Board 25: WORK IN PROGRESS: Understanding Pre-service Teacher Beliefs about Vaccination Using and Modifying Group-based Computational Simulations

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Introduction

The Texas Department of State Health Services reported 56,738 kindergarten through 12th grade students entered the 2017-2018 school year having been unvaccinated for non-medical reasons [1]. These children have parents who file for a *conscientious exemption* to vaccines or are more colloquially known "anti-vaxxers." [2]. While this figure only represents 1.07% of the student body of Texas, a closer analysis shows the heterogenous composition of unvaccinated students in schools. Austin, Texas presents an interesting case where schools range in vaccination rates from 100% in some schools to below 50% in others, posing a disparate threat to the health of students [1]. In Texas, most schools with vaccination rates lower than 50% are smaller sized private schools located in higher socioeconomic status (SES) areas of cities, posing a unique problem for public health.

Teachers are an interesting demographic that are not often considered when thinking about how to engage parents in scientific and social discussion about the importance of vaccinating children who attend schools. The training of preservice teachers (teachers who have yet to complete their student teaching) at our institution are rarely provided opportunities to discuss public health issues for students, specifically about the misconceptions of vaccination and disease transmission. Moreover, systemic reasoning about disease transmission and vaccination can be supported by creating, using, or evaluating computer models; however, this type of engagement is infrequent in elementary pre-service teacher programs [3].

This work in progress is part of a larger design-based research project to implement computational modeling of complex phenomena in STEM education. In this single-implementation case study, the authors sought to use computational simulations to engage preservice teachers in dialogue about the locally relevant issue of vaccination in K-12 schooling. The researchers built and used simulations of disease transmission and engaged teachers in a 3-hour lesson to determine:

1. what beliefs pre-service teachers hold about requiring vaccinations in schools before and after engaging with the simulations; and
2. how these beliefs emerge when pre-service teachers attempt to re-design a computational model to represent three schools with unique social and economic conditions.

Literature Review

Public and academic discourse about vaccination and its role in public health are often at odds. A review of anti-vaccination websites demonstrates the variety of tactics individuals engage in to spread post-modern rhetoric about the lack of safety in having children vaccinated [4]. Despite the reasoning, these websites engage in being classified as incorrect by medical professionals or demonstrating *reasoning flaws* (such as seeking to find order and predictability in random data), they are increasing in readership and influence [5] [4]. These beliefs can often be immutable even in the face of evidence. A recent study working with in-service teachers sought to use refutational texts to engage teachers and elicit more positive attitudes towards vaccination with moderate effect [6]. While refutational texts show some evidence of increasing positive attitudes among teachers, this research intends to accomplish the dual goals of engaging preservice teachers in model-based inquiry as a strategy for teaching and learning science [7] while also seeing how using and re-designing models affects beliefs about vaccination.

Models and simulations are often used interchangeably; however, simulations are a subset of models. Models vary in their form; however, they exist to simplify and represent natural phenomena [8]. Simulations are a type of *dynamic* model which imitate the behavior of complex systems using some symbolic system [9]. Agent-based models (ABM), such as *NetLogo* [10], are simulations that represent emergent phenomena by giving users the power to manipulate variables and run a simulation of a system [10]. Agent-based models allow learners to engage in thinking about complex systems in a way that cannot be entirely captured by diagrammatic models alone [11]. These simulations, while powerful for representing complex phenomena, do not leverage the group-nature of many classroom learning environments.

Group-based Cloud Computing: The Disease Model

This study focuses on the use of a new agent-based modeling platform called Group-based Cloud Computing (GbCC). *GbCC* is an agent-based modeling program, powered by *NetLogo Web* [12], which extends the capabilities of traditional ABM and enables learners to work independently or *collaboratively* to participate in, modify (or author), and share models [13]. GbCC models lend themselves easily to achieving all of the higher-order uses of models while also encouraging collaboration of many learners: (a) users can *use* the simulation independently by changing slider values; (b) make changes to how models work using the NetLogo programming language; and (c) share their changes or data generated from the model with other learners currently using the model. Below is a screenshot of a user working with *the disease model*, one of the models developed by a research team member for use in this case study.

--Figure 1—

Figure 1: The GbCC Disease Model which shows a screen with infected agents (red); vaccinated agents (yellow); and unvaccinated but healthy agents (green). Lines between agents dictate the direction of infection. Buttons, toggles, and sliders to the left of the screen are used to manipulate variables and run simulations.

