

AN ABSTRACT OF THE THESIS OF

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Abstract approved:

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This study aimed to evaluate the contingencies and reinforcements that most engage active high school (HS) students in a virtual classroom to learn and adopt healthy lifestyles. In Phase 1, 21 HS students completed focus groups about factors they perceived as engaging for them in learning about lifelong healthy habits. In Phase 2, three high schools were surveyed on the types of fluids that were available to active HS students and the number of water fountains in each school building. Both male and female high school students were most interested in learning about the types of foods that are helpful for an athlete's performance, as well as recovery foods. Among three sampled HS, the most common beverage was flavored water. The variety of fluids available to students significantly decreased after school hours. School demographics were notably different. Crescent Valley High School (CVHS) was higher in Whites (76%), Corvallis High School (CHS) was higher in Hispanics (13%), and Clackamas High School (CLHS) was higher in Asian (16%). Per 10,000 square feet, there were 0.77, 0.63, and 0.73 fountains at CVHS, CHS, and CLHS, respectively. These findings contributed to the WAVE Project intervention to prevent childhood obesity among active HS students.

Key Words: active, performance, demographic, high school, fluid, engaging, focus group.

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How To Engage Active High-School Students in A Virtual Classroom

To Learn and Adopt Healthy Lifestyles

By

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I understand that my project will become part of the permanent collection of Oregon State University, University Honors College. My signature below authorizes release of my project to any reader upon request.

Younghee Kim, Author

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How To Engage Active High School Students in A Virtual Classroom To Learn and Adopt Healthy Lifestyles

INTRODUCTION

The prevalence of obesity among children and adolescents continues to remain high and is considered a major public health issue (Ogden, 2014). Currently, the unprecedented high levels of obesity has occurred across every age, sex, race, and smoking status, and data indicate that segments of individuals in the highest weight categories have increased proportionately more than those in lower Body Mass Index (BMI) categories (Wright, Aronne, 2012). According to the Centers for Disease Control and Prevention, 60.3% are overweight and 26.8% are obese in Oregon alone among adults age 18 and over.

Unhealthy habits, including becoming more sedentary, are common after high school.

The goal of this study was to identify major factors, such as contingencies and reinforcements in group learning methods, that would engage high school students in learning about physical activity, nutrition, and Family and Consumer Sciences (PAN-FCS) to support healthy lifestyles that prevent obesity. The second phase of the study focused on the types of beverages available to high school students.

Table 1: 2010 State Obesity Rates by the CDC

2010 State Obesity Rates							
State	%	State	%	State	%	State	%
Alabama	32.2	Illinois	28.2	Montana	23.0	Rhode Island	25.5
Alaska	24.5	Indiana	29.6	Nebraska	26.9	South Carolina	31.5
Arizona	24.3	Iowa	28.4	Nevada	22.4	South Dakota	27.3
Arkansas	30.1	Kansas	29.4	New Hampshire	25.0	Tennessee	30.8
California	24.0	Kentucky	31.3	New Jersey	23.8	Texas	31.0
Colorado	21.0	Louisiana	31.0	New Mexico	25.1	Utah	22.5
Connecticut	22.5	Maine	26.8	New York	23.9	Vermont	23.2
Delaware	28.0	Maryland	27.1	North Carolina	27.8	Virginia	26.0
District of Columbia	22.2	Massachusetts	23.0	North Dakota	27.2	Washington	25.5
Florida	26.6	Michigan	30.9	Ohio	29.2	West Virginia	32.5
Georgia	29.6	Minnesota	24.8	Oklahoma	30.4	Wisconsin	26.3
Hawaii	22.7	Mississippi	34.0	Oregon	26.8	Wyoming	25.1
Idaho	26.5	Missouri	30.5	Pennsylvania	28.6		

According to Table 1, Oregon's obesity rate was at 26.8 back in 2010. The state of Mississippi was the highest, at 34% while Colorado was the lowest, at 21% (Centers for Disease Control and Prevention, 2014).

Hydration

An essential factor in preventing obesity is the topic of hydration. According to the National Obesity Forum, there is great evidence regarding the types of fluids consumed by individuals having long-term impacts on health, influencing the development of obesity and other metabolic diseases. Staying hydrated helps to keep the body maintain

its necessary levels of body fluids, which in turn affects diet and energy balance (National Obesity Forum, 2014). To ensure optimal hydration, it is important for all individuals to know how proper levels of hydration can help one to perform their best in an athletic event.

Maintenance of proper hydration levels is crucial in cognitive performance, as well as physical performance for student athletes and active students. Pre-exercise hydration status of an athlete is vitally important. Although hypohydration (a deficit in total body water or dehydration) pre-exercise is common for many athletes, studies investigating its influence on exercise performance are lacking. It has been observed, however, that hypohydration levels of between 2% and 7% of body mass during exercise can significantly affect performance, particularly in environments with a temperature of 30 degrees Celsius or more (Coe, Williams, 2011). Fluid consumption during exercise helps to maintain blood volume and cardiac output and can influence thermoregulation, ultimately aiding performance. However, this can be only beneficial if the duration of exercise is long enough for the fluid to be assimilated into the body.

Hydration for athletes is an area of great concern for athletic and health care professionals, such as certified athletic trainers and sports nutritionists, who urge athletes to maintain proper hydration to prevent dehydration. There may be many consequences of dehydration such as fainting, heat exhaustion, and in some extreme cases, heat stroke (Nichols et al., 2005). Dehydration can also impair mental and on-field performance in soccer athletes (Gibson et al., 2012).

In a study published in the Journal of Sports Sciences, researchers assessed the pre-game hydration status and fluid balance of elite young soccer players competing in a match played in heat for an official Brazilian soccer competition. Fluid intake was measured during the match, as were urine specific gravity and body mass before and after the game to estimate the hydration status. In conclusion, they found that sweat loss and fluid deficits can be high (up to 3% of body mass) in young soccer players taking part in a match played in the heat. They reported that the mean fluid intake was about half of the mean sweat loss, an indication that fluid replacement remains a challenge for certain athletes (Da Silva, 2012). A more effective strategy of fluid replacement is required for players competing in the heat. It is important that young soccer players are educated about the importance of pre-game hydration since several athletes are hypohydrated before kick-off.

There is a constant need for ongoing education of athletes regarding hydration and fluid replacement. Sports nutritionists, coaches, and athletic trainers not only need to educate athletes about proper hydration, but also by creating an environment that will promote positive attitudes and behaviors they can ensure that athletes will put their knowledge to practice (Nichols et al., 2005).

Physical Activity

Physical activity levels and obesity rates seem to remain inversely proportional. Lowered physical activity levels indicate higher levels of obesity rates. While physical activity is one of the most common options of energy output, there are many aspects which affect an

individual's physical activity levels. According to Steinbeck, physical activity in children is related to developmental states, reduced with increasing age, and influenced by parental physical activity. Physical activity is an accepted tertiary prevention strategy in obesity treatment (Steinbeck, 2008).

Nutrition

Nutritional science studies how the body metabolizes food and repairs and creates cells and tissues. According to Nordqvist, nutritional science also examines how the body responds to food (2014). Learning how different types of food groups affect the body is essential to understand how diseases such as obesity can be prevented with a healthy diet.

Family and Consumer Sciences

Family and Consumer Sciences (FCS) is about the research, knowledge, and skills that help people learn about the various ways of improving one's quality of life. This area of study focuses on issues that may affect individuals, families, and communities that relate to basic needs of relationships and resources that affect one's overall well being (American Association of Family & Consumer Sciences).

PAN-FCS knowledge and skill building are the main intervention of the WAVE~Ripples for Change obesity prevention program. This thesis focuses on looking into subjects and different topics that are most interesting for the high school students to be fully engaged. Participatory research, the co-construction of research between researchers and people affected by the issues under study, was used in the first phase of this project in order to

best prepare a PAN-FCS curriculum most applicable to active high school students in the Corvallis school district.

For the scope of this thesis, focus groups were conducted to identify the most interesting topics to current high school students to help them stay motivated and engaged in an obesity prevention intervention. Likewise, to inventory foods available to high school students would also take an extended period of time, therefore the scope of this thesis focused on the types of beverages sold on three different high school campuses, and the locations of water fountains.

MATERIALS AND METHODS

Study Design and Sample

Phase 1

Goal and Objective: To conduct a face-to-face focus group to identify motivations for high school students to engage in a PAN-FCS experiential learning program.

Recruitment and Enrollment of Subjects: Twenty-one high school male and female students attending Crescent Valley High School were recruited from a health class. There were two male groups and one female group.

Survey Instrument: A script was developed for conducting a gender-specific focus group. This method was selected because it was deemed most effective in evoking rich information and insights among this target audience that would have been difficult to obtain through other group interview methods. The script consisted of 10 questions about what topics high school students are interested in knowing and how they would learn best (Appendix A). Each facilitator asked questions and discussed responses with the students. The two all-male groups had one male facilitator each, and the all-female group had one female facilitator. Five note takers were present for the focus group discussions. The group interview was planned to last 45-60 minutes. The protocol allowed the facilitator to help refocus group discussion, when necessary, to ensure all questions were asked and discussed to preserve the research integrity.

