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The Impact of Group Selection on Student Performance and Satisfaction

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Abstract

Investigates whether the performance and attitudes of students could be improved by giving them some control over the group selection process. Groups were formed either by randomly combining paired friends or by randomly assigning all students. Students completed a group exercise and a group case. The dependent variables were the project grades and student satisfaction. Student satisfaction was measured using a questionnaire. The results show that attitudes of students were more positive when they were allowed to choose a single friend in the group. The project grades were significantly higher when students were paired, and this result was true regardless of their grade point averages. The interaction between group selection and grade point average is explained, and the paper concludes that the best group selection is to pair friends and then combine them to form groups with high ability rather than randomly assigning students to groups.

Introduction

The Accounting Education Change Commission (1990) has urged accounting educators to develop new approaches to teaching and endorsed cooperative learning as a suitable method for developing the interpersonal skills of students. Cooperative learning is defined as students' collaboration to maximize their own and each other's learning, which is characterized primarily by group interdependence and individual accountability (Dudley *et al.*, 1997; Johnson *et al.*, 1993). Previous studies have shown that cooperative learning can also enhance students' attitudes and performance (Slavin, 1995). Johnson and Johnson (1989a; 1989b) list more than 400 studies which indicate that the use of cooperative learning has a positive effect on students' achievement, interest in the subject matter, self-esteem, attendance and ability to work effectively with others.

This study investigates whether the performance and attitudes of students could be improved by giving them some control over the group selection process. In one class, students were allowed to pair up with a friend before being randomly assigned to a group, and in the other class, all students were randomly assigned to a group. Students remained in the same group to which they were assigned for the entire semester. Students' performance on group projects and satisfaction were evaluated before they knew their grades. The results showed that attitudes of the students were more positive when they were allowed to choose a single friend in the group[1]. The group project grades of students were significantly higher when students were paired rather than when the group was formed entirely by random assignment. This result was true regardless of students' abilities, which were measured using their grade point averages. This study discusses these findings and concludes that it is generally better for instructors to intervene in the group selection process to make sure that the average ability of the group as a whole is high enough so that low ability students can learn from their high ability peers.

A discussion of the relevant theoretical issues leading to the hypotheses is presented next, followed by sections describing the methodology and results. The paper concludes with a summary of the findings and a discussion of their implications.

Literature review

There are three ways in which groups could be composed:

1. 1 grouping students randomly;
2. 2 grouping students based on friendship or on some other shared interest; and
3. 3 grouping students based on teacher selection.

According to Sharan and Sharan (1992), advocates of random grouping believe that all students are equally valuable. Random grouping also encourages students to discover that anyone in their class can contribute to their learning. With groups formed on the basis of friendship, the assumption is that students who want to work together will work more effectively. When teachers assign groups, they try to ensure that no one is left out for social, academic, or ethnic reasons. Although students can also be grouped in a variety of other ways such as by gender, grade point average (GPA), or by majors, systematic research evidence concerning the advantages of composing groups based on any one of these criteria is sparse (Stout and Rebele, 1996; Ravenscroft *et al.*, 1995).

Psychologists have stressed the importance of fostering conditions whereby each member in the group exerts a therapeutic influence on others (e.g. Webb and Palincsar, 1996; Feldman and Wodarski, 1975). Accordingly, groups should be structured as an influence system in which changes in attitudes and

improvements in performance come about through members' interaction with each other. Students' compatibility with one another is an important factor in group composition. According to Feldman and Wodarski (1975, p. 75) compatibility should be "sought with reference to one's peers in the group, and not with reference to any absolute standard of behavior or personality" (p. 75). Thus, when a group is formed with peers, Webb and Palincsar (1996) suggest that the consequence would be greater peer pressure towards the enactment of pro-social behavior and greater interpersonal attraction among members, both of which are likely to contribute to greater satisfaction. There is no reason to expect that the satisfaction results would be different when college students are first paired on the basis of friendship and then pairs are randomly combined to form larger groups of four to six members. Therefore, the first hypothesis is stated as:

H1: The group satisfaction would be greater when pairs of friends are randomly combined rather than when the entire group consists of members who were randomly assigned.

