USING AN INTERDISCIPLINARY CASE STUDY TO INCORPORATE QUANTITATIVE REASONING IN SOCIAL WORK, NURSING, AND MATHEMATICS

Elizabeth Post
Ferris State University
ElizabethPost@ferris.edu

Mischelle Stone
Ferris State University
MischelleStone@ferris.edu

Lauren Cavner Williams
Ferris State University
LaurenCavnerWilliams@ferris.edu

Mary Beaudry
Ferris State University
MaryBeaudry@ferris.edu

https://doi.org/10.25891/6dtp-vn32

ABSTRACT
Through the national consortium, SUMMIT-P, Ferris State University faculty collaborated to develop and scaffold mathematics and quantitative reasoning across disciplines to reduce math anxiety. Participants in this collaborative group included faculty from social work, nursing, and mathematics who developed a case study on a Hurricane Katrina scenario that necessitated calculating the need for emergency shelter, water, food, and medicine, and as a response to the potential for a Malaria outbreak. This particular case study allowed faculty to use the lens of social justice to teach mathematical concepts and provided an avenue for nursing and social work students to engage in mathematics through a case study germane to their profession. This article discusses the process of developing this case study and focuses on the successes and challenges faculty and students faced while the parts of the case study were implemented in the varied disciplines. This discussion also includes sidebar contributions from faculty at other SUMMIT-P institutions who have engaged in similar cross-disciplinary collaborations.

KEYWORDS
quantitative reasoning, mathematics, social work, nursing, case study, interdisciplinary, education

General math anxiety is "a state commonly described as approaching mathematics with trepidation due to related feelings of weakness, dependency, and frustration" (Hekimoglu & Kittrell, 2010, p. 301). There can be many reasons for this state of trepidation, among them the transfer of mathematics anxiety from parent to child (Maloney et al., 2015). In addition to parents, teachers also can influence students' math anxiety, whether it is through imparting their own attitude toward the subject, or through their choice of instructional methods. For example, when procedural, rather than applicable, learning becomes the focus in classrooms, "these policies have produced students that rely more on rote memorization and have increased the level of anxiety in young children by making mathematics a high-risk activity" (Geist, 2010, p. 25). Further, when compared to men, women tend to have greater levels of math anxiety (Hart & Ganley, 2019).

Math anxiety can be an obstacle for students seeking a degree, as mathematics is often positioned as a gatekeeper subject. In addition, "students with math anxiety will likely avoid careers that require math" (Henrich & Lee, 2011, p. 1). The paradox here is that many, if not most, careers involve some form of quantitative reasoning. Often, students do not understand how and why they will use quantitative reasoning in their careers after college (Davis & Mirick, 2015), so it is important to introduce these concepts via applications that are relevant to the students. With these goals in mind, the national consortium, Synergistic Undergraduate Mathematics via Multi-institutional Interdisciplinary Teaching Partnerships (SUMMIT-P) engaged faculty from 14 institutions to improve lower-level mathematics courses through collaboration with other disciplines. This article discusses general math anxiety across the disciplines of mathematics, social work, and nursing, best practices to address general math anxiety, and the development of a Faculty Learning Community (FLC) at Ferris State University (Ferris) to improve mathematics and quantitative reasoning courses through the development of an interdisciplinary case study.

Math Anxiety in Quantitative Reasoning Courses

It is not uncommon for students who enter a college mathematics or quantitative reasoning course to express anxiety about mathematics. This anxiety can stem from what the students describe as negative or stressful experiences they previously had with the subject. These experiences may have come from one of the following common causes: "having an insensitive or incompetent math teacher in the past, student fear of failure or a sense of inadequacy, inability to handle frustration, poor pre-college math preparation, and low math achievement" (Henrich & Lee, 2011, p. 1). In addition, some students who enter college later in life express anxiety regarding mathematics because they have not interacted with the subject in years. Support for students in mathematics and quantitative reasoning courses is important because of the status of mathematics as a gatekeeper subject (Thiel et al., 2008), and because having math anxiety "may affect students' success in their higher education studies" (Núñez-Peña et al., 2013, p. 49). Helping students succeed in their mathematics courses is not only important while enrolled in the courses themselves, but also to help them achieve their goal of graduating from college.

