

Diversity & Inclusion Plan (DIP): Department of Mathematics & Statistics 2019-2020

Report to CATL, Spring 2020

Members: Ryne VanKrevelen, Laura Taylor, Mark Weaver, Kirstie Doehler, & Aaron Trocki

Phase III, the Assessment & Sharing Phase: Diversity and Inclusion Plan

Implemented Course: STS 212: Statistics in Application in fall 2019 and spring 2020

Project Summary

The objective addressed with this Diversity and Inclusion Plan (DIP) was to meet the needs of diverse learners represented in the course, STS 212: Statistics in Application. Addressing this objective is in line with the Mathematics and Statistics Department's larger goal to gather and identify research to break down obstacles for diverse groups entering Elon and MTH/STS courses. An obstacle identified by our group is the limited opportunities for learners to collaborate with a diverse group of peers both within and outside of class to assist each other in learning course content. The evidence-based pedagogy our group identified and implemented was using heterogeneously mixed student work groups. In phase one of our DIP, we researched evidence-based pedagogies to work to overcome this obstacle and drafted an implementation plan. Two of us implemented the plan in fall 2020 and two of us implemented the plan in spring 2020.

One particularly challenging learning objective in STS 212 is that of learning how to code in the statistical software, Statistical Analysis Software (SAS). Based on our research, we felt this learning goal would be more readily achieved by all students, including those from diverse backgrounds, as students work together and honor each other's distinct backgrounds and knowledge. We created and used a curricular resource that emphasized student communication, interaction, and development of shared understanding, thus aligning with a theoretical learning framework of social constructivism. We furthermore believed that heterogeneous groups would offer students of diverse backgrounds the fullest opportunity to work within their respective zones of proximal development as originally conceptualized by the influential learning theorist Vygotsky.

The guiding goal of our project was to increase the success of diverse learners in STS 212 through implementing several evidence-based pedagogies related to student collaboration. Research has shown that students who work with each other can more readily master difficult statistical concepts (Garfield, 1993; Roseth, Garfield, & Ben-Zvi, 2008). We anticipated three byproducts of meeting this goal: 1) increased access to statistical content; 2) increased agency, authority, and identity; and 3) flexible instruction that responds to students' needs and thinking. We also anticipated that students who had not had a mathematics or statistics background that

reflects being asked to share their ideas with each other would benefit from experiencing pedagogies that align with the project goal.

We used three ways to include evidence-based pedagogies to meet our goal of increasing the success of diverse learners in STS 212. We began the semester with use strategies such as ice-breakers to build community within each course. We felt that doing so provided a foundation to contextualize the subsequent learning as recommended by the Elon University Center for Research on Education, Diversity, and Excellence (CREDE). Two of the indicators provided in reference to CREDE's contextualization standard are paraphrased in the following: 1) making connections between school and their personal experiences; and 2) helping to reach a deeper understanding of the academic material through deeper personal connections. The second way we changed our course instruction was to use the software Socrative at the beginning of class sessions to randomly group students. Students then interacted in their groups to answer various statistics questions throughout the semester. During this time, the instructor could formatively assess students' progress in attaining learning goals while providing a forum for students from diverse backgrounds to participate and share their thinking with their peers. We also anticipated that the use of Socrative would help continue to build community within the classroom. The third way we changed our instruction was to implement a course project entitled Olympics Swimming. Students representing diverse backgrounds collaborated with a diverse group of peers in heterogeneously mixed project groups. These interactions were guided by a handout and poster we developed called "Successful Teamwork in Statistics" (see appendix). The handout and poster contained suggestions for how to best function in teamwork settings when the learning content is specific to statistics. It should be noted that we changed some of the project expectations due to moving to remote instruction after spring break in March 2020.

We assessed the effectiveness of our DIP in three ways. In every section of STS 212 we taught, students completed a pre-course and post-course questionnaire to gather information on each student's perception of participating in learning statistics. The questionnaire addressed the areas of access, agency, authority, and identity (Schoenfeld, 2016). Each professor also completed three sequential reflections each semester that STS 212 was taught to record perceptions on how well the DIP was executed with specific attention to the efficacy of the strategies employed. Finally, professors gathered student work samples as a representation of the learning that took place under certain evidence-based pedagogies and during group work on the Olympics swimming project. We secured Institutional Review Board (IRB) approval for all data collected.

