December 2003

Students' Perceptions Toward Peer Evaluation

Yining Chen
Ohio University

Hao Lou
Ohio University

STUDENTS' PERCEPTIONS TOWARD PEER EVALUATION

Yining Chen
Ohio University
cheny@ohiou.edu

Hao Lou
Ohio University
lou@ohiou.edu

Abstract

This research-in-progress employs expectancy theory to evaluate key factors that may motivate students to participate in the peer evaluation process of group projects. The preliminary results indicate that students generally perceived peer evaluation being taken into consideration in determining peers' grades to be the most attractive outcome of a peer evaluation system. The second attractive outcome was using peer evaluation to reduce conflict and uneven workload distribution among group members. Peer evaluation being provided to peers in improving their performance and behavior and using peer evaluation to enhance productivity and collaboration of the group in meeting its goal were less important from the students' standpoint. The results of this pilot study provide a starting point for understanding the behavioral intention (motivation) of students' participation in the peer evaluation process.

Keywords: Group projects, peer evaluation, expectancy theory, motivation

Introduction

The use of student groups for class projects is now a common practice in many business schools. Instructors view class group projects as excellent learning exercises and training opportunities for students. Due to the difficulty of evaluating uneven performance among group members, many researchers suggest incorporating peer evaluations in a grading system that permits an instructor to more equitably evaluate and grade individual performance within a group (Williams et al. 1991; Beatty et al. 1996). It is believed that peer assessment reflects the perspective from peer students who are in closer contact and are familiar with behaviors and characteristics of group members that may not otherwise be available to an instructor (Barrett 1996; Cedeblom and Lounsbury 1980). Research on peer evaluations often examines issues like the development and validity of an evaluation instrument (Johnson and Smith 1997; Levi and Cadiz 1998; Smith 1998), the validity (Beatty et al. 1996) and reliability (Morahan-Martin 1996) of peer ratings in measuring student performance, and the potential bias of peer ratings (Ghorpade and Lackritz 2001; Hass et al. 1998). Very few studies, however, have examined students' perceptions of peer evaluations and their motivation to participate in the evaluation. Since students' input is the root and source of peer evaluation data, active and meaningful participation by students is essential.

Expectancy theory has been recognized as one of the most promising conceptualizations of individual motivation (Ferris 1977). Many researchers have proposed that expectancy theory can provide an appropriate theoretical framework for research that examines a user's acceptance of and intent to use a system (DeSanctis 1983). This study uses expectancy theory as part of a student based experiment to examine students' acceptance of and motivation to participate in a peer evaluation system. The research questions are (1) whether expectancy theory can appropriately explain behavioral intention of students to participate in peer evaluations; and (2) how the potential uses of peer evaluations affect students' motivation to participate in the evaluation process.

Theoretical Background

Expectancy theory (Vroom 1964) has served as a theoretical foundation for a large body of studies in psychology, organizational behavior, and management accounting (Harrell et al. 1985; Brownell and McInnes 1986; Hancock 1995; Snead and Harrell 1994; Geiger and Cooper 1996). Expectancy models are cognitive explanations of human behavior that cast a person as an active, thinking, predicting creature in his or her environment. He or she continuously evaluates the outcomes of his or her behavior and

subjectively assesses the likelihood that each of his or her possible actions will lead to various outcomes. The choice of the amount of effort he or she exerts is based on a systematic analysis of (1) the values of the rewards from these outcomes, (2) the likelihood that rewards will result from these outcomes, and (3) the likelihood of reaching these outcomes through his or her actions and effort.

According to Vroom, expectancy theory is comprised of two related models: the valence model and the force model. In our application of the theory, the valence model shows that the overall attractiveness of a peer evaluation system to a student (V) is the summation of the products of the attractiveness of those outcomes associated with the system (V_k) and the probability that the system will produce those outcomes (I_k):

$$V = \sum_{k=1}^{n} (V_k * I_k)$$

where: V = the valence, or attractiveness, of a peer evaluation;
V_k = the valence, or attractiveness, of peer evaluation outcome k; and
I_k = the perceived probability that the peer evaluation will lead to outcome k.

In our case the four potential outcomes (i.e., k=1, 2, 3, 4) are the four uses of peer evaluations that are described in the literature. They are (1) determining peers' grades, (2) improving peers' performance and behavior, (3) enhancing group productivity and collaboration, and (4) reducing conflict and uneven workload distribution among group members.

The second model, force model, shows that a student's motivation to exert effort into a peer evaluation system (F) is the summation of the products of the attractiveness of the system (V) and the probability that a certain level of effort will result in a successful contribution to the system (E):

$$F = E * V$$

where: F = the motivational force to participate in a peer evaluation;
E = the expectancy that a particular level of participation (or effort) will result in a successful contribution to the evaluation; and
V = the valence, or attractiveness, of the peer evaluation; derived in the previous equation of the valence model.

