

The Bullying Effect

New Mexico
Supercomputing Challenge
Final Report
April 4, 2012

Team #101
Piñon Elementary School

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Table of Contents

Executive Summary.....	3
Our Team	3
1 Introduction	4
1.1 Previous Work.....	4
1.2 The Project.....	5
1.2.1 Model 1 – Bystander	6
1.2.2 Model 2 – Frally.....	8
1.2.3 Model 3 – Force Field Model	11
2 Computational Model.....	12
2.1 Spaceland.....	12
2.2 Agents	13
2.3 Programming	13
2.4 Data Monitoring.....	14
2.5 The Interface.....	16
3 Results.....	17
4 Conclusions	18
5 Most Significant Achievement	18
6 Future Work	19
Glossary.....	20
Acknowledgements.....	21
Bibliography	22
Appendix A – Interviews	24
Appendix B – Presentations.....	27
Appendix C – Game Results	28
Appendix D – Sample Raw Data.....	29
Appendix E – Related Statistics.....	31

Executive Summary

The purpose of the project is to show the effects of bullying on people and to lower the number of bullying situations. By educating people on the effects of bullying, they can see how harmful it is. StarLogo TNG was used to model the effects of bullying on a playground. This project was designed to understand the impact a bully can have in a school environment. Three models were created and compared and support the importance of positive students in a school environment. Based on the current project, the awareness and importance of getting bystanders involved has already increased. These models show how bullies need to be taken seriously and will help teachers understand how important it is to stop bullies.

Our Team

Ruby and Jordan, life-long friends, had heard about the Supercomputing Challenge and formed a team to work on the problem of bullying.

Initially, we worked on the model together, but then decided it would be easier if one person worked on the model, while the other worked on other elements of the project. However, in the final stages, we worked on all elements of the challenge together. We both worked on the proposal, the interim report, interviews with specialists, the model, the presentations, and the final report. Each of us proofread the other's work. Jordan and Ruby shared and exchanged information about details of the model and projected outcomes. Appendix B shows 2 photos from 2 presentations we have already given on the Bullying Effect.

1 Introduction

The reason we picked the topic bullying is because we know how big of a problem bullying is in schools across the country. One in 10 students drops out or changes schools due to repeated bullying. We also wanted to do a unique project that not many people have done before. We picked our topic by brainstorming possible ideas, and choosing the best ones off of that list, and which ones we liked best, which ended up being this bullying project. We created a model based on self-esteem. In this model, when the bully attacks a student, the student's self-esteem goes down. Then, we realized that we wanted to add a positive agent to our model for comparison. A word had to be created for the opposite of a bully. This word also needed to include someone who goes around and spreads positive behavior, making the students' self-esteem go up. So, that is why we made up the word frally by combining the words friend and ally. Then, finally, we could get on to programming - the most exciting part! Once we finished the Frally Model, we thought that maybe there should be a safe area where the students can be protected from the bully. So, that is where we came up with the force field. We created the force field and thought that it would be a good idea to compare the Force Field Model to the one without a force field, as well as the Bystander Model.

The project showed us how much bullying goes on and how important the topic really is. There is such a growing awareness of bullying and its harmful effects. First, our priest, Father Kelly, was doing a series of sermons on bullying so we created and presented a movie for a service. This movie has some religious content in it. A picture from the presentation can be found in Appendix B.

<http://youtu.be/JNOUCFN53wU> youtube: What if...

A few months into the project, a Memorial House Bill passed in New Mexico. Every public school in the state has to have an anti-bullying program in place by August 2012. Since January, our school has been highlighting the anti-bullying program at our school, which is called Positive Behavior Supports (PBS). When our school district heard that our supercomputing project was on bullying, they asked us to present our project to the Los Alamos School Board. A picture from the presentation can be found in Appendix B. We created another movie with statistics on bullying for that presentation.

<http://youtu.be/TaR-VvRv7aM> youtube: Make a Difference...Be a Frally

1.1 Previous Work

We researched models which simulated bullying but, no known models could be found. At first, we thought that our model would be an infection model, but as it progressed we realized that bullying does not really work that way. The original infection model was with two agents. The bully agent was a red dot, and the green dots were supposed to be the students. When you ran this model, the red dot collided with a green dot, the red dot turned the green dot into a red dot. When the model ran long enough, all of the green dots would turn to red. However, in reality when a bully attacks a student, the student does not turn into a bully. Therefore, we changed our approach to the problem. We also created a game to help us understand how the model might work. This game can be found in Appendix C.

1.2 The Project

Three main models were created and compared. The first model was the Bystander Model, the second was the Frally Model, and the third was the Force Field Model.

Variables

The variables are the students, bully, frally, bystander, self-esteem, environment, and force field.

Our independent variables are the frally and the force field.

Our dependent variable is the self-esteem of the students and the bullies.

Our controlled variables are the bullies and the environment.

Assumptions

The starting population for each model was 36 students with low self-esteem of 40, 122 students with high self-esteem of 60, and 5 bullies with self-esteem of 35. The Bystander Model had 1 bystander and the Frally and Force Field Models started with 1 frally having self-esteem of 65. The bullies and frallies both seek out students with low self-esteem.

Students will drop out of the simulation when their self-esteem is less than or equal to 30. A student turns into a frally when its self-esteem is greater than or equal to 65. A bully will turn into a student when its self-esteem is greater than or equal to 40. Students will group together based on their common self-esteem.