Math anxiety is expressed by students in nearly all disciplines. For example, it is not unusual to hear a social work student say they are "just not a math person" or are "more clinical" in their orientation. The first empirical research conducted on how this phenomenon manifests in the social sciences was done by DeCesare (2007), who surveyed sociology students about their math anxiety. In this study, students experiencing math anxiety also showed higher levels of test

anxiety. Conversely, students who had previously taken a statistics course reported lower anxiety levels. Davis and Mirick (2015) surveyed graduate social work students to delve deeper into this phenomenon and to better understand students' attitudes and beliefs about statistics. They found that after having taken a statistics course, students both perceived statistics as important in the profession and indeed, used it in the field of social work in their practicum experience. Quantitative reasoning and mathematics are integral to social work. To be able to use evidence-based practice, social work practitioners must be able to read and critically evaluate research studies. They must also be able to evaluate their own work with individual clients as well as their work at the community level. Further, practitioners must be able to evaluate if an individual client is meeting his or her treatment goals, as well as evaluate whether an entire program is effective.

Math anxiety is also common in nursing. In nursing education, educators find that students have elevated levels of anxiety with high-stakes testing and clinical settings where demonstration of mathematics skills is crucial. In clinical settings such as the intensive care unit (ICU), students can display excessive anxiety which impedes clear and critical thinking (Hopkins, 2019). Patient care involves assessing, medicating, treating, and educating patients. To accomplish these tasks, a nurse must demonstrate proficiency in mathematics. When a dose of medication is incorrectly calculated, patient lives are at risk. Addressing math anxiety in both classroom and clinical settings is necessary to provide a learning environment that leads to appropriate patient care.

Math anxiety is even present at STEM Universities. Faculty at Emory Riddle Aeronautics University (ERAU), a widely respected STEM-focused university, noted their own experience with teaching students who have math anxiety:

> *Even at our STEM-focused institution, the non-traditionally aged students of the Worldwide Campus have a great deal of math anxiety. Not all of our students need calculus to succeed in aviation and aerospace careers, but every student everywhere needs to skillfully approach quantitative information in their lives. Coursework that addresses the breadth of mathematics – rather than the climb to calculus – is the goal of our quantitative reasoning courses*.

Best Practices to Overcome Math Anxiety

There are established best practices to overcome math anxiety in mathematics and quantitative reasoning courses and other disciplines. One of these practices is to have students complete a mathematics autobiography as a way to encourage students to reflect on their experiences with, and feelings about, mathematics and quantitative reasoning. This exercise can help students communicate their concerns early in the semester in an interaction with the instructor that the students do not find intimidating. This assignment could also help students organize their thoughts and feelings and they may come to a better understanding of themselves as a person and a learner. It can also help the instructor gain a better understanding of the students in the classroom. This exercise could be incorporated into courses across various curriculums, rather than offering it solely in just one or two required mathematics courses.

Another best practice includes continued exposure to quantitative reasoning, rather than teaching it in one discrete course. Condron, Becker, and Bzhetaj (2018) found that continued exposure to quantitative reasoning instruction helps to reduce math anxiety. They surveyed social work students about general math anxiety and provide a framework for incorporating quantitative reasoning across the curriculum. This includes beginning the semester with a review

of mathematical concepts, explaining the importance of statistics in social work, and boosting students' confidence in statistics, including incorporating these analyses throughout the curriculum.

The use of interdisciplinary education to apply quantitative reasoning across the disciplines is another best practice for reducing math anxiety. In this practice, mathematical concepts are introduced in quantitative reasoning courses and reiterated in courses related to the student's field of study. Thus, the student has exposure to real-world applications. At Ferris, faculty had the opportunity to do just this through the SUMMIT-P project.

Interdisciplinary Collaboration – Establishing a Faculty Learning Community

The FLC at Ferris resulted, in large part, from the Curriculum Foundations (CF) Project, a comprehensive review of undergraduate mathematics programs from 1999 to 2007 (see Ganter & Barker, 2004; Ganter & Haver, 2011). The CF project conducted several workshops to help mathematics faculty gather information from 22 partner disciplines. Recommendations from the CF Project led to the creation of SUMMIT-P, a multi-institutional project that brought together numerous colleges and universities with the goal of creating interdisciplinary initiatives to improve student learning. One of these initiatives was the development of Faculty Learning Communities (FLCs).

