# Type 2 Calamity

New Mexico Supercomputing Challenge

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Team #: 061

Shiprock High School


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1. Mrs. Noble
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**Mentors:**

1. Carol Percy

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# Executive Summary

We chose the topic Type 2 Diabetes because the majority of Navajo people are diagnosed with this disease. Our main goal is to inform others and help those individuals gain a better understanding of this disease through our research. Our project, *Weighting for Prom*, was a duplicate of a local project administered at the Northern Navajo Medical Center, the Diabetes Prevention Program (DPP). We hope to help the students of Shiprock High School (SHS) in maintaining a stable weight, watching their food intake, and exercising on a regular basis to decrease their risk of developing Type 2 diabetes.

Meeting every Wednesday, we would first record their weights, look over our "Keeping Track" book(a pamphlet keeping track of our food intake along with the calories and fat count for that source of food), and teach a lesson, usually concerning the consumption of healthy foods.

We made sure to keep calculations of their height and weight before we began the program, and we will compare the information with our results after eight weeks keeping in mind that all our students aged within the range of 16-18 years. At the beginning of each session, we record their weights so that we can be safe that none of our members end up below their minimum weight.

# Introduction

## Background Information

Diabetes is defined as a disease that impairs the body's ability to use food. Hormone insulin, made in the pancreas, helps the body change food into energy. For people with diabetes, either their pancreas does not make insulin or the body does not use insulin properly. Without insulin, sugar builds up in the blood. There are two types of diabetes: Type 1 diabetes and Type 2 diabetes. Type 1 diabetes is when the body does not make insulin but instead needs insulin provided by a doctor. Type 2 diabetes is called noninsulin-dependent diabetes mellitus because is does not need insulin.

Our project, Type 2 Calamity, helps us better understand about a disease in which most people have no idea. We have hopes of informing others of the causes and affects, overall relieving Shiprock High School students of the chances of being diagnosed with Type 2 Diabetes, the seventh leading cause of death in America. It is a major problem on the Navajo Reservation increasing the chances of Native Americans because they are five times more likely to contract the disease then any other race. Communities, due to poor water quality, have no other choice but to turn to soft drinks and fast-food outlets found all around the reservation.

In our project we came up with a plan that would help the students of Shiprock High School from being diagnosed with the disease. Because people over their original weight may be at risk for diabetes, we based our project on helping the members of the program lose seven percent of their body weight by the end of the eight-weeks. We began a class that would teach the basic functions of reducing the risk of developing diabetes; members, based on a project by the Northern Navajo Medical Center called

DPP (Diabetes Prevention Program), were encouraged to eat and exercise correctly so that they would be able to maintain their goal of losing weight, reducing their risk of developing this disease.