Model Based on Piñon Elementary

This model was based on numbers from Piñon Elementary School. Mrs. Cort, the school counselor, works at Piñon Elementary and provided the data. We interviewed her to see how many students there are in the 4th-6th grades and how many bullies there are. We also asked Mrs. Cort for estimates of how many students she thought had high self-esteem (75%) and how many had lower self-esteem (25%). She also thought that a bully would have fairly low self-esteem. Mrs. Cort's interview questions can be found in Appendix A. Therefore, we set up our model to have 164 students, 5 which are bullies and one bystander. The bully's self-esteem started at 35, and the frally's self-esteem started at 65. Seventy-five percent of the students start at self-esteem of 60 and twenty-five percent at self-esteem of 40.

We also interviewed Dr. Tom Csanadi, to see how much bullies can affect students, and to learn his point of view of bullying from a health perspective. He mentioned an incident about these boys who were bullying. There were bystanders, who did nothing but stand there, some even thought it was funny! He mentioned that the bystander plays an important part. Before this interview, we were not really thinking about the significant role of the bystander, but once he brought it up, it really changed our thinking, so we decided to add the bystander to our model. Dr. Csanadi's interview questions can be found in Appendix A.

1.2.1 Model 1 - Bystander

Student Interaction

The students group together based on their self-esteem and separate if one of the student's self-esteem changes from a collision with a bully as seen in Figure 1.

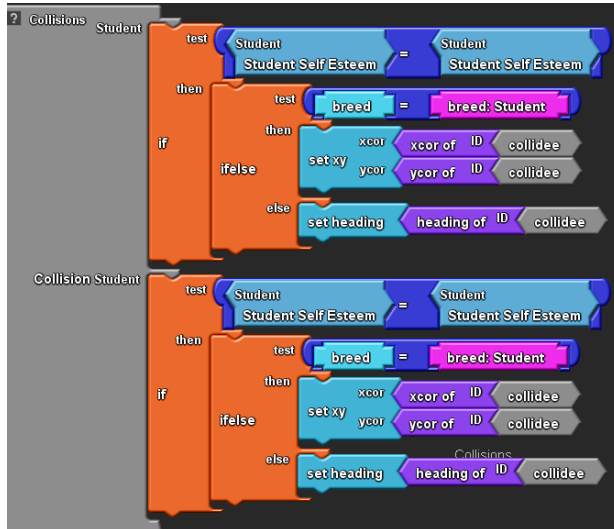


Figure 1 Student Grouping Block

Bully Interaction

When a bully collides with a student, that student's self-esteem goes down by one. The bully can lower the students' self-esteem to the point where the student drops out of school. The bully was also programmed "to smell" (in StarLogo Talk) out the students with low self-esteem, which in the model is students with a self-esteem between 30 to 40. Figure 2 shows the smell block from StarLogo.



Figure 2 Smell Block

The bully on its way to smelling students with low self-esteem could collide with a student with a higher self-esteem, and that student's self-esteem would go down by .75 as seen in Figure 3.



Figure 3 Collision Block

When a bully collides into a student, the student's self-esteem goes down and the bully says "hit". Figure 4 shows the bully saying "hit".

Bystander Interaction

The bystander model shows how the bystander walks around the playground not interacting while the bully goes around lowering the student's self-esteem.



Figure 4 StarLogo Spaceland

Self-esteem

The model starts with 36 students with a low self-esteem of 40, 122 students with a high self-esteem of 60 and 5 bullies with self-esteem of 35. The bystander does not have a self-esteem value.

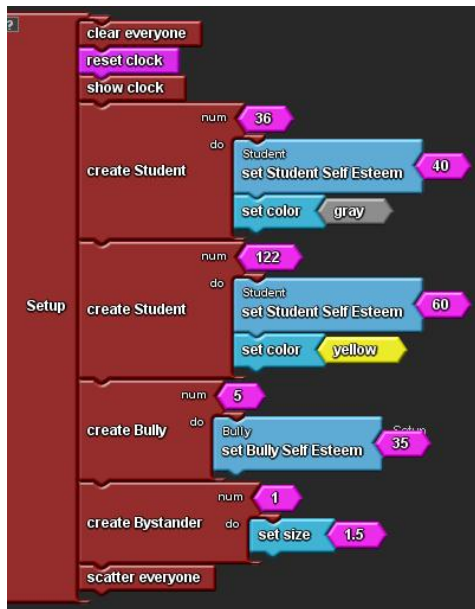


Figure 5 Setup Blocks

1.2.2 Model 2 – Frally

We had an original model that we thought was finished, but when we ran the model, the students were dropping out faster than they were in the bystander model, so we had to rebuild the model from scratch.

Student Interaction

When students collide, the program will see if they have the same self-esteem, and if they do, they group together, but not all students group together. They split apart when one of the student’s self-esteem changes from a collision with a bully or frally. It was programmed this way to be more realistic. Most students on a playground normally hang out with their friends. There are also a few students that walk around by themselves. Also, in this model, if the frally collides with a student and its self-esteem goes up to 65, then that student turns into a frally.



Figure 6 New Frally Procedure

If the bully collides with a student and causes the students’ self-esteem to go down to 30, then that student drops out of school as seen in Figure 7.

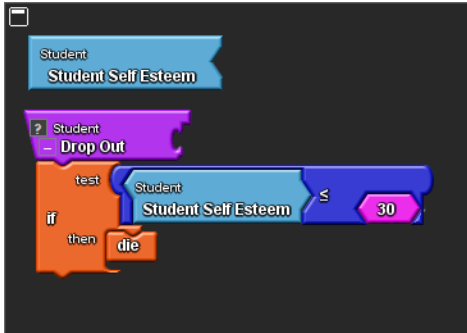


Figure 7 Drop Out Procedure

Bully Interaction

The way bullies interact in this model is the same way they do in the bystander model. When a bully collides with a student, that student's self-esteem goes down by one. We also programmed the bully to smell out the students with low self-esteem, which in the model is a student with self-esteem between 30 to 40.