To develop the FLC at Ferris, faculty from the local SUMMIT-P project team developed and submitted a proposal to the Faculty Center for Teaching and Learning (FCTL) at the university. The proposal was evaluated against predefined criteria, including how it aligned with the overall values of the FCTL, the measurability of outcomes, and the presence of an assessment plan. Following approval, the project team began to plan for the selection of faculty and the training itself. The year-long FLC began in August 2018, and the SUMMIT-P project team members served as facilitators of the FLC. The structure of the FLC was an outcome of faculty from the partner disciplines of mathematics, social work, and nursing coming together to engage in active collaboration to develop a curricular approach to enhance the teaching and learning of mathematics and quantitative reasoning. To select faculty members, a call went out to the individual departments letting them know that the project was being developed. Faculty then contacted the facilitators to express their interest. Faculty participating in the FLC were provided with professional development funds of $1,200 at the conclusion of their participation over the one-year period.

At the beginning of the FLC, all of the faculty who volunteered to participate were divided into interdisciplinary teams. Each time was comprised of a faculty member from mathematics, social work, and nursing. All FLC members met approximately every three weeks. Early on, the teams focused on identifying common mathematics and qualitative reasoning concepts that were embedded in their discipline-specific courses. The identification of these common concepts was designed to reduce the barriers that prevented students from carrying quantitative reasoning concepts forward into their respective majors, and to develop cross-disciplinary concepts and context that faculty could embed into each of the partner disciplines. The FLC interdisciplinary collaborative structure turned out to be relatively common among participants at the various SUMMIT-P institutions. This is illustrated in the description below of the collaborative structure provided by participating faculty at Lee University.

Vignette – Lee University

At Lee University a FLC initially started between the Departments of Mathematical Sciences; Behavioral and Social Sciences; Natural Sciences; and Early Childhood, Elementary, and Special Education. Faculty from the non-mathematical department disciplines consulted the CF project publication Voices of the Partner Disciplines (Ganter & Barker, 2004), for discipline-specific recommendations. Each partner discipline faculty shared the recommendations with their respective department to choose the ones that best suit their needs. Through several meetings and fish bowl activities, the faculty were able to map their discipline needs with the syllabi of the targeted mathematics courses. The recommendations were specifically for introductory courses: Algebra for Calculus, Introduction to Statistics, College Algebra, Concepts of Mathematics I, and Concepts of Mathematics II.

This initial collaboration resulted in a better understanding of each other's discipline, the realization of the different language used in each discipline, and the curriculum expectations of each discipline. From this point, the FLC was expanded to include other faculty from the collaborating departments. The discussions took the form of fishbowl activities or meetings with faculty from individual departments. Ideas for interventions were discussed and wish lists were created by the partner disciplines. The result of these collaborations has been the creation and implementation of several discipline-specific interventions in the above courses. Manipulatives were introduced, for the first time, in Concepts of Mathematics I and II, and Introduction to Statistics, and the creation of a collaborative environment between the different departments thus began breaking down discipline-specific silos in academia and increasing camaraderie among participants.

The Work of the Ferris FLC

One of the major goals of the FLC at Ferris was to confront the fragmented approach to teaching and learning that so frequently results in a student experience that lacks relevance and coherence across disciplines. Even though faculty are often incentivized to experiment with a variety of pedagogical strategies to enhance student learning, little has been done to encourage them to cross academic boundaries in order to collaborate in curricular reform (Bishop et al., 2020). Bringing faculty together toward this end is a rather large undertaking; however, without it, students are not likely to understand how to work collaboratively to solve real-world problems. The need to produce college graduates who are prepared to engage with real-world problems across their educational experience necessitates that faculty engage in cross-disciplinary efforts to provide opportunities for students to apply important concepts across disciplines. Nowhere is this more important than in mathematics and quantitative reasoning, which are often perceived by students as “stand-alone” disciplines unrelated to their major field of study. Even when students recognize that some mathematics or quantitative reasoning may be required in their specific discipline (such as nursing), they are often content to let computers perform the calculations for them. Students in specific disciplines apart from mathematics rarely understand or appreciate the extent to which the *context* for the calculations influences their application in the field. Bringing interdisciplinary faculty together in one space over an extended period of time to develop mathematical problems with application to real-world, discipline-specific situations was a primary goal of the FLC. This is consistent with the recommendations

outlined in the CF Project (Ganter & Barker, 2004), which emphasizes the need to help students develop a conceptual understanding of mathematics as it relates to partner discipline needs.