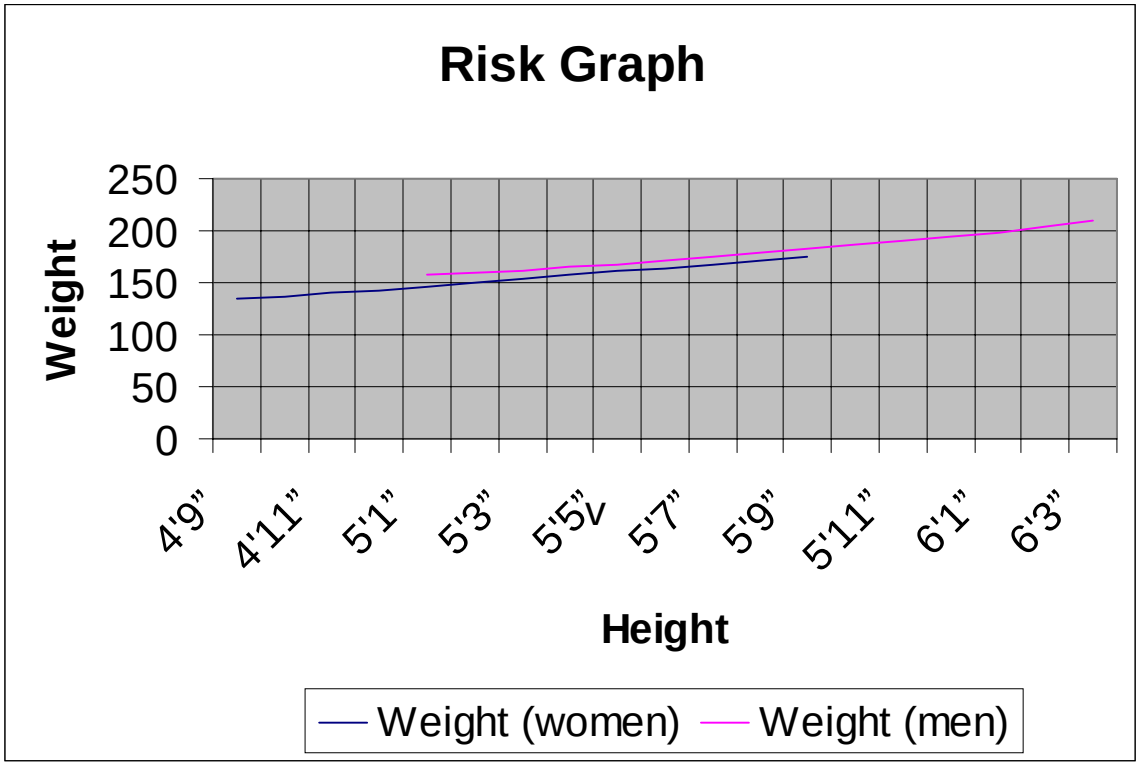
Complications that may result over time due to diabetes include blindness, heart disease, kidney disease, nerve damage, gum disease, and foot disease.

## Hypothesis

To inform students of Shiprock High School (SHS) that exercising daily, watching their food intake, and maintaining an ideal weight will decrease their risk of developing type 2 diabetes.

**Model**

**Mathematical model**




***Data***

| Height Women | Weight |
|---|---|
| 4'9” | 134 |
| 4'10” | 137 |
| 4'11” | 140 |
| 5'0” | 143 |
| 5'1” | 146 |
| 5'2” | 150 |
| 5'3” | 154 |
| 5'4” | 157 |
| 5'5” | 161 |
| 5'6” | 164 |
| 5'7” | 168 |
| 5'8” | 172 |
| 5'9” | 175 |

| Height Men | Weight |
|---|---|
| 5'1” | 157 |
| 5'2” | 160 |
| 5'3” | 162 |
| 5'4” | 165 |
| 5'5” | 168 |
| 5'6” | 172 |
| 5'7” | 175 |
| 5'8” | 179 |
| 5'9” | 182 |
| 5'10” | 186 |
| 5'11” | 190 |
| 6'0” | 194 |
| 6'1” | 199 |
| 6'2” | 203 |
| 6'3” | 209 |