The disease model shows three different types of agents or characters: healthy vaccinated individuals (green), healthy unvaccinated individuals (yellow), and sick individuals (red). The grey lines between agents indicates the vector of infection. To the left of the simulation screen are a variety of toggles and sliders to change variables to simulate different types of disease. Users can manipulate: (a) the number of individuals on the screen; (b) the percentage vaccination; (c) the ability for agents to move around the screen; (d) the symbol used to represent the agent; (e) the duration of the illness in weeks; (f) the change an individual will recover; (g) and the infectiousness of the disease. In this model, infectiousness is how likely an individual who is sick will infect another individual they come in contact with. The model also contains a graphic element to show the percentage of sick and healthy individuals. This model shows a population of individuals which the researchers call *homogenous*, meaning, each agent functions the same as every other agent.

All GbCC models have some ability to be shared with other users. In the disease model, users can share their model to a gallery space along with their name. When an individual clicks a model in the gallery, the variables of that model are imported into their own space so the user can run the same simulation. This allows a classroom of participants to run unique simulations and share their results with other participants.

Methodology

This work-in-progress study is part of a larger design-based research project to understand how to integrate Group-based Cloud Computing models or simulations into STEM education. This particular iteration represents a single-implementation case study working with preservice elementary science teachers at a large university in the Southwest. This case study is currently being analyzed to inform future implementations with preservice elementary science teachers. The sections below highlight the participants, the lesson, and the data collection and analysis to date.

Participants and Participant-Observers

Participants were 33 pre-service elementary education teachers enrolled in an elementary science methods course enrolled in a classic teacher preparation program, two course instructors (one of which who was a member of the research team), and a graduate student researcher. The course instructor designed the class to focus on teaching science methods to preservice teachers with a focus on K-5 education. The course had two sections that met once a week for 2 hours and 45 minutes during the Spring semester (14 weeks). While both class sections focused on how models and simulations could be used in the elementary science classroom, participants in section two included additional discussion about classroom methods that could be leveraged with bilingual students.

The Lesson

This case study took place over the course of two lessons and were both led by the graduate student researcher with the course instructors present. Lesson one used half of the class time (1 hour and 15 minutes) and focused on: (a) model-based teaching and learning; (b) agent-based models; and (c) GbCC models. This was done to increase participants' familiarity with the models before diving deeper into their classroom uses. Lesson two used the entire class time (2 hours and 45 minutes) and focused on using, evaluating, and modifying models about disease transmission and vaccination related to the Austin case study.

--Table 4—

Data Collection and Analysis

Qualitative data was collected during the second lesson in the form of pre- and post-lesson assessment questioning, collection of classroom artifacts related to the model redesign task, and video/audio recording of preservice teacher discussions of their final model product.

Pre- and Post-Lesson Assessment

Research question one aims to understand preservice teacher beliefs about requiring vaccines for students entering kindergarten. Understanding these beliefs (and if they change after the modeling experience) provides insight as to how GbCC models can be used to dislodge misconceptions or start a richer dialogue about vaccines and their utility in school based public health. Before the lesson began, the instructor provided participants with a copy of the Center for Disease Control's (CDC) recommendations for vaccines for children age 0 to high school age and a single question:

1. *Thinking about the Texas' policy for parental exemptions, how many of these vaccines should be required upon entering kindergarten?*
    a. *All of the vaccines should be required*
    b. *Some of the vaccines should be required, some should be optional*
    c. *None of the vaccines should be required*

    Explain more on your thoughts behind your answer choice (write your answer below).

Participants answered this multiple-choice question and were prompted to explain their thinking at the beginning and end of the second lesson. Answers to the multiple-choice question were recorded and answers to the open-ended question were transcribed and coded for themes.

Classroom Artifacts from the Re-Design Task

The first two models participants engaged with represented a homogenous population where all individuals are the same. Similar to the practice of scientists, models have affordances and limitations. Participants were given the chance to evaluate the homogenous models and discuss where the models fell short of representing the more complex nature of the real world. Participants were then given a specific task to redesign the model. The task was framed as follows:

> *Imagine thinking of three separate schools. One school is a large public school located in a part of the city characterized as high SES. The second school also a large public school but is located in a part of the city typically characterized as lower SES. The third school is a much smaller private school, also located in a high SES part of the city. Redesign a model that would show what these three*

schools would look like in a city. Think about how and why the vaccination rates at each school would be different.