Data Management: Focus group notes were compiled and coded by one person for common themes corresponding to topics in PAN-FCS curriculum development and strategies for experiential learning engagement.

Phase 2

Goal and Objective: To document the placement, availability, and accessibility of low calorie beverages, including water fountains, to high school students at school during and after school hours.

Recruitment of Schools: Crescent Valley High School, Corvallis High School, and Clackamas High School were surveyed. Corvallis High School and Crescent Valley High School are both located in the Corvallis school district while Clackamas High School is located in the Clackamas school district.

Survey Instruments: To survey the types of beverages available to students during and after school hours, a recording sheet listing different locations where the beverages are found was used (Appendix E). Prior to the survey, a campus map from the main office of each school was obtained for the surveyor to mark the geographical locations of all water fountains located in the school. Next, the average number of water fountains in each building was determined and reported by number per square footage. Permission was required to enter the school building and to walk around during school hours. The minimal distance between the school's soccer field and a water fountain was determined

by strides. An average stride was approximately 2.25 feet. A total of five round-trip trials were conducted by one surveyor to determine a precise average of the minimal distances.

Data Management: All data were recorded on papers, including marked school maps. For data analysis, the types of fluids available to students were further organized into categories of where beverages are located, and by when they were available (i.e., during school hours or after school hours). The school maps marked where water fountains and vending machines were located and the total counts per square footage and per student were reported. To analyze the distance between each school's soccer field and its closest water fountain, the total number of all five round-trips of strides made by one surveyor was averaged and reported in meters.

RESULTS

Phase 1

Twenty-one students from a health class at Crescent Valley High School completed the focus group in February 2014. There were three focus groups: two male groups (n=7 per group) and one female group (n=7). Each group received the same two sets of interview questions. The first set focused on the interests and experiences in nutrition and exercise. The second set focused on motivation to learn about PAN-FCS. Participants were asked how they learn best, what specifically engages them during class time, what some of their most enjoyable experiences were, and what they would imagine a good nutrition and exercise program would be like. The students expressed they would like a positive and encouraging learning environment full of discussions and peer input. They emphasized the importance of having a genuine teacher with a positive attitude as well as a competent individual who is confident in the content. Because all individuals learn differently, many students favored a variety of teaching techniques.

Table 2: Main themes in female and male responses about nutrition and exercise, and learning engagement

Questions	Female Responses	Male Responses
1. First, please tell me if you have an interest in nutrition and exercise.	<ul style="list-style-type: none"> Interested in nutrition and exercise for future health 	<ul style="list-style-type: none"> Most interested in different sports and which effective exercise methods enhance sports performance
		Continued on next page

Questions	Female Responses	Male Responses
2. Ok. So, what are your thoughts about developing a nutrition and exercise program for teens?	<ul style="list-style-type: none"> • A program that helps with time management and one that is applicable to life 	<ul style="list-style-type: none"> • A program that is practical and one that consists of recommendations and information regarding what kinds of diets are appropriate for specific sports
3. Thank you for those responses. In order to help us develop a good program, can you please tell me what topics or questions you think should be included in a nutrition program?	<ul style="list-style-type: none"> • Healthy recipes that are great alternates to different foods 	<ul style="list-style-type: none"> • What kinds of foods are appropriate for specific activities • Meals that deliver all daily recommendations
4. Ok. Now, I'd like you to share with me some of your personal experiences with nutrition and/or exercise.	<ul style="list-style-type: none"> • Not knowing what to eat before practices or athletic events • Either ate food and did not feel well afterwards, or didn't consume any food all day to avoid feeling sick 	<ul style="list-style-type: none"> • Learning about different diets regarding individual sports • Runner stopped consuming fast food • Wrestler on a smoothie diet to drop weight
5. Looking toward your future, are you interested in the ways nutrition and exercise impact your health as you age into your 40's, 50's, 60's, etc.?	<ul style="list-style-type: none"> • Future health • Keeping workout schedules with friends and keep each other accountable 	<ul style="list-style-type: none"> • More concerned about 20's and 30's health • Staying healthy and active in college
6. Ok. So, keeping with the impact of nutrition and exercise on health as you age, what are some specific nutrition and exercise questions or nutrition topics that you would like to learn more about?	<ul style="list-style-type: none"> • Major side effects of fast food • Specific foods to consume for specific activities • Cooking and eating healthy 	<ul style="list-style-type: none"> • Concerned about exercise and bodies • What should be consumed to improve performance • How to eat healthy on a limited budget • Evolution of bodies in the future
		Continued on next page

Questions	Female Responses	Male Responses
7. So, thinking about your personal experiences, how would you describe how you learn best?	<ul style="list-style-type: none"> • Hands on learning • Discussion-based learning environment 	<ul style="list-style-type: none"> • Working in smaller groups • Have goals set • Competition among students
8. Can you tell me more about what specifically engages you during class time?	<ul style="list-style-type: none"> • Smaller groups and one on one attention from teachers 	<ul style="list-style-type: none"> • Working through examples • Learning through variety of techniques • Videos, presentations, games, activities
9. What about your most enjoyable experiences, can you describe one or more of these for me?	<ul style="list-style-type: none"> • Teacher's attitude and personality is important in creating positive learning environment 	<ul style="list-style-type: none"> • Freedom to explore different learning methods
10. I'd like to finish by asking you to tell me what you would imagine a good nutrition and exercise program would be like for you.	<ul style="list-style-type: none"> • Peer discussion based learning environment • Variety of activities to learn and stay engaged in lesson 	<ul style="list-style-type: none"> • Rewards and goal-oriented environment • Experiment and track own progress • See positive results in their efforts to improve their health

Phase 2

Beverages available during school hours at the sampled high schools included bottled water, flavored water, 100% juice, milk, sports drinks, soda, and others such as diet tea and sparkling water (Figure 1). Beverages available after school hours included bottled water, flavored water, 100% juice, sports drinks, soda, and others such as diet tea (Figure 2).

