



HSTA 2023-2024

Student Guide

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Summary of Lessons

Submission Date = Highlighted in Yellow

Activities in orange will need materials.

Fall Lessons	Summary	Spring Lessons	Summary
Lesson 1	Introduction to HSTA Lab Safety Training Elephant Toothpaste Activity	Lesson 13	Ethics/Safety Review Project Work Taste Test with Sugar
Lesson 2	Review Ethics Complete Ethics Activity CITI/OnTrack Register	Lesson 14	Title Project Work Submission Guest Speaker
Lesson 3	Observation Activity HSTA Research Overview CITI/OnTrack Work	Lesson 15	Sort and Filter State Data Project Work OnTrack Work
Lesson 4	Project Selection Observation Project Work CITI/OnTrack Work	Lesson 16	Descriptive Stats Project Work OnTrack Work
Lesson 5	Hovercraft Hover Activity Research Question and Variables CITI/OnTrack Work	Lesson 17	Descriptive Stats Project Work OnTrack Work
Lesson 6	Submission Recruitment of State Survey CITI/OnTrack Work	Lesson 18	Graphing Project Work Activity Dissection
Lesson 7	Taste Activity: Sweetness Background Research CITI/OnTrack Work	Lesson 19	P Value Project Work Activity Dissection
Lesson 8	Taste Activity: Salty Background Research CITI/OnTrack Work	Lesson 20	Inferential Statistics Project Work OnTrack Work
Lesson 9	Taste Activity: Sour Hypothesis CITI/OnTrack Work	Lesson 21	Inferential Statistics Project Work Activity Solar Power
Lesson 10	Guest Speaker Submission Data Collection Sheet	Lesson 22	Conclusion Project Work Activity Solar Power
Lesson 11	Wrapping Presents CITI Training Due December 1 st Procedures	Lesson 23	Practice Project Work Activity Solar Power
Lesson 12	Procedures Project Submission	Lesson 24 April 19, 2024	Practice Project Work Project Submission

Materials by Semester

Materials listed are for one group (2-3 students).

Fall Lessons	Summary
Lesson 1	Elephant Toothpaste <ul style="list-style-type: none">• transparent glass jar or plastic bottle (at least 12oz)• 1 packet yeast (rapid rise yeast or instant dry yeast)• 1/2 cup of 3% hydrogen peroxide• 3 drops of liquid soap• food coloring and/or glitter (optional)• 1 bowl/cup• 4 teaspoons of room temperature water• spoon• gloves• safety goggles• lab space/outside
Lesson 5	Hovercraft Hover <ul style="list-style-type: none">• Pop-top lid from a plastic drinking bottle.• An old CD or DVD (it will not be playable after this activity)• A medium-sized balloon (inflate to at least 11 inches around)• Craft glue or super glue• Stopwatch or timer• Large flat surface for testing the hovercraft
Lesson 7	Taste Activity: Sweetness Consumables: <ul style="list-style-type: none">• Granulated sugar, or sucrose (10 g)• Water, preferably distilled• Cotton swabs (at least 12)• Paper or plastic cups (at least five per group)• Paper towels (five squares per person)• Coffee Stirrers (at least five per group) Reusables (Materials will be used for Lesson 8 and 9): <ul style="list-style-type: none">• Marker for Labeling• Stirring rod or spoon• Gram balance• 100 mL graduated cylinder• 10 mL graduated cylinder
Lesson 8	Taste Activity: Salty Consumables: <ul style="list-style-type: none">• Table salt, or sodium chloride (10 g)• Water, preferably distilled.• Cotton swabs (at least 12)• Paper or plastic cups (at least five per group)• Paper towels (five squares per person)• Coffee Stirrers (at least five per group)

Lesson 9	Taste Activity: Sour Consumables: <ul style="list-style-type: none">• Vinegar (4 mL)• Water, preferably distilled• Cotton swabs (at least 12)• Paper or plastic cups (at least five per group)• Paper towels (five squares per person)• Coffee Stirrers (at least five per group)
Lesson 11	Wrapping Presents <ul style="list-style-type: none">• Wrapping paper• Scissors• Tape• Present• Bows/Ribbons• Tag

Spring Lessons	Summary
Lesson 13	Sugar Taste Test <ul style="list-style-type: none"> • Plates and Napkins • Snack with a sugar free/low sugar as well as a regular option. Examples: <ul style="list-style-type: none"> ○ Wafers ○ Jell-O ○ Chips ○ Mandarin Oranges ○ Werther’s Candy ○ Jolly Rancher ○ Hershey’s Candy ○ Gummies ○ Reese’s Candy ○ Russell Stover Candy ○ Gum ○ Kool aid
Lesson 18	Activity Dissection <ul style="list-style-type: none"> • Kit https://www.carolina.com/mammal-organ-dissection-kits/comparative-sheep-organ-dissection-kit/227970.pr?question=dissection Reusable: <ul style="list-style-type: none"> • lab space • safety glasses/goggles • microscopes (optional) • dissecting instruments • dissecting trays • aprons Consumables: <ul style="list-style-type: none"> • disposable gloves • cleaning materials • dissecting trays (if disposable) • aprons (if disposable)
Lesson 19	Activity Dissection Consumables: <ul style="list-style-type: none"> • disposable gloves • cleaning materials • dissecting trays (if disposable) • aprons (if disposable)
Lesson 21, 22, and 23	Activity Solar Power <ul style="list-style-type: none"> - Kit https://www.browndoggadgets.com/products/solar-science-station?variant=803371137

Master List of Lesson Links

The title of each folder is hyperlinked. The direct link for each folder is also listed.

Main Google Drive Folder

Direct Link for Main Google Drive Folder:

https://drive.google.com/drive/folders/1jwR3t7YgkSo8GzCi2asIAbrZo2oUG_qS?usp=share_link

Lesson 1

Direct Link for Main Lesson 1 Folder:

https://drive.google.com/drive/folders/1IiH4BMfnP8WKI5uf1g3z3lqDgICQz7aq?usp=share_link

Lesson 2

Direct Link for Main Lesson 2 Folder:

https://drive.google.com/drive/folders/1OgYvdeujskk08z_Yof_VO8H8_-5e-3yx?usp=share_link

Lesson 3

Direct Link for Main Lesson 3 Folder:

https://drive.google.com/drive/folders/1h6O6OynPePLJoW6JJphrbgnoLbQ1-jVg?usp=share_link

Lesson 4

Direct Link for Main Lesson 4 Folder: https://drive.google.com/drive/folders/1zOj-A4-Jye2x3CNzkkqFMUNdhdWyIcx3?usp=share_link

Lesson 5

Direct Link for Main Lesson 5 Folder: https://drive.google.com/drive/folders/1Bz-EjAvwVagZcbgd1oe4XteunE4sMNY_?usp=share_link

Lesson 6

Direct Link for Main Lesson 6 Folder:

https://drive.google.com/drive/folders/1DCkCpfT01mp3NTkA1tO8XPVjgTk0EIqQ?usp=share_link

Lesson 7

Direct Link for Main Lesson 7 Folder:

https://drive.google.com/drive/folders/1qmfz0_4jCxupB7_6bfKYNq6RaepomskC?usp=share_link

Lesson 8

Direct Link for Main Lesson 8 Folder:

https://drive.google.com/drive/folders/1h6O6OynPePLJoW6JJphrbgnoLbQ1-jVg?usp=share_link

Lesson 9

Direct Link for Main Lesson 9 Folder:

https://drive.google.com/drive/folders/14dfNCEjCF8fGsj3N35Cpe8fV-z1O3h?usp=share_link

Lesson 10

Direct Link for Main Lesson 10 Folder: https://drive.google.com/drive/folders/1GzUH4oq-mObelTJ-dHv_P4WpQKNp3czF?usp=share_link

Lesson 11

Direct Link for Main Lesson 11 Folder: https://drive.google.com/drive/folders/1hituhHQ6A9OK-Z9IW6_4bqZ9oe10vviS?usp=share_link

Lesson 12

Direct Link for Main Lesson 12 Folder:
https://drive.google.com/drive/folders/1LFJ6eLHO5Y4kZuUH0UHp0kUDI2BIx64?usp=share_link

Lesson 13

Direct Link for Main Lesson 13 Folder:
https://drive.google.com/drive/folders/1fyUrIH8uvqFGGr17jhsLT7GLdMCt_kNU4?usp=share_link

Lesson 14

Direct Link for Main Lesson 14 Folder:
https://drive.google.com/drive/folders/1HRof5WUgTH7CWmmQXsWsS2QqvtAHjx9F?usp=share_link

Lesson 15

Direct Link for Main Lesson 15 Folder:
https://drive.google.com/drive/folders/1WHvRucZcRX3uHQRgHi7Mv13SsezeUSYy?usp=share_link

Lesson 16

Direct Link for Main Lesson 16 Folder:
https://drive.google.com/drive/folders/1xLe0TjrwGDgY4oiXvhgTNW-SiChxXVWj?usp=share_link

Lesson 17

Direct Link for Main Lesson 17 Folder:
https://drive.google.com/drive/folders/1pE1K77n-9l_EE1K9STPIcczKWRyVjmU?usp=share_link

Lesson 18

Direct Link for Main Lesson 18 Folder:
https://drive.google.com/drive/folders/1553MURr0_pHpp2pvpF98ZBcjNiZo0Mz?usp=share_link

Lesson 19

Direct Link for Main Lesson 19 Folder:
https://drive.google.com/drive/folders/1KP8QNqbj2yZe-iWfEc6aug_-s5NmdaU-?usp=share_link

Lesson 20

Direct Link for Main Lesson 20 Folder:
https://drive.google.com/drive/folders/1BzjJYPo3ABzsaAW7HcgUWMv9y14vIN3c?usp=share_link

Lesson 21

Direct Link for Main Lesson 21 Folder:

https://drive.google.com/drive/folders/1O4S8DRA4jITN8q02tvK6ewX5U5H4Ap8Y?usp=share_link

Lesson 22

Direct Link for Main Lesson 22 Folder:

https://drive.google.com/drive/folders/1w6uMrAvDm9_Yy_OTr-K0rFcIRLX0JEs_?usp=share_link

Lesson 23

Direct Link for Main Lesson 23 Folder:

https://drive.google.com/drive/folders/1y9b4LJn99N2ikZyKEpcBh1b_L8YaThup?usp=share_link

Lesson 24

Direct Link for Main Lesson 24 Folder:

https://drive.google.com/drive/folders/1DQRhNGTH_8r7kBgds-PSwvBYdgL7oR-2?usp=share_link

Master List of Other Links

The title of each folder is hyperlinked. The direct link for each folder is also listed.

