DOCUMENT RESUME

ED 424 250 TM 029 122

AUTHOR Levi, Daniel; Cadiz, David
TITLE Evaluating Team Work on Student Projects: The Use of Behaviorally Anchored Scales To Evaluate Student Performance.
PUB DATE 1998-00-00
NOTE 11p.
PUB TYPE Reports - Research (143)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *College Students; Engineering; *Evaluation Methods; Grading; Group Behavior; *Group Dynamics; Higher Education; Performance Factors; Psychology; Research Methodology; Self Evaluation (Groups); *Student Evaluation; *Teamwork; Test Construction
IDENTIFIERS *Behaviorally Anchored Rating Scales; *Social Loafing

ABSTRACT

One of the biggest problems students face in team projects is social loafing, a situation in which students may view team projects as a free ride. Social loafers let others do the work, knowing that the professor will only grade the completed project. This research examined the performance of students grading other student team members on a group project. Team members' evaluations were part of the grade, worth 10 to 20% of the project grade. All evaluations were confidential, and other students never saw the evaluations. A behaviorally anchored scale was designed and used to discourage ratings based merely on personality. A behaviorally anchored scale is an approach to evaluating performance that encourages the rater to evaluate a subject's performance, rather than irrelevant characteristics such as personality or liking. The scale developed for this study was based on student opinions about the important task and social behaviors in team work. The sample included 3 psychology classes and 1 aeronautical engineering class, for a total of 142 students in teams ranging from 3 to 6 members. Results indicate that students can make evaluations of team members and give them grades other than all "A's". The distribution of grades given by the students was somewhat high for the psychology students, but was more typical for the engineering students. Ratings by students did make sense, and the correlations between the behaviorally anchored scales and the overall teams ratings were significant. Student ratings of team work were different and independent from their project grades. The value of the team work rating scales is to improve both the accuracy of grading and to give the teams a way to control social loafing. (Contains three tables and nine references.) (SLD)

EVALUATING TEAM WORK ON STUDENT PROJECTS: THE USE OF BEHAVIORALLY ANCHORED SCALES TO EVALUATE STUDENT PERFORMANCE

Daniel Levi and David Cadiz*
Psychology and Human Development Department
Cal Poly, San Luis Obispo, CA

Introduction

One of the most important aspects of teaching students team work skills is to provide them with opportunities to work on team projects. Students need an opportunity to practice team work skills in order to learn (Johnson & Johnson, 1997). However, it is important that they actually learn effective skills during this experience. Research has found that students do not learn as much from participating on dysfunctional teams as they do from participating on functional teams (Lewis, Aldridge, & Swamidas, 1998).

One of the biggest problems students face in team projects is social loafing - some of the students view team projects as an opportunity for a "free ride" (Beatty, Haas, & Sciglimpaglia, 1996; Yamane, 1996). Social loafers let other students do the work, knowing that the professor can only accurately grade the final project, not their contribution to it. Students may, in turn, perceive group projects as being unfairly graded because of the unequal participation and commitment of team members. Their bad experiences working in groups could lead students to acquire a negative attitude toward team work.

There are a number of ways to deal with the social loafing problem. Students could be required to turn in individual rather than team reports, but this is impractical for some projects and defeats some of the purposes of using team projects. Students could be required to report about ongoing team processes and experiences through assignments such as writing a journal, but writing such a report can create additional social problems for team members and may be difficult for a professor to interpret (Lewis, Aldridge, & Swamidas, 1998). A third alternative is to have the students evaluate the performance of their fellow team members. Professors have successfully used peer evaluations to ensure equal participation (Longmore, Dunn, & Jarobe, 1996).

* This research was funded by the NASA Multidisciplinary Design and Analysis Fellowship Program.

Students have been found to be the best evaluators of the relative contributions of other team members (Metheny & Metheny, 1997). The faculty member primarily sees the final product of the project, but not all of the activities which go into its creation. However, faculty members are reluctant to use student evaluations. The reluctance of faculty members (and of managers in industry) is partially based on the belief that students will not accurately evaluate other students. Many faculty members believe that students will give team members "A"s in order to get along or will base their ratings on personality or liking rather than performance (Levi, Cacapit, Rinzel, & Stultz, 1995).