Our group met multiple times in summer 2019 to prepare for our DIP implementation and in late fall 2019 to discuss our progress and share successes and challenges. In spring 2020, we implemented our evidence-based instructional strategies again but had to adjust to remote instruction midway through the semester. For this semester we also added a question item to the pre-course and post-course questionnaire that targets students' perceptions of being randomly placed in small working groups. We have begun analyzing data from fall 2019 and will add to that collection of data after post-course data have been collected at the end of spring semester 2020.

Assessment Results

Current findings relevant to the goals of our DIP are provided below.

Pre-Course Questionnaire Results Summary (n = 156)

Question	Summary
1) From the following list of practices, rank the 3 things that you think will be most beneficial in helping you learn course content. <ul style="list-style-type: none"> • Completing homework assignments • Contributing to in-class group work • Participating in non-graded short competitive in-class assessment activities • Contributing to out-of-class group projects • Reviewing class notes and activities outside of class • Taking notes • Watching online videos • Attending office hours • Working with available tutors • Participating in class discussions 	<p><u>Top Three Responses for Rank 1</u></p> <ol style="list-style-type: none"> 1) Taking notes (n = 60) 2) Reviewing class notes and activities outside of class (n = 50) 3) Completing homework assignments (n = 46) <p><u>Top Three Responses for Rank 2</u></p> <ol style="list-style-type: none"> 4) Completing homework assignments (n = 43) 5) Taking notes (n = 40) 6) Reviewing class notes and activities outside of class (n = 32) <p><u>Top Three Responses for Rank 3</u></p> <ol style="list-style-type: none"> 7) Reviewing class notes and activities outside of class (n = 26) 8) Participating in non-graded short competitive in-class assessment activities (n = 24) 9) Completing homework assignments (n = 19)

For questionnaire items 2 – 6 students considered the following directive.

Use this scale for the items 2 - 6. Please indicate your level of agreement with the following statement by marking the best descriptor.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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We translated these levels to a scale from 1 to 5 with 5 being “Strongly Agree” to produce the weighted averages found below.

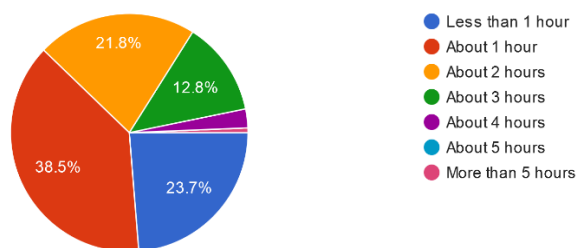
Prompt	Weighted Average
2) In previous math/statistics classes I have taken, I have been actively engaged in learning the math/statistics content during class sessions.	2.79
3) In previous math/statistics classes, group work has helped me to understand the course material.	3.56
4) In previous math/statistics classes I have taken, I feel that all students had opportunities to talk about course content during class sessions.	3.70
5) In previous math/statistics classes I have taken, I feel that the instructor adjusted their instruction appropriately based on the learning needs of students.	3.43
6) In previous math/statistics classes, I felt that the instructor cared about my progress in the class.	3.93

7) Based on my experience in previous math/statistics classes, I am comfortable being randomly assigned to work in a student work group.	3.45 (n = 73)
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8) On average how many hours per week do you anticipate working with classmates outside of class to learn the content in this course?

On average how many hours per week do you anticipate working with classmates outside of class to learn the content in this course?

156 responses



Post-Course Questionnaire Results Summary (n = 80)

Question	Summary
1) From the following list of practices, rank the 3 things that you think were most beneficial in helping you learn course content. <ul style="list-style-type: none"> • Completing homework assignments • Contributing to in-class group work • Participating in non-graded short competitive in-class assessment activities • Contributing to out-of-class group projects • Reviewing class notes and activities outside of class • Taking notes • Watching online videos • Attending office hours • Working with available tutors • Participating in class discussions 	<u>Top Three Responses for Rank 1</u> <ol style="list-style-type: none"> 1) Taking notes (n = 40) 2) Reviewing class notes and activities outside of class (n = 27) 3) Completing homework assignments (n = 19) <u>Top Three Responses for Rank 2</u> <ol style="list-style-type: none"> 1) Completing homework assignments (n = 26) 2) Taking notes (n = 19) 3) Contributing to in-class group work (n = 14) <u>Top Three Responses for Rank 3</u> <ol style="list-style-type: none"> 1) Completing homework assignments (n = 19) 2) Reviewing class notes and activities outside of class (n = 19) 3) Participating in non-graded short competitive in-class assessment activities (n = 11)

For questionnaire items 2 – 6 students considered the following directive.

