# Teen Smoking

### New Mexico

# Supercomputing Challenge

**Final Report** 

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## Team Number 20

# Centennial High School

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### **Executive Summary:**

Our model is a visual representation of how each rick factor for smoking effects students. Due to the complexity and arbitrary nature of the human mind, it is nearly impossible to list all the possible factors that could influence teenage smoking. After working with our topic, we found that a linear and 'accurate' representation would be extremely difficult to create, considering that the ability to do so would be tantamount to emulating the very nature of the human mind. However, we've decided upon using an abstract model to depict possible outcomes, and while it is still limited in comparison to a 'perfect' model, this model itself is versatile in a sense that it is possible to change just how 'influential' a set of fixed factors are.

#### BACKGROUND INFO:

Tobacco is defined as a plant that is mainly popular for its use in cigarettes. Tobacco has close to 600 ingredients and when burned, creates close to 7,000 harmful toxins. Of these 7,000 ingredients, 69 are known to cause cancer. Acetone (used in nail polish), ammonia (common household cleaner), cadmium (active in battery acid), naphthalene (found in moth balls), and more are all found in cigarettes. Every day close to 3,200 people younger than 18 years old smoke their first cigarette, and from this number, close to 2,100 minors who occasionally smoked became daily cigarette smokers in their future. According to the Centers of Disease Control and Prevention, if our country continues at this rate "5.6 million of today's Americans younger than 18 years of age are projected to die prematurely from a smoking-related illness." Also according to the Centers of Disease Control and Prevention, 23.3% of high school students are currently using tobacco products including cigarettes, cigars, hookahs, snus, and other tobacco related products.

#### INTRODUCTION:

Our project is about teen smoking and how the possible variables affect it, such as family, friends, or even commercials. Due to the alarming amount of people who will die due to smoking, we chose this model to spread awareness; it was estimated by the American Cancer Society that nearly 159,000 people will die and nearly 228,000 new cases of lung cancer will be diagnosed in the United States of America (USA) in 2013, which is one of the many consequences of smoking. Smoking is an issue that is very prevalent in teenagers today. An estimated 18% of teenagers in high school are already smokers, meaning a massive amount of

kids under the age of 18 are already on the road to cancer. Statistics show that those who leave high school as smokers, stay addicted past the age of 35 and that more than 80% of adult smokers began before their habits before they were 18.

#### DESCRIPTION:

Our model simulates possible real world influences that can cause a student to either pick up or reject smoking.

Our code consists of various methods that allow the model complexity. The methods are similar to that of an infection model in which turtles interact with each other and cause changes in certain variables. To be specific, there are 4 breeds of turtles: the regular students, the honor students, the smokers, and the heroes. The regular and honor student have no effect on any of the other breeds and own a variable called 'energy', which represents 'resistance' within the model, with the honor student starting out with generally higher resistance than the regular student. Smokers and heroes cause decreases and increases towards the 'energy' of regular and honor students respectively (By how much is settable). Heroes are special because they can cause a smoker to either turn into a regular student or a hero as well but at a very small fixed percentage. If the energy were to reach 0 on either turtle, their breed will change to the smoker breed. A hero is representative of an active anti-smoking campaigner.

Not only do the smoker and hero breeds affect energy, but various colored patches that represent a real world influence can as well. There are 6 influences total within the model with 2 of them able to cause both increases and decreases. These influences are family, friends, television/movies, commercials, and schools with family and friends being the 2 that can cause negative and positive influences. The system is based on the color of the patches, each color represents an influence and whenever a turtle with energy comes across the patch, depending on the color, it will cause a change in the turtle's energy. How much the patch changes the energy is also settable.

We had originally made our model to represent the lives of 123 students as the model is being played. This had allowed them to encounter other turtles that could either help or hinder the student. In our minds, this seemed to work as a well-enough model until we concluded that we it did not make sense. We then changed our model to represent the life of one student as the turtle went through the model.

