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Pharmacy and Empathy: Evaluating the Impact of a Pharmacy Student's Project in a Service-Learning Course

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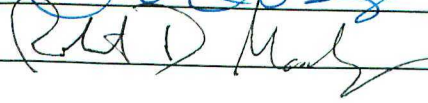Applicant   Carly Armida D'Agostino
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Pharmacy and Empathy: Evaluating the impact of a pharmacy student's project in a service-learning course

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Carly D'Agostino

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Pharmacy and Empathy: Evaluating the impact of a pharmacy student's project in a service-learning course

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ABSTRACT

Background: Empathy is taking on a larger role in the pharmaceutical field as pharmacists place emphasis on patient-centered care. Service-learning courses can expose pharmacy students to future patients, allowing them to interact and develop empathy. While this study suggests service-learning can foster empathy, further research is needed to assess the specific outcome of empathy as a result of incorporating a project in a service-learning course for pre-pharmacy students.

Objective: To evaluate the effect on a pharmacy student's empathy after completing a one-on-one patient interview project during a service-learning experience. A secondary objective is to assess the validity of a rubric designed to evaluate empathy in reflection papers.

Methods: The specific assignment of interviewing a patient was assigned to one PX200 section, while two other PX200 sections were assigned a chronic disease project. A validated Likert scale-based survey was given to all three PX200 sections at the beginning and the end of the semester. Students' reflective writing papers were analyzed using a newly constructed rubric by blinded investigators.

Results: Students in both groups had an increase in scores from pre- to post-survey; however, results were not statistically significantly different between the two groups. Average rubric scores in the project group were higher than in the control group ($p = 0.037$). Scores from the rubric also correlated well to results of the post-survey.

Conclusion: Although results of the survey component did not show evidence of a statistically significant change between the two groups, an interview project within a service-learning course may still be beneficial for pre-pharmacy students. In addition, the newly designed rubric can be considered a useful measuring device to evaluate empathy within a group of pre-pharmacy students.

BACKGROUND

The topic of empathy is taking on a larger role in the pharmaceutical field as pharmacists continue to place emphasis on patient-centered care. In order to achieve a successful patient counseling interaction, pharmacists are required to possess good communication skills as well as the ability to empathize with the patient and understand their concerns. As pharmacy students develop into healthcare professionals, they need to

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understand the importance of empathy and the ability to communicate with diverse patients.[1]

The concept of empathy has often been difficult to define. Empathy is derived from the Greek word *empatheia* which means "feeling into" or understanding others by entering into their world.[1] Empathy involves not only understanding another person's feelings but also connecting with an individual based on his or her specific situation and communicating his or her understanding.

Furthermore, service-learning is a relatively new area of active learning for pharmacy schools. It allows students to step out of the traditional pharmacy student role and to start interacting and caring for a wide variety of people, their potential future patients.[2] Through service-learning, students are able to develop their communication skills, especially active listening and empathetic concern for their patients, which are two of the many components included in the Accreditation Council for Pharmacy Education (ACPE) 2011 Standards and Guidelines.[3]

In 2010, two pharmacy students at Butler University conducted a study to assess pre-pharmacy students in a service-learning course and its effect on a multitude of characteristics, such as empathy, social behavior, personal development, etc. This study was a double-blinded, randomized, controlled trial. Although a variety of traits were assessed, no statistically significant difference was found. Based on the results of this study, it was encouraged to focus evaluation on a single trait, such as empathy, throughout a pharmacy student's service-learning course to narrow the research and determine how students' baseline empathy qualities are affected after implementing a communication project into the course.[4] Other recent studies have employed specific

interventions within the four-year pharmacy education curriculum in hopes to evaluate empathy changes in pharmacy students. The data from these studies all found increases in empathy within students as a result of the intervention.[5-8]

Each of the studies mentioned above used assessment tools including pre- and post-tests as well as a reflective writing component. However, no standardized rubric was used to evaluate the reflections. In order to better assess the specific outcome of empathy as a result of incorporating a project in a service-learning course for pre-pharmacy students, this project sought to develop and assess a rubric designed to evaluate empathy within a reflective writing piece.