Participants were split into self-selected groups of 3-4 students, given a large piece of chart paper with markers, and were provided the original GbCC disease model. Participants were given 1-hour to redesign the model on paper and attempt to find and make changes to the GbCC model code to modify the original model.

At the end of the hour, all participants had discussed and redesigned the model on paper, but no group had sufficient time to attempt to make programming changes to the model. The redesigned models were then hung around the classroom and each group presented on their model while other participants asked questions and discussed affordances and limitations. These models were collected and are being analyzed for themes in how preservice teachers think about a more complex system of interacting individuals.

Results and Discussion

This single-implementation case study sought to use sophisticated modeling tools with preservice elementary science teachers to both enhance their practices as future teachers and understand how their beliefs about vaccination and disease transfer emerge when working with models. The results and discussion below are organized by research question.

Research Question 1: Pre-service teacher beliefs about required vaccination in schools
Before and after the lesson, participants were asked what they believed about required vaccination in Texas public schools. Answer choice A (All vaccines should be required) was labeled a *pro-vaccination belief*; where as answer choices B (Some vaccines should be required, some should be option) and C (no vaccines should be required) were labeled as *anti-vaccination beliefs*. In this study, anti-vaccination beliefs do not refer to a participant *being* an *anti-vaxxer*, but rather holding some beliefs that vaccines are not always safe or necessary to use. This distinction is important to uncover participant beliefs about vaccines and the undergirding beliefs about disease transmission.

Similar to other studies where attempts are made to dislodge misconceptions about vaccination or disease transmission, there was little change before and after the lesson (Table 2). The majority of participants recorded that all vaccines should be required both before (18/31) and after (20/31) the modeling lesson. About a third of participants selected option B – some vaccines required – which also showed very little change. A much smaller amount of the students believed that none of the vaccines should be required both before (3/31) and after (2/31) the model lesson. This is consistent with the literature that beliefs on controversial topics like vaccination are multi-faceted and cannot be dislodged or changed in short time spans. Future efforts to affect participant beliefs about complex problems like disease transmission and vaccination should give more time to discussing particularities of people's beliefs, where they see the models aligning with their conceptions of the problem, and where they see the models mis-aligning with their conceptions of the problem.

--Table 2—

Perhaps more reinforcing of the nature of people's beliefs is how individuals changed or maintained their beliefs after the model lesson. Of the 31 students who responded to both the pre- and post- assessment, 28 of the 31 maintained the same belief before and after the model lesson (Table 3). Two individuals began the lesson believing that some vaccines should be required and ended the lesson believing that all vaccines should be required. One individual began the lesson believing that no vaccines should be required and ended the lesson having believed that *some* vaccines should be required. While these cases are few, they will be examined more closely to determine what features of the model lesson dictated their shifting beliefs. Understanding these reasons can provide insight into what features of the GbCC model lesson some participants found relevant to changing their beliefs.

--Table 3—

Examining participants' explanations behind their answer choice to the pre- and post- assessment question provides insight into why they hold these beliefs. All explanations were transcribed, read, and notes were made about the general topics within their reasoning. After notes were compiled for each respondents pre- and post- answer, a coding scheme was developed and refined to capture patterns in the type of reasoning. The coding resulted in five codes that describe the major reasons people cite for holding their belief about required vaccination (Table 4): prevention, economic, risks, rights and responsibilities, personal experience, and unsure. Sub-codes emerged within each category to describe the variety of contexts each code appeared in. The first three codes – prevention, economic, and risks – were the most frequently cited reasons for requiring all, some, or no vaccines. A brief description of two patterns is provided below to characterize their pre- and post- assessment answers.

Anti-Vaccination Maintained Beliefs

Participant 32 recorded that they believed no vaccines should be required during the pre- and post-assessment, indicating that they held anti-vaccination beliefs and did not change throughout the course of the lesson. During their pre-assessment, to explain why they believed no vaccines should be required they wrote the following:

> *I don't think anything should be required because I think everything should be up to the parent [1]. However, I do strongly believe in vaccinating my children. I think vaccines should be strongly encouraged, especially for anything that could result in death. I really have no prior knowledge on the subject.*

This response was coded with two themes: Rights/responsibilities (RR) and risk (R). The first sentence (1) explicitly states that parents should have the right and ultimate say to choose whether their students are vaccinated or not (RR1). The second sentence in their explanation indicated that only the highest-risk diseases should be encouraged for vaccination, but not required (R4). This indicates the belief that illnesses that can be cured should not have vaccinations required by the state. Some scholars refer to this belief as *believing natural immunity is greater than vaccinated immunity* [4] [5]. After the modeling experience, the student recorded the same response (no vaccines should be required), and explained the following:

> *My decision has not changed. I still think everyone deserves their own choice. I still support vaccinations and think people should get them.*

This response indicates again that the participant believes it is the right of the individual or parent (RR1) despite this particular participant being personally pro-vaccination. The models used in this lesson could be modified in future implementations to incorporate the economic costs of non-malignant viruses like influenza to help preservice teachers understand the cost to public health. The model can also be modified to show the impact to immune-compromised students who cannot receive vaccinations.