### <u>RESULTS</u>:

Each experiment represents a changing factor generally do have an impact on high school aged

students such as friends, family, anti-smoking commercials, television shows and movies.

All of these experiments are tested with factors set to values in which, if left alone, will result in the students continuing to stay the same for an extended amount of time.

### Friends Experiment:

Week:	Smokers	Heroes:	Regular	Honor	Week	Smokers	Heroes:	Regular	Honor
			Students	students				Students	students
0	27	20	10	15	0	27	15	10	15
50	27	20	10	15	50	27	15	10	15
100	26	21	10	15	100	27	15	10	15
150	26	21	10	15	150	28	15	10	14
200	26	21	10	15	200	28	15	10	14
250	26	21	10	15	250	28	15	10	14
300	26	21	10	15	300	28	15	10	14

Week:	Smokers	Heroes:	Regular	Honor	Week:	Smokers	Heroes:	Regular	Honor
			Students	students				Students	students
0	27	5	10	15	0	27	10	10	15
50	27	5	10	15	50	27	10	10	15
100	27	5	10	15	100	27	10	10	15
150	27	5	10	15	150	27	10	10	15
200	27	5	10	15	200	27	10	10	15
250	27	5	10	15	250	27	10	10	15
300	27	5	10	15	300	27	10	10	15

In this experiment, friends do not count as an influential factor. The results show that since the values of friends in the positive and negative integer are virtually similar, the complete removal of this influence results in the preservation of equilibrium for the amount of 'energy' the students receive between negative and positive values.

Family Experiment:

Week:	Smokers	Heroes:	Regular	Honor
			Students	students
0	27	20	10	15
50	27	20	10	15
100	26	21	10	15
150	26	21	10	15
200	26	21	10	15
250	26	21	10	15
300	26	21	10	15

Week:	Smokers	Heroes:	Regular	Honor
			Students	students
0	27	15	10	15
50	27	15	10	15
100	27	15	10	15
150	28	15	10	14
200	28	15	10	14
250	28	15	10	14
300	28	15	10	14

Week:	Smokers	Heroes:	Regular	Honor
			Students	students
0	27	10	10	15
50	27	10	10	15
100	27	10	10	15
150	27	10	10	15
200	27	10	10	15
250	27	10	10	15
300	27	10	10	15

Week:	Smokers	Heroes:	Regular	Honor
			Students	students
0	27	5	10	15
50	27	5	10	15
100	27	5	10	15
150	27	5	10	15
200	27	5	10	15
250	27	5	10	15
300	27	5	10	15

In this experiment, instead of friends being removed as a factor, it is family. The results prove to be the same since family is also virtually similar in negative and positive integer.

Week:	Smokers	Heroes:	Regular	Honor
			Students	students
0	27	20	10	15
50	27	20	10	15
100	28	20	9	15
150	30	20	8	14
200	38	20	5	9
250	40	20	5	7
300	41	20	5	6

No Anti-Smoking Commercials Experiment:

Week:	Smokers	Heroes:	Regular	Honor
			Students	students
0	27	15	10	15
50	26	16	10	15
100	26	16	10	15
150	28	16	8	15
200	29	16	8	14
250	31	16	7	13
300	33	16	6	12

Week:	Smokers	Heroes:	Regular	Honor
			Students	students
0	27	10	10	15
50	27	10	10	15
100	28	10	9	15
150	29	10	9	14
200	31	10	9	12
250	31	10	9	12
300	31	10	9	12

Week:	Smokers	Heroes:	Regular	Honor
			Students	students
0	27	5	10	15
50	27	5	10	15
100	27	5	10	15
150	27	5	10	15
200	27	5	10	15
250	28	5	9	15
300	29	5	9	14

In this experiment, since Anti-Smoking Commercials were counted as a positive influence, once removed, the equilibrium of the influences were disrupted with negative influences being more prominent which resulted in the increase of smokers.