The purpose of this research is to examine the performance of students grading other student team members on a group project. The students worked on a team project which required a single team project report which was an important part of their grade in the class. The grading system was set up with a few conditions designed to help make it work better. The team members' evaluations were part of their grade, worth at least 10% of the project grade (and often 20%). All of the evaluations were confidential - other students never saw the evaluations. Finally, a behaviorally anchored scale was designed and used to discourage ratings based merely on personality.

A behaviorally anchored scale is an approach to evaluating performance which encourages the rater to evaluate a subject's performance, rather than irrelevant characteristics such as personality or liking (Smith & Kendall, 1963). By having the evaluation process focus on project related behaviors, it was believed that many of the biases in performance evaluations could be eliminated. Research on the success of using behaviorally anchored scales in the workplace have been mixed (Landy & Farr, 1980). However, the development of behaviorally anchored scales has been viewed as a good way to better explain to employees what behaviors are important in the evaluation process. This helps to set up performance goals for employees.

The behaviorally anchored scale used in this study was based on a common model of team work which proposes that team members perform two basic functions: task and social activities (Johnson & Johnson, 1997). Task activities are behaviors which are oriented toward the project or task the group is working on. Typical task activities during a group meeting focus on problem solving and group decision making. Social activities are behaviors which are designed to maintain social relations within the group. These group maintenance activities help to reduce tension in the group and increase cohesion among group members.

Students from Psychology and Engineering classes rated their team members on the behaviorally anchored scale and then gave the team member an overall rating. It was hypothesized that the act of completing the behaviorally anchored scale would make the overall ratings significantly correlate with the students' performance. Student team work grades in the class were calculated by averaging the overall team ratings for each student from their team members. This

study examined the relationships among the ratings and between the team work ratings and the project scores.

The goals of this project were as follows:

1) to develop a behaviorally anchored team work scale to measure an individual's contribution to a team project;
2) to demonstrate that student evaluations create a reasonable grade distribution which is independent of faculty evaluations; and,
3) to examine the relationship of task and social behaviors in the students' evaluations of team performance.

The importance of these goals is that developing a valid performance measure of individual behavior within a team is one way to control the problem of social loafing. However, it is important to develop a measurement system which does not disrupt the team project and is acceptable to the professor in the class. In addition to these goals, an examination of the differences between engineering and psychology students was used to show whether this approach could be used on a wide variety of students.

Method

Development of a Behaviorally Anchored Team Work Scale

As part of a class exercise in a Group Dynamics class in Psychology, students were asked to list the important task and social behaviors which contributed to a team project. An analysis of their responses to this exercise generated a list of the four most common task and social behaviors useful for evaluating student team work. The four task behaviors were making commitments to do task assignments, completing tasks on time, doing their fair share of work, and producing work of acceptable quality. The four social behaviors were acting in a cooperative fashion, actively participating in the team, promoting a climate of trust and mutual respect, and handling conflicts in an open and constructive fashion.

A team work evaluation form was created which required the students to list the names of the other team members on the project, to rate them on a set of behaviorally anchored scales, and then to give each student an overall team member rating. The behaviorally anchored scale contained the eight items (four task and four social behaviors) which were generated in the previous class exercise. These behaviors were rated on a five point scale from never to always. The overall team member rating was made on a ten point scale from poor team member to excellent team member.

Testing of the Team Work Scale

The sample included three Psychology classes and a sophomore Aeronautical Engineering class. Altogether, 142 students participated in the study. Team size ranged from three to six students.

Students rated all of the members of their team. The grading was done in class and the students' ratings were kept confidential. A student's grade was calculated as the average response received from his/her team members. In addition, the professors' grades from the projects were collected.