Models reinforcing beliefs about vaccination

The intention of the lesson was to see if models have any role in dislodging or shifting beliefs about vaccination; yet there was little evidence to suggest this with the method of data collection we used. However, there were two instances where students mentioned the models as providing support to their belief about the need to require all vaccines during the post-assessment question:

> *I still think every child should be vaccinated - seeing the model and seeing how diseases can be spread at a fast pace was valuable. Really showed that protecting yourself is a good choice. (Participant 6)*

> *Seeing how quickly disease can spread/infection rates, my opinion has not really changed. (Participant 9)*

Both participants cite the model as evidence for why they *maintained* their belief that all vaccines should be required. Both respondents attended to the aspect of *speed* that was conveyed with the simulation. This notion of the speed of a viral epidemic should be attended to more when working with individuals who hold anti-vaccination beliefs.

Research Question 2: Re-designing the Disease Model

The design task in the last hour of the lesson served two purposes: (a) to engage preservice teachers in the act of model evaluating and revising (a central practice of scientific modeling); and (2) to see how conceptions of vaccination, disease transmission, and society emerge when they engage in model re-design. The original model showed a homogenous system where all the agents were “equal” in their ability to move and there was one vaccination rate. The task asked participants to think of a model that represented three different school sites with varying social and economic conditions as well as varying vaccination rates. This was done to highlight the unique problem described in the Austin case study, where some schools have dramatically lower vaccination rates than others. The analysis of these artifacts is an ongoing process, yet two models will be shown here to address the main strategies students engaged in while re-designing the model.

Modeling Strategy One: Separate agents for each school type
The most used modeling strategy to represent three school types with varying social, economic, and vaccination conditions is displayed below (Figure 2). This strategy places three types of agent to represent students from each of the three school types in the same interacting simulation space: A large public and affluent school; a large public and not affluent school; and a small private affluent school. A slider for each student type controls each the level of vaccination for each agent class. The agents in the model are geographically distributed and *come together* at certain points on the simulation space to interact. This demonstrates that preservice teachers were attending to: (a) the differing vaccination rates they would expect to see in across the three school types; and (b) the spaces in which contact might occur outside of isolated school sites.

--Figure 2—

Figure 2: Modeling strategy one presents all agents from varying school settings in a similar space with variables developed to control their interaction.

Modeling Strategy Two: Sliders control agents
Perhaps a more sophisticated model (Figure 3), participants in this group chose to think about the vaccination as the product of other social and economic variables interacting. This modeling strategy did not explicitly show the agents on the simulation space interacting, but rather displayed sliders that could be set to varying levels which control the rate of vaccination among a population. A graphic was inserted at the bottom to show the varying infection rates among different racial or ethnic communities in the simulation space.

--Figure 3—

Figure 3: Modeling strategy two presents no agents, but rather variables which interact to control vaccination level of the agents.

Conclusion
Analysis of the artifacts and video/audio data is on-going and will be used to inform next iterations of using GbCC models to engage preservice teachers in teaching and learning about complex phenomena. The results to date demonstrate that beliefs about complex and socially contentious problems like vaccination are pernicious and often maintained despite engaging with evidence to the contrary; however, modeling could provide a space to open individuals up to the many variables that interact within this problem space. While no preservice teachers were able in the time given to make computational modifications to the model, all participants were able to re-design the models based on their current understanding of vaccination in heterogenous systems. Future implementations of this work should include more explicit

instruction on how to author changes to the program of the model as well as more time to spend evaluating and re-designing the models.

References:

[1] J. Hellerstedt, "Annual report of immunization status of students. DSHS Immunization unit," Texas Department of State Health Services. [Online]. Available: https://www.dshs.texas.gov/uploadedFiles/Content/Prevention_and_Preparedness/immunize/coverage/schools/11-14849%20Annual%20Report%20of%20Immunization%20Status%20of%20Students_06-2018.pdf. [Accessed Oct. 14, 2018].