Use this scale for the items 2 - 6. Please indicate your level of agreement with the following statement by marking the best descriptor.

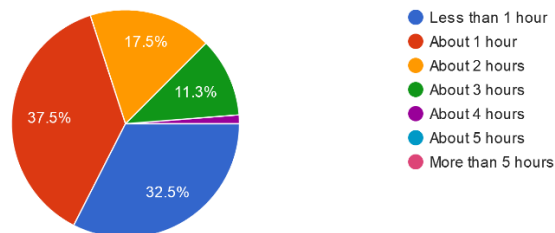
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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We translated these levels to a scale from 1 to 5 with 5 being “Strongly Agree” to produce the weighted averages found below.

Prompt	Weighted Average
2) I have been actively engaged in learning the statistics content during class sessions.	3.95
3) In this current statistics class, group work has helped me to understand the course material.	3.59
4) In this statistics class, I feel that all students had opportunities to talk about course content during class sessions.	4.16
5) In this statistics class, I feel that the instructor adjusted their instruction appropriately based on the learning needs of students.	4.21
6) In this statistics class, I feel that the instructor cared about my progress in the class.	4.48
7) Based on my experience in this statistics class, I am comfortable being randomly assigned to work in a student work group.	N/A

8) On average how many hours per week did you spend working with classmates outside of class to learn the content in this course?

On average how many hours per week did you spend working with classmates outside of class to learn the content in this course?
80 responses



Initial results from the study are promising. On questionnaire item one, we did not see much change from pre-course to post-course with *Taking notes*, *Reviewing class notes and activities outside of class*, and *Completing homework assignments* being the predominantly chosen activities. However, on items two through six we find some interesting results. Item two targets, “actively engaged in learning the statistics” and its weighted average went from 2.79 to 3.95. Item three targets, “group work has helped me” and its weighted average went from 3.56 to 3.59.

Item four targets, “all students had opportunities to talk about course content during class sessions” and its weighted average went from 3.70 to 4.16. Item five targets, “the instructor adjusted their instruction appropriately based on the learning needs of students” and its average went from 3.43 to 4.21. Item six targets, “the instructor cared about my progress in the class” and its weighted average went from 3.93 to 4.48. On item eight, we saw some changes to average hours per week spent working with classmates outside of class to learn the content. We are awaiting post-course questionnaire data from spring semester and will update our findings appropriately. We expect that the professor feedback in the form of reflections will assist us in unpacking the quantified results from the pre-course and post-course student questionnaires.

Professor Feedback

The three professors who participated provided feedback in the following form: 1) three professor reflections (early, middle, and late in semester). We felt that this documentation would provide us and others insights into how to implement the evidence-based strategies. Furthermore, we expected that the reflections would serve as a gauge on how well the implementation played out and what we learned about implementation as the semester progressed. See below for a summary of each of the three professors reflecting on their experiences using these strategies.

Professor One Reflections (Dr. VanKrevelen)

Strategy #1 - Get to know students and student names

To accomplish this, I used a handful of different approaches. In both the fall and spring, my first homework assignment was 5 points for visiting my office at some point during the first two weeks of class. The goal was to lower the barrier for future visits and to begin to learn names better. In the fall, I had around one third of my students return to office hours and several visited almost weekly. One student would come in to discuss research being done for another class as well. I also made a point of quizzing myself on student names during in-class work time and found that I was able to learn almost everyone’s name by the end of the second week. Lastly, I made a more concerted effort to use student names when talking to them so they knew that I knew them. One student early in the fall even commented that they thought I was their only professor who knew them by name.