Ethics Contract

Direct Link for Ethics Contract: <https://redcap.link/ethics2023>

Lab Contract

Direct Link for Lab Contract: <https://redcap.link/safety2023>

Symposium Excuse

Direct Link for Symposium Excuse: <https://redcap.link/symposiumexcuse2024>

Waiver Information

Direct Link for Waiver Information: <https://health.wvu.edu/health-sciences-and-technology-academy/resources/students/college-preparedness/>

Direct Link for Waiver Information: <https://health.wvu.edu/media/16789/waiver-quick-guide-2021.pdf>

Student and Parent Handbook

Direct Link for Student and Parent Handbook: http://wv-hsta.org/media/6311/student_parent_handbook_2017kk.pdf

HSTA Website

Direct Link for HSTA Website: <https://health.wvu.edu/health-sciences-and-technology-academy/>

OnTrack

Direct Link for HSTA Website: <https://ontrackpse.com/Account/Login.aspx>

CITI Training

Direct Link for HSTA Website: https://about.citiprogram.org/landing-page-gcp/?gad=1&gclid=Cj0KCQjwwISlBhD6ARIsAESamp4X_WuE1YJCr8MUyZc5bX_PsI7xbhnAGjtax0jTuwZcKqHovKXembQaAhZuEALw_wcB

Template: Research Project Slides

Direct Link for Research Project Slides:
https://docs.google.com/presentation/d/1YI5HBFj7bKrx8oheS9V2gs-ixLMaWCOM/edit?usp=share_link&oid=111684462036397782926&rtpof=true&sd=true

Main Score Sheet

Direct Link for Score Sheet:
https://docs.google.com/document/d/1QTcSQ8GzkimiIh6U8nqE330-tLbvfggKp9PP_lprRbA/edit?usp=share_link

Symposium Score Sheet

Direct Link for Symposium Score Sheet:

https://docs.google.com/document/d/1dEOlUJ1K17Ua_1Ed462-ZHwaRW8CPUZwJesL1HSMHJM/edit?usp=share_link

Directions HSTA Community Research Project

Direct Links for Directions for HSTA Community Research Project:

https://docs.google.com/document/d/1GmXpXsxwMnckFnsfr7FB6nMf6INtksoe2zU2zdfwv-o/edit?usp=share_link

WV State Survey Link

Direct Link for the WV State Survey: <https://redcap.link/wvstate2324>

Google Folder with Survey and Recruitment Information

Direct Link to access Google Folder with WV State Survey and Recruitment Information:

https://drive.google.com/drive/folders/1FI1E9-qz5f-85S2saqcHR2EKzaq_yH7R?usp=share_link

HSC Email and Portal Information

Direct link for HSC Email and Portal Information:

https://docs.google.com/document/d/1LSAY_ribu85OVByGeGN6G1oYTaW4yFvc3a1G8mDcDfM/edit?usp=share_link

REDCap Information

Direct link for REDCap Information:

https://docs.google.com/document/d/1LlSrrrMNBbpXdbT4muCIH6JSs4VSZIOah_YErZ_riD4/edit?usp=share_link

Lesson #1: Introduction and Lab Safety

Objectives:

- Students will review what HSTA is about.
- Students will calculate how much HSTA is worth.
- Students will complete Lab Safety Training.
- Students will make Elephant Toothpaste.

Materials:

- Internet
- Pencil and paper
- Lesson 1 Worksheet **How much is an hour of HSTA time worth?**
- Elephant Toothpaste

transparent glass jar or plastic bottle (at least 12oz)	4 teaspoons of room temperature water
1 packet yeast (rapid rise yeast or instant dry yeast)	spoon
1/2 cup of 3% hydrogen peroxide	gloves
3 drops of liquid soap	safety goggles
food coloring and/or glitter (optional)	lab space/outside
1 bowl/cup	

Activities:

1. What is HSTA?
 - Show PowerPoint Presentation
 - Review Student Contract
 - Worksheet/Internet Exercise: **How much is an hour of HSTA time worth?**
2. Lab Safety Training
 - Show PowerPoint Presentation
 - Complete Elephant Toothpaste Activity

Lesson 1 Links

Direct Link for Main Lesson 1 Folder:

https://drive.google.com/drive/folders/1iH4BMfnP8WKI5uf1g3z3lqDgICQz7aq?usp=share_link

What is HSTA?

[Click here](#) to access the Introduction to HSTA PowerPoint.

Welcome Letter

Dear HSTA Students,

Welcome to the start of HSTA 2023-24. We are excited to begin a successful year of in person club meetings as we get back to a more normal lifestyle. We know you are most successful when you're consistently engaged and participating, so we have worked hard to make that happen.

Let's remember, first and foremost, HSTA is here to help you prepare for college and obtain a tuition waiver, but you must do your part.

ATTENDANCE Attend meetings. Each meeting is a lesson, and you build on that knowledge as you work through your research project. Your teacher will set both 1) after school meeting times when school is in session and 2) remote times if school is virtual.

JOBS We know many of you work. If you have a job, talk to your employer to arrange your schedule so you are available for meetings. If your job/supervisor is not understanding of your participation in the HSTA program, ask your Field Site or teacher to help you explain the importance of HSTA.

SPORTS Sports are important, but so is HSTA. Talk to your coach about the importance of your HSTA meetings. Your coaches and teachers can work out a compromise if you bring the conflict to their attention. **100%** of students successfully completing HSTA receive a tuition waiver, fewer than **2%** of high school student athletes are offered athletic scholarships and most are not full rides. HSTA attendance is money in the bank.

ACADEMICS Stay on top of your assignments. If you fall behind, ask for help. Talk to your teacher. Find a study group. Your HSTA teacher and peers will help you.

GRADES You must maintain a 3.0 after your freshman year or you are not eligible for your waiver. You can do this.

FAMILY Your family is a support for you. They want you to be successful. Sometimes, families are under duress and fall upon difficult times. We understand. We've all been there. Your HSTA family is here to help.

In closing, let's remember to look after one another, communicate, be flexible, and have a successful year.

Dr. Cathy Merten

*Vice President Health Sciences
HSTA Director*

Student Contract

1. I am a United States citizen, a West Virginia resident, and I attend an approved high school in an approved county served by the HSTA program.
2. I will meet or exceed the semester GPA (Grade Point Average) as stated in Section 5 of the HSTA Policy and Procedures Manual: [9th grade – 2.5 both semesters, and 10th to 12th grade – 3.0 both semesters].
3. I agree to attend 70% of all HSTA meetings per semester and attend all HSTA activities or make special arrangements with the HSTA teacher and HSTA Local Governing Board (LGB).
4. I agree to follow my school's 'Acceptable Computer/Internet Use' policy, all HSTA rules and behavioral and safety guidelines, and recommendations from the HSTA teacher and field site coordinator for all HSTA activities.
5. I agree to complete a yearly science project and present the project at the state Science Symposium. I understand that to remain in the HSTA program, my symposium project presentation must receive a passing score designated by HSTA. I understand that I must complete all aspects of my science project by the given deadlines.
6. I agree to attend at least 2 HSTA Summer Institute camps before my senior year.
7. I agree to complete at least 75 documented hours of community service prior to filling out the HSTA Waiver application my senior year. I understand that the amount of the HSTA waiver granted by a WV college or university will vary, subject to the policies established by each individual WV college or university.
8. If I am suspended or expelled from school for any reason, I understand that I will be suspended or expelled from HSTA. I will immediately contact my HSTA teacher and the Field Site Coordinator as soon as I am suspended or expelled.
9. I understand that I will be placed on probation for only one semester during my entire participation in the HSTA program for not meeting academic, attendance, or behavioral requirements. If I fail to comply with these requirements and/or have any major discipline problems, the LGB can terminate my HSTA Club membership, which would result in forfeiture of my eligibility for the HSTA waiver.
10. I agree that if my HSTA membership is terminated, I have ten working days after receipt of written notification from the LGB to make an appeal for reinstatement to the program. In my written appeal I must set forth the reasons that I contend the termination decision is in violation of my rights under this agreement.
11. I agree that within ten working days of receipt of the denial of appeal by the LGB, I have the right to make a written appeal to the HSTA Joint Governing Board (JGB).
12. In the event the HSTA Program in my region is discontinued due to the lack of funding or factors beyond the control of HSTA, this contract may be terminated.
13. I give HSTA permission to include my GPA and test scores for program evaluation purposes. My name and other personal information will not be included with this evaluation data.

Student and Parent Handbook

The following link is the student and parent handbook for HSTA students.

<https://health.wvu.edu/media/17221/student-and-parent-handbook9-2022.pdf>

HSTA Summary 2023-2024

Attendance

You will earn attendance credit by attending club meetings in person and completing activities along with a community-based research project. Your HSTA teacher will discuss how meetings will be conducted during your first HSTA meeting. Per policy, you need to attend at least 70% of your meetings. Note that club meetings are set up to prepare you to complete your annual community-based research project.

HSTA Meetings

HSTA meetings will be in person and your HSTA teacher will give you a schedule. Work with your HSTA teacher and Field Site if you must miss a meeting.

Community Service

You need 75 community services hours by December of your senior year. Check with your HSTA teacher and Field Site to verify if an opportunity counts towards community service. HSTA will offer a few online opportunities to earn community service hours – check the websites for dates and times.

Keep track of the community service hours you complete. Make sure to turn your community service sheets into your Field Site. You need to keep a copy of your hours in your notebook or email. Remember you need 75 hours to graduate from the HSTA Program.

HSTA Community Research Project

As a HSTA student, you are required to conduct a community research project that sets out to improve the wellbeing of your community. You will complete four projects over the course of your HSTA career. You may work in a group of three or less (check with your Field Site to see if this is different for your region). Your HSTA teacher, peers, Field Site, Community Research Associate (CRA), and Graduate Assistant (GA) will assist you in completing the project.

Attendance at Symposium

This year symposia will be on the local level. You will come together as one region and share your presentations. Presentations will be judged by local community members, teachers, and STEM/Health experts. Location, date, and time will be released to by your Field Site.

Teacher Copy How much is an hour of HSTA time worth?

How much is an hour of HSTA time worth? *Over 4 years... How much time do you invest in HSTA?*

Directions: Watch the [HSTA Waiver Information](#) video, then use the Student Contract, Handbook, and the internet to complete the worksheet.

Credit: Mrs. Hanna from Greenbrier East High School.

How many community service hours do you need to complete HSTA? _____

Estimate the number of hours for 2 summer camps: _____

Club Meeting Time for one Semester: _____

Estimate the number of hours to attend a symposium: _____

Add it all up: _____

Now we will find the total tuition for the in-state college of your choice. Use the internet to do a little research to find the current tuition. Remember the cost of higher education may change, so this serves as an estimation.

In State College to Attend: _____

Major: _____

Tuition for one semester: _____

Tuition for eight semesters: _____

Now, let us find out how much *money* HSTA students earn by attending HSTA meetings.

$\frac{\text{_____}}{\text{Total Tuition}} / \frac{\text{_____}}{\text{Total Hours}} = \frac{\text{_____}}{\text{_____}} / \text{hr.}$
This is what you earn attending each hour of HSTA.

Plan to go to graduate school? HSTA will cover 1) 8 semesters of one undergraduate degree, 2) a master's degree in STEM/Health Sciences, and 3) a terminal degree (PhD in STEM/Health Sciences, Medical School, Dentistry School, etc. look at the website for other terminal degrees). Make sure to check the HSTA website for updates about colleges and majors. Email Kas Kasten kkasten@hsc.wvu.edu for more information. Make sure to visit the HSTA website to learn about the waiver: <https://health.wvu.edu/health-sciences-and-technology-academy/resources/hsta-graduates/>.

Example: I want to attend Medical School

Undergraduate Tuition = _____

Medical School Tuition = _____

_____ + _____ = _____
 Undergraduate Medical School Total Tuition

_____ / _____ = _____ /hr.

Total Tuition Total Hours This is what you earn attending each hour of HSTA.

Procedures for Lab Safety

- 1) Click [here](#) to access the Safety Lab Presentation.
- 2) Discuss the PowerPoint as a club.
- 3) Read over the lab safety contract for the HSTA Term 2023-2024.
- 4) Use lab safety rules to complete the Elephant Toothpaste activity.

Lab Safety Contract for 2023-2024

Directions: After you have reviewed the Safety Lab Presentation and read over the Lab Safety Contract click <https://redcap.link/safety2023> to sign the Lab Safety Contract.