One of the goals for the participants in the Ferris FLC was to reduce the rates of grades D, F, and W (withdrawal) among students in partner discipline courses. One of the previous challenges identified by the General Education task force at Ferris was the high number of students from all disciplines who received grades of D, F, or W in the lower-level mathematics and quantitative reasoning courses required to graduate. In discussing this issue at the start of the FLC, it became clear that all participants in both the partner disciplines and in mathematics could provide anecdotal data about fear and anxiety their students experienced relative to "passing math."

It was agreed by participants in the FLC that reducing this fear and anxiety would correlate to improved mathematics and quantitative reasoning scores, which would reduce D, F, W rates in the required mathematics classes for non-mathematics majors. One of the major challenges in accomplishing this reduction in fear and anxiety was to develop curricular activities where mathematical concepts necessary for different disciplines could be embedded in the discipline-specific courses. To accomplish this, a Case Scenario method was used. Participants decided to develop a case study on a Hurricane Katrina scenario which necessitated calculating the need for emergency shelter, water, food, and medicine, as well as a response to a potential for a malaria outbreak. This particular case study allowed faculty to use the lens of social justice to teach mathematical concepts in a mathematics course and provided an interesting avenue for nursing and social work students to engage in mathematics through a case study germane to their profession.

We used the following case scenario:

> *New Orleans was devastated by Hurricane Katrina in 2005 and has not yet fully recovered. There are significant social justice issues here as the areas initially affected were primarily in poor Black communities and have since taken a great deal of time to recover. The more affluent primarily white communities were less affected because they had the proper infrastructure and recovered faster because they had access to more resources. This city remains a hurricane hotspot.*

Immersive experiences such as working on an interdisciplinary case study as described above shed new light on the value and contributions of other team members from different disciplines. Participating in the FLC led to an enhanced understanding by faculty of the context of how mathematical concepts and quantitative reasoning are identified and applied in the disciplines of social work and nursing.

The FLC group faced the challenge of developing and implementing assignments that maintained the integrity of the case study across disciplines. The group began with an analysis of the mathematics course and then used the course schedule to incorporate social work and nursing components. Each course introduced the same case study by showing a short video clip of a documentary and engaged students in a reflective discussion afterward. This introduced the case scenario and offered the framework for both quantitative reasoning and social justice.

Additionally, the group had considerable dialogue regarding how to scaffold quantitative reasoning into assignments. Ultimately, the group used the structure of the mathematics course to determine the scaffolding and then applied the framework to the social work and nursing courses. Scaffolding quantitative reasoning assignments was integral to the process.

The mathematics course provided a course pack of instructional materials to the mathematics students, which included instructional materials and assignments that made

application of mathematics and quantitative reasoning concepts for all three disciplines. The course pack consisted of explorative activities that encouraged students to use a collaborative and inquiry-based approach to mathematical ideas rather than giving students content via lecture. Applications from nursing and social work were frequently used throughout the course pack. The application of mathematics to the partner disciplines was intentional and easily seen by students because of the examples included within assigned activities. For example, students interested in nursing were presented with examples involving patients' blood pressure or conversions for dosages of medication; students interested in social work could see the application of mathematics from the point of view of a homeless shelter, i.e., determining the change in the number of guests from one year to the next. In the case study scenario, each of the disciplines was intentionally built into the design. Social work was incorporated through ideas involving the finances of a shelter for displaced victims of the disaster, i.e. food, mortgage. Nursing was included through the use of determining proper dosages for antimalarial medication for adults, children, and infants, a likely result of the hurricane on the community, given the hot and humid summer climate in the region. It was through ideas like these that students could see the direct application of mathematics in their respective disciplines as well as the importance the subject has on real-world applications.