Figure 8 Bully Smell Procedure

The bully on its way to smelling students with low self-esteem could collide a student with higher self-esteem, and that student's self-esteem would go down by .75. If a frally collides with a bully, then the bully's self-esteem would go up by .125, and if the frally gets the bully's self-esteem to go up to 40, then the bully turns into a student.

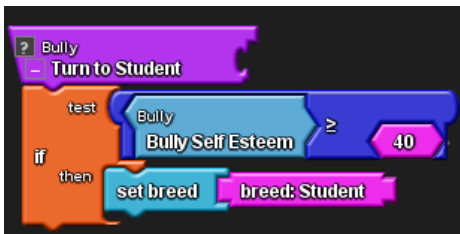


Figure 9 New Student Procedure

Frally Interaction

Frallies seek out students with lower self-esteem as seen in Figure 10 below. When a bully collides with a student with high self-esteem, then that student's self-esteem goes down by .75. When a bully collides with a student with low self-esteem, then that student's self-esteem goes down by 1. When a frally collides with a student with high self-esteem, then that student's self-esteem goes up by .125. If a frally collides with a student with low self-esteem, then that student's self-esteem goes up by .25.

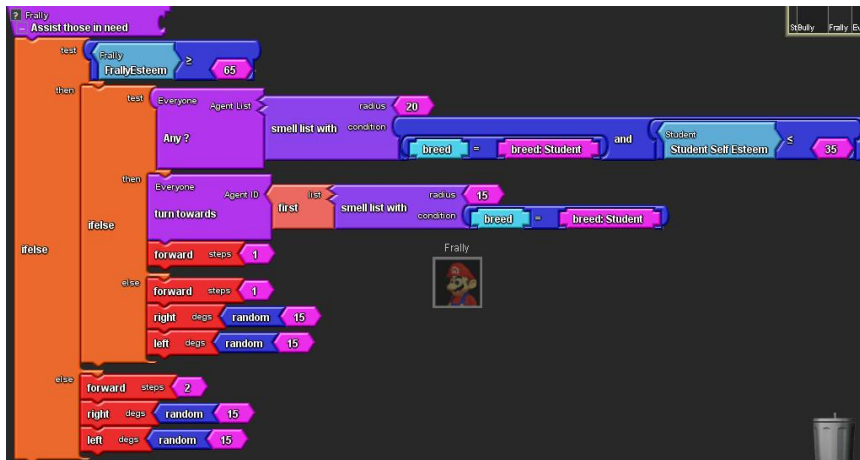


Figure 10 Frally Smell Block



Figure 11 Frally Collision Block

Self-Esteem

This model starts with 36 students with a low self-esteem of 40, 122 students with a high self-esteem of 60 and 5 bullies with self-esteem of 35. The self-esteem of these agents will go up and down based on the agents that collide with them. The frally has a fixed self-esteem of 65.

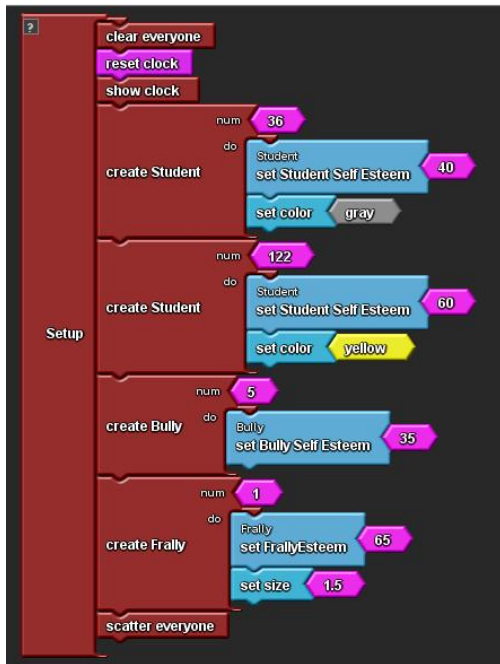


Figure 12 Setup Self Esteem Block

1.2.3 Model 3 – Force Field Model

Model 3 is the same as Model 2 with the exception of adding the force field.

The Force Field

A separate model was created with a force field that attached to the frally so that the bully would not be able to collide with the student when the student was inside the frally force field. This force field represents the frally’s ability to provide a safe place for students when they are present. The force field is named the YlluB Effect in the model.



Figure 13 The YlluB Effect Procedure

The bully will say “ok” and back away when the bully collides with the frally force field. In this model it is called the YlluB Effect which represents the positive energy of the frally.

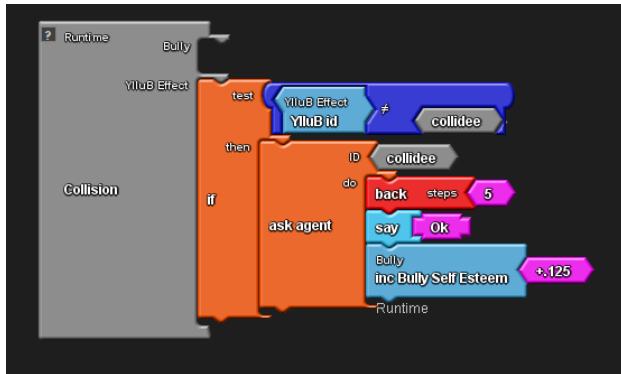


Figure 14 YlluB Collision Block

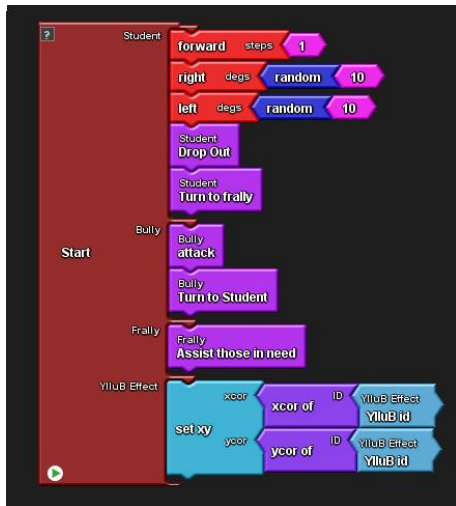


Figure 15 Startup Block

2 Computational Model

2.1 Spaceland

Spaceland is where the model takes place and the students interact. All the data for this model came from Piñon Elementary School. A Google Earth image was used to show Piñon Elementary School’s playground.