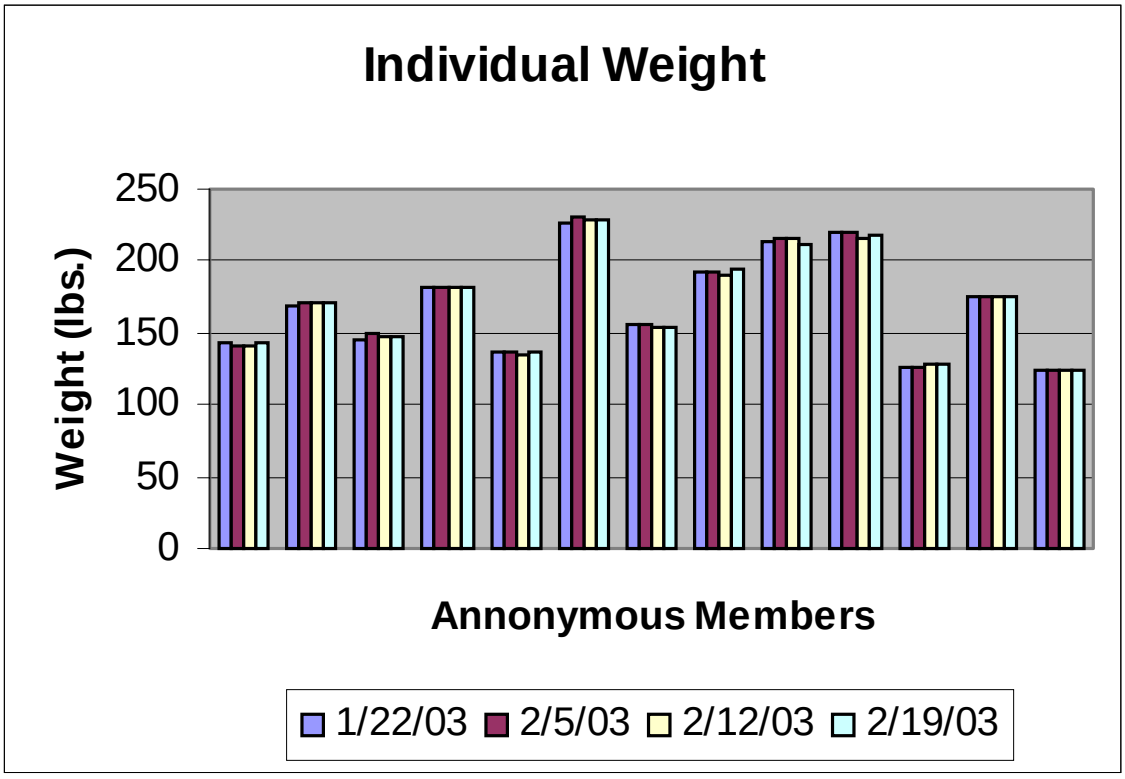
The graph, based on information from the Diabetes Prevention Program (DPP) resource chart, shows an anticipated weight for a given height creating the best fit line indicating that those individuals, exceeding over this line, are at risk of developing Type 2 diabetes. For example an individual weighing 143 pounds who is 4’9” in height may be at risk of developing diabetes. Keep in mind that the chart is based on the risk of developing diabetes and not meaning to tell someone that they are overweight.

# Project Description

Earlier in the year we were greeted by an eager mentor, Carol Percy, who had in mind only to help us with our project. She visited us one day, introducing us to her own program, the Diabetes Prevention Program (DPP), which she had implemented among the public at the Shiprock Northern Navajo Medical Center. My group and I attended a few meetings and decided that we would like to acknowledge our own program rather than go by their research so that we would get some training on working with others.

We began with eleven members, all seniors at SHS, counting as fifteen, with our team members involved, altogether. We recorded their weight and height at the beginning of the program, hoping to compare the information with our results after eight-weeks, finding those who have succeeded. Unfortunately, we were unable to keep our program working well after five-weeks with one of our sessions taking two-weeks resulting with only four sessions of data.

We then began to make graphs, turning out to be very unstable, as a group and individually for their own reference so that they would be able to see how they were doing.



## Method

With the help of the information gained from our project, we were able to begin creating our code. Using a questionnaire found on the internet, a pamphlet we retrieved from the local hospital, and the information we knew about diabetes, we have created questions that will help us to determine the risk of the public for developing diabetes.

We have used the Java program to work out our code so that we can ask the public questions about their history, lifestyle, family background, and any variable that may impact their risk. With these questions, we hope to attain information that will help us to calculate their risk by creating a scale in which the program would be able to add and subtract any number, depending upon the impact the question has on the person's chances, in which the risk is able to work flexibly, increasing with the public's risk.

If each question's answer turns out to be a "yes", then a number depending on the impact made on the person would be calculated as that individual's risk. If the answer turns out to be a "no", then the calculations would just continue on to the next question. In the end after calculating the answers we would be able to determine the risk of that person intended for developing diabetes.

QUESTIONS we asked for our code:

1) Do your parents have diabetes?

2) Do you do less then 2 hours of exercise per week?

3) Do either of your maternal and paternal grandparents have Diabetes?

4) Have you been told by a doctor that you are overweight?

5) Are you eating healthy?

6) Do you continue to eat unhealthy foods?

7) Do you eat unhealthy foods more then three times a day?

8) Do you think you are at risk of being diagnosed with diabetes?

9) Are you Native American(if so, press 5), Hispanic

American(1), African American(1) or Pacific Islander(1)?

//Being Native American puts you at a risk 5 times more likely than any other race.

10) Have you recently given birth to a baby who weighed more then 9 pounds?