NEED FOR THE STUDY

As a continuation project of "Service Learning: Assessing the impact of a student project in advancing the service learning experience,"[4] this new study focused primarily on assessing pharmacy students' changes in empathy over the course of the semester. The previous study identified a variety of characteristics that possibly would change as a result of service-learning. By using a conglomeration of scales and not a validated measure, their outcomes may have been inaccurate, leading to a lack of statistically significant results. The new study used a validated measure, the Interpersonal Reactivity Index, which is specific for students completing a service-learning course and determining changes in empathy, a quality that pharmacists must possess for successful patient interactions. In addition, despite new medical educational goals involving reflection, there is little evidence on the validity of rubrics to evaluate empathy in a reflective writing piece.[9] Healthcare professional schools often require students to participate in patient care activities and reflect on their experiences; these patient-

centered courses can benefit from a instrument specifically targeted at reviewing the aspect of empathy. A secondary goal of this study was to construct an appropriate rubric to assess a person's ability to reflect on a situation and their communication skills involving empathy throughout a patient interaction.

OBJECTIVE

The objective of this study was to evaluate the effect on a pharmacy student's empathy after completing a service-learning experience compared to completing a one-on-one patient interview project during the service-learning experience as assessed by a pre- and post-test as well as a newly constructed rubric.

A secondary objective was to assess the validity of the rubric designed to evaluate empathy in reflection papers.

METHODS

Target Population: Butler University pre-pharmacy students enrolled in fall 2011 PX200 course.

Study Design: This is a randomized survey-based study that also incorporates a reflective writing analysis component. The fall 2011 PX200 course was divided into 3 sections, PX200-01, PX200-02, and PX200-03. The PX200-01 section was selected as the project group and was assigned the interview project, while the other two sections combined to form the control group. The specific interview assignment given to PX200-01 instructed the student to introduce themselves to a patient at their service-learning site. The students could select any participant and talk to that individual on a regular basis whenever they were present at the site. In addition, the students gathered information on the patient based on their conversations and prepared a final project of a family history or

presentation about the patient. Finished projects included photo albums, scrapbook pages or picture videos for the patient to cherish in years to come. Students were allowed to decide if they wanted to work on the craft project (photo albums, scrapbook pages, picture videos, etc.) with their patient or design the project as a surprise gift for their patient. On the other hand, the control group, comprised of sections PX200-02 and PX200-03, was assigned a project in which they had to research a chronic disease and complete the assignment outside of the service-learning experience. Therefore, both groups had a similar workload, yet PX200-01 completed their project within the service-learning experience. A Likert scale-based survey was given to all sections, PX200-01, PX200-02, and PX200-03, at the beginning and the end of the semester. The survey was posted online during the fall 2011 semester using Survey Monkey and a link was made available to each of the PX200 students participating in the study. Reflective writing papers were submitted by students after completing fifteen hours of the service learning experience. Instructions for the reflection piece guided the student to reveal their thoughts throughout the service-learning experience and their feelings toward the site and their interactions with the participants (Appendix A). The two evaluators of the paper were blinded and used a newly constructed rubric to assess the students' experiences.

Inclusion Criteria: Students must be enrolled in PX200 course at Butler University during the fall 2011 semester and complete the pre- and post-surveys as well as a service-learning reflection paper.

Exclusion Criteria: Students in the PX200 course who opt to not complete either the pre- or post-survey were not included in the study.

Survey Instrument: The survey utilized in this study is the Interpersonal Reactivity Index (IRI) extracted from *The Measure of Service Learning.*[10] This validated scale in service-learning courses is a self-report measure consisting of 28 items in four subscales: perspective taking, fantasy, empathetic concern, and personal distress (Appendix B). These subjects were measured by students' responses to specific statements. Responses ranged from *does not describe me well* (1) to *describes me very well* (7). A higher score indicates a higher tendency to have empathy qualities. Nine negatively worded items within the scale were reverse-scored. Students were asked to type the last four digits of their Butler University Student ID number in order to match the survey and reflection paper after the surveys and paper were evaluated. Students' gender, age, and race were also requested and students were assured the data was confidential. The study was allowed to proceed by the Butler University Institutional Review Board.