1. I have read over the Lab Safety PowerPoint Presentation and have watched the Lab Safety Video.
2. I will conduct myself in a responsible manner at all times in the laboratory, no horseplay.
3. I will follow all written and verbal instructions carefully. If I do not understand a direction, I will ask my teacher before proceeding.
4. Any time chemicals, heat, or glassware are used, I will wear protective eyewear.
5. I will not eat food, drink beverages, or chew gum in the laboratory area.
6. I will know the locations and operating procedures of all safety equipment, including the first aid kit, eyewash station, safety shower, fire extinguisher, and fire blanket. I will also know where the fire alarm and the exits are located.
7. I will always work in a well-ventilated area.
8. I understand that all chemicals should be considered dangerous.
9. If a chemical should splash in my eye(s) or on my skin, immediately flush with running water from the eyewash station or safety shower for at least 20 minutes. I will also notify my teacher immediately.
10. I will dispose of all chemical waste properly. Refer to the Flinn Safety website: <http://www.flinnsci.com/homepage/sindex.html>
11. I will wash my hands with soap and water after performing all experiments.
12. I will always use caution when using knives and other sharp instruments.
13. I will dress properly during a laboratory activity. Long hair must be tied back, dangling jewelry and loose or baggy clothing must be secured, and shoes must completely cover my feet.
14. I will report any accident (spill, breakage, etc.) or injury (cut, burn, etc.) to my teacher immediately. Never dispense flammable liquids anywhere near an open flame or source of heat.
15. I will exercise extreme caution when using a heat source. Light gas (or alcohol) burners only as instructed by my teacher.
16. If I have any allergies, I will let my teacher know. Please specify: _____
17. I will cooperate to the fullest extent to maintain a safe lab environment.

Hands on Activity: Elephant Toothpaste

Resource: https://assets.contentstack.io/v3/assets/blt822c60c126c92e3a/bltd16ebf61f2d22b9c/5f7cc09cf98ad40e91dc650d/HP_GRTL_Influencer_Cont

ELEPHANT TOOTHPASTE



SUPPLIES

- 1/2 Cup of Hydrogen Peroxide
- A Packet of Dry Yeast (one packet is approximately 1/4 oz)
- 3 Tablespoons Warm Water
- Food Coloring
- A Cylinder (at least 500 ml)
- A Tablespoon of Dish Soap
- A Tray
- A Funnel
- Safety Goggles

INSTRUCTIONS

- 1 With safety goggles on, place your cylinder in your tray. Have an adult pour the hydrogen peroxide into the cylinder.
- 2 Add two pumps (or about one tablespoon) of dish soap into the cylinder.
- 3 Add several drops of ONE color of food coloring. If you want to create those classic toothpaste looking stripes, add the same color to various sides of the cylinder.
- 4 Mix the yeast with the warm water for at least 30 seconds.
- 5 Pour the yeast into the cylinder, step back and watch the foamy magic happen! **DON'T TOUCH THE FOAM AS IT'S AN EXOTHERMIC REACTION AND IS HOT!** After several minutes, it does cool down.

What's the Science?

Hydrogen peroxide (H_2O_2) is composed of water and oxygen. The yeast is a catalyst that takes the oxygen away from the hydrogen peroxide and in turn forms water and oxygen.

The oxygen then gets trapped by dish soap and forms lots of bubbles which is the foam you see that looks like elephant toothpaste!

The resulting experiment produces oxygen, gas, water and iodine so you may notice a brown or yellow tint to your foam. This reaction is exothermic which means it produces heat, so do not touch the foam right away.

Lesson #2: Ethics and Research Project

Objectives:

- Students will review Ethics.
- Students will discuss a case study on Ethics.
- Freshmen will register for CITI Training.
- Sophomores, juniors, seniors will start OnTrack videos for their graduation year.

Materials:

- Internet
- Pencil and paper
- Worksheet

Activities:

1. Ethics Training
 - Review PowerPoint Presentation
2. Ethics Activity
3. Research Project Overview
 - Explain projects?

Lesson 2 Links

Direct Link for Main Lesson 2 Folder:

https://drive.google.com/drive/folders/1OgYvdeujskk08z_Yof_VO8H8_-5e-3yx?usp=share_link

Ethics Training – CITI Training

Many HSTA projects involve human subjects. Ethics training is important to understand how to protect humans in research projects. **All freshmen will complete CITI training.** This training will be good for four years. Freshmen will work on this training during club time along with the HSTA teacher. Next meeting freshmen will register their accounts and start on Module 1.

CITI Certificates are due December 1, 2023.

Introduction to Ethics

You are conducting research and are responsible for the ethical treatment of any and all subjects. It is mandated by law that you adhere to strict rules.

RULES WERE DEVELOPED BECAUSE OF TO THE UNETHICAL TREATMENT OF RESEARCH SUBJECTS IN PAST EXPERIMENTS, LABS, AND STUDIES. THESE RULES WERE CREATED TO PROTECT EVERYONE IN THE RESEARCH PROCESS, INCLUDING YOU. These rules are known as **THE BELMONT PRINCIPLES**. Review the Ethics PowerPoint to learn more about research ethics then complete the group activity on pages 34-36.

The Belmont Report

Directions: Read through the principles. You will use these principles to discuss a case study.

STUDENT HANDOUT 1.4

The Belmont Report

Name _____ Date _____ Period _____

The Belmont Report—Guidelines for Using Human Subjects in Research

The Belmont Report was created in 1978 by the U.S. Department of Health to establish some basic ethical principles to be considered when people participate in research.

1. Respect for Persons

- *Description:* Respect for individuals and their **autonomy**; obtain informed consent.
- *How is this applied?*
 - A person has the right to make choices, hold views, and take actions according to his own beliefs.
 - If a person does not have the capacity to make her own choice, she must be protected from harm.
 - A person must enter into research voluntarily and must be informed in an adequate manner.
 - To truly respect a person's autonomy, he must be able to give genuinely informed consent with full knowledge of both harms and benefits of the study.

On the back of this paper, give an example of how this principle was upheld or not from one of the case studies.

2. Beneficence (or maximize benefits/minimize harms)

- *Description:* Beneficence stresses "doing good" and "doing no harm" by minimizing all potential harm(s) and maximizing all potential benefit(s) to the subject as well as potential benefit(s) to society.
- *How is this applied?*
 - There is an obligation to minimize the harm/risks to the greatest extent possible.
 - Maximize the potential benefits.
 - Ensure the rights and well-being of the patient take precedence over the needs of science.

On the back of this paper, give an example of how this principle was upheld or not from one of the case studies.

3. Justice

- *Description:* Be fair in the distribution of the benefits and in bearing the burden of research.
- *How is this applied?*
 - The benefits and burdens of the research should be justly distributed.
 - Guard against using **vulnerable populations**.
 - Ensure fair selection of research participants.
 - Guard against **coercion** and **undue influence**.
 - Avoid potential financial or other **conflicts of interest**.

On the back of this paper, give an example of how this principle was upheld or not from one of the case studies.

Autonomy: A person's freedom and ability to make his or her own decisions.

Coercion: The act of pressuring someone to do something using force, intimidation, or threats without respect for individual choice. This includes the idea that a person with few choices may find participation in a study to be so appealing that they feel they cannot decline, even if being in the study is not a good decision for other reasons.

Conflict of interest: A situation in which someone is responsible for making a decision in an official capacity (e.g., someone holding public office) that could benefit them personally.

Undue influence: Is exerted when a person of higher power or authority takes advantage of another person; undue influence can often include coercion.

Vulnerable (populations): Groups who may be exploited for use in research, e.g., children, people who are illiterate, and prisoners.

Case Study – Henrietta Lacks and HeLa Cells

Read through the case study and complete the worksheet to discuss the Belmont Principles.

STUDENT HANDOUT 1.1a

HeLa Cells

Case Study A: Henrietta Lacks and HeLa Cells

Henrietta Lacks died when she was 31 years old in a segregated hospital ward for “coloreds” in Baltimore, Maryland on October 4, 1951. Lacks was a poor, black woman from an uneducated family who had worked in the tobacco fields in Virginia almost all of her life. She married young and had five children.

Soon after the birth of her youngest child in 1950, Henrietta discovered a lump in her body. A doctor at a free clinic ward for colored people examined her lump and the diagnosis was **cervical cancer**. The doctor performed a routine medical procedure to collect **tissue samples** from her cancerous tumor. At the time, it was common for doctors to send tissue samples to research facilities so that cells could be studied to learn more about many diseases. The rules for getting **informed consent** from patients were much less strict than they are today. Henrietta’s doctors did not inform her about what they were doing or get her permission for the tissue collection, though they did get consent from her husband to perform an **autopsy** after her death.

On the same day that Henrietta passed away, Dr. George Gey [pronounced “guy”], a leading researcher who had been trying to establish the successful growth of a stable **human cell line**, appeared on television to present his contribution to the fight against cancer. Dr. Gey introduced to the world the first successfully grown human cell line, which he termed “HeLa” in honor of the human patient who had unknowingly donated to the cause— Henrietta Lacks.

As Dr. Gey was presenting his discovery, scientists all over the world were being given HeLa cells for free to conduct their own studies. The HeLa cell line became an essential resource for medical research in many labs worldwide. Soon, many companies began mass producing HeLa cells for commercial research use, reaping millions of dollars in profits that would never have been possible without Henrietta’s cells. HeLa cells have since been used in many ways, including testing vaccines, learning about genetics, research into cancer and AIDS, and developing drugs. It took decades, and the help of a journalist, for the family to learn what had happened to their mother’s cells.

Henrietta was buried in an unmarked grave for almost 60 years, until 2010. Her headstone has now been marked with her name and an inscription that reads “In loving memory of a phenomenal woman, wife, and mother who touched the lives of many. Here lies Henrietta Lacks (HeLa). Her immortal cells will continue to help mankind forever.”

Henrietta’s family never received any part of the billions of dollars that HeLa cells brought (and continue to bring) to many companies. In fact, since Henrietta was never informed that her tissue had been collected, for more than 20 years after her death, her family was unaware of the robust industry Henrietta’s cells helped launch or her “immortal” status.

The Lacks’ family and children are still economically disadvantaged. Many of Henrietta’s descendants can’t afford health insurance or treatments that have been made possible by direct work with the HeLa cell line. Deborah, the fourth of Lacks’ children, describes the situation: “Truth be told, I cannot get mad at science, because it helps people live and I’d be a mess without it. But I won’t lie. I would like some health insurance so I don’t got to pay all that money every month for drugs my mother’s cells probably helped make.”

This summary is based on a true story. Please see the Sources section for reference information.

Contributed by Myra Amone, Redmond High School, Redmond, WA.

Autopsy: An examination conducted on a dead body to determine the cause of death.

Cervical cancer: Cancer of the cervix, which is the lower, narrow end of the uterus.

Human cell line: A continuously dividing set of cells used in medical research that are derived from a single human cell.

Informed consent: A process that outlines required elements of research participation, including its risks and potential benefits, to help someone decide whether to participate. An informed consent form is used to convey essential information and is signed by the participant if he or she decides to join the study.

Tissue sample: Bodily fluids (e.g., blood or saliva) or tissue (e.g., cells, skin, bone, or muscle) for use in research.

HANDOUT

STUDENT HANDOUT 1.2

Guiding Questions for Historical Case Studies

Name _____ Date _____ Period _____

Complete the following chart with your group after you read through your case study. Record information from the other case studies presented by other groups in your notebook.