Results

Table 1 shows the ratings on the behaviorally anchored scale items for the Psychology and Engineering students separately. The Psychology students used the top of the scale about three quarters of the time, while the Engineering students' ratings were generally lower. T-tests were performed to statistically examine the differences between the ratings of the Psychology and Engineering students. The Psychology students gave higher ratings than the Engineering students on all of the task behaviors (Commitment: $t(463) = 3.32$, $p<.001$; Complete: $t(463) = 5.12$, $p<.001$; Fair share: $t(463) = 2.79$, $p<.01$; and Quality: $t(463) = 3.69$, $p<.001$). There were no significant differences between the students' ratings on the social behaviors.

Table 1
Ratings on the Behaviorally Anchored Scales*

Psychology Students Ratings:	5	4	3 or less
Task			
Make commitments to do task assignments	76%	17%	7%
Complete assigned tasks on time	73%	19%	8%
Do their fair share of work	74%	17%	9%
Produce work with acceptable quality	79%	15%	6%
Social			
Act in a cooperative fashion	84%	11%	5%
Actively participate in the team	73%	18%	9%
Help to promote a climate of trust and mutual respect	77%	13%	10%
Handle conflicts in an open and constructive fashion	75%	16%	9%
Engineering Students **Ratings:**	**5**	**4**	**3 or less**
Task			
Make commitments to do task assignments	54%	29%	17%
Complete assigned tasks on time	42%	40%	18%
Do their fair share of work	51%	37%	12%
Produce work with acceptable quality	50%	41%	9%
Social			
Act in a cooperative fashion	78%	20%	2%
Actively participate in the team	58%	33%	9%
Help to promote a climate of trust and mutual respect	65%	31%	4%
Handle conflicts in an open and constructive fashion	58%	37%	5%

*Scale ranged from 1 - Never, 2 - Sometimes, 3 - Many times, 4 - Most of the time, to 5 - Always

Table 2 contains the distribution of scores on the overall team member rating scale and the grades for the individual students. The grades were calculated by averaging the ratings on the behaviorally anchored scales for each student from their team members and using a standard grading criteria (90% and above for an A, etc.). The Psychology students gave higher ratings than the Engineering students on the overall team member ratings ($t(463) = 3.55$, $p<.001$). This difference led to higher grades given by the Psychology students. However, for both the Psychology and Engineering students, the overall ratings did create a grade distribution which identified differences in performance.

The ratings on the behaviorally anchored scales and the overall team rating were compared to the professor's project grades. Only two of the behaviorally anchored scales significantly ($p <$

.01) correlated with the project grades (Complete: r = .25 and Conflict: r = .21). The overall team rating did not significantly correlate with the project grade.

Table 2
Distribution of Scores and Grades Using the Overall Rating

Rating	Psychology	Engineering	Grade	Psychology	Engineering
10	62%	27%	A	48%	11%
9	17%	33%	B	32%	50%
8	9%	23%	C	11%	32%
7	6%	13%	D	6%	1%
6	2%	2%	F	4%	1%
5	2%	1%			
4	0%	0%			
3	0%	1%			

A multiple regression using all eight of the team work behaviors on the behaviorally anchored scales to predict the overall team member rating was significant ($F(8,456) = 196.1$, $p < .0001$) with a $R = .88$ and an adjusted R-squared of .77. The regression found that five of the eight team work behaviors were significant in the model. A simplified regression model using only the top four of the variables had a $R = .86$ (adjusted R-squared of .75) and was statistically significant ($F(8,456) = 340.10$, $p<.0001$). This model closely approximates the full regression, and suggests that a simpler four variable rating scale would be sufficient. The four variable model included three task behaviors (Commitment, Fair Share, and Quality) and one social behavior (Participate).

Table 3 presents the regression information for this four variable model, and includes separate models for the Psychology and Engineering students. Although all three models are statistically significant ($p<.001$), the regression model works better (explains more of the variance) for the Psychology students than the Engineering students. In the models, one of the four variables is a social, rather than task, behavior. In the Psychology model, this social variable (Participate) accounts for 40% of the variance, while it accounts for only 26% of the variance in the Engineering model.