In the valence model, each participant in a peer evaluation system evaluates the system's outcomes and subjectively assesses the likelihood that these outcomes will occur. Next, by placing his or her own intrinsic values (or weights) on the various outcomes, each student evaluates the overall attractiveness of the peer evaluation. Finally, the student uses the force model to determine the amount of effort he or she is willing to exert in the peer evaluation process. This effort level is determined by the product of the attractiveness generated by the valence model (above) and the likelihood that his or her effort will result in a successful contribution to the evaluation. Based on this systematic analysis, the student will determine how much effort he or she would like to exert in participating in the peer evaluation.

Research Method

Subject Selection

This study was conducted to a MBA class and a capstone senior MIS class of a mid-west university. The students were actively involved in group projects and were familiar with peer evaluation practices, therefore were considered appropriate for this study. The instrument was administered in a class session to all the students who were present on that day. Faculty members explained the use of the instrument, read the instruction page to the students, and then asked the students to complete the instrument. The process took between 15 and 20 minutes. Fifty three usable instruments were obtained after four with incomplete data were eliminated. Among the 53 respondents, 19 of them were females and 34 were males. The average GPA is 3.40 on a 4-point scale.

The Experiment Design

The within-person or individual focus of expectancy theory suggests that appropriate tests of this theory should involve comparing measurements of the same individual's motivation under different circumstances (Harrell et al. 1985; Murray and Frizzier 1986). Following this suggestion, this study incorporates a well-established within-person methodology originally developed by Stahl and Harrell (1981) and later proven to be valid by other studies in various circumstances (e.g., Snead and Harrell 1994; Geiger and Cooper 1996). This methodology uses a judgment modeling decision exercise that provides a set of cues, which an individual uses in arriving at a particular judgment or decision. Multiple sets of these cues are presented, each representing a unique combination of strengths or values associated with the cues. A separate judgment is required from the individual for each unique combination of cues presented.

We employed a one-half fractional factorial design using the four outcomes of peer evaluations shown prior to Decision A. This resulted in eight different combinations of the outcomes (2^4 x $1/2$ = 8 combinations). Each of the resulting eight combinations was then presented at two levels (10% and 90%) of expectancy to obtain 16 unique cases (8 combinations x 2 levels of expectancy = 16 cases). This furnished each participant with multiple cases that, in turn, provided multiple measures of each individual's behavioral intentions under varied circumstances. This is a prerequisite for the within-person application of expectancy theory (Snead and Harrell 1994).

In each of the 16 cases, the participants were asked to make two decisions. The first decision, Decision A, corresponded to the V in the valence model and represented the overall attractiveness of participating in the peer evaluation, given the likelihood (I_k = 10% or 90%) that the four outcomes (V_k) would result from their participation. The instructions and a sample case are provided in the Appendix. The second decision, Decision B, corresponded to F in the force model and reflected the strength of a participant's motivation (or the level of effort a participant is willing to exert) to participate in the peer evaluation, using (1) the attractiveness of the evaluation (V) obtained from Decision A and (2) the expectancy (E = 10% or 90%) that if the participant exerted a great deal of effort, he or she would be successful in providing meaningful or useful input to the evaluation process. We used an eleven-point response scale with a range of -5 to 5 for Decision A and 0 to 10 for Decision B. For Decision A, negative five represented "very unattractive" and positive five represented "very attractive". For Decision B, zero represented "zero effort" and ten represented a "great deal of effort".

We used "Further Information" in the instrument to introduce the expectancy (E) factor of the experiment. It is quite common that open-ended questions are enclosed in a peer evaluation to allow students to express an unconstrained opinion about some aspect of a group member (peer) and/or the group in which they are involved. Such questions usually provide important diagnostic information and insight for the formative evaluation about the group member and/or the group. Though important, open-ended questions are more difficult to summarize and report. In "Further Information" of the instrument, we explained to each participating student that despite of his or her best effort his or her feedback might not be helpful to the readers. Likewise, the data from multiple-choice questions could be difficult to interpret or meaningless if the questionnaire is designed poorly or the questions are ambiguous or the evaluation is administered inappropriately. Therefore, regardless of his or her effort, the student may not be successful in contributing meaningfully to the evaluation process. The students were further reminded that their participation in the evaluation is voluntary and they are free to decide to what extent they would participate in the evaluation. This added the necessary uncertainty (expectancy) about the reward of effort, as well as providing a feeling that the required effort could be considerable.

Preliminary Results

Valence Model

Through the use of multiple regression analysis, we sought to determine each student's perception of the attractiveness of participating in the peer evaluation. Decision A (V) served as the dependent variable, and the four second-level outcome instruments (I_k) served as the independent variables. The resulting standardized regression coefficients represent the relative importance (attractiveness) of each of the outcomes to each participant in arriving at Decision A.