CASE STUDY:	
1. What good came out of the research? What was the importance of the study?	
2. What things were not fair or are questionable about the research or its process?	
3. Who was involved in the case? Directly? Indirectly?	
4. Was everyone involved fully aware of and did they agree to be part of all aspects of the research?	
5. What was society's role in the case?	
6. How did social issues (e.g., poverty, education, religion) influence the case?	
7. What core values were in conflict in this case?	

HANDOUT

Ethics Contract 2023-2023

Directions: After you have reviewed the Ethics Presentation and read over the Ethics Contract click <https://redcap.link/ethics2023> to sign the Ethics Contract.

- I understand and will put into practice at all times the Belmont Principles.
- As a Researcher or Investigator, I will conduct my research with integrity and safeguard my research participants/subjects and any data I may gather.
- I will protect all participants/subjects and adhere to the research standards set forth in federal and state code.
- I will design my research to be fair and provide the same opportunity to all subjects. I will adhere to my approved research protocol.
- When recruiting subjects/participants I will explain:
 - what the research is about
 - why it is being conducted
 - why I want them to participate
 - what they will be asked to do
 - how and when they will be asked to do it
- I will explain how the research data will be measured and collected and the plan to protect their privacy and information.
- Furthermore, I will explain to the subject/participant how the knowledge learned from the research may be of benefit to them or others.
- I will explain any possible harm that may occur during the research, and the safeguards in place to prevent such harm.
- I will assure them that they may chose not to participate or may opt out of participation at any time with no repercussions.
- I understand the importance of research and will conduct my research with honor and integrity.

Freshmen CITI Training

CITI training is Collaborative Institutional Training Initiative or CITI. It is a college level ethics training that all researchers affiliated with a university or institution must complete before beginning any research. It teaches why we must have training so that studies like Tuskegee, Willowbrook, or Nazi experiments never occur again. **Everyone must complete the training during their freshmen year.** This training is good for four years. **Due December 1.** Website: <https://www.citiprogram.org/>

1. Google CITI Training Login – It will bring you to this page. If you don't know/have a username and password, click on Register.
2. Type in West Virginia University. Click I agree.
3. Click on I affirm.
4. Then Click Create a CITI Program Account

[LOG IN](#)

[LOG IN THROUGH MY ORGANIZATION](#)

[REGISTER](#)

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CITI - Learner Registration

Steps: **1** 2 3 4 5 6 7

Select Your Organization Affiliation

This option is for persons affiliated with a CITI Program subscriber organization.

To find your organization, enter its name in the box below, then pick from the list of choices provided. ⓘ

West Virginia University

West Virginia University allows the use of Single Sign On (SSO) or a CITI Program username/password for access.

Single Sign On (SSO) requires a username and password issued by West Virginia University.

I AGREE to the [Terms of Service](#) and [Privacy Policy](#) for accessing CITI Program materials.

I affirm that I am an affiliate of West Virginia University.

[Log In with West Virginia University](#)

or

[Create a CITI Program account](#)

———— or ————

Independent Learner Registration

Use this option if you are paying for your courses. This option is for persons not affiliated with a CITI Program subscriber organization, or who require content that their organization does not provide. Fees apply. Credit card payment with American Express, Discover, MasterCard or Visa is required. Checks are not accepted.

I AGREE to the [Terms of Service](#) and [Privacy Policy](#) for accessing CITI Program materials.

5. Type in your information in the red circle, then click on Continue to Step 3

CITI - Learner Registration - West Virginia University

Steps: 1 2 3 4 5 6 7

Personal Information

* indicates a required field.

* First Name * Last Name

* Email Address * Verify email address

We hope you to provide a second email address, if you have one, in case messages are blocked or you lose the ability to access the first one. If you forget your username or password, you can recover that information using either email address.

Secondary email address Verify secondary email address

[Continue To Step 3](#)

6. Fill in all the information in the red circle. Click on to Step 4.

CITI - Learner Registration - West Virginia University

Steps: 1 2 3 4 5 6 7

Create your Username and Password

* indicates a required field.

Your username should consist of 4 to 50 characters. Your username is not case sensitive; "A1234CD" is the same as "a1234cd". Once created, your username will be part of the completion report.

* User Name

Your password should consist of 8 to 50 characters. Your password is case sensitive; "A1234CD" is not the same as "a1234cd".

* Password * Verify Password

Please choose a security question and provide an answer that you will remember. NOTE: If you forget your login information, you will have to provide this answer to the security question in order to access your account.

* Security Question

* Security Answer

[Continue To Step 4](#)

7. Skip down to Country of Residence and enter United States. Next question mark **No** and Click to Step 5.


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CITI - Learner Registration - West Virginia University

Steps: 1 2 3 **4** 5 6 7

* indicates a required field.

Would you like to connect your ORCID® ID to your CITI Program account? ⓘ

 Connect your ORCID ID

* Country of Residence

Search for country; Enter full or partial name (e.g., "United States") OR your country's two or three character abbreviation (e.g., "US", "USA"), then pick from the list of choices provided.

United States

* May we contact you to provide information about other courses and services after you complete your CITI Program coursework? ⓘ

Yes

No

Continue To Step 5

8. Click **No** to the first question, then click Continue to Step 6.

CITI - Learner Registration - West Virginia University

Steps: 1 2 3 4 5 6 7

* indicates a required field.

* Are you interested in the option of receiving Continuing Education Unit (CEU) credit for completed CITI Program courses?

CITI is pleased to offer CE credits and units for purchase to learners qualifying for CE eligibility while concurrently meeting their institutions training requirements.

CE credits/units for physicians, psychologists, nurses, social workers and other professions allowed to use AMA PRA Category 1 credits for re-certification are available for many CITI courses - with that availability indicated on course and module listings. **Please register your interest for CE credits below** by checking the "YES" or "NO" dots, and, when applicable, types of credits you wish to earn at bottom of page. Please read texts entered for each option carefully.

Yes

At the start of your course, you will be prompted to click on a "CE Information" page link located at the top of your grade book and to VIEW and ACKNOWLEDGE accreditation and credit designation statements, learning objectives, faculty disclosures, types, number and costs of credits available for your course.

Yes

No

The CE functionality will not be activated for your course. Credits and units will therefore not be available to you for purchase after you start your course. You can change your preference to "YES" before such time however by clicking on the "CE Credit Status" tab located at the top of your grade book page.

No

If you picked "YES", please check below the one type of credit you would like to earn

- Athletic Trainers - BOC Category A Hours
- Dentists - ADA CERP Credits
- Dietitians - CDR Continuing Professional Education Units
- MDs, DOs, PAs - AMA PRA Category 1 Credits™
- Nurses - ANCC CNE
- Optometrists - COPE CE Credits
- Other Participants - Certificates of Participation
- Pharmacists - CPE Credits
- Psychologists - APA Credits
- Social Workers - CE Credits

Continue To Step 6

9. Fill in the boxes with the red *
 1. Language Preference
 2. Email – This can be a student email or personal email
 3. Department: HSTA
 4. Role: Student Researcher Undergraduate

10. Click to final step

English ▾

CITI
PROGRAM

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CITI - Learner Registration - West Virginia University

Steps: 1 2 3 4 5 **6** 7

Please provide the following information requested by West Virginia University

* indicates a required field.

Language Preference

* Institutional Email Address
We recommend providing an email address issued by West Virginia University or an approved affiliate, rather than a personal one like @gmail, @hotmail, etc. This will help West Virginia University officials identify your learning records in reports.

* Verify Institutional Email Address

Highest Degree

Employee Number

* Department

* Role?

Address Field 1

- 11. There will be a list of questions. Click on the following courses:
- 12. Scroll to the very bottom and click submit.

Question 2

HUMAN SUBJECT RESEARCH (IRB)

Please select the following required course(s) that pertains to your research (more than one can be chosen):

Initial Courses:

Choose all that apply

- Biomedical Research Investigators (5-year, Human Subject Research)
- Social & Behavioral Research Investigators (5-year, Human Subject Research)
- Biomedical Research Investigators (3-year, NIDA ONLY)
- Social & Behavioral Research Investigators (3-year, NIDA ONLY)
- IRB Members (Human Subject Research)
- IRB Chair Member
- Abbreviated Social/Behavioral Research Training (Human Subject Research)
- Abbreviated Biomedical Research Training (Human Subject Research)

Refresher Courses

- Biomedical Research Investigators (Refresher)
- Social & Behavioral Research Investigators (Refresher course)

13. Click on Finalize Registration



English ▾

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CITI - Learner Registration

Welcome to the CITI Program. Your registration with West Virginia University is complete.

[Finalize Registration](#)


New to the CITI Program? Read the [getting started guide](#) or watch the [getting started video](#).

Need Help? [Support Center](#)

14. Click the icon View Courses

Welcome, Jan
[Add Institutional Affiliation](#)
[Register as Independent Learner](#)

0 Courses Completed 1 Day of Membership

 Due to planned maintenance, the CITI Program website will be unavailable on Friday November 18 from 9 p.m. to 12 a.m. U.S. Eastern Time (6 p.m. to 9 p.m. U.S. Pacific). We apologize for the inconvenience.

✔ Your registration has been completed successfully.

Institutional Courses

Institutional Courses are available to learners who have an affiliation with one or more subscribing institutions. If an institution with which you are affiliated is not listed, you may want to [add an affiliation](#). If you are no longer associated with a listed institution, you may want to [remove an affiliation](#).

West Virginia University

[View Courses](#)

Would you like to affiliate with another institution?

[Add Affiliation](#)

Would you like to remove an existing affiliation?


[Remove Affiliation](#)

Independent Learner

15. Click Start now.

You will read through the material and take quizzes. Not all sections will have a

quiz. You need to score at least 80% in each section, and you can take the quizzes as many times as you need.

 CITI Program now supports linking your ORCID® ID.

[Connect your ORCID ID](#) [How to link your ORCID ID](#)
[About ORCID](#)

Show Courses for: West Virginia University

[Institution List](#)

West Virginia University

Active Courses

[Learner Tools](#)

You have no active courses for this Institution.

Courses Ready to Begin

[Learner Tools](#)

West Virginia University
Abbreviated Social/Behavioral Research Training (Human Subject Research)
Stage 1 - Basic Course

0 / 8 modules completed

[Start Now](#)

Completed Courses

[Learner Tools](#)

You have not recently completed any courses for this Institution. Full records of past completions are available in [Records](#).

[Learner Tools for West Virginia University](#)

16. When you are done, you need to email your FSC a copy of your certificate. **Due Date is December 1, 2023.**

The screenshot displays the CITI PROGRAM website interface. The top navigation bar includes 'Main Menu / My Courses', 'My Profiles', 'My Records' (circled in red), 'My CEUs', and 'Contact Us'. Below the navigation, a message states: 'The My Records section provides access to course completion data for both your current active affiliations and for past affiliations that are no longer active.'

The main content area shows 'West Virginia University Records' under 'Human Research'. It contains two tables:

Abbreviated Social/Behavioral Research Training (Human Subject Research)								
Stage	Record ID	Passing Score	Your Score	Start Date	Completion Date	Expiration Date	Gradebook	Completion Record
Basic Course	11605839	80%	90%	24-Oct-2013	24-Oct-2013	23-Oct-2016	View	View-Print-Share

Biomedical Research Investigators								
Stage	Record ID	Passing Score	Your Score	Start Date	Completion Date	Expiration Date	Gradebook	Completion Record
Basic Course	19563274	80%	81%	24-Oct-2013	17-May-2016	17-May-2019	View	View-Print-Share

The 'View-Print-Share' link for the Biomedical Research Investigators course is circled in red.