Table 3
Regression of the Behaviorally Anchored Scales to the Overall Rating, with Standardized Beta Coefficients

	Psychology	Engineers	Total
Make commitments to do task assignments	.16**	.27*	.20**
Do their fair share of work	.23**	.14	.21**
Produce work with acceptable quality	.21**	.29*	.25**
Actively participate in the team	.40**	.26*	.35**
N	369	95	464
R^2 adjusted	.78**	.56**	.75**

** p<.001, * p<.01

An analysis was made of the differences between three, four and five person teams. (There were too few six person teams to include in the analysis). This analysis showed that there were significant differences ($p < .05$) on the Conflict, Cooperate, and Complete behaviors. In all cases, the three person teams were rated higher than the four and five person teams. This suggests that there is no difference between four and five person teams, and little difference with the three person teams. Consequently, there is probably not a need to adjust the team work evaluation system due to varying team sizes.

Conclusion

This study demonstrates a number of points about the use of student team work ratings and the value of behaviorally anchored scales. First, students can make evaluations of their fellow team members and give them grades other than all "A"s. The distribution of grades given by the students was somewhat high for the Psychology students, but a more typical grading distribution was given by the Engineering students. (This is similar to the differences in the overall grade distributions of the two types of classes.)

The ratings given by the students do make sense. The correlations between the behaviorally anchored scales and the overall teams ratings are significant. The ratings show that students do consider the behavior of their team members when making their ratings, especially the task oriented behaviors.

It is important to note that although the behaviorally anchored scales correlated significantly with the overall team ratings, that does not mean that the overall rating can be used to replace the

behaviorally anchored scales. It is assumed that the act of completing the behaviorally anchored scales helps the students to make better overall ratings by focusing on the performance of the team members, rather than relying on irrelevant factors such as personality or liking.

Student ratings of team work are different and independent from their project grades. This shows the value of allowing students' ratings of team work to be part of the grading system. Team work scores discriminate within team performance in ways which are not included in the professors' overall project grades. In addition, the value of student team work ratings is more than just improving the accuracy of the class grading system. The ability to evaluate each others performance is an important tool for students to manage social loafing in their teams.

The value of the team work rating scales is to both improve the accuracy of the grading and to give the teams a way to control social loafing. The lack of a correlation between the project grade given by the professor and the student team work evaluations shows that teams hide the effects of social loafing by some its members. Interviews with the professors participating in this study showed that complaints about social loafing were reduced when the student evaluation system was used. The student evaluation system does not eliminate the social loafing problem, but it does give students a way to manage the problem and a sense that they are being treated fairly.

The regression analysis suggests that a simpler rating system would be sufficient. Students could use a four item behaviorally anchored scale, and this should reach the same conclusion. The four scale items include the following: make commitments to do task assignments, do their fair share of work, produce work with acceptable quality, and actively participate in the team. A copy of this revised rating scale is included in the Appendix.

Three of the four items in the behaviorally anchored scale are task related behaviors. Even though 75% of the evaluation scale deals with task related behaviors, this does not measure the importance of social activities nor the amount of time a group may participate in task related behaviors. The regression analysis suggests that social related behaviors are more important for Psychology than Engineering majors. For the Psychology students, active participation (the social behavior in the scale) accounted for 40% of the total score, while it accounted for only 26% of the Engineering students total score. However, an observational analysis of Psychology and Engineering classes found that student teams in both classes spent only about 10% of their team time engaged in social, rather than task, oriented behaviors.

References

Beatty, J., Haas, R., & Sciglimpaglia, D. (1996). Using Peer Evaluations to Assess Individual Performances in Group Class Projects. Journal of Marketing Education, Summer 1996, 17-27.

Johnson, D. & Johnson, F. (1997). Working Together: Group Theory and Group Skills. Boston: Allyn and Bacon.