Strategy #2 - Use Socrative software to structure heterogeneous in class group work

I was very pleased by how well this worked and my only regret was that I ran out of class time to use it more in the fall. Students responded well to it, and it gave them a chance to get to know people other than the one or two people they usually sat next to. In the spring, I began to add more structure to the process by giving them a couple things to discuss together while they introduced themselves each time groups were created. Unfortunately, when we shifted to online learning, I was unable to continue with this. However, I plan to build on using randomized groups for Socrative quizzes in future classes.

Strategy #3 - Use heterogeneous groups to complete an out of class group project

I was happy with how this strategy worked as well. After students completed this project in the fall, I asked them whether they would prefer randomized groups or choosing their own groups for the second project. Around 60% said they preferred having me randomize groups. Additionally, some of the ones who wanted to choose their own group felt that way because they wanted to keep working with their group from the first project. Others had legitimate scheduling concerns due to things like athletics and wanted to make sure they worked with people with compatible schedules. In the past, I didn't stop to think about how often students feel left out or awkward when they choose their own groups because the most vocal students argued for choosing groups. I believe using these randomized groups allowed for a more fair process for everyone.

Overall Takeaways

I felt that I knew my students better than in any previous semester, which was wonderful. Several students felt more comfortable in class than I believe they would have otherwise. Additionally, the use of randomized groups went very smoothly and I noticed several cases where students began sitting together / working together after being partnered up previously. There is plenty of room to build in additional structure to these processes, but this was very promising initially.

Professor Two Reflections (Dr. Weaver)

Strategy #1 - Get to know students and student names

A couple of days before fall semester started, I sent a brief Google Form survey to registered students to collect some information on the students. I asked about their preferred pronouns, their year in college, their hometown, one or two things that were important in their lives, their previous experience learning math and/or statistics, and whether there was anything else they would like to share with me. I reviewed their responses to these questions periodically throughout the semester and I feel like they helped me to get to know the students a bit better. In addition, on this survey, I asked whether they had ever previously had a statistics class and whether they had any previous coding experience. Across both of my sections, almost half (46%) had never previously taken statistics and 86% had no previous coding experience. I projected these results on the board on the first day of class and stressed to the students that previous experience in either of these areas was in no way required or expected in order to be successful in this course. I always make it a goal to learn the students' names quickly and to use them frequently throughout the semester. I find that this facilitates rapport with the class.

Strategy #2 - Use Socrative software to structure heterogeneous in class group work

I really like Socrative, I am so happy that Dr. Taylor introduced this software to us all over the summer! During the fall semester, I was able to use this software to conduct 9 group quizzes, roughly one for every non-exam week after the first week. For the first 5 quizzes, I randomized students to groups at the beginning of class. This worked as a double-bonus because I then had the students stay in these same groups throughout that class period, which allowed students to interact with other students in class whom they may not have met previously. The students did not resist being randomized, although some expressed a preference for not having to change their

seats. Thus, I did not randomized the last 4 group quizzes. I will definitely use Socarative in future STS 212 sections, and I will continue to randomize students to groups for at least the first several quizzes.

Strategy #3 - Use heterogeneous groups to complete an out of class group project

I randomized students to group for their first class project in the fall semester, but I allowed them to select their own groups for the second project. At the end of the semester, I surveyed them about which they preferred, randomized groups or selecting their own. I was pleased that about a third of the respondents indicated that they preferred randomized groups! I see great value in randomizing project groups, and plan to continue to use this strategy in the future for at least one project per semester. It forces the students out of their comfort zone and requires them to work with others in the class with whom they otherwise might not have worked, and it seems to help enhance the sense of community within the class. It also allowed students who were struggling with learning SAS software the opportunity to work with students who had a better grasp on the software - I think this would actually be beneficial for both students, and I perceived better results on the coding portion of my third exam (held during the Final Exam period of the semester).

Overall takeaways: I very much enjoyed all 3 of our selected strategies and plan to continue using all of them (possibly with further enhancements) moving forward. Socrative software provides such a great vehicle for formative assessment that I will definitely continue to use it in STS 212, and also STS 110, moving forward. Getting to know the students better, and allowing them opportunities to get to know one another better, just seems to open up the classroom atmosphere. This was such a great learning experience!