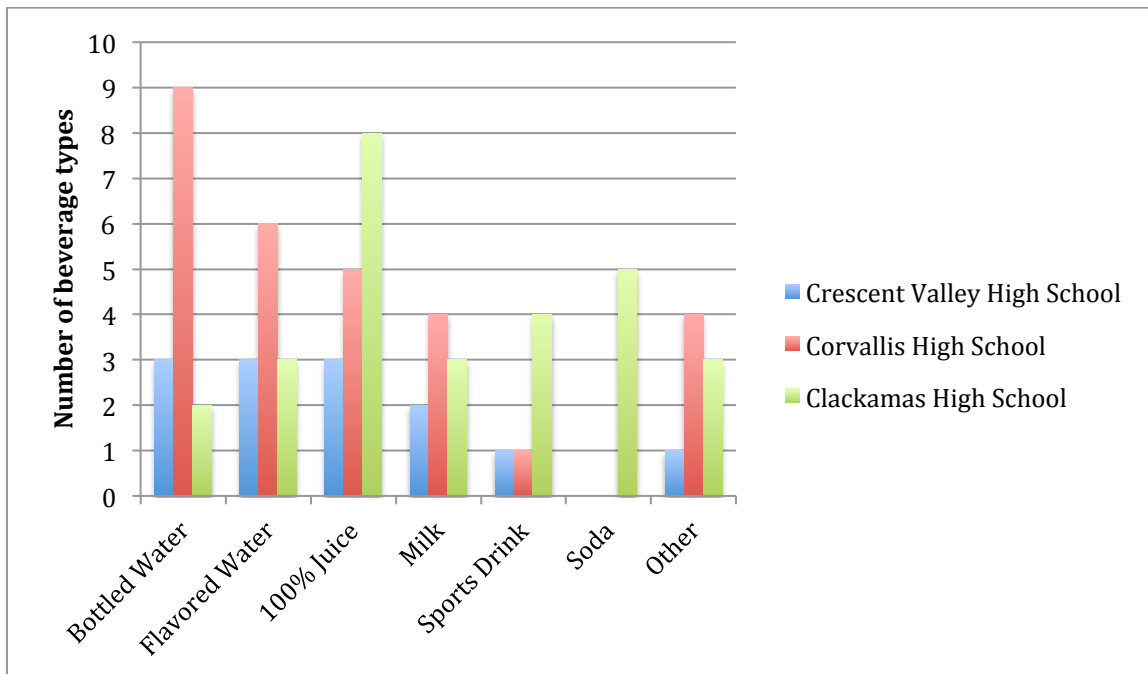


Figure 1: Beverages available during school hours at sampled high schools

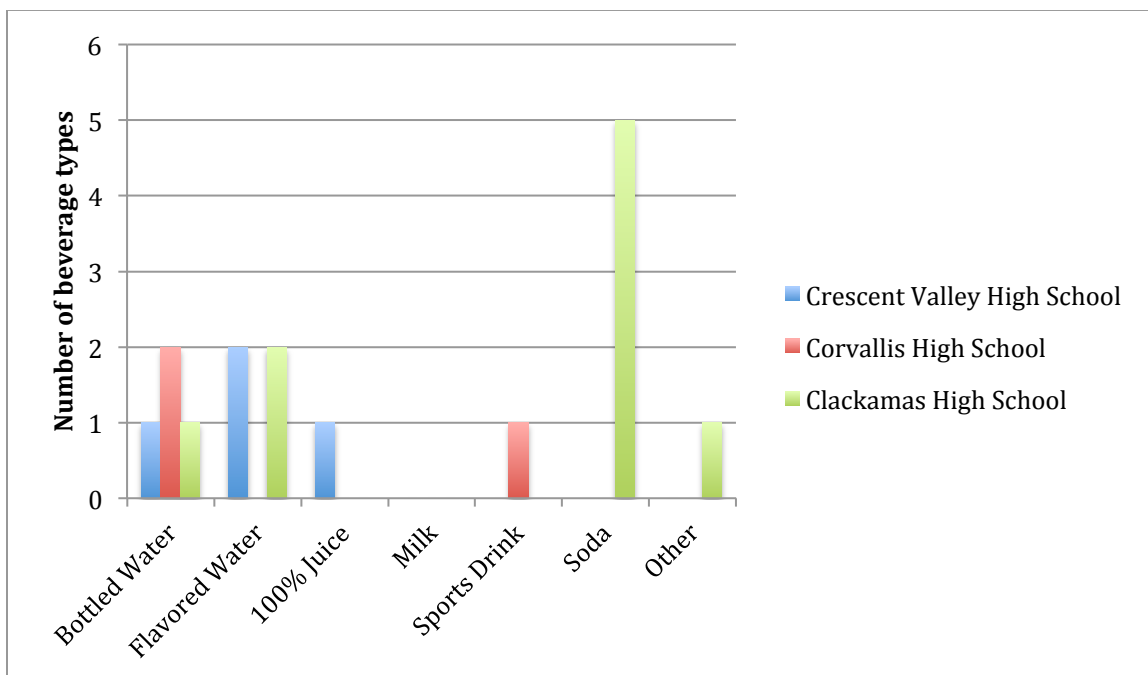


Figure 2: Beverages available after school hours at sampled high schools

Table 3: Beverages available at Crescent Valley High School

Cafeteria	Vending Machine
<ol style="list-style-type: none"> 1. Aquafina bottled water 2. Lipton Diet Tea 3. Powerade Zero Calorie Sports Drink 4. V8 Fusion 100% Juice 5. Snapple 100% Juice 6. SoBe 0 Calorie Lifewater 7. Nestle bottled water 8. Lochmead 1% Lowfat Milk 9. Lochmead Fat free Chocolate Milk 	<ol style="list-style-type: none"> 1. 100% Snapple Juice 2. Aquafina bottled water 3. Propel flavored water 4. SoBe 0 Calorie Lifewater

Table 4: Beverages available at Corvallis High School

Cafeteria	Vending Machine	Snack Store
<ol style="list-style-type: none"> 1. Fat free chocolate milk 2. Fat free milk 3. 1% Lowfat milk 4. Snapple 100% Juice 5. Propel Flavored Water 6. Pure Spring Water 7. Nestle Pure Life bottled water 8. Diet Gold Peak Tea 9. Treetop 100% Juice 10. Flavored Water: VitaRain Zero 11. Aquafina Flavored Water 12. Hansen's Natural 100% Juice 	<ol style="list-style-type: none"> 1. Aquafina water 2. Powerade Zero Calorie Sports Drink 3. Dasani Water 	<ol style="list-style-type: none"> 1. Smart Water 2. Arrowhead Water 3. Aquafina Water 4. Nestle water 5. Propel water 6. Sparkline ICE Lemon Lime Zero Calorie drink 7. Treetop 100% Juice 8. Caprisun 100% Juice 9. Hansen's Natural 100% Juice 10. Organic Soy Milk 11. Fat Free Milk 12. 1% Lowfat Milk 13. Fat Free Chocolate Milk 14. SoBe Lemonade 15. Gold Peak Diet Tea 16. Diet Snapple Tea 17. VitaRain Zero water 18. Flavor Splash Sparkling Berry Loco 19. Aquafina flavored water 20. Vitamin Water 21. Switch 100% Sparkling Juice 22. SoBe Lifewater 23. WAT-AAH Water

Table 5: Beverages available at Clackamas High School

Cafeteria	Vending Machine
1. Tree Ripe Apple Juice	1. 20 Oz. Diet Pepsi
2. Tree Ripe Orange Juice	2. Diet Mountain Dew
3. Darigold 1% Lowfat Milk	3. Diet Dr. Pepper
4. Darigold Chocolate Milk	4. Diet Pepsi Wild Cherry
5. Darigold Fat Free Milk	5. Pepsi Max
6. SoBe Lifewater	6. Aquafina water
7. SoBe tropical Blend	7. Lipton Citrus Diet Tea
8. Gatorade Berry	8. Flavored Aquafina water
9. Gatorade Lemon-Lime	9. Flavored Propel water
10. V8 Splash Berry Blend	
11. V8 Fusion Strawberry	
12. Naked Strawberry-Banana	
13. Naked Green Machine	
14. Naked Mango	
15. Naked Berry Blast	
16. Aquafina water	
17. Propel Kiwi	
18. Propel Berry	
19. Switch Sparkling Juice Lime	

Tables 3-5 showed the types of beverages available at each sampled high school. The most popular beverages among all sampled high schools included bottled water, flavored water, and 100% juice. White and chocolate milk, either fat free or 1%, are available in the cafeterias at each sampled high school. Vending machines have bottled water, flavored water, 100% juice across all three sampled high schools, however Clackamas High School also provides diet soda in the vending machines.

Table 6: Number of water fountains and vending machines in each high school

School Name	Building Assessed	Number of Water Fountains	Number of Vending Machines
Corvallis High School	Main Campus	14	3
	T Building	1	0
	H Building	1	0
Crescent Valley High School	Main Campus	19	3
Clackamas High School	West Campus	18	5
	East Campus	8	2

The total number of water fountains placed in each high school is shown in Table 6.

Please refer to Appendix C for locations of all the water fountains marked on each high school's campus map. Crescent Valley High School has a student population of 1,021 students in a 247,071 square footage campus. Corvallis High School has a student population of 1,159 students in a 252,352 square footage campus. Clackamas High School has a student population of 2,251 students in a 366,721 square footage campus. Each high school has varying diversity among the student demographics. Figure 3 shows the student demographics of the sampled high schools.

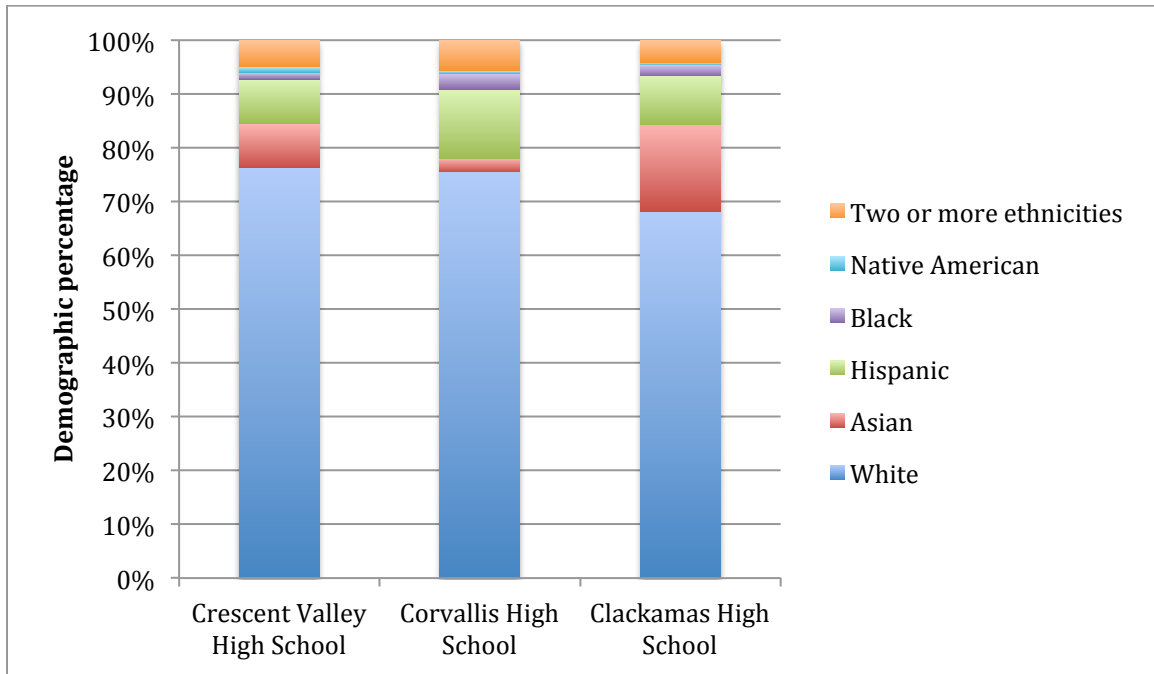


Figure 3: Student demographics for sampled high schools

Table 7: Availability of water fountain per square footage

Crescent Valley High School	<ul style="list-style-type: none"> • 247,071 square feet • 0.77 fountain per 10,000 sq. ft.
Corvallis High School	<ul style="list-style-type: none"> • 252,352 square feet • 0.63 fountain per 10,000 sq. ft.
Clackamas High School	<ul style="list-style-type: none"> • West campus: 265,355 square feet • East Campus: 101,366 square feet • Overall: 366,721 square feet • West campus: 1 water fountain per 14,742 square feet • East campus: 1 water fountain per 12,671 square feet • Overall: 0.73 fountain per 10,000 sq. ft.