[2] A. Kata, "A postmodern pandora's box: Anti-vaccination misinformation on the internet," *Vaccine*, vol. 28, no. 7, 2010, pp. 1709-1716. doi: 10.1016/j.vaccine.2009.12.022.

[3] C. V. Schwarz, "Developing preservice elementary teachers' knowledge and practices through modeling-centered scientific inquiry," *Science Education*, vol. 93, no. 4, pp. 720–744, July, 2009. doi:10.1002/sce.20324.

[4] A. Kata, "Anti-vaccine activists, web 2.0, and the postmodern paradigm – An overview of tactics and tropes used online by the anti-vaccination movement," Vaccine, vol. 30, no. 25, pp. 3778-3789, 2012. doi: 10.1016/j.vaccine.2011.11.112.

[5] R. M. Jacobson, P. V. Targonski, & G. A. Poland, "A taxonomy of reasoning flaws in the anti-vaccine movement," *Vaccine*, vol. 25, no. 16, 2007, pp. 3146-3152. doi:10.1016/j.vaccine.2007.01.046.

[6] A. R. Vaughn, & M. L. Johnson, "Communicating and enhancing teachers' attitudes and understanding of influenza using refutational text," *Vaccine*. vol. 36, no. 48, 2018, pp.1-10, 2018. 10.1016/j.vaccine.2018.10.040.

[7] R. Lehrer, & L. Schauble, "Origins and evolution of model-based reasoning in mathematics and science," in *Beyond constructivism: models and modeling perspectives on mathematics problem solving, learning, and teaching*, R. Lesh & H. M. Doerr, Mahwah, NJ: Lawrence Erlabaum Associates, 2003, pp. 59-70.

[8] C. V. Schwarz, "Developing preservice elementary teachers' knowledge and practices through modeling-centered scientific inquiry," *Science Education*, vol. 93, no. 4, 2009, pp.720-744. doi:10.1002/sce.20177.

[9] R. Rosenberg-Kima, "Models and Simulations," in *The SAGE Encyclopedia of Educational Technology*, J. M. Spector, Ed.1, Thousand Oaks, CA: SAGE Publications, Inc. 2015, pp. 1-4

[10] U. Wilensky, "NetLogo," [Computer Software] Northwestern University, Evanston, IL: Center for Connected Learning and Computer-Based Modeling. http://ccl.northwestern.edu/netlogo.

[11] J. A. Danish, & N. A. Thompson, "Systems thinking," in *The SAGE Encyclopedia of Out-of-School Learning*, K. Peppler, Ed. 1, Thousand Oaks, CA: Sage Publications, Inc., 2017, pp. 1-4. doi: 10.4135/9781483385198.

[12] U. Wilensky, "NetLogo Web" [Computer Software]. Evanston, IL. Center for Connected Learning and Computer-Based Modeling. http://ccl.northwestern.edu/netlogo.

[13] Petrosino, A. J., Stroup, W. M., Harron, J. R., & Sherard, M. K. (2017, June). Group-based cloud computing for STEM education. Poster at the annual convention of the American Society of Engineering Education, Columbus, OH.

Tables and Figures:

Figure 1

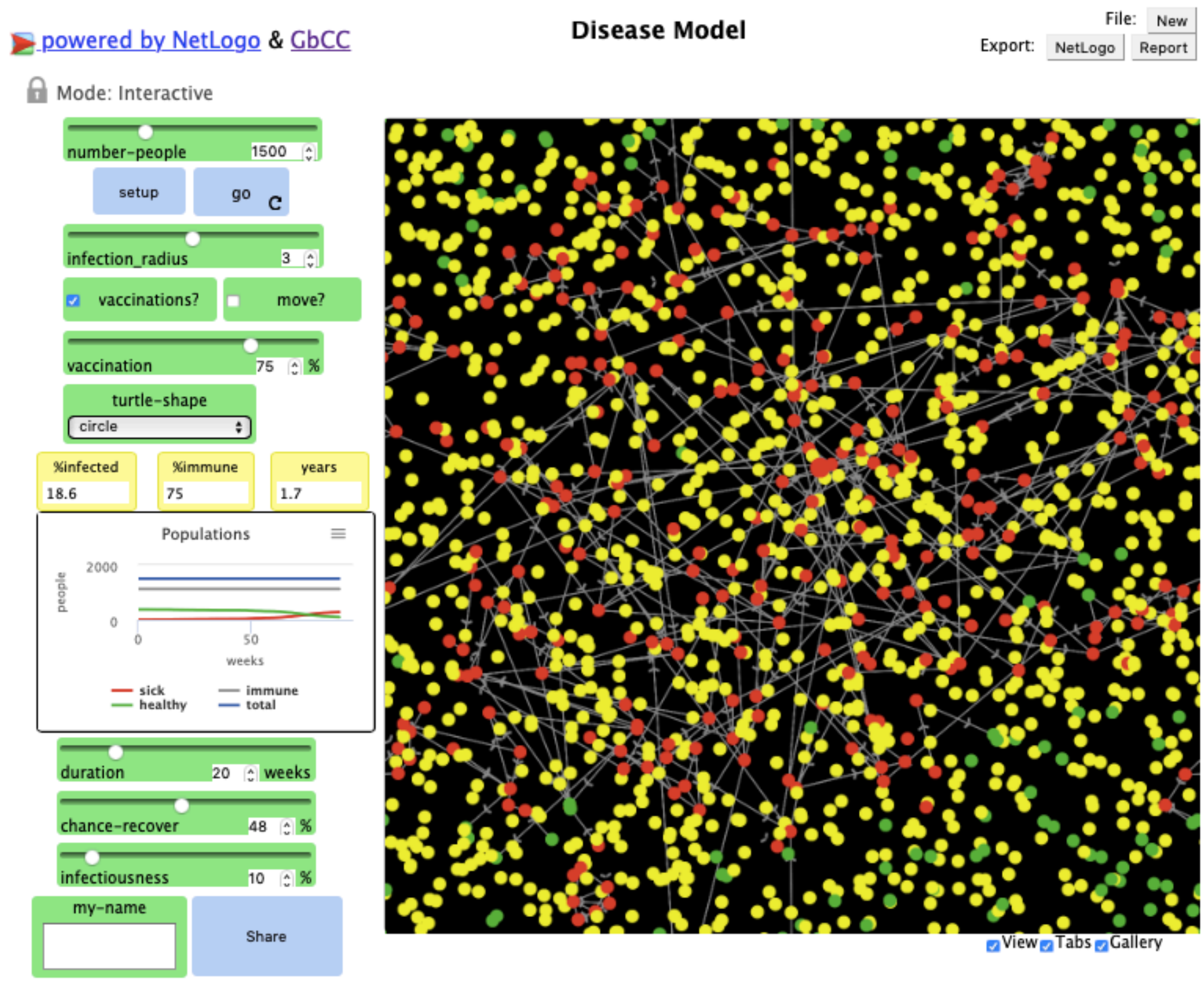
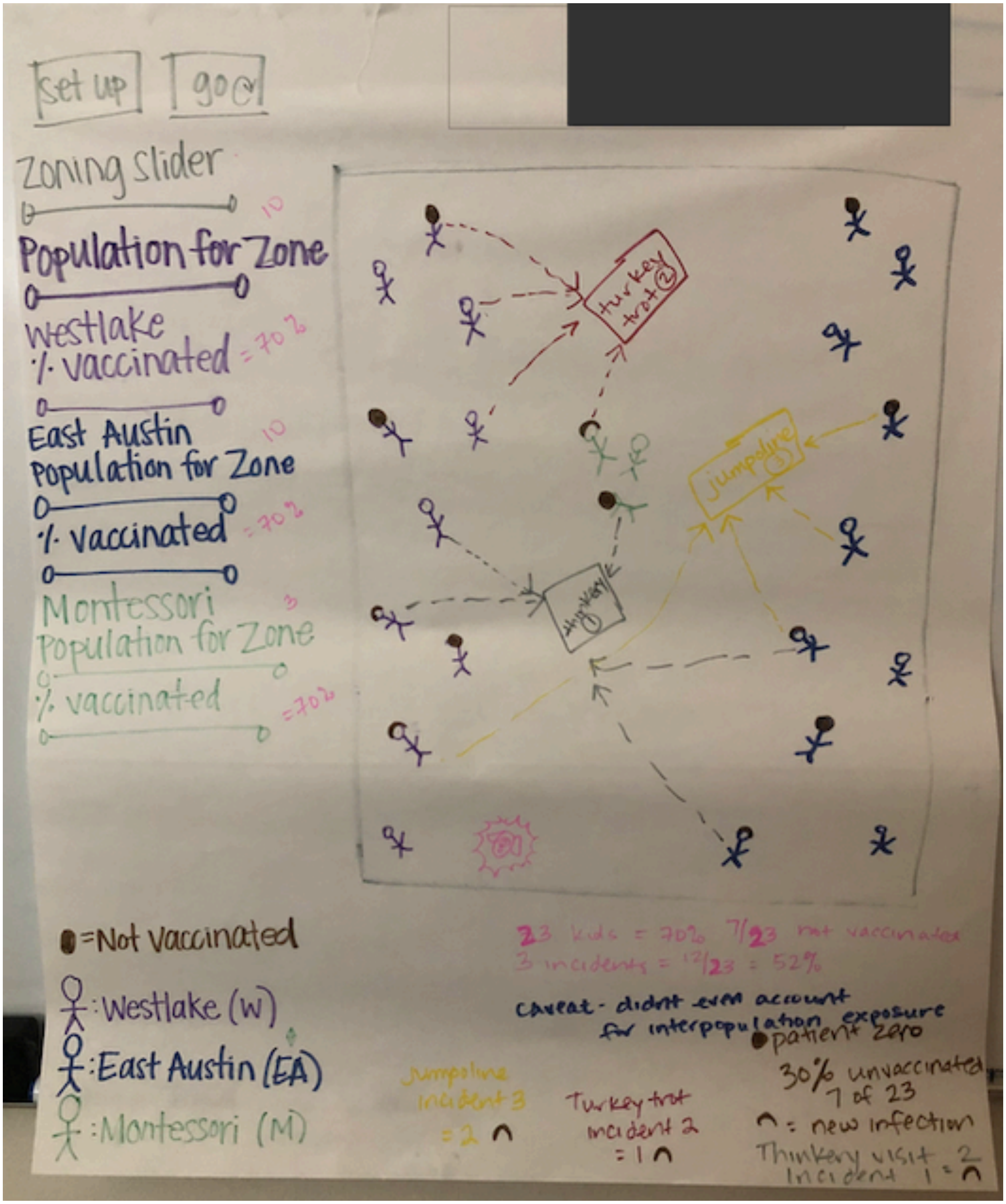