Statistical Analysis: The data collected from the pre- and post-surveys from the intervention and control groups were analyzed using the Mann-Whitney U test and Wilcoxon Signed-Ranks test. These statistical tests were used to analyze the ordinal data to determine the difference between the two groups. The statistical tests were conducted at the 0.05 level of significance using the IBM SPSS Statistics 19 (SPSS Inc., Chicago). Reflective writing was assessed by two blinded evaluators using a newly constructed grading rubric created by the researcher (Appendix C). The rubric was divided into sections based on four elements necessary for empathetic arousal – identification, understanding, emotional concern, realism.[11] Within each section, evaluators scored a student's reflective writing from 1 – 4 with a maximum rubric score of 16, indicating

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very high empathetic arousal. The graded rubrics were further analyzed using central tendency statistics.

RESULTS

Thirty-one students (55% of entire course) completed both the pre-survey before their service-learning experience and the post-survey towards the end of the semester with corresponding identifiers – 15 students in the project group and 16 students in the control group. All students were 18-22 years old and 77.4% were females. There were no significant differences in their baseline characteristics (age, race, gender) between the two groups. Also, the two groups had similar pre-survey scores which indicated similar baseline empathy qualities (Appendix D – Table 1).

When analyzing the project group, two questions – #2 and #9 – had a statistically significant increase in scores from the pre- to post-survey (Table 2). In the control group, there was no significant change among all twenty-eight questions from the pre- to post-survey (Table 3). However, several questions had a change close to statistical significance, indicating a general increase in empathy qualities throughout the semester. Overall, within both groups there was a trend of increasing scores from the beginning of the semester to the end, even though only two questions reached statistical significance.

When comparing the post-surveys between the two groups, the project group had a statistically significant higher score in two questions – #9 and #12. The control group had a statistically significant higher score in one question – #27 (Table 4). Overall, the project group tended to score higher than the control group even though statistical significance was not reached. Among both groups and within both survey tests, females tended to have higher scores.

In terms of the rubric scores, 34 students (15 students from the project group and 19 students from the control group) completed both the post-survey as well as the reflective writing piece. The project group had a mean rubric score of 11.23 compared to the control group's mean score of 9.26 ($p=0.037$).

For the secondary objective of the correlation of the newly constructed rubric, it was determined a priori that a person had a "high" level of empathy according to the survey results if they had an average post-survey score greater than 4. In addition, students were defined as achieving a "high" level of empathy if they had an average rubric score greater than 8. Conversely, a "low" level of empathy was defined as an average post-survey score less than 4 or an average rubric score less than 8. As a result of these definitions, it was discovered that 24 students scored "high" on both the rubric and post-survey, while 3 students scored in the "low" category for both the rubric and post-survey. Seven students' scores on the rubrics and post-survey did not fall into the same "high" or "low" category, indicating their rubric did not reflect their post-survey results. Therefore, 79% of students (27 out of 34 students) showed a direct relationship between their post-survey scores and rubric scores (Table 5).

DISCUSSION

The findings in this randomized, double-blinded, controlled study provide evidence that pre-pharmacy students benefit in a service-learning class due to an increase in their empathetic qualities. As a continuation project of a similar study conducted last year, this study also found limited statistically significant differences in students completing an interview project within a service-learning site compared to those who did not complete an interview project based on the results of a survey instrument. However,

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unlike the previous study, the rubric constructed in this study showed a statistically significant difference in the two groups and proved to correlate with the results of the Interpersonal Reactivity Index.

Overall, scores from the pre- to post-survey improved in both the project and control group. Although the results did not indicate a statistically significant change among all scores, the two questions that had a statistically significant increase (#2 and #9) were related to "Empathetic Concern." This provides evidence that there was an increase in empathy within this group of students who completed an interview project during the semester. Similarly, question #9 and #12 had a statistically significant increase in the project group versus the control group in the post-survey results. Once again, #9 is included in the "Empathetic Concern" category, while #12 is related to "Fantasy," demonstrating there was not a large difference in empathy between the two groups at the end of the study.

The results of the surveys along with the results of the reflective writing pieces demonstrated a general direction of improvement from the beginning of the service-learning experience to the end as was predicted, especially in the project group. Reasons for not reaching statistical significance in the survey results may include the small sample size of respondents as well as the high baseline empathy scores in the pre-survey completed by both groups. Pre-pharmacy students may already have a higher level of empathy due to their decision to enter into a profession that is geared towards helping and caring for others. The Interpersonal Reactivity Index is a scale that was validated in a wide variety of students undergoing service-learning experiences. Because it is not specific to students in a healthcare-related field, statistical significance may have been

unable to be detected in the present study. This study was a snapshot of only one semester of a specific group of students; an analysis of multiple service-learning courses, including non-pre-pharmacy students, over a longer period of time may provide more significant results and may shed light on the differences between pharmacy students and students in other academic fields.