TV/Movies Experiment:

Week:	Smokers	Heroes:	Regular	Honor	Week:
			Students	students	
0	26	10	10	15	0
50	26	10	10	15	50
100	28	10	10	14	100
150	29	10	9	14	150
200	29	10	9	14	200
250	30	10	9	13	250
300	29	10	10	13	300

Week:	Smokers	Heroes:	Regular	Honor
			Students	students
0	27	15	10	15
50	27	15	10	15
100	26	15	10	15
150	26	15	10	15
200	26	15	10	15
250	26	15	10	15
300	26	15	10	15

Week:	Smokers	Heroes:	Regular	Honor	Week:	Smokers	Heroes:	Regular	Honor
			Students	students				Students	students
0	27	20	10	15	0	26	5	10	15
50	27	20	10	15	50	26	5	10	15
100	27	20	10	15	100	26	5	10	15
150	27	20	10	15	150	26	6	10	15
200	26	20	11	15	200	26	6	10	15
250	26	20	11	15	250	26	6	10	15
300	27	20	11	14	300	27	6	9	15

Even though TV/Movies were counted as a negative integer and were removed as an influence, there was not much of a decrease in smokers because while positive influences were more prominent, the fact that there is no way to change smokers aside from the small percentage caused by the encounter of a hero means that the model will mostly stay the same with the exception of only a few small changes.

### CONCLUSIONS:

What we found within our experiments is that when removed, anti-smoking commercials had a bigger impact on a student's decision making as compared to family, friends, and TV/Movies factors being removed. When we removed anti-smoking commercials as a factor, the number of smokers had increased to the most of 14. We made sure that anti-smoking commercials had a larger impact on the student because according to tobaccofreeflorida.com, "hard hitting" anti-smoking commercials resulted in a fewer amount of adult smokers as compared to previous years, and with that come a fewer amount of Florida's youth not being exposed to injurious toxins released by secondhand smoke.

#### **RECOMMENDATIONS:**

In our next project, we would first choose a more broadened topic that has been well studied and is easier to research, such as tobacco in general or the introduction of electronic cigarettes in modern society. While researching our topic, we realized that though studies have been performed on teen smoking, the results were not as conclusive as we predicted. We also found that while teen smoking is something that can greatly hinder today's youth, there is no 100% way to stop or prevent it from happening. We would also like to perform more experiments on the likelihood of an individual student or honors student of becoming a smoker given a certain amount of risk factors. We would like to see how the results vary within the same risk factor levels. We believe this could be informative for students, parents, and community organizations.

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### MODEL CODE:

;; Team 20 – C. Barrera, M. Doctor, J. Maldonado, C. Nguyen

;; Teen Smoking

breed [regstudents regstudent] ;;Creates a different breed.

breed [honorstudents honorstudent] ;;Creates a different breed.

breed [smokers smoker] ;;Creates a different breed.

breed [heroes hero] ;;Creates a different breed.

```
turtles-own [energy] ;;Creates a new variable for the turtles.
```

to psetup ;;Sets procedure name.

clear-all ;;Clears everything on the monitor.

Ask patches ;;Initiates command chain for the patches.

# [

let a random (100) ;;Sets a variable (a) to a random number from 0-100.

if (a < 20) ;;Sets condition for if the variable (a) is less than 20 (20% chance).

## [

let b random (4) ;;In the condition, another variable (b) is assigned a random value from 0-4. ifelse (b < 2) ;;Sets another condition, but this time if variable (b) is less than 2, it sets the color orange, if not, it sets the color blue. (50% chance).

[

set pcolor orange ;;Sets the color of the patch orange if condition is met.

```
]
   [
    set pcolor blue ;;Sets the color of the patch blue if the condition is not met.
   ]
   ]
  let c random (100) ;;Sets a variable (c) to a random number from 0-100.
  if (c < 20);;Sets condition for if the variable (c) is less than 20 (20% chance).
  [
   let d random (4) ;;In the condition, another variable (d) is assigned a random value from 0-4.
   ifelse (d < 2) ;;Sets another condition, but this time if variable (d) is less than 2, it sets the
color red, if not, it sets the color brown. (50% chance).
   [
    set pcolor red ;;Sets the color of the patch red.
   ]
   [
```

set pcolor brown ;;Sets the color of the patch brown.

```
]
```

let h random (100) ;;Sets the variable (h) to a random number from 0-100 if (h < 4) ;;Sets condition for if the variable (h) is less than 4. (4% chance).