11) Are you older then 45 years of age?

12)Do you have a sister of brother with diabetes?

14)Have you recently been told by a doctor that you have high blood pressure?

15)Have you recently been told by a doctor that you have a high sugar level?

16)Do you smoke?

## Implementation

Acknowledging all the resources it took for us to complete this project:

Microsoft Word-Writing our final report.

Java-the program used to create a code.

Microsoft Excel-to alter our data into graphs.

MS DOS-to implement our code so that it would work.

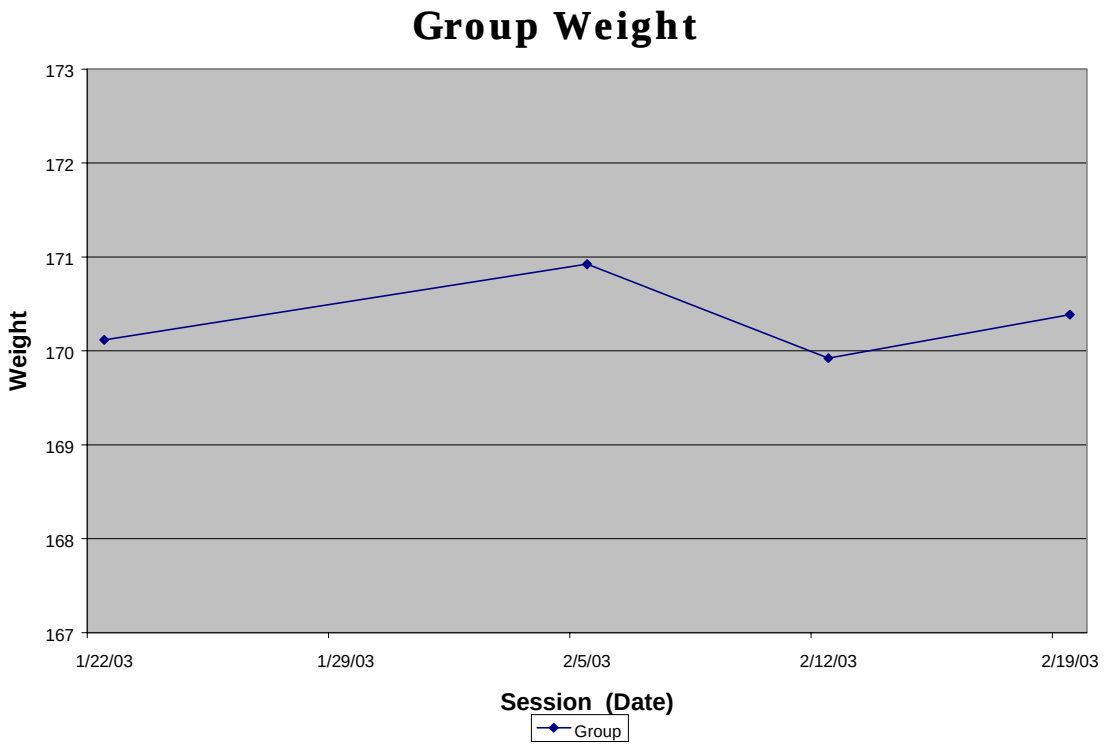
Internet Explorer-Helping us define Diabetes.

Telnet-Keeping in contact with our mentors.

Power Point-allowing us present in fashion.