Figure 16 Google Earth Image for Spaceland

2.2 Agents

We have three agents per model and four agents all together.

The Bystander Model has the bully, the student, and the bystander agent.

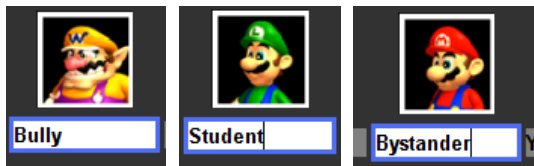


Figure 17 Agents in Bystander Model

The Frally Model has the bully, the student, and the Frally agent.

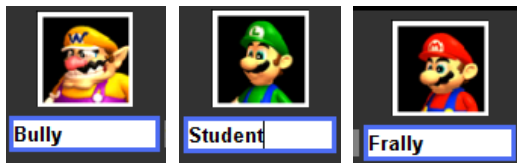


Figure 18 Agents in Frally Model

2.3 Programming

Most of the programming blocks have already been described above. The following procedure is used in all three models. The everyone procedure stores the list of agents and their unique ID to be used while the program is running. This procedure is used during the smell block.



Figure 19 Everyone Block

2.4 Data Monitoring

The data was recorded in StarLogo. A table of data and graph were generated each time the model was run. When the number of dropouts reached 10% of student population or in this model 16 dropouts, the model would be manually stopped. The data was then saved into Excel for compiling and analyzing the results.

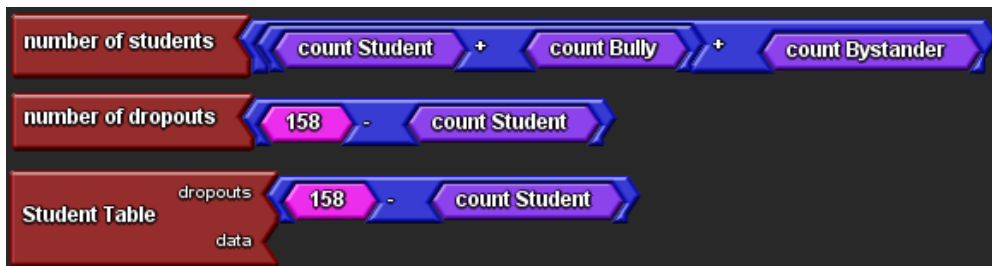


Figure 20 Bystander Data Monitoring Blocks



Figure 21 Frally Data Monitoring Blocks

The following is an example of a StarLogo graph. It records the change in populations for the different agents.



Figure 22 StarLogo Graph

Figure 23 shows the data from StarLogo taken every 2 intervals. Once the number of dropouts reached 16, the user would stop the model and record the data. The data was also saved into Excel for further analysis.

The table displays the student count for Bully, Dropouts, and Frally every 2 seconds from 0.0 to 42.0. The data shows that the number of dropouts increases from 0.0 to 1.0 at 2.0 seconds and remains constant thereafter. The number of bullies remains constant at 5.0, and the number of frally students remains constant at 1.0.

TIME	frally	bully	dropouts
0.0	1.0	5.0	0.0
2.0	1.0	5.0	1.0
4.0	1.0	5.0	1.0
6.0	1.0	5.0	1.0
8.0	1.0	5.0	1.0
10.0	1.0	5.0	1.0
12.0	1.0	5.0	1.0
14.0	1.0	5.0	1.0
16.0	1.0	5.0	1.0
18.0	1.0	5.0	1.0
20.0	1.0	5.0	1.0
22.0	1.0	5.0	1.0
24.0	1.0	5.0	1.0
26.0	1.0	5.0	1.0
28.0	1.0	5.0	1.0
30.0	1.0	5.0	1.0
32.0	1.0	5.0	1.0
34.0	1.0	5.0	1.0
36.0	1.0	5.0	1.0
38.0	1.0	5.0	1.0
40.0	1.0	5.0	1.0
42.0	1.0	5.0	1.0

Figure 23 StarLogo Table

	A	B	C	D	E
1	TIME	frally	bully	dropouts	
2	0		1	5	0
3	2		1	5	0
4	4		1	5	0
5	6		1	5	0
6	8		1	5	0
7	10		1	5	0
8	12		1	5	0
9	14		1	5	0
10	16		1	5	0
11	18		1	5	0
12	20		1	5	0
13	22		1	5	0
14	24		1	5	0
15	26		1	5	0
16	28		1	5	0
17	30		1	5	0
18	32		1	5	0
19	34		1	5	0
20	36		1	5	0
21	38		1	5	1
22	40		1	5	1
23	42		1	5	1
24	44		1	5	1
25	46		1	5	1
26	48		1	5	1
27	50		1	5	1

Figure 24 Excel Table

2.5 The Interface

This program is designed to be very simple for everyone to use. When the user presses setup, the correct number of students, bullies and frallies are ready to roam the playground. When the user presses start, the model starts running, and the agents walk around according to how they are programmed. When a bully collides with a student, then that student's self-esteem goes down. Once a bully collides with a student so many times, and the students' self-esteem goes down to 30, then the student drops out.