[

set pcolor gray ;;Sets the color of the patch gray.

]

let f random (100) ;;Sets the variable (f) to a random number from 0-100
if (f < 6) ;;Sets condition for if the variable (f) is less than 6. (6% chance)
[</pre>

set pcolor magenta ;;Sets the color to magenta.

]

let g random (100) ;;Sets the variable (g) to a random number from 0-100.

if (g < 5) ;;Sets condition for if the variable (g) is less than 5. (5% chance)

[

set pcolor pink ;;Sets the color of the patch pink.

]

setup ;;Calls upon a procedure.

end ;;Ends Procedure.

to setup ;;Sets name of the procedure.

reset-ticks ;;Resets ticks, a measurement of time.

create-regstudents Amnt-regstudent ;;Creates a varying amount of 'regstudents' (Regular students) based on the variable Amnt-Regstudent.

create-honorstudents Amnt-honorstudent ;;Creates a varing amount of 'honorstudents'

(Honor students) based on the variable Amnt-Honorstudent.

create-smokers Amnt-smoker ;; Creates a varying amount of 'smokers' based on the variable

Amnt-Smoker

create-heroes Amnt-hero ;;Creates a varying amount of heroes based on the variable Amnt-Hero.

ask regstudents ;;Starts command chain for regstudents.

```
[
```

set size 1.25 ;;Sets the size of the turtle to 1.25.

set shape "regular student" ;;Sets the shape (Appearance) of the turtle.

set energy 80 ;;Gives the variable 'Energy' a value of 80.

set color white ;;Sets the color of the turtle to white.

setxy random-xcor random-ycor ;;Distributes the turtles across the monitor randomly.

]

ask honorstudents ;;Begins command chain for honorstudents.

[

set size 1.25 ;;Sets the size of the turtle to 1.25.

set shape "willful student" ;;Sets the shape (Appearance) of the turtle.

set energy 100 ;; Gives the variable 'Energy' a value of 100.

set color white ;;Sets the color of the turtle white.

setxy random-xcor random-ycor ;;Distributes the turtles across the monitor randomly.

]

ask smokers ;;Begins command chain for smokers

[

set size 1.25 ;;Sets the size of turtles to 1.25.

set shape "smoker" ;;Sets the shape (Appearance) of the turtle.

set color white ;;Sets the color of the turtle to white.

setxy random-xcor random-ycor ;;Distributes the turtle across the monitor randomly.

]

## ask heroes

## [

set size 1.25 ;;Sets the size of the turtles to 1.25.

set shape "hero" ;;Sets the shape (Appearance) of the turtle.

set color white ;;Sets the color of the turtle to white.

setxy random-xcor random-ycor ;;Distributes the turtle across the monitor randomly.

]

end ;;Ends the procedure.

to go ;;Sets name of procedure.

```
ask turtles ;;Begins command chain for all turtles.
```

[

wiggle ;;Calls upon a procedure.

]

ask honorstudents ;;Begins command chain for honorstudent.

[

if energy < 0 ;;Sets condition for if the variable of energy is less than 0.

[

set breed smokers ;; If condition is met, it changes the breed to a smokers breed.

## ]

ask smokers ;;Begins command chain for smokers.

[

set size 1.25 ;;Sets size of the turtle to 1.25.

set shape "smoker" ;;Sets the shape (Appearance) of the turtle.

set color white ;;Sets the color of the turtle white.

]

if count smokers-here > 0 ;;Sets condition for if a turtle encounters a smoker.