Table 7 shows the campus sizes of each sampled high school. Clackamas High School is the largest and Crescent Valley High School is the smallest campus among the sampled high schools.

Table 8: Distance from soccer fields to the closest water fountain

	Distance from field to stadium fountain (meters)	Distance from field to campus fountain (meters)
Crescent Valley High School	Not Applicable	48.0
Corvallis High School	54.2	125.5
Clackamas High School	36.4	85.7

Table 8 shows the measured distances from soccer fields to the closest water fountain. When the distance between the stadium fountain and soccer field were measured, they were shorter compared to the distance between the campus fountain and soccer field at each high school.

DISCUSSION

Phase 1

The focus group in Phase 1 found that both male and female high school students were most interested in learning about the types of foods that are helpful for an athlete's performance, as well as recovery foods. In addition to the types of foods, the majority of male and female students showed interest in learning about preventative health, as well as learning how to be self-equipped and efficient in cooking for oneself. The importance of fluid intake was not a strong topic in the focus groups for both males and females. It is possible that they have already been educated on the topic, or it could be an indication of more education needed on all aspects of food intake for a healthy lifestyle

When students were asked about their motivations for learning in an obesity prevention program, the majority emphasized the essentiality of the teacher's positive energy, the power of peer education, discussions, and a variety of teaching approaches used in an attempt to reach all students with different learning styles. The students agreed on one main aspect in an education setting: to have positively filled energy in a learning environment.

Application. Findings from Phase 1 can be applied to effective strategies in teaching active high school students. For example, for an hour-long lesson, the instructor may create a welcoming and positive learning environment for this target audience by beginning the lesson with a fun ice breaker. An ice breaker serves the purpose of helping students learn better by allowing them to get involved physically, mentally, and

emotionally. Ice breakers reduce student anxiety and are powerful motivation for peer-to-peer interactions. Following an ice breaker or two, discussion questions can be facilitated among groups of students including boys and girls. Encouraging peer discussions can help students gain more confidence in voicing their opinions and in building a well thought-out answer to questions. In addition to a discussion-based learning environment, the teacher should be reminded of different learning styles. So, a variety of teaching techniques can be integrated because each student learns best in different ways. For examples, showing a video clip may help students stay engaged after a lesson is taught, doing hands-on activities that allow students to move around and learn from their work, which may help them remember the information better. After students have worked through their activity, the instructor may provide a handout of the lesson. Teaching students the background knowledge after the students have conducted the activity is essential in the learning and retaining of information. When students learn new information they have never thought of after their experiment, new knowledge will be remembered more easily, especially from correcting their mistakes (Kirwan, 2014).

Phase 2

The three high schools we surveyed were located in two different school districts. They were selected intentionally to compare differences between the two school districts. In terms of the variety of fluids sold at schools, Clackamas High School was the only high school that made soda available to students. Although sodas were not sold in the cafeteria as part of students' meal plans, several diet soda vending machines were scattered throughout the school campus.

In terms of when the fluids were available to students at school, it was important to identify the types of fluids that are sold to students after school hours because student athletes practice after school hours, and they would need to rehydrate themselves after the practice. All high school sports, including practices and games, along with other school activities are considered as after school hour activities. These events and times are not included in curriculum minutes. Among these three schools, fluids available to students during school hours included everything offered on campus. These included all options in the cafeteria, vending machines, snack store, and water fountains. Fluids available to students after school hours only included vending machine options and water fountains. There were more options for students during school hours. However, they are usually offered only during a certain time frame. Lunch hours at these high schools ranged from 30 minutes to 55 minutes. Specifically, Clackamas High School's lunch hours were 11:34 a.m. to 1:39 p.m. Crescent Valley High School's lunch hour was 11:20 a.m. to 11:55 a.m. Corvallis High School's lunch hour is 11:20 a.m. to 11:50 a.m. These lunch hours were taken from each school's bell schedule.

Tables 3, 4 and 5 show the different beverages available in each high school. Figures 1 and 2 show the types of fluids available during school hours and after school hours, respectively. Regardless of the length of lunch hours, all three high schools offered similar beverages such as water, flavored water, 100% juice, milk, as well as diet teas and sports drinks, except that Clackamas high school offered diet sodas in vending machines while the other two high schools did not. Here is one possible reason: the differences between types of beverages sold among the three high schools depend on the different

vendors and policies of each school district. The Corvallis School District might have contracts with vendors that may limit their ability to provide soda to schools, while the Clackamas School District might have contracts that allow diet soda to be sold as a beverage. Regardless, all schools complied with the policy of selling beverages that are below 15 calories per serving, with the exception of 100% juices.

There is a correlation between the distribution of water fountains in Corvallis High School and the abundance of bottled water sold at the high school. Corvallis High School has 0.63 fountains per 10,000 square feet. This is the lowest value compared to 0.77, and 0.73 for Crescent Valley High School and Clackamas High School, respectively.

Corvallis High School has the most variety in bottled water and flavored water sold on campus making it a possible indication of a shortage of water fountains available for students to stay adequately hydrated.

Student demographics of each of the three high schools are shown in Figure 3.

Demographics of a given school can show the population that is directly affected by the beverages sold in each high school. Clackamas High School has the largest student enrollment of 2,251 students. Corvallis High School has 1,159 students and Crescent Valley High School has 1,021 students. The biggest difference in the school demographics includes the largest student enrollment and largest percentage of an Asian population attending Clackamas High School. There is no evidence that the Asian population consumes more diet sodas or juices, therefore the types of beverages available

to schools are likely to depend on the types of agreements between school districts and their vendors.

Based on the preliminary findings of this study, each high school may improve the school environment to support student athletes' hydration levels by adding more water fountains near the soccer fields. Schools may also change their hours of operation for cafeteria and snack store to provide healthy options of fluids to allow for more access throughout the school day. In addition, on special game days and athletic event days, snack shops may be opened after school for a limited amount of time to support better hydration for student athletes.

Strengths of The Study

This study has several strengths. First, the focus group interview in Phase 1 was conducted among a target audience of active high school students, who were comparable to that of the WAVE Project. Second, site visit at surveyed high school provided opportunities for the surveyor to observe student activities to better document the context of the location, availability, and accessibility of fluids and water fountains to students on campus.

Limitations of The Study

This study contained several limitations: 1) most of the facilitators and note takers of the focus groups were less experienced in qualitative research. As both a science and an art, qualitative analysis involves critical, analytical thinking and creative, innovative

perspectives. In the process of getting to know the data, focusing the analysis, categorizing the information, identifying patterns and connections within and between categories, and interpretation of the entire set, there have been a lot of gray areas in learning how to avoid any generalizations. During focus group interventions, there were different students and note takers for each group (female, male 1 and male 2). Therefore, facilitation styles of different facilitators, as well as note takers could show variation in the notes that were taken and then analyzed. An ideal focus group would consist of the same facilitator and same note taker throughout each group in order to keep data collected as consistent as possible; 2) the focus group interviews were only conducted at one high school; 3) themes of all responses were coded by one person, 4) the fluids surveys were also completed by one person; and 5) the minimum distance from one water fountain to the soccer field were measured using strides. There might have been better options in approaching this if more resources were available.

There were unexpected challenges faced in conducting this study. In the efforts of finding the square footages of each school and whether if there were any policies for water fountain placements in high school buildings, I emailed and called numerous representatives from the city hall, school district offices, specific facilities, and maintenance offices. Several people were able to provide information regarding the building square footage, however they were different each time. Nobody was able to provide information regarding any policies.

Recommendations for Future Research

There is always room for improvements in any study. For examples, 1) the protocol for data collection may include clearer instructions; 2) the survey recording sheet may be adapted in advance to match to the school setting prior to the onsite survey; and 3) communication with the school security and the principal may be improved through prior exchange of details regarding the visitors and school rules on walking on school premise.

CONCLUSIONS

This study identified the contingencies and reinforcements from active high school students aged 15-18 to serve as preliminary data for the development of the WAVE obesity prevention PAN-FCS curriculum. In addition, findings from the fluids survey in three high schools help in the development of a more relevant curriculum for this target audience, and in the development of virtual learning activities to better reflect the fluid options available to students to choose in the physical world when they apply their knowledge learned in class to the virtual simulations. Obesity levels remain high in the nation and in Oregon. In an approach to help and serve the community by education consisting of simple and doable tasks, this project has contributed a small but important aspect to help the WAVE project move forward in developing its intervention to prevent childhood obesity among active high school students.