Unlike the previous study, the reflective writing pieces demonstrated a significant difference between the project and control group. This change can be attributed to the development of a rubric that specifically examined the quality of empathy within the students' reflections. Many students in the project group wrote specifically about their connection to a patient at their site and how they were able to converse with this individual and understand more about their background and health conditions.

In addition, the newly constructed rubric proved to be an appropriate tool to measure empathy within a reflective writing piece. Seventy-nine percent of students who completed both a post-survey and reflective writing piece had scores that correlated well between the validated post-survey and rubric. Implementation of this rubric in another course may prove beneficial to both the instructor and the student to identify areas of strength and improvement in empathy.

This study is unique for its randomized, controlled nature. The PX200 course is a requirement for all pre-pharmacy students at the study institution and students were not aware of the interview project prior to registering for a course section. The two groups of students were well-balanced and had similar baseline characteristics. Unlike the previous study, a validated survey scale was employed in this study to specifically evaluate

empathy in service-learning students. Finally, the rubric's high correlation with the post-survey results indicates its potential usefulness in future courses.

STUDY LIMITATIONS

Limitations of this study, including the specific pre-pharmacy course and small sample size in a single institution, pose a threat to external validity and may be difficult to generalize to larger universities. Although nearly 100% of students completed the pre-survey at the beginning of the semester, approximately half the students finished the post-survey, leading to a lower than desired participation rate. In addition, the reliability of the instrumentation, particularly the rubric, needs to be further validated with supplementary studies. The subjective nature of this type of research may have made the results difficult to measure. For instance, students' survey answers may have been influenced by events occurring outside of the service-learning course. In addition, social desirability may have had an effect when the students were writing their reflection papers. Because they knew the papers would be graded by their professor, students may not have been fully truthful in describing their service-learning experience. As seen in the previous service-learning study, pharmacy students scored high in pre-survey results which makes it difficult to score higher on post-surveys. More research is necessary to compare baseline empathy qualities in pharmacy students versus students in other majors.

CONCLUSIONS

Implementation of a one-on-one interview project within a pre-pharmacy service-learning course is a beneficial activity for students. Although the results of the survey did not reach statistical significance, overall the students in the intervention group had higher scores in both post-survey results and evaluations of their reflective writing pieces. The

service-learning component within the course allows students to increase their empathetic qualities through developing a connection with potential future patients as well as understanding their backgrounds and health problems. Additionally, the newly constructed rubric demonstrated a strong association with the results of the post-survey and may be an effective tool for professors to evaluate a student's empathy level in future patient-centered courses. Further studies are necessary to increase the validity of the rubric for personal reflections in different class settings.

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APPENDIX A. Reflective Writing Paper Instructions

The reflection paper needs to include:

    a. Your rating of the following statement:

I feel I made a positive impact at the service learning site
I completed my experience at this semester

    Please copy and paste this scale to your paper, indicate the extent to which you agree or disagree with this statement by circling the appropriate number.

Strongly Disagree					Strongly Agree
1	2	3	4	5	6

    b. Explain the ways in which you agree or disagree with this statement and provide personal examples when relevant.

    c. How you used and the results of open ended questions and active listening skills

    d. Describe an interaction you had with individuals at the site and your reflection of these interactions.

    e. Describe something you have learned about yourself by completing this assignment

APPENDIX B. Survey Instrument

Interpersonal Reactivity Index

The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by choosing the appropriate rating using the following scale. When you have decided on your answer, fill in the number next to the statement. READ EACH ITEM CAREFULLY BEFORE RESPONDING. Answer it as honestly as you can. Thank you.