When a frally collides with a student, then that students' self-esteem goes up. Once the student's self-esteem reaches 65, then that student becomes a frally too. When a bully collides with a frally or force field, then the bully's self-esteem goes up by .125, and when the bully's self-esteem gets up to 40, then the bully turns into a student.

The user can look at the bottom of the screen to see how many students have dropped out, how many frallies there are, and how many bullies there are.

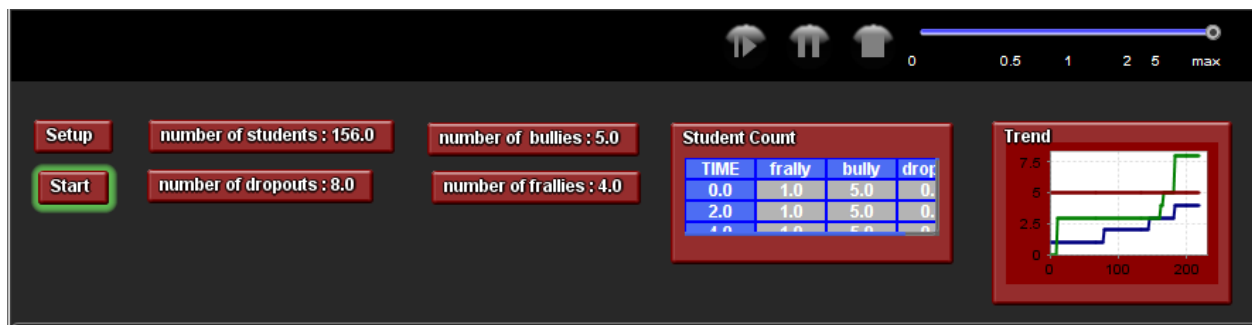


Figure 25 Data Monitoring

The user can also see visually how many students turn into frallies, how many bullies turn into students and how many students drop out because the frallies are red, and the students are green and the bullies are yellow.



Figure 26 A Bully, Frally and Student

3 Results

Bystander			Frally no Force Field					Frally with Force Field				
Trial	Time	Dropouts	Trial	Time	Frally	Bully	Dropouts	Trial	Time	Frally	Bully	Dropouts
1	428	16	1	822	8	5	16	1	476	9	0	10
2	358	16	2	850	9	5	16	2	474	7	0	14
3	434	16	3	668	8	5	16	3	540	7	0	15
4	434	16	4	592	8	5	16	4	716	6	0	11
5	422	16	5	504	4	5	16	5	588	3	4	16
6	448	16	6	616	4	5	16	6	660	4	0	13
7	420	16	7	706	9	5	16	7	390	10	0	6
8	456	16	8	576	4	5	16	8	710	4	3	16
9	442	16	9	746	9	5	16	9	480	10	0	11
10	476	16	10	894	8	5	16	10	470	6	0	8
11	358	16	11	762	10	5	16	11	480	1	5	16
12	442	16	12	576	5	5	16	12	594	8	0	8
13	468	16	13	574	3	5	16	13	628	8	0	10
14	518	16	14	914	15	0	8	14	498	6	0	8
15	436	16	15	736	4	5	16	15	556	3	4	16
16	440	16	16	1166	16	0	2	16	434	11	0	2
17	436	16	17	704	4	5	16	17	592	5	0	4
18	466	16	18	550	2	5	16	18	636	4	3	16
19	436	16	19	1150	13	0	7	19	526	9	0	7
20	360	16	20	624	7	5	16	20	540	5	0	10
Avg.	434	16	Avg.	737	8	4	14	Avg.	549	6	1	11

Table 1 Result from StarLogo

Each model was run 20 times. It took an average time of 434 to have 16 dropouts with no intervention in the bystander model. It took an average time of 737 to have 16 dropouts in the frally model. 75% of the time the force field model prevented the dropouts reaching 10% or 16. The reason to stop at 16 dropouts was because of the national statistic that states “One in 10 students drops out or changes schools due to repeated bullying.” 15% of the time the frally model prevented the dropouts

from reaching 10% or 16. The number of dropouts was compared between the model with the bystander and the model with the frally. The average number of dropouts from the Bystander Model was 16 per run. The average number of dropouts from the Frally Model was 15 per run. Both models were capped at a maximum of 16 dropouts per run. A sample of the raw data can be found in Appendix D.

4 Conclusions

A Student T-Test was performed on the data from the StarLogo programs. The Student T-Test was used to check the statistical significance of the data. This test tells whether the difference between the before and after numbers is genuine or whether this difference could merely have been the result of chance. Overall, a T-Test compares two means and determines within a specified degree of certainty whether the two means really are different, or whether the difference might have occurred by chance. An unpaired two sample, two tailed T-Test was calculated using Microsoft Excel. The probability for the number of dropouts for the bystander versus the frally was 9% which is greater than the 5% value in the region of uncertainty. The data can be stated to be outside of the 95% confidence level of certainty. This means that the data is not statistically significant. The same T-Test was performed on the number of dropouts for the bystander versus the frally with a force field. The probability for this test was 0.0005%, which is less than the 5% value in the region of uncertainty. This means that there is a 99.0005% chance that there is a difference in the number of dropouts between the Bystander Model versus the Frally with a Force Field Model.

What this means is that there is no statistical difference in the number of dropouts in school when there are people present that positively affect the attitude of students (the Frally Model). But when there exists a person that actively interferes and stops bullying, in addition to positively influencing people's attitudes, there is a statistically significant decrease in the number of students that drop out.

What we learned from our model and research is that schools and adults tend to focus too much on the negative. Everybody knows that being a bully is bad, that we should not bully, but we want to focus on the positive and do the opposite by saying, "Be a frally!" If other people are frallies we could not only help the person being bullied but we could also help the bully. We believe that this could make a difference in how many dropouts there are, and our model has shown us that this is true. There would be fewer dropouts if there was at least one frally in every school.