Power in the classroom literature

Relationships between students, and between students and teachers have always had power and control implications (Barraclough and Stewart, 1992; Dillard, 1990). These authors suggest that forming a group by combining two or more dyads, where two friends make up the dyad, may be a means of giving students more control to influence each other's behavior. McKeachie *et al.* (1986, p. 63) noted that "the best answer to the question, 'What is the most effective method of teaching?' is that it depends on the goal, the student, the content, and the teacher. But the next best answer is, 'Students teaching other students"'.

One of the reasons for low academic performance and dropping out of college is the minimum interaction of students with their peers and faculty (Daly and Kreiser, 1992). Daly and Kreiser (1992) investigated the affinity-seeking behavior of teachers and students in classrooms and found that they had no difficulty recognizing the concept of affinity seeking. However, identifying the behavioral enactment of it can be difficult. These authors found that greater affinity seeking on the part of the teacher is positively and strongly related to variables such as liking the teacher, a sense that they had learned substantial material, and reported their intentions to take other classes with the same teacher. Gorham *et al.* (1989) proposed that teachers should also engage in behaviors that aim to generate student affinity for the subject matter being taught. Further, according to Gorham *et al.* (1989) and Webb and Palincsar (1996) another line of inquiry would be to study what students can do to engender greater liking among their peers.

Studies relating to the power in the classroom have tried to identify which of the five types of power bases suggested by French and Raven (1960) contributes most to effective learning (e.g. Plax *et al.*, 1986; McCroskey and Richmond, 1992). Plax *et al.* (1986) were interested in how teachers communicated their power sources to their students. They found that teachers perceived themselves as primarily using pro-social, reward-based behavioral alteration techniques. Their study found a greater propensity for college students to resist teachers who used anti-social behavioral altering techniques, and a greater tendency to comply with teachers who used pro-social techniques. Kearney *et al.* (1985), and Webb and Palincsar (1996) studies report that teachers often use student peer pressure to make non-conforming students comply.

Plax *et al.* (1986) suggest that the use of coercive and legitimate power is negatively associated with learning, while the use of referent and expert power is positively associated with learning. According to French and Raven (1960), referent power is based on the target's identification with the agent. Thus, we believe that using students who are friends in a group will have the effect of increasing the referent power base when students identify themselves with their group's members. Greater compliance and hence improved learning would result when students identify with both the instructor and their peers than when they rely only on the instructor's power bases. Hence, the second hypothesis is stated as follows:

H2: The group performance would be higher when pairs of friends are randomly combined rather than when the whole group is formed with members who are chosen randomly.

Group socialization literature

Adolescence is the period that students are most susceptible to the influence of their peers. According to Harris (1998) adolescence is when older teenagers put to use what they have learned about assimilation and differentiation behaviors from their childhood. Further, being accepted or not being accepted into a social group can make a big difference to students who are not sure of themselves. Harris (1998, p. 281) notes that "among most European-American and African-American adolescents, braininess is not considered an asset. You might be able to get away with it, but only if you have other assets that are valued by your peers". She suggests that braininess is not considered an asset among students who do well in college because they are seen as turncoats: too much under the influence of their teachers.

The traditional developmental psychologists' view is that good teenagers are influenced by their parents because of their use of the right kind of child-rearing style, and the bad teenagers are influenced by their peers and not by their parents (Maccoby, 1992; Fletcher *et al.*, 1995; Foreman, 1997). According to these psychologists this is because parents of bad teenagers usually use the wrong kind of child-rearing style. However, contrary to this view, Harris (1998) and Merten (1996) argue that peers equally influence both the good and bad groups of teenagers: it is just that they belong to different sorts of peer groups. Further, according to Lightfoot (1992), teenagers seldom need to be pushed to conform to the norms of the group; once they are in a group they are pulled into conformance and do not have to be pushed or prodded by an adult to conform.

Harris (1998) argues that, for students, what matters most in school is their status among peers. She suggests that a large part of a teacher's power resides in his/her ability to put individual students in the spotlight, and then make them the focus of their peers' attention. According to her, social categorization is always at play in a college environment. Thus, even if there had not been any differences among students to begin with, the mere existence of two dichotomous social categories such as paired friends versus all students who are not acquaintances, may be enough to produce a social categorization. Harris and Liebert (1987) reported on a study where the teachers divided up children into good readers and those that were not so good and found that the good readers tended to get better and the not so good tended to get worse. The two groups developed different group norms, which led to different behaviors and attitudes. Members who were not so good at reading devalued the importance of reading and developed the attitude that "school sucks" and that anyone who did well was a "nerd". Thus, group contrast effects between quick learners and slow ones resulted in the slow learners adopting norms that caused them to avoid doing things that might make them learn more. Harris (1998) suggests that slow learners did not have a poor attitude towards themselves but just towards the school they belonged to. Such group contrast effects are the key concept of Harris's group socialization theory. If her theory is true, then even an unintentional grouping based on ability can have a significant contrast effect between the groups, which can affect the groups' learning outcomes.