BIBLIOGRAPHY

- Adult Obesity Facts. 2014. *Centers for Disease Control and Prevention*.
- Afridi, A.K. and Khan, A. 2004. Prevalence and Etiology of Obesity-An Overview. *Pakistan Journal of Nutrition* 3.1:14-25.
- Agbonlahor, E.I., Ikhioya, G.O. and Okaka, R.O. Strategies for Preventing and Managing Overweight and Obesity. *Pakistan Journal of Nutrition* 8.10:1689-1692.
- Clackamas High School. 2014. *Oregon Multiple Listing Service system*.
- Coelho, J.S., Souza, R.A., Barbosa, D. and Oliveira, A. 2007. Effects Of A Handball Match On The Hydration Status Of Amateur Athletes. *Fitness & Performance Journal* 6.2:121-125.
- Corvallis High School. 2011. Corvallis, OR Enrollment & Demographics. *USA School Info*.
- Crescent Valley High School Corvallis OR. 2014. *Find Good School*.
- Da Silva, R.P., et al. 2012. Pre-game hydration status, sweat loss, and fluid intake in elite Brazilian young male soccer players during competition. *Journal of Sports Sciences* 30.1:37-42.
- Gibson, J.C., et al. 2012. Hydration Status And Fluid And Sodium Balance In Elite Canadian Junior Women's Soccer Players In A Cool Environment. *Applied Physiology, Nutrition & Metabolism* 37.5:931-937.
- Hydration for Health-Healthy hydration & obesity. 2014. *National Obesity Forum*.
- Jagosh, J., et al. 2012. Uncovering The Benefits Of Participatory Research: Implications Of A Realist Review For Health Research And Practice. *Milbank Quarterly* 90.2:311-346.
- Kirwan, L. 2014. Making mistakes is part of the learning process. *Nursing Children & Young People* 26.5:15.
- Mazerolle, S.M., Casa, T.M., and Casa, D.J. 2009. Heat And Hydration Curriculum Issues: Part 2 Of 4--Exercising In The Heat. *Athletic Therapy Today* 14.3:42-47.
- Nichols, P.E., et al. 2005. Knowledge, Attitudes, And Behaviors Regarding Hydration And Fluid Replacement Of Collegiate Athletes. *International Journal Of Sport Nutrition & Exercise Metabolism* 15.5:515.
- Nordqvist, C. 2014. What is nutrition? Why is nutrition important? *Medical News Today*.

| Ogden C.L., Carroll, M.D., Kit, B.K., and Flegal K.M. 2014. Prevalence of childhood and adult obesity in the United States. *Journal of the American Medical Association* 311.8:806-814.

Steinbeck, K.S. 2001. The Importance Of Physical Activity In The Prevention Of Overweight And Obesity In Childhood: A Review And An Opinion. *Obesity Reviews* 2.2:117-130.

Taylor-Powell, Ellen & Renner, Marcus. *Program Development & Evaluation: Analyzing Qualitative Data*. Wisconsin: Cooperative Extension Publications, 2003. Print.

Wright, S. and Aronne, L. 2012. Causes Of Obesity. *Abdominal Imaging* 37.5:730-732.

APPENDICES

APPENDIX A. Focus Group Questions**Focus Group: WAVE PAN-FCS Curriculum**

February 11, 2014

Objective

To guide the development of the PAN-FCS curriculum for year 1 and year 2.

Year 1:

- To determine engaging activities for in-class and VLE

Year 2:

- To provide insight into topics of interest relating to nutrition, exercise and health among teenagers

Preparation/what is needed:

Paper, pens

Scripts of questions

Incentives

Target Population

Primary: High school-aged youth; mixed gender

Secondary: Active youth/athletes

Group Sizes

Class size= 24 males, 7 females

Desired group divisions: k=2 (1 girl, 2 boy); n~10

Facilitators

Females: Rachel Kelly

Males: Andrew Derringer; Alex Taraghi

Note Takers

Alissa Kummer

Younghee Kim

Yu Meng

Gretchen Dursch

Kari Pilolla

Pilolla

WAVE

Focus Group: WAVE PAN-FCS Curriculum

February 11, 2014

Focus Group Script with Questions

- I. Introduction –*Kari will introduce the “program”;* you will then introduce yourself. (Avoid using terms such as research, study, data)

Hello & welcome. My name is _____, I am majoring in _____ at OSU, and my plan is to _____ (career goals).

As Kari has already mentioned, I am here representing a group of people who are developing a program on nutrition and exercise for teens. We would like your help in guiding the format, content, and activities used in this program.

Since you all already know each other, and I’ve told you a little about me, I’d like to learn a little about you. Please tell me your first name and what your current plans are for after high school.

Thank you for sharing. Briefly reflect on their comments.

NOTES

Focus Group: WAVE PAN-FCS Curriculum

February 11, 2014

II. Questions

To start off, I'd like to ask you some question about your interest and experiences in nutrition and exercise.

1. First, please tell me if you have an interest in nutrition and exercise.

Focus Group: WAVE PAN-FCS Curriculum

February 11, 2014

2. Ok. [Can provide reflective feedback].... So, what are your thoughts about developing a nutrition and exercise program for teens?

Focus Group: WAVE PAN-FCS Curriculum

February 11, 2014

3. Thank you for those responses. [*Pause.*] In order to help us develop a good program, can you please tell me what topics or questions you think should be included in a nutrition program?

Focus Group: WAVE PAN-FCS Curriculum

February 11, 2014

4. Ok. [*Pause.*] Now, I'd like you to share with me some of your personal experiences with nutrition and/or exercise.

Focus Group: WAVE PAN-FCS Curriculum

February 11, 2014

Now I'd like to hear about your thoughts regarding nutrition and exercise for health.

5. Looking toward your future, are you interested in the ways nutrition and exercise impact your health as you age into your 40's, 50, 60's, etc?

Focus Group: WAVE PAN-FCS Curriculum

February 11, 2014

6. Ok. So, keeping with the impact of nutrition and exercise on health as you age, what are some specific nutrition and exercise questions or nutrition topics that you would like to learn more about? (You may need to repeat this & rephrase as necessary)

Focus Group: WAVE PAN-FCS Curriculum

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This is really good information for our staff to consider when developing the content of the program. However, they also need to learn more about how you would like to learn this information.

1. So, thinking about your personal experiences, how would you describe *how you learn best*?

Focus Group: WAVE PAN-FCS Curriculum

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2. Can you tell me more about what specifically engages you during class time?

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3. What about your most enjoyable learning experiences? Can you describe one or more of these for me?

Focus Group: WAVE PAN-FCS Curriculum

February 11, 2014

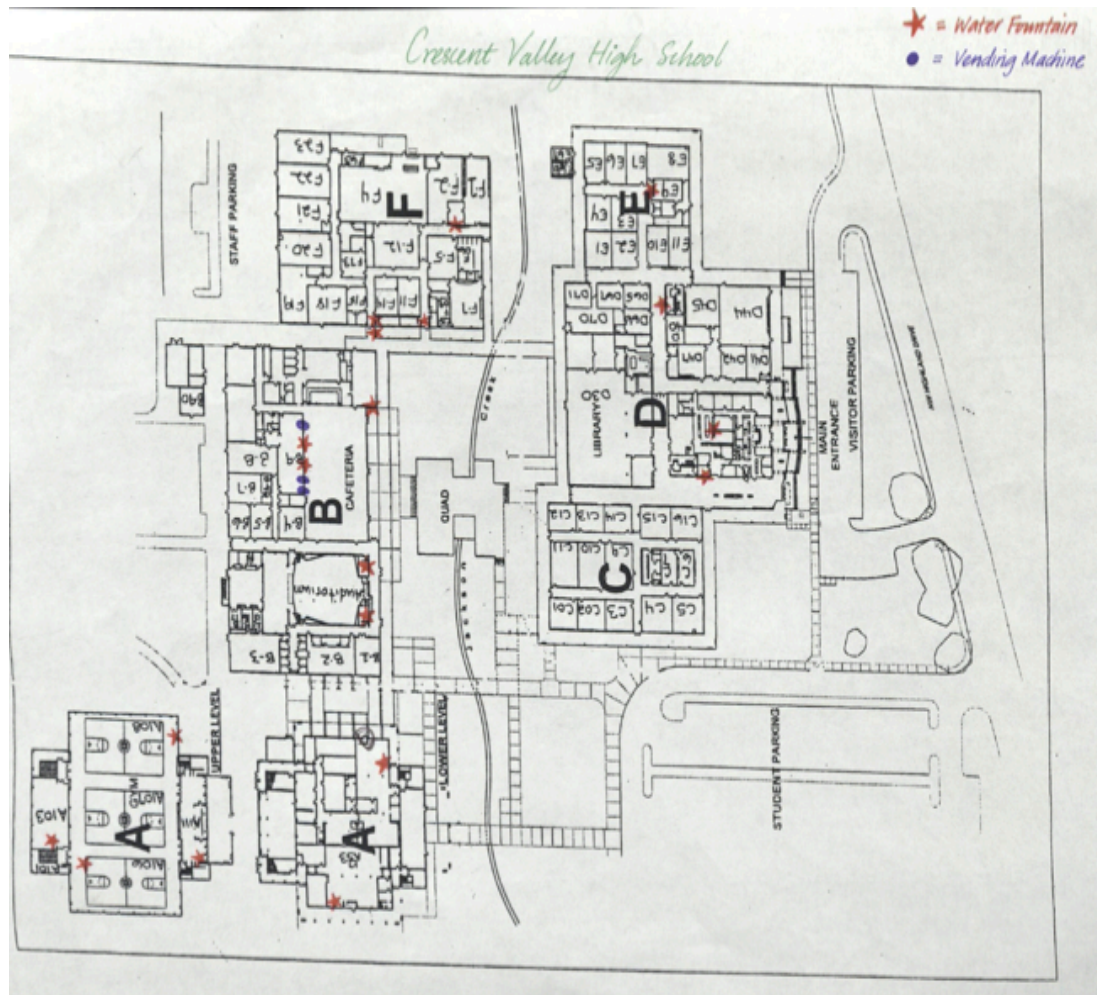
Wrap up question: I'd like to finish by asking you to tell me what you would imagine a good nutrition and exercise program would be like for you.