We found that overall, the frally made a huge difference, and the force field helped even more. According to our model, to have a healthy school environment, there has to be between 5 and 8 frallies for the number of students in our model. We also learned that there only needs to be one person to start to make a difference and be a frally because if there is at least one frally it will make other people join in on the kindness.

5 Most Significant Achievement

We came up with the word frally by combining two words, friend and ally. The video that we created for our school board was put on youtube, and it has already reached 200 views! After doing all of this research, we realized how far we can take this and that it does not just have to be a

supercomputing project, we can take this as far as we want! Another huge significant achievement for us is that we can make a difference in the lives of many people. It was also fun to learn how to program our idea in StarLogo.

6 Future Work

We hope to continue to work with the schools to reduce bullying by promoting our frally concept.

We also want to create a slider for our models to allow the user to control how many bullies, students and frallies there are, so you would not have to go back to the program and change the numbers, you could just slide it. This program could be used for any school to see how many frallies it would take in their school to have a healthy school environment.

We are also interested in testing what the different effects it would be if we had the bullies group like the students.

An interactive game might also help people realize how big of a problem bullying is and what it feels like to be a frally.

Glossary

Bully - A person who is habitually cruel or overbearing, especially to smaller or weaker people.

Bullying - The repeated act to physically or mentally intentionally hurt someone.

Bystander - Someone who watches the bullying act but does not do anything, they might even encourage the bullying to keep going.

Controlled Variable - Something that is constant and unchanged in an experiment.

Dependent Variable - A variable that depends on other factors.

Frally - The bystander who chooses to get involved and interferes; the friend, the ally.

Frallies - More than one frally.

Independent Variable - A variable that stands alone and is not changed by the other variables you are trying to measure.

Self-Esteem - Confidence and satisfaction in oneself.

StarLogo - An agent-based simulation language.

YlluB - This is Bully spelled backwards. We chose this to represent the positive effect frallies have on bullies.

Acknowledgements

Aaron Soto – Interim Comments

Derek Selvage and Ryan Swart – StarLogo Help

Diego – Student at NM Tech

Donese Mayfield-Bailey – Editor

Dr. Morrie Pongratz – Local Administrator for Bully Data

Dr. Eugene Schmidt – Los Alamos Schools Superintendent

Dr. Tom Csanadi – Pediatrician

Father Colin Kelly – Rector of Trinity on the Hill Episcopal Church

Isabella Bailey – Moral Support and in videos

Joshua Thorp & Nick Bennett - Red Fish – StarLogo Help

Mrs. Ellen Cort – Elementary School Counselor

Our Moms: Kim Selvage and Alison Bailey – Mentors

Piñon 6th Grade Leadership Club Students – participated in Bully Game

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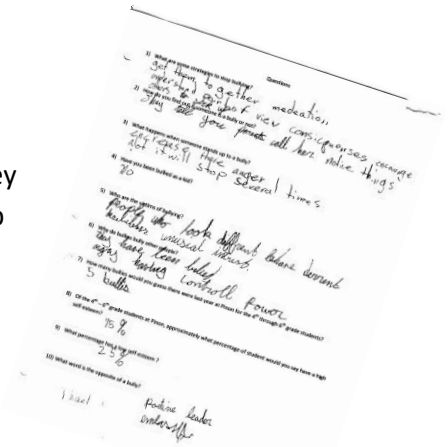
APPENDIX

Appendix A – Interviews

Questions for Mrs. Cort

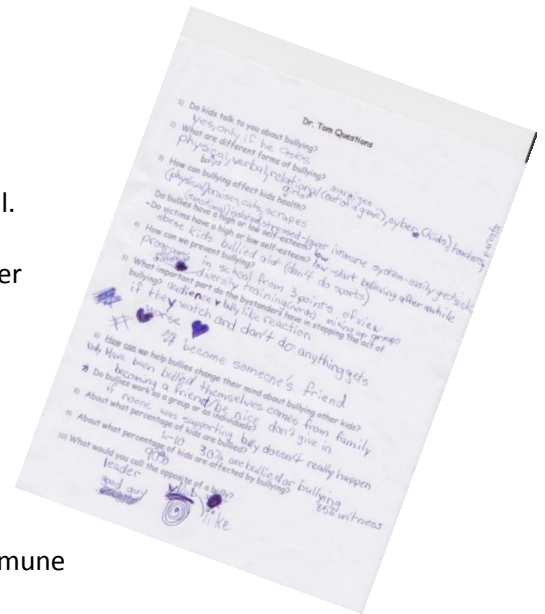
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- 1) What are some strategies to stop bullying?
Get the bully and the victim together she calls it mediation so they can understand the other persons point of view. If they don't stop there are consequences she also encourages people to stand up for their friends
- 2) How do you find out if someone is a bully or not?
The person who is being bullied will tell her or their parents will call her or the duty teachers will tell her
- 3) What happens when someone stands up to a bully?
Sometimes it increases their anger or they will stop if you stand up to them many times.
- 4) Have you been bullied as a kid?
no
- 5) Who are the victims of bullying?
People who look and behave different or have disabilities or different interests
- 6) Why do bullies bully other people?
They have been bullied and are angry or they want control over something
- 7) How many bullies would you guess there were last year at Piñon for the 4th through 6th grade students?
5 bullies
- 8) Of the 4th – 6th grade students at Piñon, approximately what percentage of student would you say have a high self-esteem?
75%
- 9) What percentage has a low self-esteem ?
25%
- 10) Positive leader