In college, students' alliances are probably made on the basis of academic performance, motivation, and attitudes. An example of such an alliance can be students with good study habits versus poor ones. Students who associate with good students tend to have good attitudes towards college work, while those who associate with the not so good students may develop poor attitudes. Thus, the danger of having a student paired with a friend might be that the group to which they belong could begin to reflect the dominant personalities of a dyad of friends who may have poor study habits. If randomly combining pairs results in a group that has a good attitude towards work and high abilities, then such a group would excel. On the other hand, the opposite can happen when randomly combining pairs results in a group that has low ability.

The dysfunctional behaviors that develop in the low ability group can affect the group's learning. Hence, our final hypothesis is stated as follows:

H3: The ability of the groups formed might mediate the effectiveness of selecting a group based on paired friends. Particularly, the learning outcomes of groups that are formed with paired friends who have higher GPA are likely to be greater than the learning outcomes of groups that have lower GPA.

Methodology

Subject selection and experimental design

The authors, who were instructors of an introductory management accounting course in a midwestern US university, used their 110 students as subjects for this field experiment. In spring of 1997, there were four sections of this course taught with 32, 30, 28, and 20 students in each class. In the first week of class, students were told about the group selection process. Each instructor had one section in which students were told to pick another student with whom they would like to work as a pair. A group was formed in this section by randomly combining two or three pairs of students. Each instructor also had another section in which groups were formed entirely by assigning students randomly. The random assignment (with or without pairs of friends) was made with the help of a deck of playing cards. In the class with completely randomly assigned students, every student in random order picked playing cards. In the class with combined pairs, only one member of the dyad picked a card from the deck. Adjacent cards from each suit were combined to form groups, each of which consisted of four or six students [2].

Experimental materials

The student groups worked on four group exercises and four group cases that were chosen from the textbook by Garrison and Noreen (1997), and from the casebook by Rotch *et al.* (1995). Each group was assigned one group exercise and one group case from these books. In addition, each group was required to do some background reading of at least four articles. The articles were chosen and provided by the instructors to the students. Descriptions of group exercises and group cases are provided in Appendix 1. The group projects were chosen so that the students' ability to gather the facts of the case, and to analyze them objectively were balanced across the projects [3].

The questions to be answered in each group project were also made available to the students. The group exercises were presented immediately after covering the respective chapter in the Garrison and Noreen textbook (1997) and the cases selected from Rotch *et al.* textbook (1995) were presented during the last two weeks of classes. In all four sections, all group projects were presented and write-ups were collected in the same week. The write-ups from all sections were scored separately by both instructors, and the correlation between them was 0.85. These group projects were worth 20 percent of the class grade. Furthermore, students were told that there would be a question from each group project in the subsequent exams. Apart from making sure the important concepts in a case were covered in class, the instructors made no attempt to influence the group selection, preparation, presentation and write-ups.

Each member evaluated his/her contribution and the group members' contributions for completing the group projects. Each group member had 100 points to allocate to other group members based on their individual contribution. The individual grade was determined by taking the group project grade and scaling it by the average percentage score each group member received from the rest of the members in the group. This was done separately by each instructor. The sample of the evaluation instrument used is provided in Appendix 2.

Dependent and independent variables

At the end of the semester, a questionnaire was administered to each student. The questionnaire items in Appendix 3 were similar to the Job Diagnostic Survey instrument of Hackman and Oldham (1975). This scale has been found to be highly reliable to measure job satisfaction along various dimensions (for a review see Spector, 1986). Two questions from this scale were chosen to measure each job dimension: task variety, task significance, autonomy, and feedback. In addition, two unique questions (questions 7 and 10) were added to the questionnaire. The dependent variables were the students' satisfaction score and the students' individual project scores (the maximum possible score for the group projects was 200 points). The independent variable was the treatment, namely random selection, versus paired dyads and then random selection. Each individual student's GPA was used as a moderating variable to control for the effect of ability levels.