This case study was used in Introduction to Social Work to apply the social work values, ethical standards, and levels of practice (work with individuals on through community and policy work). This was designed to first engage students through the lens of social justice and then to introduce the importance of quantitative reasoning at an introductory level. Students learned how to read graphs representing the racial makeup of New Orleans before and after the hurricane. Additionally, students looked at maps representing the racial makeup and socioeconomic status in the city, before and after the hurricane (see Appendix A). Students also learned how to understand and compare percentages in order to see the disparate impact of Katrina on various populations. The class debriefed at the end of the lesson to connect the importance of quantitative reasoning and knowledge of disparate treatment of minoritized groups.

The case study was also used in the 200-level nursing course on role model development, which covers ethical decision-making and social justice issues. Further applications were introduced in the following semester in a 300-level course on nursing methods. This case study enabled students to practice simple ratio and proportion problems, dosage calculations using simple algebra, and engage in triage to determine who gets the medications and how much. The case study was modified here to include shortages of medications and food and ultimately the need for a shelter to house evacuees. The simplest of mathematics concepts were introduced in a nursing methods course, where calculations were taught and then applied to the case study. Students worked in small groups to solve the problems. Debriefing was essential if a calculation was missed; and discussions were held about the impact of medication shortages, correct doses, and the social justice issues that arose.

While the use of the case scenario across disciplines was conceived and implemented with little to no difficulty (largely due to the fact that all faculty involved in the FLC were stakeholders in the implementation of the scenario assignments in their own classes), a bigger challenge arose that required much more planning and cooperation from others outside the FLC. Specifically, it required that the advisors in each of the three disciplines plan how to enroll students from the three disciplines into specific sections of the mathematics courses. The advisors accomplished this by working collaboratively to establish sections of the mathematics courses in which students from the various disciplines were enrolled. This "cohort" of students

moved together from one mathematics course to the next (e.g., Math 109 to Math 114), and included students from all three disciplines. This kept the students engaged with each other, professors, and the same material (albeit using different assignments) from course to course, with a goal of improving their ability to apply quantitative reasoning principles and concepts learned in one course to problems they encountered in the next course.

Recommendations for Other Institutions

As demonstrated by the research, math anxiety is mitigated through several recommended measures: (1) teaching students the application of mathematics and quantitative reasoning in their profession, (2) scaffolding mathematics throughout the curriculum rather than teaching it in one or two discrete courses, (3) evaluating student math anxiety at the beginning of the course, and (4) evaluating math skills at the beginning of the semester. Instructors should re-familiarize themselves with their own mathematics and quantitative reasoning skills, and be able to teach these skills to students in their respective disciplines. If faculty find that they are lacking in these skills, an FLC is recommended to focus on enhancing these skills for faculty in non-mathematics disciplines, and in our own experience, hindsight suggests that it would have been useful to have the mathematics faculty participating in the FLC provide "remedial" mathematics instruction on key concepts to faculty in the partner disciplines. Finally, and perhaps most importantly, it is necessary to get students to buy into the importance and application of mathematics and quantitative reasoning in their professional fields. By exploring math anxiety without judgement early in the course, students feel more supported in their attempts to learn the concepts and skills necessary to be successful in their mathematics courses. Using an interdisciplinary course that incorporates these concepts into their major field helps students see the value of mathematics and quantitative reasoning in their professions. When this happens, they are more likely to engage with the material because it is more meaningful to them.

Through our work with the FLC and our conversations between colleagues in social work, nursing, and mathematics disciplines, the case study scenario that emerged from the FLC collaboration served to bridge the application of mathematics and quantitative reasoning to real-world scenarios in social work and nursing. The hope is that this approach has lessened math anxiety, improved student understanding of mathematical and quantitative reasoning concepts, and reduced D, F, and W rates. Data is still being collected to determine if this result has been achieved. It is also hoped that these outcomes have enhanced the student goals of graduating and becoming successful in their profession of choice, which again, requires collecting data over the course of several years as students progress academically through their respective fields. Measuring the effectiveness of FLCs on student success is imperative to the sustainability of this pedagogical model for decreasing D, F, and W rates in mathematics courses. Further, the institutional changes need to take place that are necessary to overcome the discipline "silos" so prevalent on college campuses and to transform our views on the value of changing curricula to improve student learning.