III. Conclusion

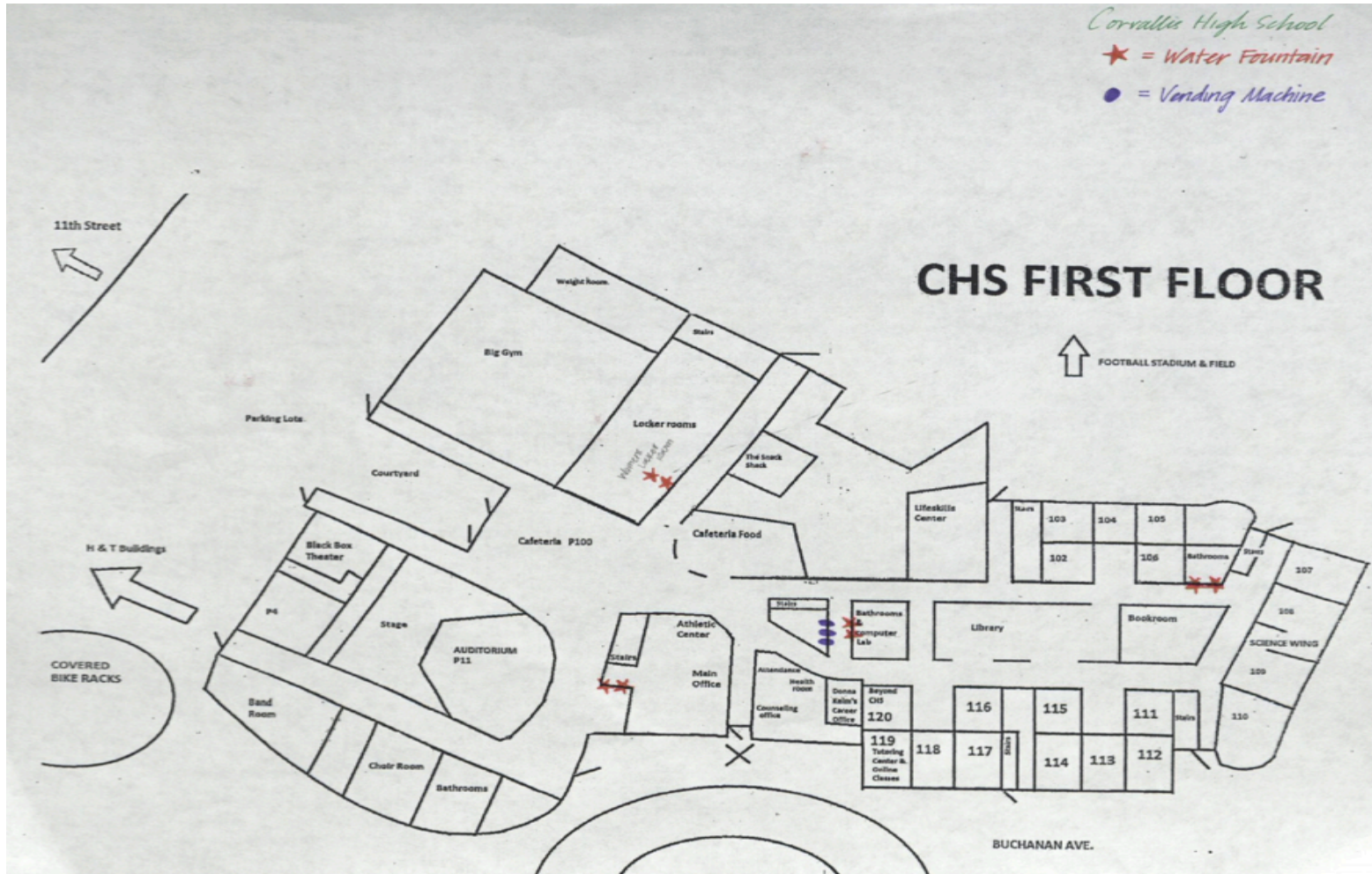
These are all the questions I have for you. Thank you so much for sharing your thoughts with me today; your comments will really help us move our project forward.

Pilolla
WAVE

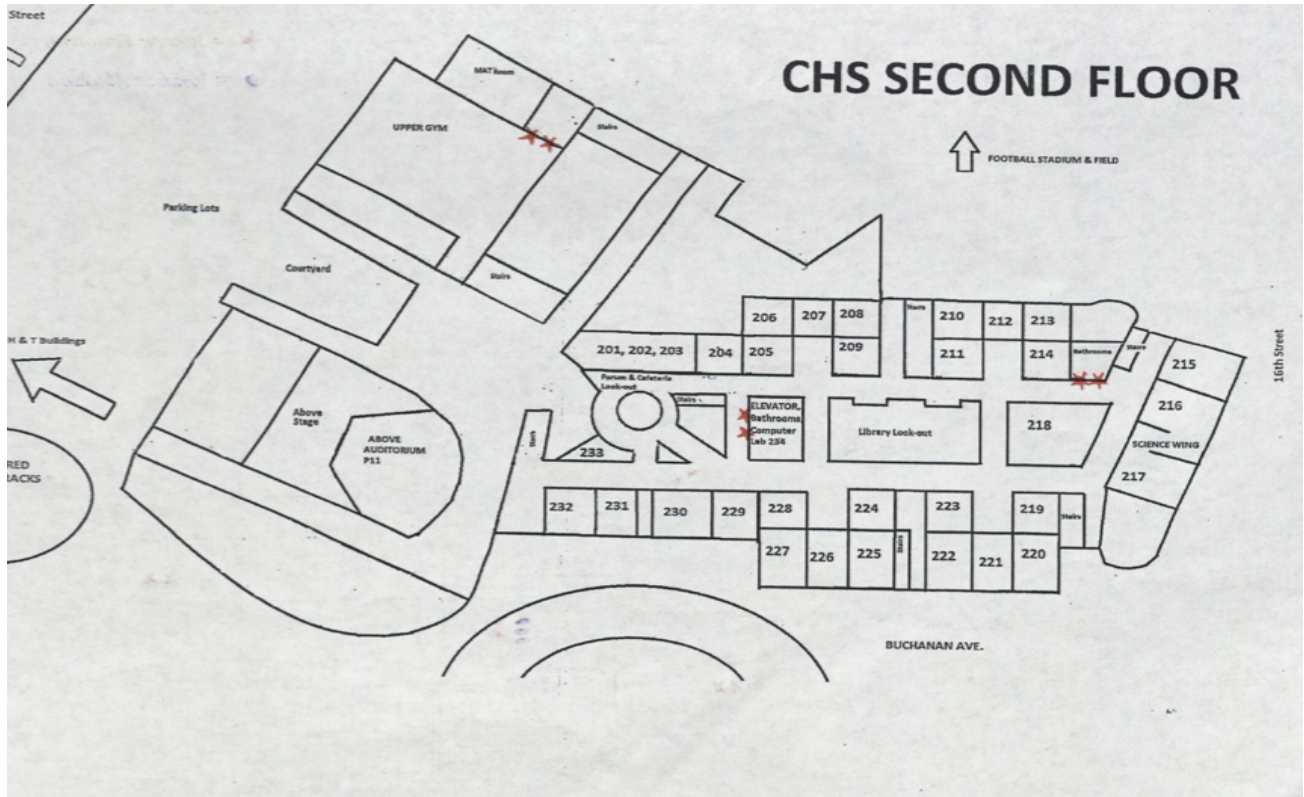
APPENDIX B. Crescent Valley High School map