Results

The summary results in Table I show that except for questionnaire item 4, all the variable means were greater for students in the groups that were formed by randomly combining pairs of friends than in groups formed entirely by random assignment. The questionnaire used to measure the satisfaction score was found to have a Cronbach Alpha reliability coefficient of 0.79. Thus, given this high level of reliability, all items in it were added to obtain an overall satisfaction score for each student. When students were given the responsibility to choose a friend with whom they would like to work in a group, both the dependent variables (the satisfaction score and group project grade) were significantly higher when paired than when randomly assigned to groups, at the 0.025 and 0.003 levels respectively. Table I also shows that initially there were no significant differences between the groups' GPAs.

Table II, the analysis of variance (ANOVA) model with GPA and pairs as the independent variable, shows that the pairing effect is significant at the 0.094 level, and students' GPA does not significantly affect the level of student satisfaction. This result supports the first hypothesis, which stated that group satisfaction would be greater when pairs of friends are randomly combined rather than when the whole group is composed of students who are not acquaintances. The students' abilities did not significantly moderate the level of satisfaction with their groups. Students' perceptions were influenced only by how they were grouped (i.e. randomly assigned versus paired by friends and then randomly assigned to groups).

Table III shows that students' group project grade was significantly influenced by the main effects due to GPA, pairing, and the interaction between GPA and pairing at the 0.01 level of significance. The significance of pairing suggests that being with a single friend in a group when the rest were not acquaintances significantly affects their grades compared to being in a group where none were friends. This could be interpreted as supporting the second hypothesis, which stated that group performance would be higher when pairs of friends are randomly combined rather than when the whole group is formed with members who are chosen randomly. However, given the significant interaction between pairing and GPA, the main effect for pairing cannot be considered separately from its interaction with GPA.

The students were separated into two groups with high and low ability students based on their median GPA (i.e. 3.2). Table IV ANOVA results indicate that, for the low ability students, the only effect is pairing, at the 0.092 level of significance. Low ability students, when assigned to a group in which they had a close friend, performed better than when they were assigned randomly to a group where they had no acquaintances. Table V shows that this is also true for the high ability students at the 0.077 level of significance. Thus, the separate evidence for the high and low ability students provides support for *H2*. The results show that, regardless of students' ability, it is generally better when pairs of friends are randomly combined rather than when the whole group is formed with members who are chosen randomly.

Table I shows that the performance of high ability students who were paired (i.e. 190) are significantly higher than the performance of high ability students who were randomly assigned (i.e. 185) at the 0.021 level. This is also true for the low ability students (i.e. 185 vs 173 at the 0.017 level). Further, the low ability paired students, when paired with a friend, scored as high (i.e. 185) as the high ability students in the completely random group (i.e. 185). Table V shows that the main effect of GPA is a significant predictor of group performance at the 0.003 level of significance. These results support *H3*.

However, the peer pressure of the low GPA students was not negative as expected in the literature reviewed but positive. Table I shows that friendly pairs with lower GPA performed (i.e. 185) as well as random pairs with high GPA. Figure 1 shows the interaction between pairing friends and GPA. Based on this figure, it is our belief that teachers should intervene to balance the groups to include high and low ability students. The performance of the paired friends with low ability might improve even more if these students are grouped with pairs of high ability students. The low ability students can learn from their high ability peers. Thus, if teachers balance the group abilities (i.e. by GPA) and establish an environment that is comfortable for student learning (i.e. paired friends), performance and learning are likely to increase for all students.

Discussion and conclusion

Students' evaluation of each other in the group can provide insights into the effectiveness of the group selection process. As indicated earlier, the students' individual grades were determined by taking the group grade and scaling it by the average percentage score that the student received from the rest of the group members. As described in Appendix 2, students allocated 100 points to members of the group based on each member's contribution to completing the project. A student who did not put forth as much effort as the other group members received a grade lower than the group grade. The students who put forth more effort received a grade higher than the group grade. We identified students who received individual grades lower than the group grade as "slackers". For the first project, there were six slackers among the paired groups and 13 slackers in the random groups. After receiving peer evaluations from the first project, the number of slackers dropped from six to three for the paired groups and from 13 to six for the random groups. The drop in the number of slackers among both groups is significant at the 0.05 level. These numbers indicate that the peer evaluations encouraged greater individual accountability for both the paired and random groups. The total number of slackers for the random groups compared to the number of slackers for the paired groups also suggest greater individual accountability in paired groups rather than in the completely random groups.