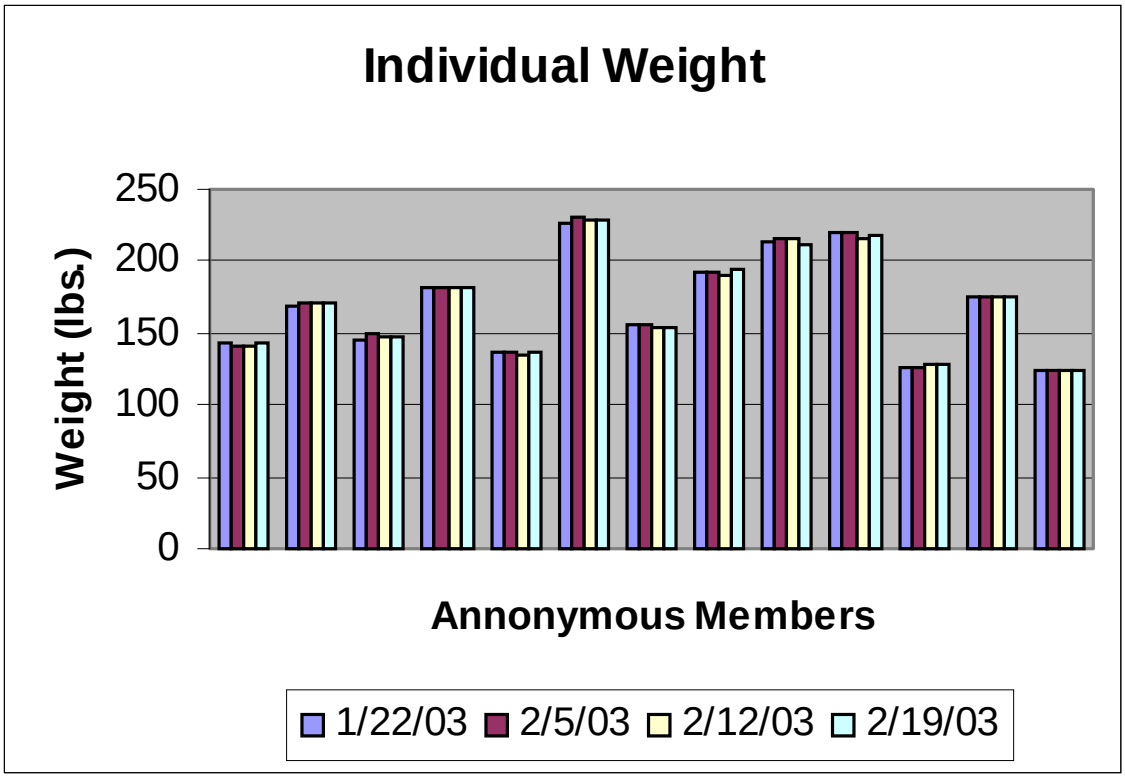
# Results

As a result we have found that maintaining a stable weight ,watching our food intake, and exercising on a regular basis has reduced our risk of getting diabetes. Weighing ourselves at each of our sessions, we can now conclude with a group graph, showing  increases and decreases from our sessions.




As a group overall, we were very unstable after meeting for our first four sessions. Our group tried their best and that was all we really asked of them. We were glad that although we were unstable as a group, individually we could see which students were being fair to themselves by sticking to our group goals of exercising on a regular basis and eating the right amount of healthy foods. The individual graph shows how each student has done.

Most of our students were able to maintain a stable weight throughout our course but like we expected, most individual weights show to have been unstable.



# Conclusion

We believe that we have helped our fellow students to reduce their risk of being diagnosed with diabetes. Our group now has better information about diabetes that we will continue to implement whether we'd like to or not. It's just the fact that we will not be able to forget the information we have learned through the challenge. I can ensure that as a group we will use what we have learned to help others whether it is people at risk of diabetes or people in need of information about our project.

# Recommendations

Once we met a representative of the website www.tribehealth.org, Molly McGetrick-Health Information Trainer. She informed us that if we could make our code work efficiently to everyone's benefit then we could implement it onto her website for the use of the public. We hope to be given the opportunity to be able to implement our code for the benefit of everyone and what better place then on the internet where everyone will get the chance to enforce our code.

# Acknowledgements

We would like to take this opportunity to thank the people who had taken the time to help with the project without their help we would not be able to proceed in our project. We would like to thank our sponsors Mrs. Hines and Mrs. Noble for their support and acknowledgement in pursing the project without them introducing the program we would not been able to understand the importance of science and computers. Mrs. Johnson, thank you for giving us the idea of diabetes and information on the topic. Thank you Eric Ovaska for helping with the Java Programming without your help our program wouldn't be as it is now. James Taylor, thank you for introducing the computer programming Star Logo. Levi Valdez, thank you for taking the time to help us finish up our code, we'd be lost without you. Molly McGetrick, thank you for giving us the chance to implement what we have learned on your website. We would also like to thank our mentor Carol Percy without you we would not be able to make our project. Thank you for guidance, interest, and taking the time to see us each week and teaching us the importance of preventing diabetes. To our parents thank you for your support and coming every week, staying extra hours.