Professor Three Reflections (Dr. Taylor)

Strategy #1 - Get to know students and student names

I began the semester with an ice breaker, which I traditionally avoid. The goal of the ice breaker was to make students feel like they belonged in the class. As this class is a 200-level introductory statistics course with a broad mix of majors and students of different years, students can feel intimidated. My ice breaker involved having students come up with a fact about themselves that they thought they would have in common with a lot of other students. We kept track of how many students identified with their fact. I collected students worksheets from the first day of class as I usually do as a ploy to pass them out the next class to learn names. Lastly, during the second week of classes I had students fill out index cards to tell me about themselves. I have not done this in a very long time, but I think it helped students feel better connected and that I cared about them. Since I was only teaching one section of STS 212 this semester, it really helped me learn names faster. By about the third day of class, I had memorized student names. Another way that I sought to build connection and accessibility is that I emailed students when I received tutoring reports and reminded them that I was also available during office hours.

Strategy #2 - Use Socrative software to structure heterogeneous in class group work

Prior to the transition to online learning, I had not had many opportunities to use Socrative in class. When I did use Socrative, I primarily used Space Race quizzes where students were randomized into different groups. This eliminated the “clique”-effect that sometimes happens when students select their own teams in class. I also randomized students into teams for the first part of the project. We did not complete any additional parts of the project due to the transition to online learning. I used Socrative extensively after the transition to online learning. While it did not meet the goal of creating heterogeneous in class group work in this setting, it did accomplish another goal to increase equity in the classroom. I used Socrative to give students an anonymous voice in the classroom. Students were hesitant to unmute themselves or to respond in the WebEx chat, but they would ask questions and answer questions using the Socrative short answer tool I utilized during online class. Through this, students had fewer barriers to asking questions and minimized concerns students might have about being embarrassed to ask questions.

Strategy #3 - Use heterogeneous groups to complete an out of class group project

We only completed one part of the online project. I have avoided randomized groups in the past due to student issues. In particular, students are sometimes frustrated by the peers that they end up with or they end up with students who have very difficult schedules to coordinate with. This semester, no students reported any issues in their groups. The project was due on Friday, March 13h, the last day that we were in person, so I did not get to see how the atmosphere of the course might have changed as a result of the randomized groups in class. Nor did we complete any additional project parts as I felt that the transition to online learning already had enough challenges and coordinating a multi-person project was more than I wanted to ask of my students at this time.

Overall Takeaways

Participating in this project helped me to revisit some strategies that I have sometimes used in the past and others that I have not used extensively. It is hard to know how these strategies played out with the transition to online learning. Additionally, having only one section of STS 212 this semester, I really felt like I could focus on these students in a way that I can't do as easily when I have two sections (and those two sections blur together). Therefore, I recognize that my takeaways are unique to this semester in many ways. I absolutely plan to use the ice breaker again in the future and note cards to increase my connection with my students. After the transition to online learning, I used Socrative in different ways that I thought were also beneficial to students.

Conclusion

Recall that the objective addressed in this DIP was to increase the success of diverse learners in STS 212 through implementing several evidence-based pedagogies related to student collaboration. Addressing this objective aligned with the Mathematics and Statistics Department's larger goal to, “gather and identify research to breaking down obstacles for diverse groups entering Elon and MTH/STS.” We anticipated three byproducts of meeting this goal: 1)

increased access to statistical content; 2) increased agency, authority, and identity; and 3) flexible instruction that responds to students' needs and thinking. We also anticipated that students who had not had a mathematics or statistics background that reflects being asked to share their ideas with each other would benefit from experiencing pedagogies that align with the project goal. Based on summarized findings, we found that the pedagogical strategies implemented and studied showed promise for meeting the overall DIP objective and specific goals. Undergraduate statistics educators are encouraged to consider implementing these strategies for the betterment of all learners.

Dissemination

Our team plans to present our study and findings with the Department of Mathematics and Statistics during a department faculty meeting in fall 2020. Additionally, we intend to submit an abstract to present our work and findings at conferences such as the United States Conference on Teaching Statistics. Finally, we look forward to discussing the possibility of crafting a paper to share our research story and findings for a journal such as the *Journal of Statistics Education* or *Teaching Statistics*.