The second screenshot shows the 'View-Print-Share Completion Record' page for record ID 19563274. It displays the following information:

Name: Summer Kuhn (ID: 3839903)
Institution: West Virginia University (ID: 827)
Course: Biomedical Research Investigators
Stage: Stage 1 - Basic Course
Completion Date: 17-May-2016
Expiration Date: 17-May-2019
Record ID: 19563274

Completion Reports are two-part transcripts of your course work, and include all quiz scores. Part 1 reflects quiz scores at the time you completed and passed the course. Part 2 includes scores for any subsequent quiz attempts.

To view or print the Completion Report for this course, click on the link below.
To share the Completion Report, copy the link below and paste it into an email or other communication.

www.citiprogram.org/verify/7k578a9206-9a0e-4cbb-88d1-5aa65ef2a497-19563274

The URL is circled in red.

17. Next week you will start working on your training.

On-Track

Throughout the HSTA year, you will complete OnTrack videos to help you prepare for college.

OnTrack to Post-Secondary Education (OTPSE) is an online college and career readiness curriculum designed to help students, parents, counselors, educators, and after-school program staff successfully navigate the post-secondary education attainment process. Through grade-specific video modules, OTPSE provides 9th-12th grade students with the knowledge and confidence to complete their high school experience and create a viable post-secondary education plan. Using the prescribed OnTrack steps, students are better prepared to navigate high school, understand the postsecondary application process, gain acceptance to an institution of their choice, and receive financial aid to support their attendance. Students can invite a mentor (parent, guardian, teacher, etc.) to share the OnTrack curriculum and assist them in the post-secondary attainment process. On Track is a gifted service of the Uncommon Individual Foundation (UIF); offered to students, mentors, schools, and community-based organizations at no cost.

The goal of the videos is to assist with college prep. It is your job to learn and ask questions about information that OnTrack gives you. Remember to take notes and soak in information that will benefit your college prep journey. OnTrack will announce various prizes throughout the year.

1. If you created an account last year, use the same login information. Email your FSC if you need your OnTrack information, or your password reset.
2. New students, watch the video that explains how to use the program
<https://ontrack.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=6ee44496-8d5d-4d40-80e8-aaae014c60d0>
3. Then go to ontrackpse.com and click the Sign Up button.
4. To sign up [Make sure to select the correct grade level]
 - a. Account Type: Student
 - b. School: HSTA [Region]
 - c. Access Code _____
 - d. Counselor: [Region] Counselor
 - e. New Student
 - i. WRITE DOWN your OnTrackID: OT _____ [This will be emailed to you]
 - ii. Write down your Password: _____ [This will be emailed to you]

Save it in your phone or email the information to yourself.
5. The sign-up process is 3 quick pages and then a pre-survey. Complete the survey to win prizes from OnTrack. If you have problems creating a login, visit the HSTA website to learn how turn off the ***pop-up blocker***.
6. Make sure you complete the pre-survey, and you can start working on assigned videos.
Note: If it kicks you out of the program, sign back in after completing the pre survey.
7. During HSTA club meetings you will work on videos.

8. You can complete more videos to win prizes and money.
 - a. Visit to learn more: <https://ontrackpse.com>

Lesson #3: Observation

Objectives:

- Students will complete an observation activity.
- Students will be introduced to the HSTA Annual Research Project.
- Students will continue to work on CITI Training and/or OnTrack.

Materials:

- Internet
- Pencil and paper
- Snack

Activities:

1. Observation Activity
2. Introduction to HSTA Annual Community Project Observation
3. Work on CITI and OnTrack

Lesson 3

Direct Link for Main Lesson 3 Folder:

https://drive.google.com/drive/folders/1h6O6OynPePLJoW6JJphrbgnoLbQ1-jVg?usp=share_link

This week we will start selecting our project topics starting with observation. To get started we will work through an observation activity.

HSTA Student Worksheet: Snack Observation

Directions: Look at the snack and use your five senses to make observations.

Snack: _____

Smell	
Sight	
Touch	
Hear	
Taste	

Now share your observations with peers. What were the similarities and differences?

--

HSTA Community Research Project

As a HSTA student, you are required to conduct a community research project that sets out to understand and/or improve the wellbeing of your community. You will complete four projects over the course of your HSTA career. You may work in a group of three or less (check with your Field Site to see if this is different for your region, but your group can be no larger than three HSTA students). Your HSTA teacher, peers, Field Site, Community Research Associate (CRA), and Graduate Assistant (GA) will assist you in completing the project.

As a 9th and 10th graders, you will collect survey data using the HSTA State Survey (for more information see pages 58, 142, and 204-211). As a 11th and 12th grader, you can work with a 9th or 10th grader on the HSTA State Survey, select a project from the Menu, and/or create your own project with CRA/GA and HSTA Teacher approval (for more information see page 60).

Before we start talking about HSTA Community Research Project, let's watch a short video on [What is Research?](https://www.youtube.com/watch?v=mV0bUQpz468) Direct link: <https://www.youtube.com/watch?v=mV0bUQpz468>

Summary of Project Logistics:

1. Once you have selected your community research topic, you will work on the HSTA research project through a series of club meetings. More information about research topics by grade level can be found on pages 58 for 9th/10th graders and 60 for 11th/12th graders.
2. There are specific deadlines that you will need to follow. You will submit project information to your HSTA teacher for comments/score. HSTA teacher will score your project's title, research question, hypothesis, variables, background research, procedures, and references. All 11th and 12th grade projects will be approved by a CRA/GA, then scored by your HSTA teacher.
3. Once you have an approved project, you may start to collect data.
4. During data collection, make sure to communicate with your HSTA teacher, Field Site, and CRA/GA with updates and any problems.
5. Assignments will be given to complete your data analysis and work through your conclusion.
6. Your final presentation must be submitted to REDCap on or before **April 19th 5PM**. Presentations will be pre-loaded and ready to go on the day of Symposium, so it is very important you submit your final project on or before **April 19th**. If you fail to submit on time, you will not be able present at symposium and will need to speak with your LGB.
7. You will present at a symposium. The annual Symposia are an important part of the HSTA experience. These events are mandatory for students to attend. The presentation of your project helps develop crucial skills, shares your work with community members, and is a requirement for the HSTA waiver.
 - o To earn symposium credit:
 - o Attend all sessions.
 - o Present and listen to all presentations.
 - o Complete your evaluation online.

Community Research Project Directions

1. Click [here](#) to access the Research Project PowerPoint Guide.
2. Project selections
 - 9th & 10th Graders: State Survey (more information on pages 58, 142, 204-211)
 - 11th & 12th Graders: Own Idea, [Research Menu](#), or partner with a 9th/10th Grader(s) on State Survey (more information on page 60.)
3. Scoring (Score sheet can be found on pages 62-67)
 - HSTA teachers will give a point for each fully completed item.
 - All 9th and 10th grader – State Survey project must be submitted to REDCap for general comments and be approved and scored by HSTA teacher.
 - All 11th and 12th grade – **Own Idea or Research Menu or Partner Project with 9th/10th Grader(s)** projects must be submitted to REDCap for general comments and approved by CRA/GA before HSTA teacher can score.
 - There are **40 possible points** from Title through Procedures, including Reference slide.
 - You must complete all 40 items to be approved.
 - At the Symposium, judges will give a point for each correctly completed content item. To pass, you will need to receive at least **20 out of 24 points**.
4. Deadlines
 - You can submit early for comments/work ahead.
 - REDCap Link: https://redcap.link/submission23_24
 - **Everyone** submits for general comments from CRA/GA. If students are 11th/12th graders, CRA/GA **approval** will be given in comments once approved.
 - The following CRA/GA will provide your region with comments.
 - Dr. Cathy Morton catherine.morton@hsc.wvu.edu
 - Eastern Panhandle
 - Merge mlmcmillion@hsc.wvu.edu
 - BWRC, Kanawha, Greenbrier/Fayette, Cabell/Lincoln/Boone
 - Giuliana gl0022@mix.wvu.edu
 - Mountain HSTA
 - Shan sec0002@mix.wvu.edu
 - Harrison/Monongalia/Marion
 - Summer slkuhn@hsc.wvu.edu
 - Mingo/Logan, Raleigh, McDowell, Mercer, Ohio/Marshall

- Submission Dates:
 - October 16th – 20th Observation – Research Question – Variables
 - November 13th – 17th Background – Hypothesis
 - Dec 4th - 8th Data Collection Chart and Procedures
 - Jan 15th – 19th Final comments
 - All approvals and 40 completion points must be earned before or on **January 31, 2024**. If you don't have an approved project, you will receive notification for non-compliance and will have 10 days to get an approved project OR be dismissed from the program.
 - Final Deadline
 - *ALL presentations will need to be uploaded to REDCap by [April 19, 2024 5PM](#). REDCap will send you a link to upload your project. All students will submit their project to REDCap, i.e., if you work in a group each group member will submit to REDCap via their email. This will be the final presentation that you will present during symposia.*
5. Symposium 2024
- Submit project through REDCap by April 19, 2024 5PM.
 - All symposia will be on the regional level. The symposia window will be April 20, 2024 – May 4, 2024. Your Field Site will give you more details about dates and times.
6. Scheduling Issues for Symposium
- We understand that sometimes circumstances arise that require special attention to students' attendance.
 - If you have a conflict, submit excuse to REDCap by April 5, 2024 midnight EST.
 - <https://redcap.link/excuse2024>
 - The following circumstances are acceptable reasons for a schedule change:
 - Prom – If you have prom, you can request to present during the morning session.
 - College graduations – Students with immediate family members graduating may be excused.
 - Serious illness
 - Other valid reasons could include funeral, wedding, major family events

Research Topics

9th and 10th Grade Project Directions

All 9th and 10th graders will select a project from the State Survey. Students will use the data to complete a cross sectional/prevalence study. A cross sectional/prevalence study is a study that looks at the population during a given time. Example: If you test the 9th graders at your school during September, their attitudes could change if you test them again in May.

As a 9th/10th grader, you will collect primary data from the State Survey. This means the data we collect will be from our community between October – December of 2023. However, the survey is preset with questions. Below is a list of topics you can select from. The full survey can be found on pages 204-211.

- Survey Topics:
 - Sociodemographic (age, gender, race, ethnicity, state, county, education, occupation)
 - General Health [self-rated health, quality of life or healthy days, height, weight, BMI, and medical diagnoses (asthma, cancer, COPD, depression, type II diabetes, fibromyalgia, generalized anxiety disorder, high cholesterol, high blood pressure)]
 - Safety (drinking and driving or riding, seatbelt, text/email while driving, smoking, vaping, chew, cigars, drinking, abstinence, and safe sex, fighting, and bullying)
 - Nutrition (eating breakfast, consumption of fruits and vegetables, water, energy drinks, soda, sports drinks, high calorie snacks, and fast food and buffet restaurants, and the use of nutrition labels)
 - Physical Activity [days active (cardio and strength), screen time, and moderate and vigorous activity levels]
 - Sleep [quality, quantity, snoring, unintentionally falling asleep, and location of sleep (also measures homelessness within the last 30 days)]
 - COVID (vaccination, and boosters)
 - Stress Score
 - Self-Esteem Score
 - Access to Resources (smartphone, wi-fi/internet, cell service, water, vehicle, public transit, food, medical care, laundry facilities, and utilities)

Follow the instructions on the PowerPoint Presentation Guide to complete your **Community Research Project Presentation**. You will submit the PowerPoint to your CRA/GA through REDCap, https://redcap.link/submission23_24 see deadlines on page 56-57. Keep in mind the following things before beginning:

- Your project topic must be from the State Survey (pages 204-211).
- Use the data tool (Lesson #5, page 83) to check your research question and variables.
- You must earn 40 points and be approved **before** you can have state data.