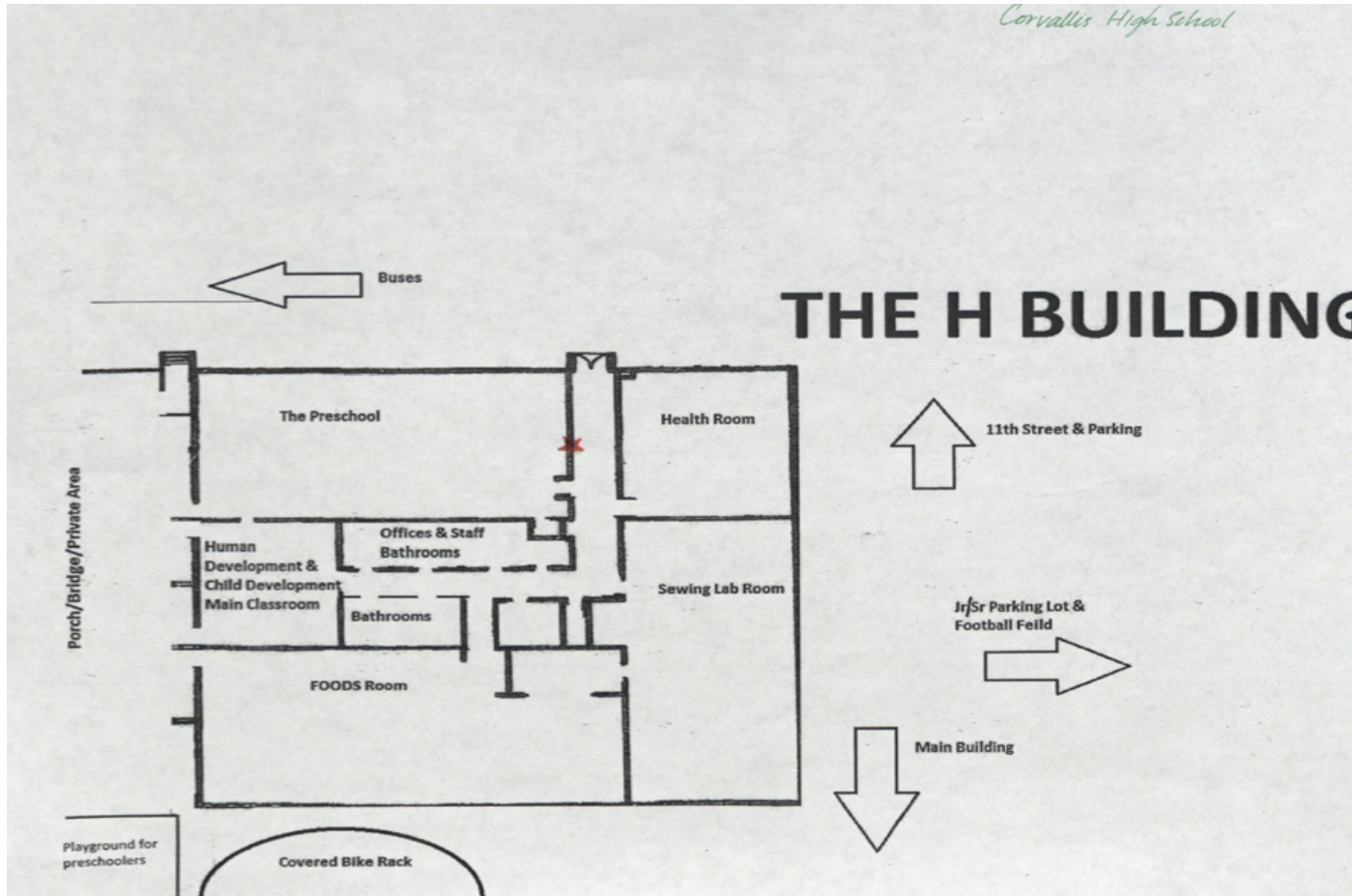
APPENDIX C1. Corvallis High School map of first floor, main building



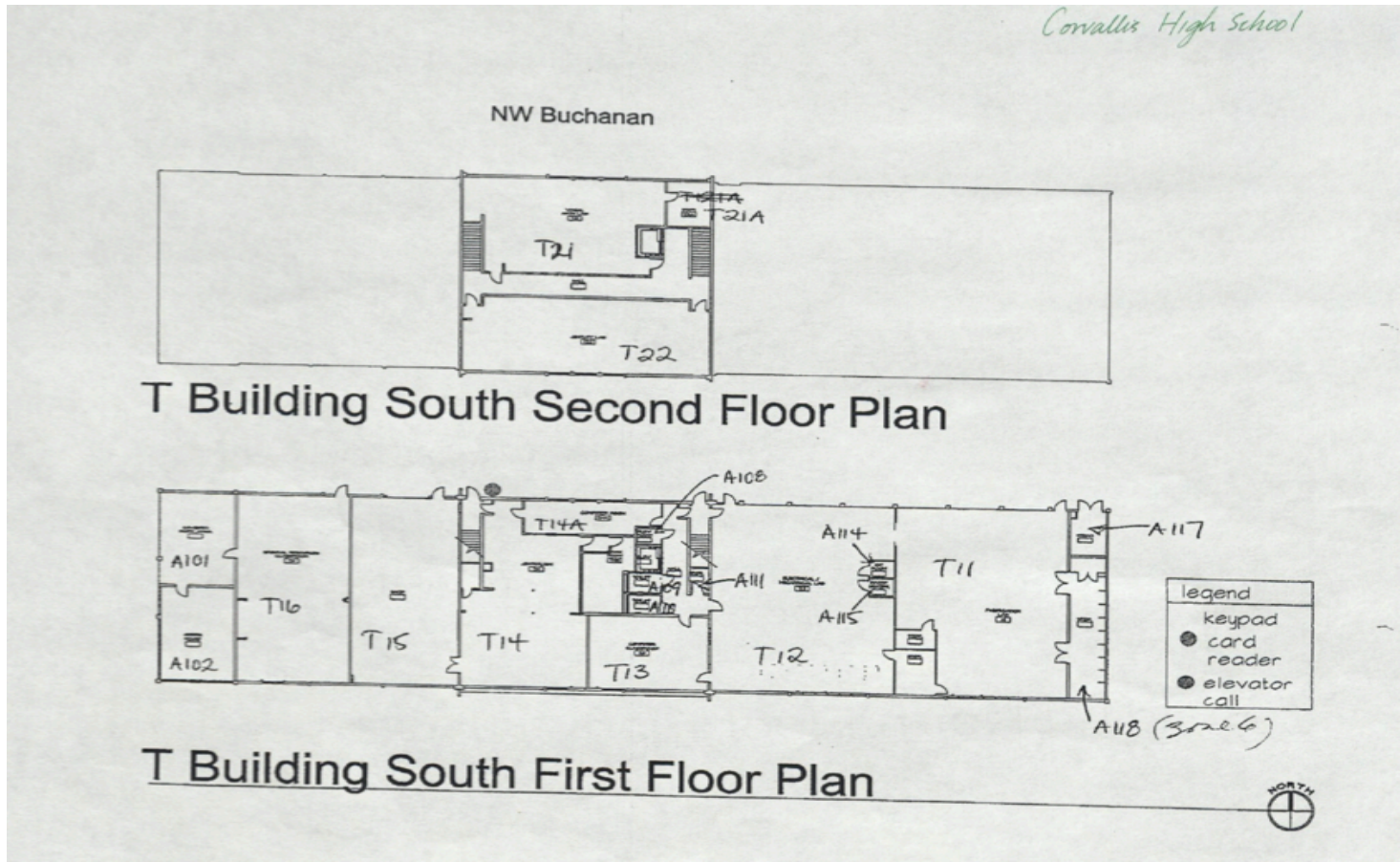
APPENDIX C2. Corvallis High School map of second floor, main building