References

National Council of Teachers of Mathematics. (2014). *Access and Equity in Mathematics Education Position Statement*. Retrieved from <http://www.nctm.org/Standards-and-Positions/Position-Statements/Access-and-Equity-in-Mathematics-Education/>

Creating, supporting, and sustaining a culture of access and equity require being responsive to students' backgrounds, experiences, cultural perspectives, traditions, and knowledge when designing and implementing a mathematics program and assessing its effectiveness. Acknowledging and addressing factors that contribute to differential outcomes among groups of students are critical to ensuring that all students routinely have opportunities to experience high-quality mathematics instruction, learn challenging mathematics content, and receive the support necessary to be successful. Addressing equity and access includes both ensuring that all students attain mathematics proficiency and increasing the numbers of students from all racial, ethnic, linguistic, gender, and socioeconomic groups who attain the highest levels of mathematics achievement.

Schoenfeld, A. (2016). What makes powerful classrooms—and what can we do, now that we know? *Mathematical Association of America Focus*, 36(2), 11-14.

If you could focus on five aspects of mathematics instruction in order to improve mathematics teaching, what would they be? Those five things should (a) have students emerge from the course as powerful thinkers and problem solvers when they are well implemented; and (b) have a coherent way to implement. The article introduces a framework with five dimensions: (1) The Mathematics; (2) Cognitive Demand; (3) Access to Mathematical Content; (4) Agency, Authority, and Identity; and (5) Formative Assessment.

Garfield, J. (1993). Teaching statistics using small-group cooperative learning. *Journal of Statistics Education*, 1(1).

Including active learning activities in the classroom as opposed to lecturing can help students overcome misconceptions more easily than if students are working alone. Additionally, if stronger students help to teach others in their groups, this can increase understanding for both parties. Additionally, in statistics there is often more than one solution, and working together cooperatively facilitates this realization. Besides increased understanding, improved attendance, student engagement, and visits to professor office hours there may also be other beneficial effects of using cooperative learning in statistics classes. It is for these many reasons that providing students with cooperative learning opportunities is recommended over lecturing in class. The author includes several examples of cooperative group activities.

Roseth, C. J., Garfield, J. B., & Ben-Zvi, D. (2008). Collaboration in learning and teaching statistics. *Journal of statistics education*, 16(1).

Student-centered instruction has benefits over instruction centered around the teacher. Additionally, the practice of statistics is collaborative by nature, thus it would be beneficial to encourage this in a classroom setting. The authors define the following terms: peer learning, active learning, cooperative learning, and group work. Social interdependence theory is also discussed. With this theory, it is expected that students will search for outcomes that are mutually beneficial to the entire group only if and only if individuals believe the only way their goal will be reached is if everyone in the group does so as well. Tips on successfully implementing cooperative learning are provided by the authors. One of these tips is to provide students with information on their specific responsibilities. Another is to have the instructor assign students to groups.

Appendix

1) Getting to Know Students at Beginning of Semester (Faculty Resource)

Begin semester with learning about each student's background and expectations (A Moodle Survey may be best option for gathering this information). Use an ice-breaker activity of your choice (see resources below).

From Wright (2012): Research on the first day of class by Knefelkamp showed there was a real desire on the part of both students and teachers for connectedness, but neither group realized the other shared that desire. If the participants on both sides don't understand how to develop their relationships, learning will be diminished. If you have experienced some anxiety about this meeting, planning some specific steps can not only reduce that feeling, but can get students to share in the sense of purpose you hold for the class.

Minimal information to attain from each student (first three may be shared with the class during ice-breaker, the last three are for the professor only). Use other prompts such as non-academic activities.

A. Name

1. Year in college
2. Where they are from
3. List one or two things that are important in your life
4. Last math or statistics course taken

5. What are your expectations for learning in this course?
6. What would you like me to know about your individual experiences learning math/statistics?

Resource One: Ice-breakers for the college classroom.

<https://ucat.osu.edu/bookshelf/teaching-topics/shaping-a-positive-learning-environment/12-icebreakers-college-classroom/>

Resource Two: Strategies for Getting to Know Your Students.

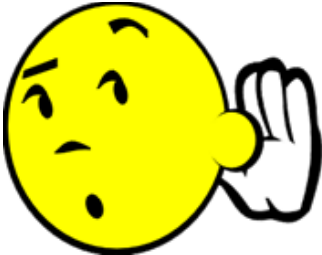

<http://www.unl.edu/gradstudies/current/teaching/names>



Resource Three: Strategies for Building Rapport with All Students.