Figure 2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Zoning slider
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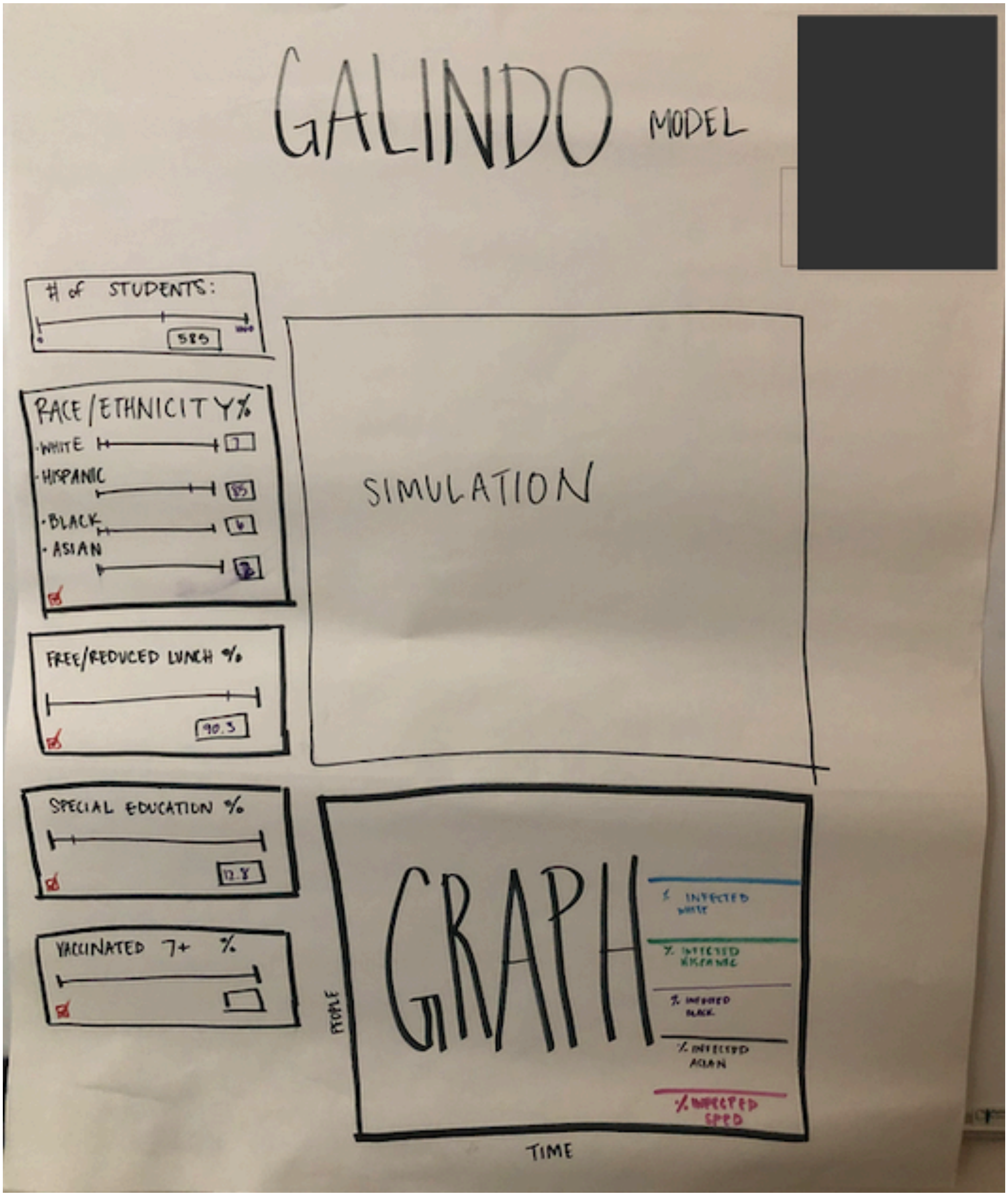
turkey trot 2
jumpoline 3
=Not Vaccinated
:Westlake (W)
:East Austin (EA)
:Montessori (M)
23 kids = 70% 7/23 not vaccinated
3 incidents = 12/23 = 52%
caveat - didn't even account for interpopulation exposure
patient zero
30% unvaccinated 7 of 23
= new infection
Jumpoline incident 3 = 2
Turkey trot incident 2 = 1
Thinkery visit incident 1 = 2