Pairing students influences student satisfaction with the group activities. For example, in Table I, the question 5 result is significantly higher for paired groups than for groups where all members were randomly assigned. Even in the paired group each student knew only one other member in the group, and the rest of the members were students who were not acquaintances (just as in the completely randomly assigned group). However, unlike members in the random group, students in the paired group felt that they had developed closer friendships with all other group members. Many of the students were freshmen and sophomores who did not have much experience working in groups, and thus having a good friend probably helped them to deal more effectively with the group activities. As one student from a paired group said "it was easier to get together outside of class because it wasn't always necessary for all of us to be at all group meetings. Sometimes I represented my best buddy and took the responsibility of informing him of what happened". This explanation suggests that close friendships helped group members to distribute responsibility more effectively amongst themselves outside the classroom.

This helped us to understand why the means for questions 6 and 7 in Table I were significantly different. These questions measured the students' perceptions of control over the pace of their group activities and

the fairness of the group selection process. Students felt they had more control over the pace of their work and felt the selection process was fairer when they were paired than when there was complete random assignment. It is interesting to explore why the only contradictory finding is question 4, which was "How much of your ability to work depended on your ability to work with others in the group?". The higher score for the random groups suggests that when students were asked to cooperate in their groups, they felt they had to put forth more effort to meet the requirements of projects. Thus, the observations noted earlier suggest that the manner in which groups are composed in an introductory class, can influence students' satisfaction with the group activities and their performance on projects. For instructors the implication is that students are likely to pay more attention to detail and follow rules and procedures when completing group projects if teachers can facilitate friendly and more cohesive groups.

In conclusion, group performance and satisfaction will be enhanced when randomly combining pairs of friends rather than randomly assigning all students to the group. Proponents of cooperative group research believe that teacher-formed teams are superior to any other method of composing groups (Kagan, 1994; Cooper, 1990). Kagan (1994) believed that teacher-composed groups that are made up of high, middle, and low achieving students are more suited for peer tutoring, integrating race and sex, and to help with classroom management. While analyzing the data, we separated the groups into high and low achievers in order to obtain a large enough sample. This study found support for the proposition that low achieving students who were randomly assigned to a group performed significantly lower than others. Results of this study supports the need for teacher intervention to make sure that the group selection process is not left to chance and that the average abilities of the groups are high enough to learn from peers. A limitation of the study is that it did not formally measure the extent of peer pressure and its effect on performance. Future research studies that formally investigate the effects of good and bad peer pressure in different countries, using Harris' (1998) theory on group socialization, hold great promise for improving the learning of college students.

Notes

1. This was a simple treatment, allowing a student to choose just one group member, who is referred to as a friend in this study. A post-experimental question confirmed successful manipulation of this treatment.

2. A single group size of either four or six students was not practical. However, according to Johnson and Johnson (1989b) this small difference in group size would not materially affect the learning outcome. Past researchers such as White and Lippit (1960) have suggested that a group size of approximately five is optimum.

3. It was the same course, hence all sections did identical group exercises and group cases regardless of how groups were formed. However, the fact that the experiment was being conducted in a real classroom setting where the cases were being used to reinforce various basic concepts made it impractical to assign an identical exercise and case to each individual group in a class.

4. A similar form is found in Ingram (1996), *Instructor's Guide to Financial Information for Decisions*, South-Western College Publishing, Cincinnati, OH.

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Appendix 1

Group exercises – from the group exercises in the text Management Accounting, 8th edition

Group exercise number and description of the topic:

1. 1. GE2-26 – Overhead is a Real Burden.
2. 2. GE3-29 – What Do Traditional Product Cost Systems Look Like?
3. 3. GE7-27 – Cost Structure of Airlines.
4. 4. GE9-29 – College Budgeting 101.Group projects – from the casebook text Cases in Management Accounting and Control Systems, 3rd edition

Name of the case and a brief description:

1. 1. Breezy Boat Company – defining the cost information that management needs.
2. 2. Oriole Furnishing – profit planning and control.
3. 3. Wendy's Chili – costing the hamburger.
4. 4. Narnia Inc. – overhead allocation in a competitive environment.