Acknowledgement

This paper was developed in part through the project Collaborative Research: A National Consortium for Synergistic Undergraduate Mathematics via Multi-institutional Interdisciplinary Teaching Partnerships (SUMMIT-P, www.summit-p.com) with support from the National

Science Foundation, EHR/IUSE Lead Awards 1625771 and 1822451. The opinions expressed here are those solely of the authors and do not reflect the opinions of the funding agency.

Author Note

Correspondence regarding this article should be addressed to Elizabeth Post, Department of Social Work, Ferris State University, 820 S. Campus Drive, Big Rapids, MI 49735
ElizabethPost@ferris.edu

References

Bishop, R., Piercey, V. & Stone, M. (2020). Using a faculty learning community to promote interdisciplinary course reform. *Journal of Mathematics and Science: Collaborative Explorations, 16*, 69 – 83. https://doi.org/10.25891/c0m8-6v73

Condron, D. J., Becker, J. H., & Bzhetaj, L. (2018). Sources of students' anxiety in a multidisciplinary social statistics course. *Teaching Sociology, 46*(4), 346 – 355.

Davis, R., & Mirick, A. (2015). MSW students' perceptions of relevance and application of statistics: Implications for field education. Journal of Teaching in Social Work, 35(3), 317 – 336. https://doi.org/10.1080/08841233.2015.1040531

Decesare, M. (2007). Statistics anxiety among sociology majors: A first diagnosis and some treatment options. *Teaching Sociology*, *35*(4), 360 – 367.

Ganter, S., & Barker, W. (Eds.). (2004). *The curriculum foundations project: Voices of the partner disciplines.* Washington, DC: Mathematical Association of America. https://www.maa.org/sites/default/files/pdf/CUPM/crafty/curriculum-foundations.pdf

Geist, E. (2010). The anti-anxiety curriculum: Combating math anxiety in the classroom. *Journal of Instructional Psychology*, *37*(1), 24 – 31.

Hart, S. A., & Ganley, C. M. (2019). The nature of math anxiety in adults: Prevalence and correlates. *Journal of Numerical Cognition*, *5*(2), 122 – 139. https://doi.org/10.5964/jnc.v5i2.195

Hekimoglu, S., & Kittrell, E. (2010). Challenging students' beliefs about mathematics: The use of documentary to alter perceptions of efficacy. *Primus*, *20*(4), 299 – 331.

Henrich, A., & Lee, K. (2011). Reducing math anxiety: Findings from incorporating service learning into a quantitative reasoning course at Seattle University. *Numeracy*, *4*(2), 9.

Hopkins, J. (2019, May 6). Strategies to decrease student anxiety and improve patient safety in critical care settings. *Quality and Safety Education for Nurses.* https://qsen.org/strategies-to-decrease-student-anxiety-and-improve-patient-safety-in-a-critical-care-clinical-setting/

Maloney, E. A., Ramirez, G., Gunderson, E. A., Levine, S. C., & Beilock, S. L. (2015). Intergenerational effects of parents' math anxiety on children's math achievement and anxiety. *Psychological Science*, *26*(9), 1480 – 1488.

Núñez-Peña, M. I., Suárez-Pellicioni, M., & Bono, R. (2013). Effects of math anxiety on student success in higher education. *International Journal of Educational Research*, *58*, 36 – 43.

Thiel, T., Peterman, S., & Brown, M. (2008). Addressing the crisis in college mathematics: Designing courses for student success. *Change: The Magazine of Higher Learning*, *40*(4), 44 – 49.

Appendix A

Math and the Partner Discipline Lesson Plan

SCWK 110 Introduction to Social Work

Social Work Values, Ethics and Levels of Practice Assignment

Learning objectives:

1. Demonstrate understanding and application of the social work values and ethical standards
2. Demonstrate understanding and application of the three tiers of social work practice
3. Demonstrate ability to read and understand a graph

New Orleans, LA, was devastated by Hurricane Katrina in 2005 and has not yet fully recovered. There are significant social justice issues here as the areas initially affected were primarily in poor Black communities and have since taken a great deal of time to recover. The more affluent primarily white communities were less affected because they had the proper infrastructure and recovered faster because they had access to more resources. This city remains in the hurricane path and is one area of the country that is most affected by hurricanes annually.