ANSWER SCALE:

1	2	3	4	5	6	7
Does not describe me well						Describes me very well

1. I daydream and fantasize, with some regularity, about things that might happen to me.
2. I often have tender, concerned feelings for people less fortunate than me.
3. I sometimes find it difficult to see things from the "other guy's" point of view.*
4. Sometimes I don't feel very sorry for other people when they are having problems.*
5. I really get involved with the feelings of the characters in a novel.
6. In emergency situations, I feel apprehensive and ill-at-ease.
7. I am usually objective when I watch a movie or play, and I don't often get completely caught up in it.*
8. I try to look at everybody's side of a disagreement before I make a decision.
9. When I see someone being taken advantage of, I feel kind of protective towards them.
10. I sometimes feel helpless when I am in the middle of a very emotional situation.
11. I sometimes try to understand my friends better by imagining how things look from their perspective.
12. Becoming extremely involved in a good book or movie is somewhat rare for me.*
13. When I see someone get hurt, I tend to remain calm.*
14. Other people's misfortunes do not usually disturb me a great deal.*
15. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments.*
16. After seeing a play or movie, I have felt as though I were one of the characters.
17. Being in a tense emotional situation scares me.
18. When I see someone being treated unfairly, I sometimes don't feel very much pity for them.*
19. I am usually pretty effective in dealing with emergencies.*
20. I am often quite touched by things that I see happen.
21. I believe that there are two sides to every issue and try to look at them both.
22. I would describe myself as a pretty soft-hearted person.
23. When I watch a good movie, I can very easily put myself in the place of a leading character.
24. I tend to lose control during emergencies.
25. When I'm upset at someone, I usually try to "put myself in his shoes" for a while.
26. When I am reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me.
27. When I see someone who badly needs help in an emergency, I go to pieces.
28. Before criticizing someone, I try to imagine how I would feel if I were in their place.

* reversed-scored
Perspective-Taking scale (Items 3, 8, 11, 15, 21, 25, 28)
Fantasy scale (Items 1, 5, 7, 12, 16, 23, 26)
Empathetic Concern scale (Items 2, 4, 9, 14, 18, 20, 22)
Personal Distress scale (Items 6, 10, 13, 17, 19, 24, 27)

APPENDIX C. Rubric to assess empathy in reflection papers

IDENTIFICATION

NOVICE (1)	APPRENTICE (2)	PROFICIENT (3)	DISTINGUISHED (4)
Student has limited evidence of connecting with the patient.	Student demonstrates ability to connect with patient and take the patient's point of view.	Student expresses ability to understand the patient's point of view and actively tries to understand patient.	Student demonstrates ability to take the patient's point of view and expresses sharing in this perspective with the patient.

UNDERSTANDING

NOVICE (1)	APPRENTICE (2)	PROFICIENT (3)	DISTINGUISHED (4)
Student shows an unclear connection between the patient and his/her past.	Student expresses some understanding of the connection between the patient and his/her past.	Student demonstrates a clear understanding of the relationship between the patient and his/her past.	Student uses the community engagement experience to show connection between the patient and self and demonstrates a clear ability to understand the past and present of the patient.

EMOTIONAL AROUSAL and CONCERN

NOVICE (1)	APPRENTICE (2)	PROFICIENT (3)	DISTINGUISHED (4)
Student shows limited to no emotion throughout the community engagement experience.	Student expresses emotion but no concern during the community engagement experience.	Student expresses emotion and concern through the community engagement but does not connect the emotion with a sharing of the patient's belief system.	Student demonstrates an act of emotional arousal with a clear concern and caring attitude for the patient.

REALISM

NOVICE (1)	APPRENTICE (2)	PROFICIENT (3)	DISTINGUISHED (4)
Student provides no mention of how the community engagement was a realistic situation.	Student expresses vague understanding that the patient's situation was realistic.	Student expresses understanding that the patient is undergoing a realistic experience.	Student demonstrates understanding of the complexity and realism of the patient's situation and expresses concern that they could be in this patient's "shoes" later in life.