The mean R^2 of the individual regression models is .6823, which indicated that the valence model of expectancy theory explains much of the variation in students' perception of the attractiveness of participating in a peer evaluation.

The standardized betas of V1, V2, V3, and V4 are all significant (p<.05), for more than half of the students. This implies that all four of the outcomes tested were important factors in determining the attractiveness of a peer evaluation system. It is the mean of these standardized betas that explains how students assess the attractiveness of potential outcomes resulting from a peer evaluation system. The participants, on average, placed the highest valence on the outcome V1, the second highest valance on the outcome V4. The other outcomes, in descending order of valence, were V2, and V3. These results imply that peer evaluation being used in determining peers' grades (V1) is the most attractive outcome to students. Using peer evaluation in reducing conflict and uneven workload distribution among group members (V4) is the second most attractive outcome. Students, however, consider that peer evaluation results being used to improve peers' performance and behavior (V2) and being used by students for enhancing group productivity and collaboration (V3) are less important outcomes.

Force Model

We then used multiple regression analysis to examine the force model (Decision B) in the experiment. The dependent variable is the individual's level of effort to participate in the peer evaluation (F). The two independent variables are (1) each student's perception about the attractiveness of the peer evaluation (V) from Decision A, and (2) the expectancy information (E =10% or 90%) which is provided by the "Further Information" sentence of the test instrument (see Appendix).

The mean R^2 (.7231) indicates that the force model sufficiently explains the students' motivation of participating in the peer evaluation. The mean standardized regression coefficient F1 (.7070) indicates the impact of the overall attractiveness of the evaluation (V) while F2 (.3425) indicates the impact of the expectation that a certain level of effort leads to successful contribution in the evaluation. Our results found significance difference between the mean standardized betas of F1 and F2. The p-value of t-test was .0001. This result implies that the attractiveness of the peer evaluation system (F1) is more important to the student's motivation than the likelihood that the student's efforts will lead to success (F2). Students are willing to exert effort if they find the peer evaluations (or outcomes of the peer evaluation) attractive to them. Their motivation, however, is less influenced by how much their effort can lead to meaningful feedback or contribution.

Discussions and Concluding Remarks

At the present, it seems reasonable to conclude that the expectancy model used in this study provides a good overall explanation of a student's motivation to participate in the evaluation of peer effectiveness. The valence model significantly explains a student's assessment of the attractiveness of a peer evaluation system. Further, the force model provides a good explanation of a student's motivation to participate in the peer evaluation. By the successful application of expectancy theory, this study provides a starting point for understanding the behavioral intention (motivation) of students' participation in the peer evaluation process.

Our preliminary results show that the students have strong preferences for the uses of peer evaluations and these preferences are remarkably consistent across individuals. Since quality student participation is an essential antecedent of the success of peer evaluations, this knowledge of student motivation should be considered thoughtfully when a peer evaluation system is implemented. If, however, students are kept ignorant of the use of peer evaluations or if peer evaluations are used for purposes that students do not value or if they see no visible results from their participatory efforts, they will cease to give meaningful input.

References

Barret, R. S. *Performance Rating*. Science Research Associates, Chicago, IL, 1996.

Beatty, J. R., Haas, R. W., and Sciglimpaglia, D. "Using Peer Evaluations to Assess Individual Performances in Group Class Projects," *Journal of Marketing Education* (18:2), Summer 1996, pp.17-27.

Brownell, P., and McInnes, M. "Budgetary Participation, Motivation, and Managerial Performance," *Accounting Review* (61:4), October 1986, pp. 587-600.

Burton, F. G., Chen, Y., Grover, V., and Stewart, K.A. "An Application of Expectancy Theory for Assessing User Motivation to Utilize An Expert System," *Journal of Management Information Systems* (9:3), Winter 1993, pp. 183-198.

Cederblom, D. and Lounsbury, J. W. "An Investigation of User Acceptance of Peer Evaluations," *Personnel Psychology* (33:3), 1980, pp. 567-579.

DeSanctis, G. "Expectancy Theory as Explanation of Voluntary Use of A Decision Support System," *Psychological Reports* (52:1), January 1983, pp. 247-260.

Ferris, K. R. "A Test of the Expectancy Theory as Motivation in an Accounting Environment," *The Accounting Review* (52:3), July 1977, pp. 605-614.

Geiger, M. A., and Cooper, E. A. "Using Expectancy Theory to Assess Student Motivation," *Issues in Accounting Education* (11:2), Spring 1996, pp. 111-127.

Ghoepade, J., and Lackritz, J. R. "Peer Evaluation in the Classroom: A Check for Sex and Race/Ethnicity Effects," *Journal of Education for Business* (76:5), May/June 2001, pp. 274-281.