Figure 3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FREE/REDUCED LUNCH %
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Table 2:
Number of participants classified as having Pro- and Anti-Vaccination beliefs for students entering Kindergarten.

	Pro-Vaccination Beliefs		**Anti-Vaccination Beliefs**			
	All Vaccines Required		Some Vaccines Required		No Vaccines Required	
	Pre	Post	Pre	Post	Pre	Post
Participants (n = 31)	18	20	11	10	3	2

n = number of students who fall into this category

Table 3:
Number of participants maintaining or changing their beliefs about vaccination after the intervention.

	All Vaccines Required	**Some Vaccines Required**	**No Vaccines Required**
Maintaining Belief	17	9	2
Changing Belief	2	1	0

*Only individuals who responded to both the pre- and post-survey were included.

Table 4:
Codes for participants reasons why they support all, some, or no required vaccines for students entering kindergarten.

Codes	**Example from Participant Answers**
Prevention (P)	
(1) prevents illness	[Vaccines] prevents more sickness from spreading!
(2) prevents stress	[Vaccines] make sure you won't have to deal with the complications of [being sick]: physically, money-wise, and stress-wise.
(3) herd-immunity	Even though vaccines are great, they only work extremely well if everyone has it.
Risk (R)	
(1) Decreases risk of infection	[Your] Chances of you getting sick are lower.
(2) Children are higher risk	Because children are more susceptible to illnesses
(3) Immune-compromised individuals	All should be required because if a student isn't able to get a vaccine b/c of immune deficiencies
(4) Depends on the risk of the disease	It should be based on how much a disease can be cured.
Economic (E)	
(1) Cost of vaccines	I know that vaccines can be expensive, and some families might not believe in them

(2) Saves money	make sure you won't have to deal with the complications of [being sick]: physically, money-wise, and stress-wise
Rights and Responsibilities (RR)	
(1) Parents right to choose	I don't think anything should be required because I think everything should be up to the parent.
(2) Responsibility to community	I feel that it is your job as a citizen to keep you and the people around you safe
Personal Experience (PE)	
(1) Relating to anti-vaxxers	I'm staying the same because I know there are people who feel strongly against vaccinations for some reason
(2) Family history of not using vaccines	I've never gotten a flu shot nor has many people in my family
(3) Getting sick after vaccination	I have seen people get the flu after getting the flu shot
Unsure (U)	
(1) Not enough information	To preface, I feel like I don't know enough about each of these vaccines
No Response (NR)	