[

```
set energy (energy - V.Smoking-Negative) ;;Decreases energy an amount based on the variable V.Smoking-Negative.
```

]

if count heroes-here > 0 ;;Sets condition for if a turtle encounters a hero.

[

]

set energy (energy + V.Heroes-Positive) ;;Increases energy by an amount based on the variable V.Heroes-Positive.

if pcolor = orange ;;Sets condition for if the patch color encountered is orange.

[

```
set energy energy + V.Family-Positive ;;Increases energy by an amount based on the variable V.Family-Positive.
```

]

if pcolor = blue ;;Sets condition for if the patch color encountered is blue.

[

set energy energy - V.Family-Negative ;;Decreases energy by an amount based on the variable V.Family-Negative.

]

if pcolor = red ;;Sets condition for if the patch color encountered is red.

[

set energy energy - V.Friends-Negative ;;Decreases energy by an amount based on the

```
variable V.Friends-Negative.
```

]

if pcolor = brown ;;Sets condition for if the patch color encountered is brown.

[

set energy energy + V.Friends-Positive ;;Increases energy by an amount based on the variable V.Friends-Positive.

]

if pcolor = gray ;;Sets condition for if the patch color encountered is gray.

[

set energy energy - V.TV/Movies-Negative ;;Decreases energy by an amount based on the variable V.TV/Movies-Negative.

]

if pcolor = magenta ;;Sets condition for if the patch color encountered is magenta.

[

set energy energy + V.Anti-Smoke-Commercials-Positive ;;Increases energy by an amount based on the variable V.Anti-Smoker-COmmercials-Positive.

]

if pcolor = pink ;;Sets condition for if the patch color encountered is pink.

[

set energy energy + V.Schools-Positive ;;Increases energy by an amount based on the variable V.Schools-Positive.

]

```
]
 ask regstudents ;;Begins command chain for regstudents.
 [
   if energy < 0 ;;Sets condition for if the energy is less than 0.
 ſ
  set breed smokers ;;Sets the breed to smokers.
 ]
 ask smokers ;;Begins command chain for smokers.
 [
  set size 1.25 ;;Sets size of turtle to 1.25.
  set shape "smoker" ;;Sets the shape (Appearance) of a turtle.
  set color white ;;Sets the color of a turtle white.
  ]
   if count smokers-here > 0 ;;Sets condition for if a turtle encounters a smoker.
   [
    set energy (energy - V.Smoking-Negative) ;;Decreases energy an amount based on the
variable V.Smoking-Negative.
   ]
```

if count heroes-here > 0 ;;Sets condition for if a turtle encounters a hero.

[

```
set energy (energy + V.Heroes-Positive) ;;Increases energy by an amount based on the variable V.Heroes-Positive.
```

```
if pcolor = orange ;;Sets condition for if the patch color encountered is orange.
```

set energy energy + V.Family-Positive ;;Increases energy by an amount based on the variable V.Family-Positive.

```
]
```

1

```
if pcolor = blue ;;Sets condition for if the patch color encountered is blue.
```

[

```
set energy energy - V.Family-Negative ;;Decreases energy by an amount based on the variable V.Family-Negative.
```

# ]

```
if pcolor = red ;;Sets condition for if the patch color encountered is red.
```

[

```
set energy energy - V.Friends-Negative ;;Decreases energy by an amount based on the variable V.Friends-Negative.
```

## ]

if pcolor = brown ;;Sets condition for if the patch color encountered is brown.

[

```
set energy energy + V.Friends-Positive ;;Increases energy by an amount based on the
```

```
variable V.Friends-Positive.
```

]

if pcolor = gray ;;Sets condition for if the patch color encountered is gray.

[

set energy energy - V.TV/Movies-Negative ;;Decreases energy by an amount based on the variable V.TV/Movies-Negative.

]

if pcolor = magenta ;;Sets condition for if the patch color encountered is magenta.