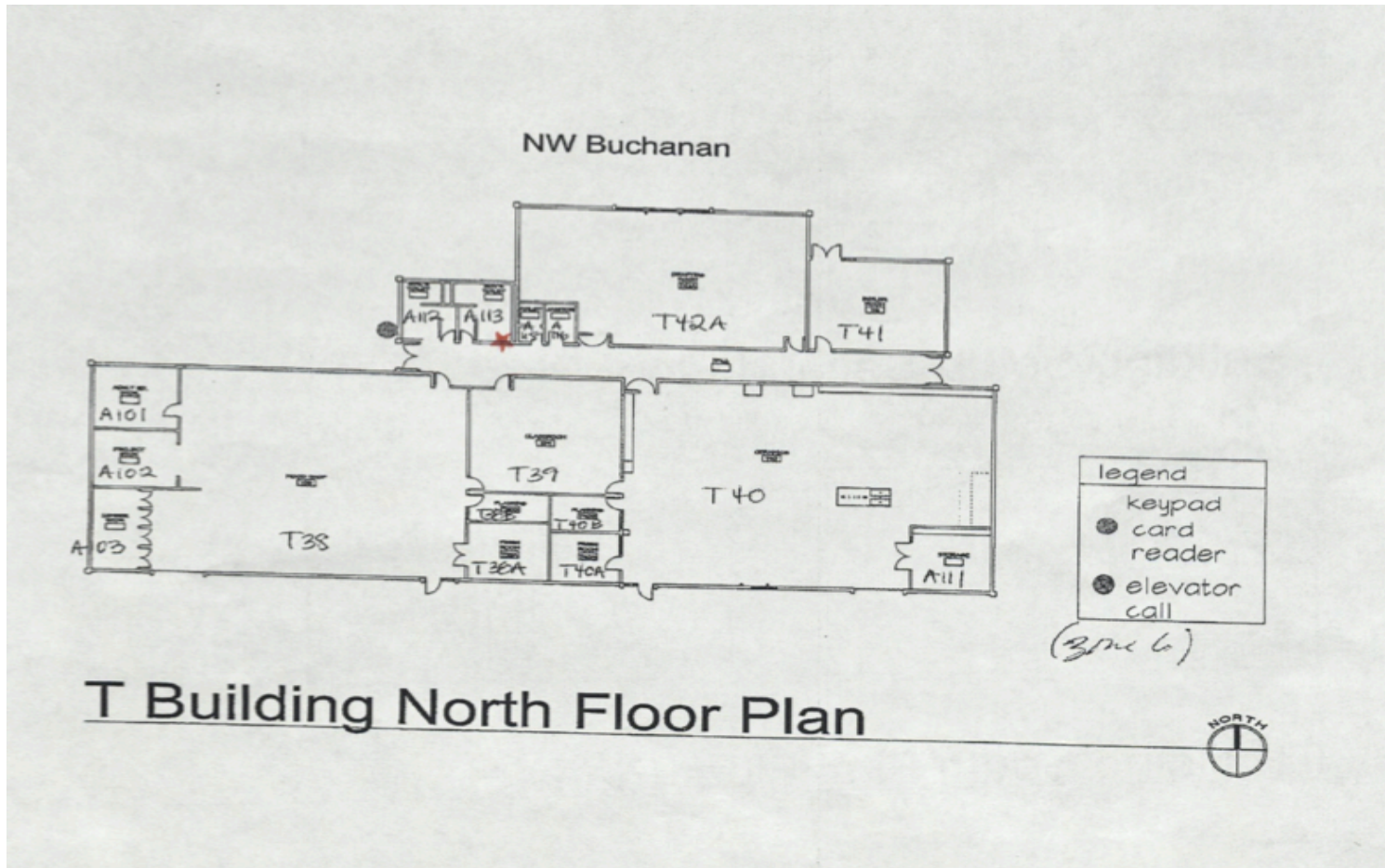
APPENDIX C3. Corvallis High School map of H Building



APPENDIX C4. Corvallis High School map of T Building South



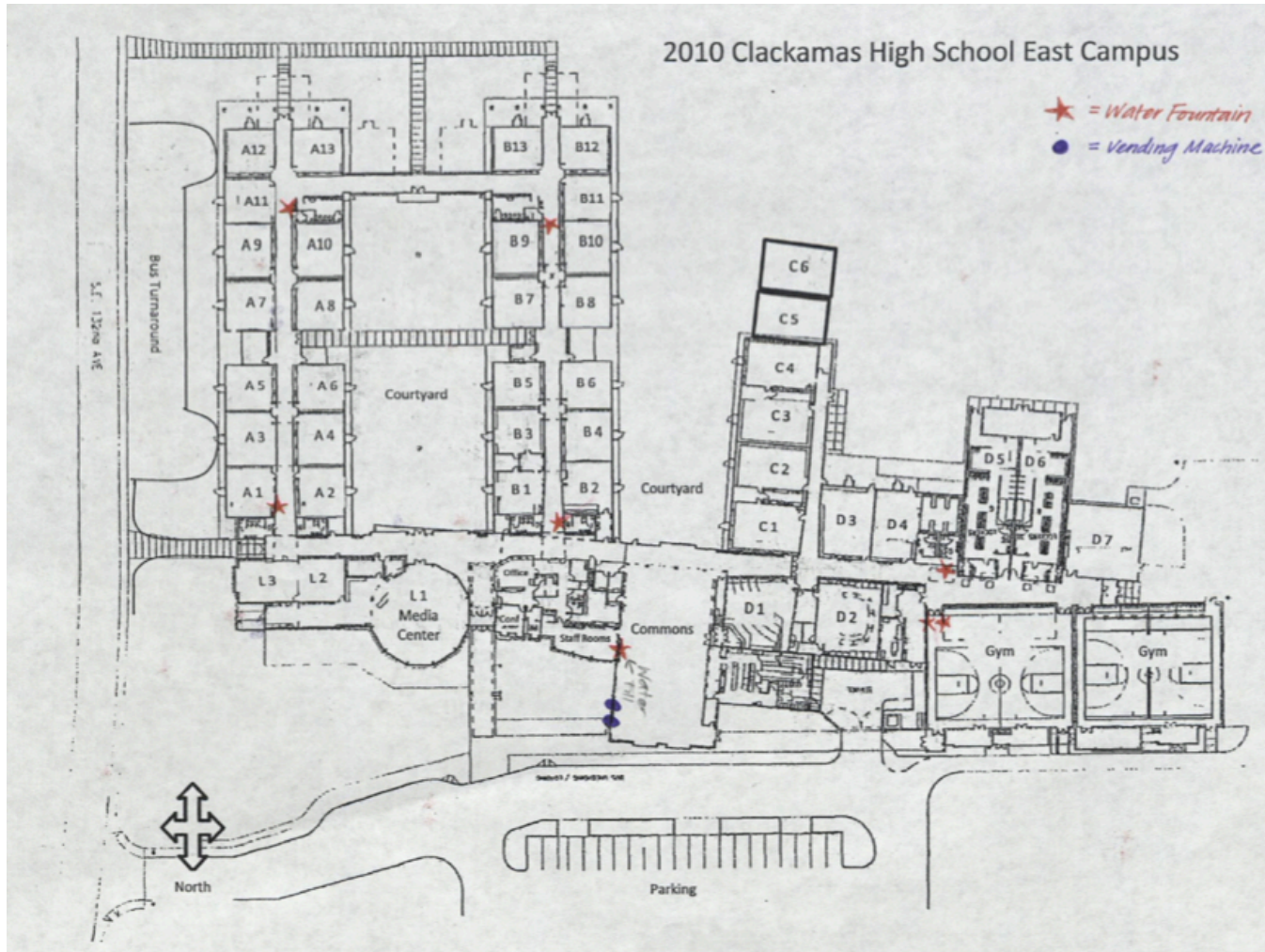
APPENDIX C5. Corvallis High School map of T Building North



APPENDIX D1. Clackamas High School map of West campus



APPENDIX D2. Clackamas High School map of East campus



APPENDIX E1. Crescent Valley High School Beverage Survey Sheet

Crescent Valley High School

Cafeteria

Aquafina bottled water

Lipton Diet Tea

Powerade zero calorie sports drink

V8 Fusion 100% Juice

Snapple 100% Juice

SoBe flavored lifewater (Dial)

Nestle bottled water

Lochmead 1% Lowfat milk

Lochmead Fat free Chocolate Milk

Vending Machine

100% Snapple Juice

Aquafina bottled water

Propel flavored water

SoBe 0 Calorie Lifewater

APPENDIX E2. Corvallis High School Beverage Survey Sheet

Corvallis High School

<u>Cafeteria</u>	<u>Vending Machine</u>	<u>Snack Store</u>
Fat free chocolate milk	Aquafina water	Smart water
Fat free milk	Powernade zero caloric sports drink	Arrowhead water
1% Lowfat milk	Dasani water	Aquafina water
Snapple 100% Juice		Nestle water
Propel flavored water		Propel water
Pure Spring water		Sparkline ILE Lemon Lime 0 Caloric drink
Nestle Pure life water		Trektop 100% Juice
Diet Bold Peak tea		Capri Sun 100% Juice
Trektop 100% Juice		Hansen's natural 100% Juice
VitaRain Zero		Orgonne Soy Milk
Aquafina bottled flavored water		Fat free milk
Hansen's natural 100% Juice		1% Lowfat milk
		Fat free chocolate milk
		SoBe Lemonade
		Bold Peak Diet Tea
		Diet Snapple Lemon Tea
		VitaRain Zero water
		Flavor Splash sparkling water
		Aquafina flavored water
		Vitamin water
		Sanich 100% Sparkling Juice
		SoBe life water
		wat-ah water

APPENDIX E3. Clackamas High School Beverage Survey Sheet

Clackamas High School

<u>Cafeteria</u>	<u>Vending Machine</u>
Tree Ripe Apple Juice	20oz. Diet Pepsi
Tree Ripe Orange Juice	Diet mountain dew
Danigold 1% Lowfat milk	Diet Dr. Pepper
Danigold Chocolate milk	Diet Pepsi wild cherry
Danigold fat free milk	Pepsi Max
SoBe lemonwater	Aquafina water
SoBe tropical blend	Upton Citrus Diet Tea
Cratorade berry	Flavored Aquafina water
Cratorade lemon-lime	Flavored propel water
V8 Berry Splash blend	
V8 Fusion Strawberry	
Naked Strawberry banana	
Naked Green Machine	
Naked Mango	
Naked Berry Blast	
Aquafina water	
Propel Kiwi	
Propel berry	
Switch Sparkling Juice - lime	