You will start sharing the state survey with family, friends, and peers

<https://redcap.link/wvstate2324>. Lesson #6 will talk about recruitment and survey details. Data will be released January 8, 2024 as long as your club has completed CITI training and all projects are approved.

11th and 12th Grade Project Directions

Follow the instructions on the PowerPoint Presentation Guide to complete your **Community Research Project Presentation**. You will submit the PowerPoint to your CRA/GA through REDCap https://redcap.link/submission23_24, see deadlines on page 56-57. Please keep in mind the following things before beginning:

- You must earn 40 points from your HSTA teacher and have an approved project by CRA/GA **before** you can collect data.
- Project selection: You can do any one of the three choices below:
 1. Select your own community research topic.
 2. Engage with a menu project [Research Menu](#)
 3. Work with a 9th/10th grader on the State Survey Project
- **ALL sensitive and/or protected health information MUST BE APPROVED BY CRA and/or WVU-IRB. (Example: blood pressure, weight, sex, drug use, etc.).**
- **Any research on vertebrate animals must BE APPROVED BY CRA and/or WVU-IACUC.**
- **No culturing bacteria.**
- **ALL SURVEYS AND INTERVENTION MATERIALS MUST BE APPROVED BY YOUR CRA/GA BEFORE BEGINNING THE PROJECT.**

Helpful Resources

- [Research Menu](#) has many projects ideas and resources.
- Visit Lesson #11 about procedures if you need help with your project ideas.

Project Definitions for 11th and 12th Graders

- A **cross sectional/prevalence study** is a study that looks at the population during a given time. If you test the 9th graders at your school during September, their attitudes could change if you test them again in May.
- An **intervention** is a ‘program’ designed to make a change among a group of individuals. This change can be a behavior change (i.e., eating healthy) or improvements in health status (i.e., lowering blood pressure).
- A **human experiment** is an experiment that is conducted with humans to measure an effect. For example, you can experiment to see if students test better if they study with iPads or books.
- A **non-human experiment** is a traditional science experiment where you test a hypothesis. For example, you can measure different amounts of light on bean growth and different amounts of caffeine on zebrafish.

Score Sheet

Your presentation should contain all the content on the score sheet and your presentation slides should be in the same order as the score sheet. Click [here](#) to access a copy of the Research Presentation PowerPoint Guide.

- Title, Observation, Background Information, Research Question, Hypotheses, Variables, Procedures A & References will be scored/given completion points by **HSTA Teacher**.
- To pass you will need to complete all **40 items** (points) ***AND*** have been approved by the teacher/CRA/GA.
 - **9th/10th Graders Approved by HSTA Teacher and use State Survey**
 - **11th/12th Graders Approved by HSTA Teacher and CRA/GA**
- Procedures B, Results, Data Analysis, Conclusion, & Presentation Skills will be scored at **Symposium**. To pass you will need to receive at least **20 out of 24** points.

CONTENT		0 or 1
Title 3 pts	Title was a complete statement/question	
	Title matched the research question	
	Title clearly defined the purpose of the project	
Observation 3 pts	Observation stated the project’s problem clearly	
	Observation included why this project was important to the community and me	
	Observation included a short summary of project including project type: prevalence, intervention, human experiment, or non-human experiment	
Background Research 7 pts	Background information was related to the research question	
	Background information was referenced using correct in-text APA citations for four sources	
	Background information is cited from at least two academic resources (i.e., Government Agency, Google Scholar)	
	Background information had at least two facts from each source totaling at least 8 facts	
	Background information was highlighted in bulleted format, not in paragraph form	
	Background information was not plagiarized (summary in own words)	
	Background information was limited to 20% of quotes	
Research Question 3 pts	Research question was a focused and specific question	
	Research question was researchable	
	Research question was measurable	
Variables 4 pts	Correct independent variable(s)	
	Correct dependent variable(s)	
	Correct control (If no control, state no control)	
	Correct constants (At least three)	

Hypotheses 4 pts	Hypothesis was based on research question and variables	
	Hypothesis is testable by a statistical test	
	Explain why this is your hypothesis using some of your background research	
	Null Hypothesis was stated correctly	
Procedures 11 pts	Project Procedures are listed below: Prevalence, Human Intervention, Human Experiment and Non-Human Experiment	
1 pt	<i>Make sure</i> Procedures are written in past tense <i>before you present your final presentation</i>	
Results 7 pts	Results displayed pictorial evidence of research study (photos)	
	Results displayed raw data in a chart	
	Results included descriptive statistics (averages, percentages, etc.)	
	Results included a properly labeled graph(s) (title, key, x-axis, y-axis)	
	Results including graphs and charts were explained well	
	Correct Number of Participants/Replications <ul style="list-style-type: none"> ○ Cross Sectional/Prevalence – 100 Participants ○ Intervention – 30 Participants (Pre/Post) ○ Human Subjects – 30 Participants in each group (at least one control/one experimental) ○ Experiment – at least 5 replications in each group (at least one control/one experimental) 	
Results displayed data that matched research question		
Data Analysis 4 pts	Data analysis included a statistical test used to test the hypotheses	
	Data analysis included an explanation of why statistical test was used	
	Data analysis included a p-value	
	Data analysis included an explanation of the statistical significance of statistical test	
Conclusion 5 pts	Conclusion included a brief summary of the project	
	Conclusion interpreted the data to conclude if it supported/rejected hypotheses	
	Conclusion answered the research question	
	Conclusion discussed limitations	
	Conclusion discussed how student(s) would implement change and/or bring awareness to their community	
References 5 pts	Reference slide included 4 or more academic sources	
	Reference slide had ONLY in-text citations that were included as full references	
	References were in the correct APA format	
	References were listed in alphabetical order	
	References were listed with hanging indents	

Presentation Skills 7 pts	Student(s) spoke clearly during the presentation	
	Student(s) could answer questions with confidence	
	Student(s) didn't read slides word for word	
	Student(s) presented slides in the correct order	
	Presentation had limited spelling/grammar errors	
	Presentation's background (color/animation) was not distracting	
	Presentation's text size/font were consistent	

Project Types – Procedures

<u><i>Prevalence</i></u> <input type="checkbox"/>	<u><i>Intervention</i></u> <input type="checkbox"/>	<u><i>Human Experiment</i></u> <input type="checkbox"/>	<u><i>Experiment</i></u> <input type="checkbox"/>
Procedures were numbered <input type="checkbox"/>	Procedures were numbered <input type="checkbox"/>	Procedures were numbered <input type="checkbox"/>	Procedures were numbered <input type="checkbox"/>
Procedures identified all safety precautions (including how participants' identity will be kept confidential, i.e., CITI Training completed) <input type="checkbox"/>	Procedures identified all safety precautions (including how participants' identity would be kept confidential, i.e., CITI Training completed) <input type="checkbox"/>	Procedures identified all safety precautions (including how participants' identity would be kept confidential, i.e., CITI Training completed) <input type="checkbox"/>	Procedures identified all safety precautions (i.e., completed lab safety training) <input type="checkbox"/>
Procedures explained who the study population was <input type="checkbox"/>	Procedures explained who the study population was <input type="checkbox"/>	Procedures explained who the study population was <input type="checkbox"/>	Procedures explained what plant, natural resource, invertebrate (other) the project was experimenting with <input type="checkbox"/>
Procedures explained what the study population did <input type="checkbox"/>	Procedures explained details of the of the intervention <input type="checkbox"/>	Procedures explained what the study population did <input type="checkbox"/>	Procedures explained details of the experimental environment and/or change in environment (if you have more than one experimental group explain differences among all groups) <input type="checkbox"/>
Procedures explained how at least 100 participants were recruited <input type="checkbox"/>	Procedures explained how at least 30 participants were recruited <input type="checkbox"/>	Procedures explained how at least 30 participants were recruited for EACH group (experimental & control) <input type="checkbox"/>	Procedures included a control group <input type="checkbox"/>
<u><i>Prevalence</i></u> <input type="checkbox"/>	<u><i>Intervention</i></u> <input type="checkbox"/>	<u><i>Human Experiment</i></u> <input type="checkbox"/>	<u><i>Experiment</i></u> <input type="checkbox"/>

Procedures included a copy of the measurement tools (Example: Survey/observation sheet) <input type="checkbox"/>	Procedures included a copy of the pre and post measurement tools (Example: Survey/observation sheet) <input type="checkbox"/>	Procedures included a copy of the measurement tools (Example: Survey/observation sheet) <input type="checkbox"/>	Procedures included a list of materials <input type="checkbox"/>
Procedures included a participant cover letter explaining the project <input type="checkbox"/>	Procedures included a participant cover letter explaining the project <input type="checkbox"/>	Procedures included a participant cover letter explaining the project <input type="checkbox"/>	Procedures explained that there were at least 5 replications per experimental group <input type="checkbox"/>
Procedures included data collection sheet <input type="checkbox"/>	Procedures included data collection sheet <input type="checkbox"/>	Procedures included data collection sheet <input type="checkbox"/>	Procedures data collection sheet <input type="checkbox"/>
Procedures explained how data was collected <input type="checkbox"/>	Procedures explained how pre and post data was collected <input type="checkbox"/>	Procedures explained how data was collected <input type="checkbox"/>	Procedures explained how data was collected <input type="checkbox"/>
Procedures included how data will be analyzed <input type="checkbox"/>	Procedures included how data will be analyzed <input type="checkbox"/>	Procedures included how data would be analyzed <input type="checkbox"/>	Procedures included how data would be analyzed <input type="checkbox"/>
Procedures provided clear description of project <input type="checkbox"/>	Procedures provided clear description of project <input type="checkbox"/>	Procedures provided clear description of project <input type="checkbox"/>	Procedures provided clear description of project <input type="checkbox"/>

Judges Score Sheet

Student Name(s) _____ School/Region _____
 Title, Observation, Background Information, Research Question, Hypotheses, Variables, Procedures,
 & References have been scored.

Score Sheet		0 or 1	Comments
<i>1 pt</i>	Procedures are written in past tense		
Results <i>7 pts</i>	Results displayed pictorial evidence of research study (photos)		
	Results displayed raw data in a chart		
	Results included descriptive statistics (averages, percentages, etc.)		
	Results included a properly labeled graph(s) (title, key, x-y-axis)		
	Results including graphs and charts were explained well		
	Correct Number of Participants/Replications ➤ Prevalence – at least 100 Participants ➤ Intervention – at least 30 Participants (Pre/Post) ➤ Human Subjects – 30 Participants in each group (at least one control/one experimental) ➤ Experiment – at least 5 replications in each group (at least one control/one experimental)		
	Results displayed data that matched research question		
Data Analysis <i>4 pts</i>	Data analysis included a statistical test used to test the hypotheses		
	Data analysis included an explanation of why statistical test was used		
	Data analysis included a p-value		
	Data analysis included an explanation of the statistical significance of statistical test		
Conclusion <i>5 pts</i>	Conclusion included a brief summary of the project		
	Conclusion interpreted the data to conclude if it supported/rejected hypotheses		
	Conclusion answered the research question		
	Conclusion discussed limitations		
	Conclusion discussed how student(s) would implement change and/or bring awareness to their community		
Presentation Skills <i>7 pts</i>	Student(s) spoke clearly during the presentation		
	Student(s) could answer questions with confidence		
	Student(s) didn't read slides word for word		
	Student(s) presented slides in the correct order		
	Presentation had limited spelling/grammar errors		
	Presentation's background (color/animation) was not distracting		
	Presentation's text size/font were consistent		

Lesson #4: Project Observation/Research Question and OnTrack

Objectives:

- Students will refer to scoresheets involving requirements and criteria.
- Students will refine their Observation slide on their PowerPoint.
- Students will provide feedback to their peers on their observations using provided criteria.
- Students will identify the criteria needed for a good research question.
- Students will formulate their research question.
- Students will work on CITI training or register with (or sign in to) OnTrack

Materials:

- Internet
- Pencil and paper
- Snack

Activities:

1. Observation and Research Question
2. CITI training or OnTrack

Lesson 4

Direct Link for Main Lesson 4 Folder: https://drive.google.com/drive/folders/1zOj-A4-Jye2x3CNzkkgFMUNdhdWyIcx3?usp=share_link

HSTA Student Worksheet: Project Selection

Revisit your grade level project options/topics on pages 58 (9th and 10th graders) and 60 (11th and 12th graders). Write down your topic options. You can do this in groups or solo.