Appendix 2. Peer evaluation form

Group name: Your name:

The purpose of this form [4] is for you to evaluate the contributions made by each of your group members to the overall performance and success of your group's project. In making your assessment, you might take into account such factors as:

a. Effort.

b. Quantity of contribution.

c. Quality of contribution.

d. Meeting of deadlines.

e. Degree of cooperation with other group members.

Directions:

1. In this space provided below, write in the names of all group members (including yourself). You should omit anyone who was part of your group initially but dropped out of the course during the semester.
2. Allocate a total of 100 points among your group members (including yourself) such that the points awarded indicate your judgement of the overall value of each member's relative contribution. The total points awarded must add up to 100.

For example, if you have five group members (and in your judgement) all members made equal contributions, each group member (including yourself) would be allocated 20 points. If you award

someone ten points and someone 30 points, this would indicate that you valued the latter person's contributions three times more than the first person's contribution.

Group member names Points

a. _____ _____

b. _____ _____

c. _____ _____

d. _____ _____

e. _____ _____

Information in this form will be kept confidential by your instructor.

Table I
Descriptive statistics of all variables

	Mean (SD)		Significance of mean differences
	Random	Paired	
Satisfaction score	33.61	36.07	0.025
	(6.49)	(4.74)	
Project grade	179.00	187.00	0.003
	(18.21)	(9.69)	
High GPA students	185.00	190.00	0.021
Low GPA students	173.00	185.00	0.017
Grade point average	3.13	3.33	0.190
	(0.90)	(0.74)	
Questionnaire item numbers			
1	3.23	3.35	0.468
	(0.93)	(0.78)	
2	3.37	3.52	0.437
	(1.05)	(0.86)	
3	3.38	3.55	0.401
	(1.06)	(0.97)	
4	3.77	3.61	0.387
	(0.93)	(0.96)	
5	2.42	3.07	0.003
	(1.17)	(1.03)	
6	2.98	3.43	0.007
	(0.98)	(0.66)	
7	3.66	4.32	0.001
	(1.15)	(0.75)	
8	3.43	3.57	0.472
	(1.06)	(1.06)	
9	3.45	3.60	0.410
	(0.95)	(0.90)	
10	3.96	4.20	0.144
	(1.01)	(0.66)	

Table II
ANOVA results for student satisfaction

Source	Sum of squares	df	Mean square	*F*	Sig.
GPA	138.66	9	15.41	0.44	0.910
PAIR	100.43	1	100.44	2.87	0.094
GPA * PAIR	188.51	8	23.56	0.67	0.714
Error	3,185.06	91	35.00		
Total	137,032.00	110			

Note: R^2 = 0.134 (Adjusted R^2 = -0.037)

Table III
ANOVA results for project grade

Source	Sum of squares	df	Mean square	*F*	Sig.
GPA	6,086.05	9	676.23	4.24	0.000
PAIR	1,048.61	1	1,048.61	6.57	0.000
GPA * PAIR	2,540.22	8	317.53	1.99	0.012
Error	14,512.11	91	159.47		0.056
Total	3,710,386.00	110			

Note: R^2 = 0.423 (Adjusted R^2 = 0.308)

Table IV
ANOVA results for project grade of the low GPA students

Source	Sum of squares	df	Mean square	*F*	Sig.
GPA	3,543.27	7	506.18	1.61	0.161
PAIR	940.58	1	940.58	2.99	0.092
GPA * PAIR	2,265.83	6	377.64	1.20	0.326
Error	12,586.17	40	314.65		
Total	1,775,782.00	55			

Note: R^2 = 0.381 (Adjusted R^2 = 0.164)

Table V
ANOVA results for project grade of the high GPA students

Source	Sum of squares	df	Mean square	*F*	Sig.
GPA	516.27	2	258.14	6.74	0.003
PAIR	124.94	1	124.94	3.26	0.077
GPA * PAIR	0.65	1	0.65	0.02	0.897
Error	1,916.31	50	38.33		
Total	1,934,604.00	55			

Note: $R^2 = 0.290$ (Adjusted $R^2 = 0.233$)