Haas, A. L., Hass, R. W., and Wotruba, T. R. "The Use of Self-Ratings and Peer Ratings to Evaluate Performances of Student Group Members," *Journal of Marketing Education* (20:3), December 1998, pp. 200-209.

Hancock, D. R. "What Teachers May Do to Influence Student Motivation: An Application of Expectancy Theory," *The Journal of General Education* (44:3), Fall 1995, pp. 171-179.

Harrell, A. M., Caldwell, C., and Doty, E. "Within-Person Expectancy Theory Predictions of Accounting Students' Motivation to Achieve Academic Success," *Accounting Review* (60:4), October 1985, pp. 724-735.

Johnson, C. B., and Smith., F. I. "Assessment of a Complex Peer Evaluation Instrument for Team Learning and Group Processes," *Accounting Education* (2:1), 1997, pp. 21-40.

Levi, D., and Cadiz., D. "Evaluating Team Work on Student Projects: The Use of Behaviorally Anchored Scales to Evaluate Student Performance," ERIC Document Reproduction Service, ED 424250. 1998.

Montgomery, D. C. *Design and Analysis of Experiments*. John Wiley & Sons, 1984.

Morahan-Martin J. "Should Peers' Evaluations Be Used In Class Projects? Questions Regarding Reliability, Leniency, and Acceptance," *Psychological Reports* (78:3), 1996, pp. 1243-1250.

Murray, D., and Frizzier, K. B. "A Within-Subjects Test of Expectancy Theory in a Public Accounting Environment," *Journal of Accounting Research* (24:2), Autumn 1986, pp. 400-404.

Smith, K. A. "Grading Cooperative Projects," *New Directions for Teaching and Learning* (74), Summer 1998, pp. 59-67.

Snead, K. C., and Harrell, A. M. "An Application of Expectancy Theory to Explain a Manager's Intention to Use a Decision Support System," *Decision Sciences* (25:4), Jul/Aug 1994, pp. 499-513.

Stahl, M. J., and Harrell, A. M. "Modeling Effort Decisions with Behavioral Decision Theory: Toward an Individual Differences Model of Expectancy Theory," *Organizational Behavior and Human Performance* (27:3), 1981, pp. 303-325.

Vroom, V. H. *Work and Motivation*, John Wiley & Sons, New York, NY, 1964.

Williams, D. L., Beard, J. D., and Rymer, J. "Team Projects: Achieving Their Full Potential," *Journal of Marketing Education* (13:2), Summer 1991, pp. 45-53.

Appendix. Instrument

INSTRUCTIONS

As a student who involves in collaborative or team-based projects, you are asked to evaluate the performance of your peers (group members). These peer evaluations may be used in various ways, such as: determining peers' grades; improving peers' performance and behavior; enhancing group productivity and collaboration; and reducing conflict and uneven workload distribution.

This exercise presents 16 situations. Each situation is different with respect to how the peer evaluation is likely to be used. We would like to know how attractive participation in such peer evaluation is to you in each given situation.

You are asked to make two decisions. You must first decide how *attractive* it would be for you to participate in the peer evaluation (DECISION A). Next you must decide how much *effort* you would exert in completing the peer evaluation (DECISION B). Use the information provided in each situation to reach your decisions. There are no "right" or "wrong" responses, so express your opinions freely. A sample situation is provided below. The 16 different situations start on the next page.

EXAMPLE QUESTIONNAIRE

The likelihood that your peer evaluation feedback:

will be taken into consideration in determining peers' grades is . . . . HIGH (90%)
will be provided to individual group member in improving his or her performance and behavior is . . . . HIGH (90%)
will be used to enhance productivity and collaboration of the group in meeting its goal is . . . . HIGH (90%)
will be used to reduce conflict and uneven workload distribution among group members is . . . . LOW (10%)

DECISION A: With the above outcomes and associated likelihood levels in mind, indicate the *attractiveness* to you of participating in the peer evaluation.

$$-5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad +1 \quad +2 \quad +3 \quad +4 \quad +5$$

Very Unattractive   Very Attractive

FURTHER INFORMATION: The peer evaluation contains several open-ended essay questions, which will require a great deal of effort for you to complete. (As you know, your participation in peer evaluations is voluntary. Thus you can choose to exert much effort in the hopes of providing meaningful feedback or at the other extreme you can do nothing.) If you exert a great deal of effort, the likelihood that the readers will find your feedback helpful is . . . . LOW (10%) *

DECISION B: Keeping in mind your attractiveness decision (DECISION A) and the FURTHER INFORMATION, indicate the *level of effort* you would exert to participate in the peer evaluation.

$$0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10$$

Zero Effort   Great Deal of Effort

*Despite your best effort to articulate your feelings, the peers may misinterpret your feedback. Even the responses to multiple choice questions are difficult to interpret when the questions are designed poorly.