Hints:

Review State Survey – As you work through your items ask yourself how they are related, how they can impact each other, is there a relationship between the items, is there a difference between the items, etc.

11th and 12th Grade Projects – Make sure to keep it simple and think about how you will measure your variables. Look at the [menu options](#). Do you see anything you like?

If you are having issues, take a few items from the State Survey and/or your research ideas and read over the observation handout, then go through the *HSTA Student Worksheet: Project Observation*. This will help you think about possible community areas you can research.



Once you are sure about your project topics, you are going to begin working on your project. The first step is to make an observation about the topic that you are studying. Click [here](#) to access the Research Project PowerPoint Guide. Save this PowerPoint Guide to a shared location for your HSTA teacher and group members to access. Next, read the handout on Observation.

Observation Information Handout.

You are now going to begin to formulate your observation that will set the tone of your project. It is very important that your research question is clear and specific, so be sure to read the tips and examples closely. Read over the Research Question Information Handout. It is also important that your variables are measurable and are included in your Research Question.

Score Sheet – Worth 3 Points

- *Observation states the project's problem clearly.*
- *Observation includes why this project is important to the community and me.*
- *Observation includes a short summary of the project, including project type: prevalence, intervention, human experiment, or non-human experiment.*

There are many reasons to do research on a particular issue: 1) When you want to alert the community about an issue that needs attention. 2) When it's important to further the public interest. 3) When you want to impact a specific issue in your community.

To incorporate community and design, a true community-based project includes community members and/or community stakeholders in every phase of the project. The guidelines below are to help you incorporate these stakeholders into your project.

1. The observation/statement of the problem should come from a true community issue.
 - Whether it starts with a statistic or just a concern by members of the community, it needs to reflect something that is tied to the community.
 - Talk to people in your community and find out what issues they see as important and build your project from there.
2. Where did your idea come from? Did it come from
 - data?
 - a community issue that you have observed?
 - a conversation or meeting you had with a community member/stakeholder?
 - a priority area from the WV Bureau of Public Health?
 - an interest you have?
3. What information do you know about the problem you are trying to address?
 - Talk to community members/stakeholders about the problem.
 - Look at data from WV BPH or Healthy People 2020
 - Gather information from as many sources as possible.
4. Make sure your problem is clearly stated.
 - What is a problem facing your community? Make sure it is a real issue in the community.
 - Back up the problem with statistics and facts.
 - Why is this a problem?

5. Explain how the problem will be addressed in the community.
 - Tell what your project will do to deal with this problem.
 - Give a brief description of your project and how it will involve the community.
6. Explain how this project idea will improve the community.
 - Tell how your project will make a positive impact on your community.
 - Tell how you will share your research findings with your community.

HSTA Student Worksheet: Project Observation

Directions: Complete the questions below. Then you/your group will type this information into your project PowerPoint. Save this PowerPoint Guide to a shared location for your HSTA Teacher and Group Members to access.

Observation

What do you think the problem is that the project is trying to address?

Observation stated the project's problem clearly.

Have you observed this problem in your community? Explain this problem in your community and/or in general.

Observation included why this project was important to the community and me.

What is the project about? Give a short summary of the project in your own words. *Observation included a summary of the project including project type: prevalence, intervention, human experiment or non-human experiment.*

Lesson #5: Research Question/Variables and OnTrack

Objectives:

- Students will build a Hovercraft.
- Students will discuss research variables.
- Students will identify the variables for their research project.
- Students will work on CITI Training or register with (or sign in to) OnTrack.

Materials:

- Internet
- Pencil and paper
- Hovercraft
 - Pop-top lid from a plastic drinking bottle.
 - An old CD or DVD (it will not be playable after this activity)
 - A medium-sized balloon (large enough to inflate to at least 11 inches around)
 - Craft glue or super glue
 - Stopwatch or timer
 - Large flat surface for testing the hovercraft

Activities:

1. How Does a Hovercraft Hover? Activity
2. What are research variables?
3. Continue to work on CITI Training and OnTrack

Lesson 5

Direct Link for Main Lesson 5 Folder: https://drive.google.com/drive/folders/1Bz-EjAvwVagZcbgd1oe4XteunE4sMNY?usp=share_link

How Does a Hovercraft Hover?

Introduction: Have you ever ridden on a hovercraft? It is like gliding on a cushion of air! In fact, this is exactly what is going on. A hovercraft is a vehicle that glides over a smooth surface by hovering upon an air cushion. Since a hovercraft can travel on top of flat land or water, it is an amphibious vehicle. In this activity, you will get to build your own mini hovercraft using a CD or DVD, a pop-top lid from a plastic bottle, some glue, and a balloon. How will different amounts of air in the balloon affect how long the hovercraft hovers?

Materials

- Pop-top lid from a plastic drinking bottle.
- An old CD or DVD (it will not be playable after this activity)
- A medium-sized balloon (inflate to at least 11 inches around)
- Craft glue or super glue
- Stopwatch or timer
- Large flat surface for testing the hovercraft



Procedures

1. Remove a pop-top lid from a plastic drinking bottle.
2. Glue the base of the pop-top lid to the CD (or DVD) so that the lid covers the hole in the center of the CD. Allow the glue to dry completely.
3. Make sure the pop-top lid is closed.
4. Blow the balloon up as large as you safely can without popping it. Then pinch the neck so that no air can escape.
5. Stretch the neck of the balloon over the pop-top lid, being careful not to let any air escape. Carefully center the balloon's opening above the pop-top lid opening. Your hovercraft is now ready to do some hovering!
6. *Tip:* If the pop-top lid detaches from the CD and you used craft glue to glue them together, try carefully re-gluing them using super glue.
7. Place the hovercraft on a flat surface. Start your stopwatch or timer, open the pop-top lid, and push the hovercraft. Stop the stopwatch when the hovercraft stops hovering.
8. Detach the balloon from the pop-top lid.
9. Repeat this process two more times, blowing the balloon up as large as you safely can, attaching it to the pop-top lid, and timing how long the hovercraft hovers for.
 - 1) Did the hovercraft hover for the same amount of time each time, or was there some variation?

10. Repeat this process three more times, but this time only blow the balloon up to a medium size. For example, if it took three breaths to blow the balloon up as large as you safely could, use only two breaths or a little less to blow it up now.
 - 1) How long did the hovercraft hover when the balloon was only a medium size?

 - 2) Did the hovercraft hover for about the same amount of time each of the three times you tested it using a medium-sized balloon?

11. Repeat this process three more times, but this time only blow the balloon up to a small size. For example, if it took three breaths to blow the balloon up as large as you safely could, use only one breath or less to blow it up now.
 - 1) How long did the hovercraft hover using a small-sized balloon?

 - 2) Did the hovercraft hover for about the same amount of time each of the three times you tested it using a small-sized balloon?

 - 3) Overall, which size balloon allowed the hovercraft to hover for the longest amount of time?

 - 4) Which allowed it to hover for the shortest amount of time?

 - 5) Why do you think this happened?

Research Question and Variables Information Handout

You are now going to begin to formulate your research question and variables that will guide the rest of your project. It is very important that your research question is clear and specific, so be sure to read the tips and examples closely. Read over the Research Question Information Handout. It is also important that your variables are measurable and are included in your Research Question.

We will start off with a short video about [What is a research question?](https://www.youtube.com/watch?v=5IEQjPk79i0) Direct link:
[https://www.youtube.com/watch?v=5IEQjPk79i0.](https://www.youtube.com/watch?v=5IEQjPk79i0)

Then continue reading the information below about research questions.

Score Sheet for Research Question - Worth 3 Points

- *Research question is a focused and specific question.*
 - Is not too broad or general.
- *Research question is researchable.*
 - Has a clear meaning of what you want to research.
 - It is not a question you can Google.
- *Research question is measurable.*
 - It clearly explains what you plan to measure and how.

Tips for Research Question

1. Research questions should be clear and focused. They “[... should address what the variables of the experiment are, their relationship, and state something about the testing of those relationships.” (Thompson Writing Group: Duke University, 2014)
2. Stay away from common sense questions – the more specific you are in your research; the more likely common-sense answers will not relate.
3. Your research question is the center of your research project and directs the hypothesis, variables, procedures, and your conclusions.
4. If you have trouble coming up with a research topic, “Choose a general topic of interest, and conduct preliminary research on this topic in current periodicals and journals to see what research has already been done. This will help determine what kinds of questions the topic generates.” (Thompson Writing Group: Duke University, 2014)
5. “[... research questions should address what the variables of the experiment are, their relationship, and state something about the testing of those relationships.” (Thompson Writing Group: Duke University, 2014)
6. Explain on your slide how addressing this research question will improve your community. How will your project make your community better?

Thompson Writing Group: Duke University. (2014). *What makes a good research question?* Retrieved August 2016 from http://twp.duke.edu/uploads/media_items/research-questions.original.pdf

Editing your Research Question. As you edit your research question and/or prepare feedback to your peers, use the following guiding questions.

- Is the example research question too broad or general? Yes or No. How would you narrow the question?
- Does the example research question have a clear meaning, is it researchable? Yes or No. How would you define the question better? Are the group of people and/or non-human test subjects defined?
- Is the example research question clear about what you are measuring? Yes or No. What would you measure in the research question? Who/what would you measure from?

After watching the short video on research variables and reading the provided information, watch [What are research variables?](https://www.youtube.com/watch?v=sbN-ymC6w3k) Direct link: <https://www.youtube.com/watch?v=sbN-ymC6w3k> and read the information below.

Score Sheet for Variables - Worth 4 Points

- *Correct independent variable*
 - *measured, manipulated, or selected by the experimenter to determine its relationship to an outcome*
 - *Experimental, manipulated, treatment group variable*
- *Correct dependent variable*
 - *observed and measured to determine the effect of the independent variable*
- *Correct control*
 - *the group that has no 'treatment' so you can use it to compare to the 'treatment' groups to observe a change*
 - *not all projects have a control variable. If there is no control, state "no control"*
- *Correct constants*
 - *elements of the project that stay the same throughout the project – like water temperature, survey questions, etc.*
 - *list at least 3 constants*
 - *all projects have constant variables*

Tips for Variables

- Independent variable is what you change/set, dependent variable is what you measure.
- Control gets no 'treatment', constants stay the same throughout the experiment.
- Variables will fall into one of these roles: Independent, Dependent, Control, or Constants.

Types of Variables.

To answer the research question, we need to understand the type of variables we are working with. Knowing the type will help identify what statistical test we will run.