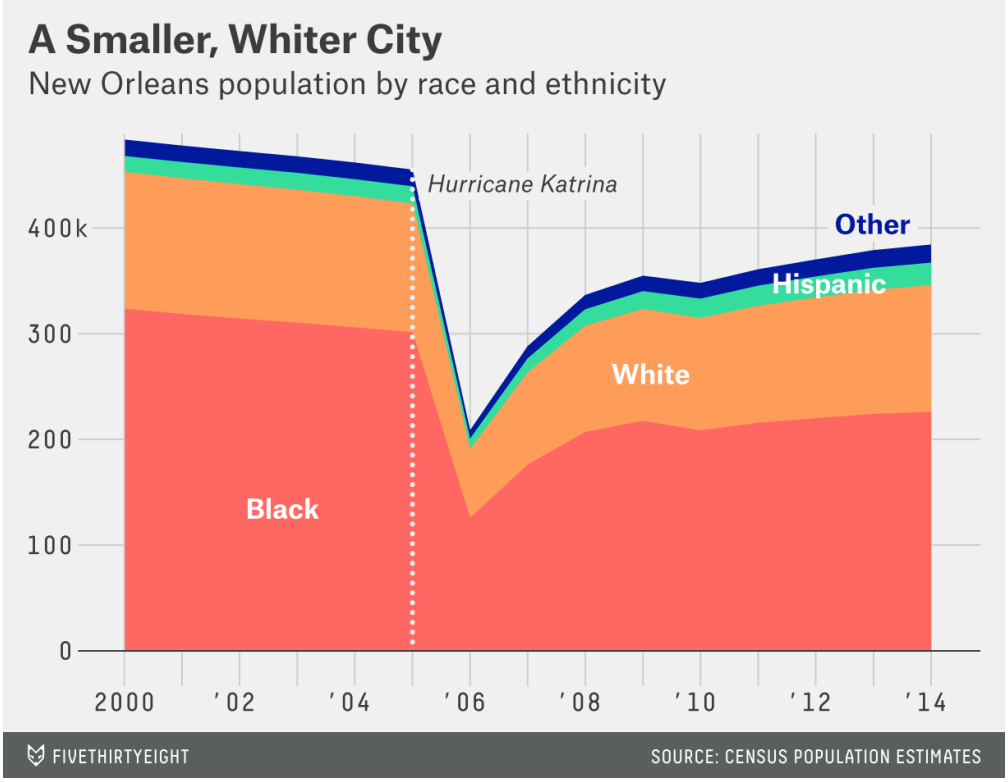
After watching *Trouble the Water* (2008), work in a small group to answer the following questions.

1. Identify and discuss what you observed in the film that relates to each of the six **values** of social work. Were these values upheld by those in power? Why or why not? Give concrete examples.
    a. Service
    b. Social justice
    c. Dignity and worth of the person
    d. Integrity
    e. Competence
    f. Importance of human relationships

2. If you were a social worker, tasked with helping the community recover, what ethical **standards** would you apply? Be specific here, including the specific ethical standard (i.e. Ethical responsibility to the client: 1.02 self-determination; 1.04 competence). Include as many as possible.

3. How were the different systems affected by the hurricane?
    a. Micro
    b. Mezzo
    c. Macro

4. Looking at the graph what do you notice about the population by race before and after the storm? What ethical standards would apply here? If you were to intervene, what tier of social work practice would you use?



5. Take some time to look at the racial **demographics** of New Orleans, LA in 2005. Now, compare these to 2017. Using the website: https://www.policymap.com/maps?i=9942151&nb=2&cb=12475&btd=18&period=2015&cx=-86.02858637207416&cy=39.76732647606186&cz=7

   What do you notice in general?

   What ethical issues do you notice if any?

6. Using the same website as listed in question 5, click on **Incomes and Spending**.

   What do you notice about the difference in incomes by race in 2005 as compared to 2017?

   What do you notice about the people in **poverty**?

   How is this different based on race?

   Websites: https://fivethirtyeight.com/features/katrina-washed-away-new-orleanss-black-middle-class/