APPENDIX D. Results

Table 1: Pre-Survey Median Scores – Project Group vs Control Group

	Project Group Median Scores (score ranges)	Control Group Median Scores (score ranges)	p-value
Q1	5 (1-7)	5 (2-7)	0.332
Q2	6 (3-7)	6 (2-7)	0.918
Q3	5 (3-7)	4.5 (3-7)	0.584
Q4	5 (3-7)	5 (3-7)	0.792
Q5	5 (1-7)	4 (1-6)	0.446
Q6	4 (1-6)	4 (2-6)	0.968
Q7	5 (3-7)	5 (2-6)	0.066
Q8	6 (3-7)	6 (4-7)	0.803
Q9	6 (5-7)	6 (4-7)	0.381
Q10	5 (2-7)	5 (1-6)	0.887
Q11	5 (4-7)	5 (4-6)	0.913
Q12	6 (2-7)	5 (2-6)	0.101
Q13	4 (1-6)	4 (2-6)	0.809
Q14	5 (3-7)	5 (3-6)	0.24
Q15	5 (2-7)	5 (3-6)	0.47
Q16	4 (1-7)	4 (2-6)	0.952
Q17	4 (2-6)	4.5 (2-6)	0.597
Q18	6 (5-7)	6 (4-7)	0.392
Q19	3 (1-5)	3.5 (2-5)	0.648
Q20	5 (4-7)	5.5 (3-7)	0.916
Q21	5 (2-7)	5 (3-6)	0.618
Q22	6 (2-7)	6 (3-6)	0.22
Q23	5 (1-7)	4.5 (2-6)	0.67
Q24	3 (1-6)	2 (2-4)	0.389
Q25	4 (2-7)	4 (2-6)	0.695
Q26	5 (1-7)	5 (2-6)	0.286
Q27	2 (1-6)	3 (2-5)	0.163
Q28	5 (4-7)	5 (3-6)	0.024

Statistically significant ($p<0.05$)
Near statistical significance ($p<0.1$)

Table 2: Project Group – Pre- vs. Post-Survey Median Scores

	Pre-survey Median Scores (score ranges)	Post-Survey Median Scores (score ranges)	p-value
Q1	5 (1-7)	5 (1-7)	0.277
Q2	6 (3-7)	6 (5-7)	0.02
Q3	5 (3-7)	6 (2-7)	0.751
Q4	5 (3-7)	5 (1-7)	0.73
Q5	5 (1-7)	6 (1-7)	0.305
Q6	4 (1-6)	2 (1-6)	0.098
Q7	5 (3-7)	5 (2-7)	0.686
Q8	6 (3-7)	6 (4-7)	0.088
Q9	6 (5-7)	6 (5-7)	0.02
Q10	5 (2-7)	3 (1-6)	0.1
Q11	5 (4-7)	6 (4-7)	0.248
Q12	6 (2-7)	6 (1-7)	0.719
Q13	4 (1-6)	3 (1-5)	0.111
Q14	5 (3-7)	6 (3-7)	0.347
Q15	5 (2-7)	5 (2-7)	0.943
Q16	4 (1-7)	5 (2-7)	0.223
Q17	4 (2-6)	4 (1-7)	0.322
Q18	6 (5-7)	6 (3-7)	0.132
Q19	3 (1-5)	3 (1-5)	0.248
Q20	5 (4-7)	6 (4-7)	0.16
Q21	5 (2-7)	6 (4-7)	0.638
Q22	6 (2-7)	6 (4-7)	0.096
Q23	5 (1-7)	5 (2-7)	0.233
Q24	3 (1-6)	2 (1-4)	0.154
Q25	4 (2-7)	5 (2-7)	0.256
Q26	5 (1-7)	6 (1-7)	0.566
Q27	2 (1-6)	2 (1-5)	0.196
Q28	5 (4-7)	6 (4-7)	0.763

Table 3: Control Group – Pre- vs. Post-Survey Results

	Pre-survey Median Scores (score ranges)	Post-Survey Median Scores (score ranges)	*p*-value
Q1	5 (2-7)	5 (2-7)	0.68
Q2	6 (2-7)	6 (3-7)	0.914
Q3	4.5 (3-7)	5.5 (3-7)	0.084
Q4	5 (3-7)	5 (2-7)	0.927
Q5	4 (1-6)	4.5 (2-6)	0.053
Q6	4 (2-6)	4 (2-6)	0.726
Q7	5 (2-6)	5 (2-7)	0.289
Q8	6 (4-7)	6 (4-7)	0.739
Q9	6 (4-7)	5 (4-7)	1
Q10	5 (1-6)	4 (3-6)	0.672
Q11	5 (4-6)	5 (3-6)	0.705
Q12	5 (2-6)	4 (2-7)	0.1
Q13	4 (2-6)	3.5 (2-4)	0.075
Q14	5 (3-6)	5 (3-7)	0.067
Q15	5 (3-6)	5 (3-7)	0.71
Q16	4 (2-6)	4 (2-7)	0.951
Q17	4.5 (2-6)	3.5 (2-6)	0.546
Q18	6 (4-7)	5.5 (3-7)	0.305
Q19	3.5 (2-5)	3 (2-6)	0.527
Q20	5.5 (3-7)	5.5 (4-7)	0.655
Q21	5 (3-6)	5 (3-6)	0.305
Q22	6 (3-6)	6 (4-6)	0.581
Q23	4.5 (2-6)	4 (2-7)	0.739
Q24	2 (2-4)	2.5 (2-4)	0.782
Q25	4 (2-6)	4 (3-6)	0.29
Q26	5 (2-6)	5 (2-7)	1
Q27	3 (2-5)	3 (1-4)	0.196
Q28	5 (3-6)	5 (3-6)	0.903