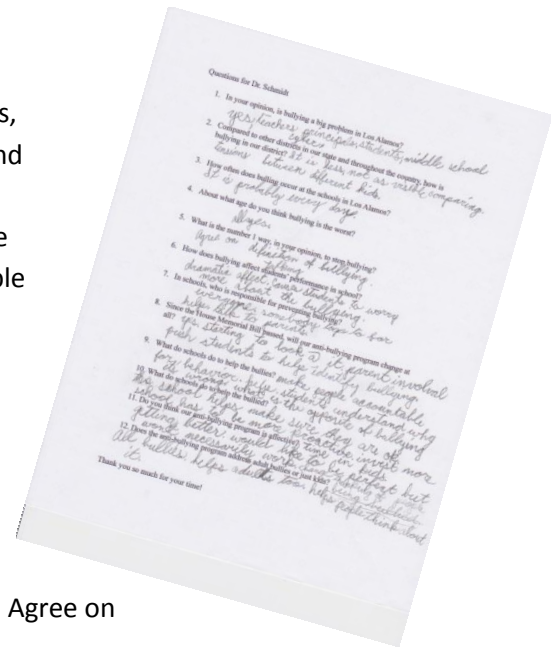
Dr. Tom Questions

- 1) Do kids talk to you about bullying? Yes, only if they ask.
- 2) What are different forms of bullying? Boys abuse more physical.
Girls (relational) can be more verbal abuse. Girls also leave other girls out as a form of bullying. Kids can also bully parents.
Teachers can bully kids.
- 3) How bullying affect can kids health? Hurt physically (bruises, cuts, scrapes) or emotionally (isolated, stressed). Can lower immune system and cause kids to get sick, stress, hormones sick sore throats.
Do bullies have a high or low self-esteem? low
Do victims have a high or low self-esteem? Low, think they should be bullied. Obese kids bullied a lot. Don't do sports.
- 4) How can we prevent bullying? Programs that work in school from 3 pints of view, diversity training, mixing up groups.
- 5) What important part do the bystanders have in stopping the act of bullying? They are the audience. Bully performs in front of group. Like an audience. Try to stop it and become someone's friend.
- 6) How can we help bullies change their mind about bullying kids? Bullies have usually been bullied
No discipline in family. Messed up. Be a friend/be nice. Don't give in.
- 7) Do bullies work as a group or as individuals? Usually as individual. Alpha male. If no one was supporting, bullying doesn't really happen.
- 8) About what percentage of kids are bullied 6-10 30% are bullied or bullying 85% witness 30% bullied
- 9) About what percentage of kids are affected by bullying? 90%
- 10) What word is the opposite of bullying? YlluB, hero, leader, good guy



Questions for Dr. Schmidt

1. In your opinion, is bullying a big problem in Los Alamos? Yes, middle school playground, facebook, teachers, principals and students.
2. Compared to other districts in our state and throughout the country, how is bullying in our district? It is less. not as visible more of a demographic groups, tension between friends, different groups based on compilation of community.
3. How often does bullying occur at the schools in Los Alamos? It is probably every day. Bullying is in the eye of the beholder.
4. About what age do you think bullying is the worst? Takes place at all ages. No specific age.
5. What is the number 1 way in your opinion to stop bullying? Agree on definition of bullying.. Solutions can be reached
6. How does bullying affect students' performance in school? Dramatic effect harmful. Students spend more time worrying about the bullying. Hurtful comments.
7. In school, who is responsible for preventing bullying? Everyone somebody to go to for help. Talk to parents.
8. Since the House Memorial Bill passed, will our anti-bullying program change at all? Yes, more parents involvement. Hope to have conversations with adults.do not ignore problem to bring it to a stop. Push students to identify bullying.
9. What do schools do to help bullies? Make accountable for behavior change. Help students understand why it is wrong to bully.
10. What do schools do to help the bullied? Being proactive. More time understanding. Invest more time in kids.
11. Do you think our anti-bullying program is affective? Getting better but have a long way from being perfect. Things are good. Change the thinking..
12. Does the anti-bullying program address adult bullies or just kids? All bullies. Helps adults too. Need to raise awareness to community.



According to Dr. Schmidt, A character in Harry Potter books was bullied but never seemed to appear bullied? Why? She had a high self-esteem so the students continual mean actions did not bother her.

Appendix B - Presentations



March 11th, Trinity on the Hill, Contemporary Service Anti-Bullying Lesson, Father Kelly



March 22nd, Piñon Elementary School, School Board Meeting, Kevin Honnell

Appendix C – Game Results

Before we started programming we created a live game for people. Basically, each person playing gets to pick three cards, either with a plus or a minus on it. If they have more pluses than minuses, they go to the positive side, showing they have a high self-esteem. If they had more minuses, then they would go to the negative side, showing they have a low self-esteem. Then, they would line up based on their cards and they would step forward and combine their cards with the person opposite them and reevaluate if they were positive or negative and line up again. If they had more pluses than minuses, they would move to the positive side, and if they had more minuses than pluses, they would go to the negative side, but this time, they would have six cards all together, so they could have exactly three pluses and three minuses. So if this was true, then they would go neutral. We would record how many people changed sides, how many people stayed the same, and how many people were neutral.

