in favor of individual practice ($F = 4.77$; $df = 1,209$; $P < .05$). The team effects on mathematics achievement, incentive value of success, and peer pressure demonstrate once again the impact of classroom reward structure on academic achievement and student attitudes. Reward interdependence and team identification led students to develop norms stressing success at the academic game task. The behavioral evidence provided in the present study indicates that students who were effective game players were rewarded with high peer group status.

A possible limitation of the study is the fact that the sociometric stimulus, "Name five students in this class you would most like to work with on math problems" is specifically related to the ability in question. Of course, students will want to work with other students whom they perceive to be good at math. However, what is of interest in this study is that the students in the individual reward condition, who had as much information about each others' abilities as the team reward students, did not choose students who were good at math. In addition, a high correlation ($r = .77$) was observed between the responses to the "math problem" question and responses to a separate sociometric stimulus, "Who are your friends in this class", given on the posttest only. This correlation indicates that responses to the two questions are homologous, probably tapping general favorable feelings toward the peers named rather than a specific desire to interact on a certain task.

The results of the present study have important implications for the sociology of education. First, they provide a quasi-behavioral analysis of the peer group processes underlying the observations of such researchers as Coleman (1959, 1960) and McDill and Rigsby (1973). The findings presented bear out the assumptions underlying the chain of casuality linking team competition and increased academic performance advanced by Coleman (1959) and Bronfenbrenner (1970). Most importantly, this study goes beyond a description of effects of successful academic performance on peer group status and offers a means of changing peer group consequences of academic success. This study suggests that the use of team-based instructional techniques such as TGT, may alter the interpersonal consequences of academic achievement.

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