Table 4: Post-Survey Results between Project and Control Groups

	Project Group Median Scores (score ranges)	Control Group Median Scores (score ranges)	p-value
Q1	5 (1-7)	5 (2-7)	0.968
Q2	6 (5-7)	6 (3-7)	0.191
Q3	6 (2-7)	5.5 (3-7)	0.967
Q4	5 (1-7)	5 (2-7)	0.732
Q5	6 (1-7)	4.5 (2-6)	0.142
Q6	2 (1-6)	4 (2-6)	0.225
Q7	5 (2-7)	5 (2-7)	0.386
Q8	6 (4-7)	6 (4-7)	0.217
Q9	6 (5-7)	5 (4-7)	0.014
Q10	3 (1-6)	4 (3-6)	0.156
Q11	6 (4-7)	5 (3-6)	0.228
Q12	6 (1-7)	4 (2-7)	0.028
Q13	3 (1-5)	3.5 (2-4)	0.74
Q14	6 (3-7)	5 (3-7)	0.434
Q15	5 (2-7)	5 (3-7)	0.838
Q16	5 (2-7)	4 (2-7)	0.108
Q17	4 (1-7)	3.5 (2-6)	0.84
Q18	6 (3-7)	5.5 (3-7)	0.583
Q19	3 (1-5)	3 (2-6)	0.728
Q20	6 (4-7)	5.5 (4-7)	0.249
Q21	6 (4-7)	5 (3-6)	0.115
Q22	6 (4-7)	6 (4-6)	0.079
Q23	5 (2-7)	4 (2-7)	0.159
Q24	2(1-4)	2.5 (2-4)	0.426
Q25	5 (2-7)	4 (3-6)	0.854
Q26	6 (1-7)	5 (2-7)	0.095
Q27	2 (1-5)	3 (1-4)	0.044
Q28	6 (4-7)	5 (3-6)	0.085

Table 5: Rubric Results

	Average Rubric Score (Max = 16)	Average Post-Survey Score (Max = 7)	High[a]	Low[b]	Neither[c]
Project Group	11.5	5.28	X		
	10	4.36	X		
	13	5.71	X		
	5.5	5.14			X
	15.5	4.61	X		
	15	5	X		
	10.5	4.39	X		
	13.5	4.07	X		
	14.5	4.86	X		
	10	5.36	X		
	6	4.39			X
	9	5.32	X		
	11.5	4.82	X		
	10.5	4.39	X		
	12.5	4.93	X		
Control Group	5.5	3.85		X	
	11	4.5	X		
	9.5	4.68	X		
	11.5	4.43	X		
	9.5	4.93	X		
	5	3.93		X	
	9	4.75	X		
	11.5	5.32	X		
	7.5	4.64			X
	13.5	4.07	X		
	5.5	3.64		X	
	9.5	4.39	X		
	10.5	5.21	X		
	10	3.74			X
	9.5	3.86			X
	7	4.71			X
	10.5	4.89	X		
	13	4.18	X		
	7	5			X

[a] Rubric scores > 8 & post-survey scores > 4; total = 24
[b] Rubric scores < 8 & post-survey scores < 4; total = 3
[c] Rubric scores & post-survey scores do not fall into "high" or "low" category; total = 7

Table 6: Project Group vs Control Group Average Rubric Scores

Project Group	Control Group	P-value
11.23	9.26	0.037