[

set energy energy + V.Anti-Smoke-Commercials-Positive ;;Increases energy by an amount based on the variable V.Anti-Smoker-COmmercials-Positive.

```
]
```

if pcolor = pink ;;Sets condition for if the patch color encountered is pink.

[

set energy energy + V.Schools-Positive ;;Increases energy by an amount based on the variable V.Schools-Positive.

```
]
```

]

ask smokers ;;Begins command chain for smokers.

[

if count heroes-here > 0 ;;Sets condition for if a breed encountered is a hero.

```
[
 let m random 100 ;;Assigns a variable (m) a number from 0-100.
 if m < 5 ;;Sets a condition for if the variable (m) is less than 5. (3% chance)
 [
  set breed regstudents ;;Sets the breed to a regstudent.
 1
  if m < 2 ;;Sets for if the variable (m) is less than 3. (2% chance)
 [
  set breed heroes ;;Sets the breed to heroes.
 ]
]
]
 ask heroes ;;Begins command chain for heroes.
[
set size 1.25 ;;Sets the size fo the hero to 1.25.
set shape "hero" ;;Sets the shape (Appearance) to hero.
 set color white ;;Changes the color of the turtle to white.
]
```

ask patches ;;Begins command chain for patches.

[

```
if mouse-down? ;;Sets a condition for if the mouse button is pressed.
```

[

ask patch (round mouse-xcor) (round mouse-ycor) ;;Begins command chain for the specific patch that is clicked on.

```
[
 if pcolor = pink ;;Sets a condition for if the patch color is pink.
 [
set plabel "Schools (+)" ;;Sets the label.
 ]
if pcolor = magenta ;;Sets a condition for if the patch color is magenta.
 [
 set plabel "Anti-Smoke Commercials (+)" ;;Sets the label.
]
if pcolor = red ;;Sets a condition for if the patch color is red.
 [
 set plabel "Friends (-)" ;;Sets the label.
 ]
```

if pcolor = brown ;;Sets a condition for if the patch color is brown.

```
[
 set plabel "Friends (+)" ;;Sets the label.
]
if pcolor = gray ;;Sets a condition for if the patch color is gray.
 [
 set plabel "Tv Shows/Movies (-)" ;;Sets the label.
]
if pcolor = orange ;;Sets a condition for if the patch color is orange.
 [
 set plabel "Family (+)" ;;Sets the label.
]
if pcolor = blue ;;Sets a condition for if the patch color is blue.
 [
 set plabel "Family (-)" ;;Sets the label.
]
1
if mouse-down? ;;Sets condition for if mouse button is pressed.
 [
ask patch (round mouse-xcor) (round mouse-ycor) ;;Begins command chain for if the patch
```

```
that's clicked on.
  [
   if pcolor = pink ;;Sets a condition for if the patch color is pink.
   [
  set plabel "" ;;Erases Label.
   ]
  if pcolor = magenta ;;Sets a condition for if the patch color is magenta.
   [
   set plabel "" ;;Erases label.
   ]
  if pcolor = red ;;Sets a condition for if the patch color is red.
   [
   set plabel "" ;;Erases label.
   ]
  if pcolor = brown ;;Sets a condition for if the patch color is brown.
   [
   set plabel "" ;;Erases label.
   ]
```

```
if pcolor = gray ;;Sets a condition for if the patch color is gray.
   [
   set plabel "" ;;Erases label.
   ]
  if pcolor = orange ;;Sets a condition for if the patch color is orange.
    [
   set plabel "" ;;Erases label.
   ]
  if pcolor = blue ;;Sets a condition for if the patch color is blue.
    [
   set plabel "" ;;Erases label.
   ]
  ]
]
]
```

tick ;;Sets the time measurement.

end ;;Ends the procedure.

]

to wiggle ;;Sets procedure name to wiggle.

right random 90 ;;Turns right randomly from 0-90.

left random 90 ;;Turns left randomly from 0-90.

forward 1 ;;Moves forwards 1.

end ;;Ends procedure.