<http://www.unl.edu/gtahandbook/building-rapport>

2) Best Practices for Discussing Mathematics (Handout/Moodle Post/Poster)

Successful Teamwork in Statistics

<p>Openness:</p> <ul style="list-style-type: none"> ● Get to know each other ● Be open to diverse ideas ● Listen to others 	
<p>Accountability:</p> <ul style="list-style-type: none"> ● Share your own ideas and feelings ● Exhibit honesty and respect ● Do your fair share and attend all group meetings on time 	

<p>Collaboration:</p> <ul style="list-style-type: none"> ● Restate others' verbal contributions ("I hear you say...") ● Be flexible in scheduling meetings ● Come to agreement before moving on 	
<p>Persistence:</p> <ul style="list-style-type: none"> ● Solve unfamiliar and challenging problems ● Utilize each group member's strengths ● Troubleshoot coding with your peers and remember SAS is new for everyone 	

Statistics Learning Questionnaire (pre)

Student Assigned Number and Section: _____

1) From the following list of practices, rank the 3 things that you think will be most beneficial in helping you learn course content.

- Completing homework assignments
- Contributing to in-class group work
- Participating in non-graded short competitive in-class assessment activities
- Contributing to out-of-class group projects
- Reviewing class notes and activities outside of class
- Taking notes
- Watching online videos
- Attending office hours
- Working with available tutors
- Participating in class discussions

Use this scale for the items 2 - 6. Please indicate your level of agreement with the following statement by marking the best descriptor.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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- 2) In previous math/statistics classes I have taken, I have been actively engaged in learning the math/statistics content during class sessions.
- 3) In previous math/statistics classes, group work has helped me to understand the course material.
- 4) In previous math/statistics classes I have taken, I feel that all students had opportunities to talk about course content during class sessions.
- 5) In previous math/statistics classes I have taken, I feel that the instructor adjusted their instruction appropriately based on the learning needs of students.
- 6) In previous math/statistics classes, I felt that the instructor cared about my progress in the class.
- 7) On average how many hours per week do you anticipate working with classmates outside of class to learn the content in this course?

Statistics Learning Questionnaire (post)

Student Assigned Number and Section: _____

1) From the following list of practices, rank the 3 things that were most beneficial in helping you learn course content.

- Completing homework assignments
- Contributing to in-class group work
- Participating in non-graded short competitive in-class assessment activities
- Contributing to out-of-class group projects
- Reviewing class notes and activities outside of class
- Taking notes
- Watching online videos
- Attending office hours
- Working with available tutors
- Participating in class discussions

Use this scale for the items 2 - 6. Please indicate your level of agreement with the following statement by marking the best descriptor.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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- 2) I have been actively engaged in learning the statistics content during class sessions.
- 3) In this current statistics class, group work has helped me to understand the course material.
- 4) In this statistics class, I feel that all students had opportunities to talk about course content during class sessions.
- 5) In this statistics class, I feel that the instructor adjusted their instruction appropriately based on the learning needs of students.
- 6) In this statistics class, I feel that the instructor cared about my progress in the class.
- 7) On average how many hours per week did you spend working with classmates outside of class to learn the content in this course?

Professor Reflection Form

Instructor Name: _____

We agreed to implement the following three strategies.

1. get to know students and student names;
2. use Socratic software to structure heterogeneous in class group work;
3. use heterogeneous groups to complete an out of class group project, Olympic Swimming.

You will provide a reflection at three points in the semester: early, middle, and late.

Provide a detailed reflection on your implementation of each of the three evidence-based pedagogies (listed above) in light of the goal of our work. For example, you might want to write about things such as:

- Whether students seem to be getting to know about each other
- Whether students in the class are learning each other's names
- The success level of specific class interventions such as Socratic quizzes/activities
- How well students seem to be working together
- The progression of student groups in their work on the Olympic Swimming project

Reflection 1 (Early--around mid-term exam)

Reflection 2 (Middle--around Thanksgiving (fall) or around SURF (spring))

Reflection 3 (Late--around final exam)