Landy, F. & Farr, J. (1980). Performance rating. Psychological Bulletin, 87, 72-107.
Levi, D., Cacapit, M., Rinzel, L., & Stultz, F. (1995). Faculty Manual for The Student Team Work Manual: A How-To Guide for Engineering Students on Project Teams. Cal Poly education manual. Development of the manual sponsored by NASA.
Lewis, P., Aldridge, D., & Swamidas. (1998). Assessing Teaming Skills Acquisition on Undergraduate Project Teams. Journal of Engineering Education, 87(2), 149-155.
Longmore, M., Dunn, D., & Jarobe, G. (1996). Learning By Doing: Group Projects in Research Method Classes Teaching Sociology, 24, 84-91.
Metheny, D. & Metheny W. (1997). "Enriching Technical Courses with Learning Teams. College Teaching, 1, 32-35.
Smith, P. & Kindall, L. (1963). Retranslation of expectations: An approach to the construction of unambiguous anchors for rating scales. Journal of Applied Psychology, 47, 149-155.
Yamane, D. (1996). Collaboration and its Discontents: Steps Toward Overcoming Barriers to Successful Group Projects Teaching Sociology, 24, 378-383.

TEAM WORK EVALUATION FORM

Instructions:

This form is designed to help you rate the team members in your class project. Begin by writing down your name and the project or team name. Use the rating scale to evaluate your team members. Write the ratings and add them together for each team member at the bottom of the page.

Your name: _____

Name of Project or team: _____

Use the following rating scale to evaluate your team members' behavior:

1	2	3	4	5
Never	Sometimes	Many times	Most of the time	Always

Did the team member you are rating:

A. make commitments to do task assignments?

B. do their fair share of work?

C. produce work with acceptable quality?

D. actively participate in the team?

Team Member	**A**		**B**		**C**		**D**		**Total**
1. _____	_____	+	_____	+	_____	+	_____	=	_____
2. _____	_____	+	_____	+	_____	+	_____	=	_____
3. _____	_____	+	_____	+	_____	+	_____	=	_____
4. _____	_____	+	_____	+	_____	+	_____	=	_____
5. _____	_____	+	_____	+	_____	+	_____	=	_____
6. _____	_____	+	_____	+	_____	+	_____	=	_____

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

ERIC

TM029122

REPRODUCTION RELEASE

(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title: Evaluating Team Work in Student Projects: The Use of Behaviorally Anchored Scales to Evaluate Student Performance	
Author(s): Daniel Levi and David Cadiz	
Corporate Source: Not published	Publication Date: july 8, 1998

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, *Resources in Education* (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign at the bottom of the page.

The sample sticker shown below will be affixed to all Level 1 documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1

Level 1

☒

Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g., electronic) *and* paper copy.

The sample sticker shown below will be affixed to all Level 2A documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2A

Level 2A

☐

Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only

The sample sticker shown below will be affixed to all Level 2B documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2B

Level 2B

☐

Check here for Level 2B release, permitting reproduction and dissemination in microfiche only

Documents will be processed as indicated provided reproduction quality permits.
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Sign here, → please

Signature: Daniel J Levi	Printed Name/Position/Title: Daniel Levi, Professor
Organization/Address: Psychology & Human Development, Cal Poly, San Luis Obispo, CA	Telephone: 805-541-1837 FAX:
	E-Mail Address: dlevi@calpoly.edu Date: 7/8/98

(over)

III. DOCUMENT AVAILABILITY INFORMATION (FROM NON-ERIC SOURCE):

If permission to reproduce is not granted to ERIC, *or*, if you wish ERIC to cite the availability of the document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents that cannot be made available through EDRS.)

Publisher/Distributor:
Address:
Price:

IV. REFERRAL OF ERIC TO COPYRIGHT/REPRODUCTION RIGHTS HOLDER:

If the right to grant this reproduction release is held by someone other than the addressee, please provide the appropriate name and address:

Name:
Address:

V. WHERE TO SEND THIS FORM:

Send this form to the following ERIC Clearinghouse:

However, if solicited by the ERIC Facility, or if making an unsolicited contribution to ERIC, return this form (and the document being contributed) to:

ERIC Processing and Reference Facility
1100 West Street, 2nd Floor
Laurel, Maryland 20707-3598

Telephone: 301-497-4080
Toll Free: 800-799-3742
FAX: 301-953-0263
e-mail: ericfac@inet.ed.gov
WWW: http://ericfac.piccard.csc.com