Trial#	Before		After			Notes
	+	-	+	-	Neutral	
1	8	4	8	0	4	
2	9	3	6	2	4	
3	7	5	2	0	10	
4	9	3	6	0	6	
5	7	5	6	2	4	
6	6	6	0	6	6	Bully added
7	10	2	10	0	2	Frally added

Appendix D – Sample Raw Data

TIME	dropouts	TIME	dropouts	TIME	dropouts	TIME	dropout	TIME	dropout
0	0	0	0	0	0	0	0	0	0
2	0	2	0	2	0	2	0	2	0
4	0	4	0	4	0	4	0	4	0
6	0	6	0	6	0	6	0	6	0
8	0	8	0	8	0	8	0	8	0
10	0	10	0	10	0	10	0	10	0
12	0	12	0	12	0	12	0	12	0
14	0	14	0	14	0	14	0	14	0
16	0	16	0	16	0	16	0	16	0
18	0	18	0	18	0	18	0	18	0
20	0	20	0	20	0	20	0	20	0
22	0	22	0	22	0	22	0	22	0
24	0	24	0	24	0	24	0	24	0
26	0	26	0	26	0	26	0	26	0
28	0	28	0	28	0	28	0	28	0
30	0	30	0	30	0	30	0	30	0
32	0	32	0	32	0	32	0	32	0
34	0	34	0	34	0	34	0	34	0
36	0	36	0	36	0	36	0	36	0
38	0	38	0	38	0	38	2	38	0
40	0	40	0	40	0	40	2	40	0
42	0	42	0	42	0	42	2	42	0
44	0	44	0	44	0	44	2	44	0
46	0	46	0	46	0	46	2	46	0
48	0	48	0	48	0	48	2	48	0
50	0	50	0	50	0	50	2	50	0
52	0	52	0	52	0	52	2	52	0
54	0	54	0	54	0	54	2	54	0
56	0	56	0	56	0	56	2	56	0
58	0	58	0	58	0	58	2	58	0
60	0	60	0	60	0	60	2	60	0
62	0	62	0	62	0	62	2	62	0
64	0	64	0	64	0	64	2	64	0
66	0	66	0	66	0	66	2	66	0
68	0	68	0	68	0	68	2	68	0
70	0	70	0	70	0	70	2	70	0
72	0	72	0	72	0	72	2	72	0
74	0	74	0	74	0	74	2	74	0
76	0	76	0	76	0	76	2	76	0
78	0	78	0	78	0	78	2	78	0
80	0	80	0	80	0	80	2	80	0
82	0	82	0	82	0	82	2	82	0
84	0	84	0	84	0	84	2	84	0
86	0	86	0	86	0	86	2	86	0
88	0	88	0	88	0	88	2	88	0
90	0	90	0	90	0	90	2	90	0
92	0	92	0	92	0	92	2	92	0
94	0	94	0	94	0	94	2	94	0

Entire run not shown due to too many pages.

292	7
294	7
296	7
298	7
300	8
302	8
304	8
306	9
308	9
310	9
312	9
314	9
316	9
318	9
320	9
322	9
324	9
326	9
328	9
330	11
332	11
334	11
336	11
338	11
340	11
342	12
344	13
346	13
348	13
350	14
352	15
354	15
356	15
358	16

292	5
294	5
296	5
298	5
300	5
302	5
304	5
306	5
308	5
310	5
312	5
314	6
316	6
318	6
320	6
322	6
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354	9
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362	9
364	9
366	9
368	9
370	10
372	10
374	10
376	10
378	10
380	10

292	3
294	3
296	3
298	3
300	3
302	3
304	3
306	3
308	3
310	3
312	3
314	3
316	3
318	3
320	3
322	3
324	3
326	4
328	4
330	4
332	4
334	4
336	4
338	4
340	4
342	4
344	4
346	4
348	5
350	5
352	5
354	5
356	5
358	7
360	7
362	7
364	7
366	7
368	8
370	8
372	8
374	8
376	8
378	8
380	8

292	2
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344	8
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348	9
350	9
352	10
354	10
356	10
358	10
360	10
362	10
364	11
366	11
368	11
370	11
372	11
374	11
376	11
378	11
380	11

Appendix E – Related Statistics

The YlluB Effect

Jordan Bailey & Ruby Selvage

2012 Supercomputing Challenge Project

Bullying - an act of repeated aggressive behavior in order to intentionally hurt another person, physically or mentally.

Frally - a bystander who chooses to get involved, a friend, an ally to ALL people.

We have created two computer simulations using StarLogo to model bullying on a playground. The first simulation model shows the impact a bully has on the students with the bystander not actively getting involved. In the second model, the bystander becomes a frally and interacts positively with the bullies and the students to attempt to create a healthy school environment. In both models, we are measuring the self-esteem of all those involved, as well as the number of school dropouts.

We want to create change by focusing on the positive.

We believe that when a person's self-esteem goes up, the number of people bullied will go down, as well as the number of students targeted to be bullied.



Bullying Statistics from Local Surveys

2009 NM Youth Risk and Resiliency Survey, YRRS Grades 6-8 New Mexico & Los Alamos

Bullied on school property in past 12 months

New Mexico – 31% Los Alamos – 39%

2011 Positive Behavior System, PBS - Grades 7th-8th Los Alamos Middle School

I feel safe questions (lunch, hallways, playground, restrooms, classrooms, going home or to school)
(average) 73% Yes 21% Sometimes 6% No

26% of students said they were picked on or teased by a student or students.

2009 Me & My World - 4th-6th Grade Los Alamos Public Schools

In the last year, has anyone hurt you by punching, hitting, slapping or scratching you?
45% Yes

2009 Search Institute - Grades 7th-12th Grade Los Alamos School

27% of students said they were hurt by someone at school.

2010-2011 Parent Resource Institute for Drug Education, PRIDE – Grades 6th-12th Los Alamos Schools

14% of students do not feel safe at school.

House Memorial Bill 25 – Passed February 7, 2012

“...all school districts in New Mexico be encouraged to actively engage parents and community members in the development and evaluation of bullying prevention programs”

**11% of peers interfere with bullying, but only 4% of adults do. (Ericson, 2001)
That is only 15% of people choosing to be a frally. Let's rewrite the statistics and all be frallies.**

<http://www.youtube.com/watch?v=TaR-VvRv7aM>