# References


- Molly McGetrick. “Diabetes among Native Americans.” March 20, 2003.<www.tribehealth.org>

- Internet
  “Diabetes.” February 12, 2003<http://www.diabetes.org>
  <http://ndep.gov/>
  <http://www.state.il.us/agency/dhs/diabetes/Test.htm>

- Percy, Carol. “The Original DPP” February 24, 2003.
  <http://biostat.bsc.gwu.edu/dpp/manuals.htmlvdoc>
  <http://www.diabetesandhealth.com/public/contenu/pages/health_center/are_you.htm>

# Appendix A – Code

```
import javax.swing.JOptionPane;

public class team061
{
        public static void main (String args [])
        {
            double sum;
            int num;

            String question1;
            String question3;
            String question5;
            String question7;
            String question9;
            String question11;
            String question13;
            String question15;
            String question17;
            String question19;
            String question21;
            String question23;
            String question25;
            String question27;
            String question29;

            int question2;
            int question4;
            int question6;
            int question8;
            int question10;
            int question12;
            int question14;
            int question16;
            int question18;
            int question20;
            int question22;
            int question24;
            int question26;
            int question28;
            int question30;

        JOptionPane.showMessageDialog(null, "Please press 1 for Yes, 0 for
        No.");
            question1 = JOptionPane.showInputDialog("Do your parents have
```

```
diabetes?");
question2 = Integer.parseInt(question1);
question3 = JOptionPane.showInputDialog("Do you do less then 2
hours of exercise per week?");
question4 = Integer.parseInt(question3);
question5 = JOptionPane.showInputDialog("Do your maternal and
paternal grandparents have diabetes?");
question6 = Integer.parseInt(question5);
question7 = JOptionPane.showInputDialog("Have you been told
by a doctor that your overweight?");
question8 = Integer.parseInt(question7);
question9 = JOptionPane.showInputDialog("Are you eating
healthy?");
question10 = Integer.parseInt(question9);
question11 = JOptionPane.showInputDialog("Do you continue to
eat unhealthy foods?");
question12 = Integer.parseInt(question11);
question13 = JOptionPane.showInputDialog("Do you eat
unhealthy foods more then twice a day?");
question14 = Integer.parseInt(question13);
question15 = JOptionPane.showInputDialog("Do you think you are
at risk of being diagnosed with diabetes?");
question16 = Integer.parseInt(question15);
question17 = JOptionPane.showInputDialog("Are you Native
American(if yes, press 5), Hispanic American, African American
or Pacific Islander?"); //Being Native American puts you at a risk 5
times more likely than any other race.
question18 = Integer.parseInt(question17);
question19 = JOptionPane.showInputDialog("Have you given birth
to a baby who weighed more then 9 pounds?");
question20 = Integer.parseInt(question19);
question21 = JOptionPane.showInputDialog("Are you older then
 45 years?");
question22 = Integer.parseInt(question21);
question23 = JOptionPane.showInputDialog("Do you have a sister
 or brother with diabetes?");
question24 = Integer.parseInt(question23);
question25 = JOptionPane.showInputDialog("Have you recently
been told by a doctor that you have high blood pressure?");
question26 = Integer.parseInt(question25);
question27 = JOptionPane.showInputDialog("Have you recently
been told by a doctor that you have a high sugar level?");
question28 = Integer.parseInt(question27);
question29 = JOptionPane.showInputDialog("Do you smoke?");
question30 = Integer.parseInt(question29);
```

```
                sum = ( question2 + question4 + question6 + question8 +
                question10 + question12 + question14 + question16 + question18
                + question20 + question22 + question24 + question26 +
                question28 + question30);

                JOptionPane.showMessageDialog(null, "You have a diabetes risk
                 factor of:" + sum);
                JOptionPane.showMessageDialog(null, "Your at risk of getting
                diabetes if your risk factor is above 8!");
                JOptionPane.showMessageDialog(null, "If you are at risk of
                 getting diabetes then we strongly suggest you eat right and
                exercise more frequently.");

                System.exit(0);
            }
}
```