- **Categorical:** contains a certain number of categories or groups.
 - *Example: Yes/No; Gender; Ratings from 1-10*
- **Continuous:** numeric variables that have an infinite number of possibilities.
 - *Examples: height, weight, amount of time, temperature*

Research Question Development

Directions: Now that you have an observation and a community problem you want to research, you will start writing research questions.

If you are a 9th or 10th grader, click here to view the [Data Tool Help Guide](#). This link will take you to a REDCap Survey where you can enter your survey items and it will help you write a research question. As you do this, make sure the question the Data Tool Help Guide is giving you makes sense.

Data Tool Help Guide: <https://redcap.link/datatool2023>. For this tool to help, you will need your two topics/items and you will need to know what type of variables they are.

Tips for Data Tool Help Guide

- If you have a categorical variable and a numeric variable, it is suggested you try working with the categorical variable as your Independent Variable first.
- If you are working with a categorical variable and it has more than 6 responses, you want to narrow it down to 5 responses.
 - Example if you are looking at counties, it would be better to compare two counties vs six counties. Increasing the number of counties will increase the factors that impact the dependent variable.
- Use the following research question templates if you need help:
 - There is a relationship between A and B?
 - There is a difference among A and B?
 - Does A impact B?
 - Does A influence B?

Example of bad fits:

- If you select County and State, does it make sense to have a question that states:
 - Does County impact State?
 - This question doesn't make sense. What are we wanting to find out?
 - A better set of topics/items would be working with county or state as the Independent Variable and see if there is a difference in an outcome. The outcome would be the dependent variable.
 - Does A influence B?

If you are an 11th and 12th grader, use the menu to develop a project and/or read through the menu options for examples of how research questions were written for those topics.

Direct link to the Menu:

https://drive.google.com/drive/folders/1IBy_7pFZ5Fbf4iytYqQ5wDKr_3YOZZ60?usp=drive_link

Developing Project Research Question

Use the space below to start writing your research question and defining your variables.

Use the Data Tool Project to work through ideas with the State Survey Variables.

<https://redcap.wvctsi.org/redcap/surveys/?s=DEKTJ8W4PKH3JXKM>

If you need help, watch this short video on how to use the Data Tool <https://redcap.link/datatool2023>

If you are using the Menu, make sure to read through the outline for the project you are interested in.

Research Question		
	Independent Variable	Dependent Variable
	What is your independent variable?	What is your dependent variable?
	What type is the independent variable: Circle one. Categorical or Numerical	What type is the dependent variable: Circle one. Categorical or Numerical
Controls		
Constants		

Lesson #6: Submission of Research Question/Variables and Recruitment

Objectives:

- Students will review Research Question and Variables.
- Students will go over Recruitment for State Survey Participants.
- Students will work on CITI Training or Register with (or sign in to) OnTrack.

Materials:

- Internet
- Pencil and paper
- Research Guide PowerPoint

Activities:

1. Feedback on Research Question and Variables.
 - 1) Type research question and variables into Research PowerPoint
2. Go over Recruitment for State Survey Participants.
3. Work on CITI Training or Register with (or sign in to) OnTrack

Lesson 6

Direct Link for Main Lesson 6 Folder:

https://drive.google.com/drive/folders/1DCkCpft01mp3NTkA1tO8XPVjgTk0EIqQ?usp=share_link

Peer feedback on Project Research Question and variables

Last week, you wrote research questions and variables. Exchange your work with another group to get feedback. Have the peer group use the space below to provide feedback.

Use the feedback to rewrite your research question and variables. Type your changes into your PowerPoint and submit to REDCap https://redcap.link/submission23_24. You will get comments back from your HSTA teacher and CRA/GA.

Research Question		
	Independent Variable	Dependent Variable
	What is your independent variable?	What is your dependent variable?
	What type is the independent variable: Circle one Categorical or Numerical	What type is the dependent variable: Circle one Categorical or Numerical
Controls		
Constants		

State Survey Participant Recruitment

Today we are going to talk about recruiting for a human subject research project. As an example, we will walk through recruiting each of you to take the WV State Survey. **All 9th and 10th graders are working with the WV State Survey.** You will collect data from your families, friends, schools, communities, neighbors, social media networks, etc.

When recruiting, remember the three main principles: Respect, Beneficence, and Justice.

Respect: When recruiting subjects to participate in your study, 1) first explain what the survey is about [topic], 2) why you are conducting it, [for a research project for HSTA to learn about _____], 3) how you are going to protect their autonomy [they can chose to not participate or may cease to participate if they become uncomfortable], and 4) how you will protect their anonymity [no names or identifiers will be used].

Recruitment Script: Thank you for talking with me about my HSTA project. I am going to ask that you participate by doing a survey. This survey will ask about stress, sleep, exercise, nutrition, environment, habits, and COVID. It should take about 15-20 minutes. Everyone must be at least 13 years of age to participate. No personal information will be collected, and no questions will be asked that will connect you to your data. You can skip any question you want.

Beneficence (Do Good/Not Harm): When recruiting subjects to participate in your study, explain how your research may benefit them and/or others by increasing or improving the knowledge about what you are testing.

Recruitment Script: This project is under WVU and will help me better understand our local community's health. Please click on the link or scan the QR code, read the cover letter, and start the survey.

Justice: When recruiting subjects to participate in your study, make sure that you treat everyone equally. This means being fair.

Recruitment Script: Let me know if you need help or have any questions.

Recruitment Goals: Students working on the state survey need to ask 20 individuals you're your community or as a club, ask three classes in your school to complete the survey. If you have research questions about teens, asking classes to complete the survey is a great way to collect information. If you have research questions about adults, asking community members to complete the survey is a great way to collect information. Think about your population.

Recruitment Materials: Email, Social Media post, Link and QR

<https://redcap.link/wvstate2324>

Google Folder with Survey and Recruitment Information:

https://drive.google.com/drive/folders/1FI1E9-qz5f-85S2saqcHR2EKzaq_yH7R?usp=share_link



Lesson #7: Background Information and Measuring Your Taste Threshold with Sweetness

Objectives:

- Students will research information about their research project.
- Students will find two facts from each of their four sources.
- Students will cite references using correct APA format.
- Students will review comments by CRA/GA.
- Students will test their taste threshold for sweetness.
- Students will complete Part 1 of the Measuring Your Taste Threshold.
- Students will work on CITI Training or register with (or sign in to) OnTrack.

Materials:

- Internet
- Pencil and paper
- Measuring Your Taste Threshold – Part 1 Sweetness
 - Consumables:
 - Granulated sugar, or sucrose (10 g)
 - Water, preferably distilled
 - Cotton swabs (at least 12)
 - Paper or plastic cups (at least five per group)
 - Paper towels (five squares per person)
 - Coffee Stirrers (at least five per group)
 - Reusables:
 - Marker for Labeling
 - Stirring rod or spoon
 - Gram balance
 - 100 mL graduated cylinder
 - 10 mL graduated cylinder

Activities:

1. Research background information about project
2. Measuring Your Taste Threshold: Part 1

Lesson 7

Direct Link for Main Lesson 7 Folder:

https://drive.google.com/drive/folders/1qmFz0_4jCxupB7_6bfKYNq6RaepomskC?usp=share_link

Hands on Activity: Measuring Your Taste Threshold – Part 1 Sweetness

Introduction: Have you ever been to a buffet and found yourself surrounded by a wide variety of taste sensations? People are generally able to discern five basic tastes: sweet, umami (also known as savory), salty, sour, and bitter. How sensitive is a person's tongue for these basic tastes? Is it easier to detect some flavors at low concentrations compared to others? In this human biology science project, you will find out by exploring your taste thresholds for sweetness, saltiness, and sourness. Get ready to find out how low you can go!

Our sensory system for taste, or our **taste perception**, is remarkably sensitive. We can detect compounds at extremely low concentrations. This amazing sensitivity is made possible by our taste buds. **Taste buds** are located on small bumps on the tongue called **papillae**. Each taste bud is made up of about 50 to 150 *taste receptor cells*. On the surface of these cells are *receptors* that bind to small molecules related to flavor. The receptors then relay the taste sensation information to the brain. This entire process allows us to discern the five basic tastes.

In this human biology activity, you will determine your own taste thresholds for sweet, sour, and salty solutions. You will start with a 10% solution and use the process of **serial dilution** to make a series of solutions, each 10-fold weaker than the preceding one (i.e., 1%, 0.1%, 0.001%, etc.). If done properly, this is an extremely accurate method.

Materials for Part 1

- Consumables:
 - Granulated sugar, or sucrose (10 g)
 - Water, preferably distilled
 - Cotton swabs (at least 12)
 - Paper or plastic cups (at least five per group)
 - Paper towels (five squares per person)
 - Coffee Stirrers (at least five per group)
- Reusables:
 - Marker for Labeling
 - Stirring rod or spoon
 - Gram balance
 - 100 mL graduated cylinder
 - 10 mL graduated cylinder Procedures

1. Make two data tables like the one below. Use as many columns as you need to determine your taste threshold for each substance. **You will use these tables for the next three HSTA meetings.**
 - a. Table 1 will be for taste indicator + or –
 - b. Table 2 will be for observations.

Substance	10%	1%	0.1%	0.01%	0.001%
Sucrose (sweet)					
Sodium chloride (salty)					
Vinegar (sour)					

2. During this meeting you will make a sugar solution.
3. Measure 90 mL of distilled water and pour it into a paper or plastic cup. Add 10 grams (g) of granulated sugar. Stir until dissolved. This gives you a 10% sucrose solution.
4. Rinse your mouth with plain tap water and wipe your tongue dry with a clean paper towel.
5. Dip a clean cotton swab into the 10% sugar solution and smear it all around your tongue. If you can taste the sweetness, put a + in your data table for 10% sucrose. Note any other observations that you make.
6. Now measure out 10 mL of the 10% sucrose solution and pour it into a clean paper cup. Add 90 mL of distilled water and stir. (*Note:* Use a clean stirrer, or else thoroughly rinse and dry the previous stirrer, so that you don't carry over concentrated solution into the dilute solution.) This will give you a 1% sugar solution.
7. Repeat step 4. Then dip a clean cotton swab into the 1% sugar solution and smear it all around your tongue. If you can taste the sweetness, put a + in your data table for 1% sucrose. Note any other observations that you make.
8. Continue making serial dilutions (by repeating step 6), rinsing and drying your tongue, and testing each new solution with the cotton swab procedure until you no longer taste the sweetness. Record the results in the data table in your lab notebook. The lowest concentration at which you can still taste the sweetness is your approximate taste threshold.
9. Keep your data table for next meeting.

Measuring Your Taste Threshold (Indicator + or -)

Substance	10%	1%	0.1%	0.01%
Sucrose (sweet)				
Sodium chloride (salty)				
Vinegar (sour)				

Measuring Your Taste Threshold (Observations)

Substance	10%	1%	0.1%	0.01%
Sucrose (sweet)				
Sodium chloride (salty)				
Vinegar (sour)				

Background Information

Watch this short video on background research Direct link:

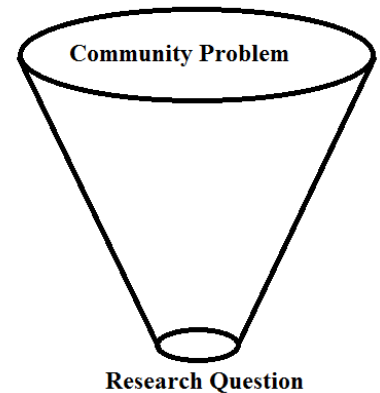
https://drive.google.com/drive/folders/1qmfz0_4jCxupB7_6bfKYNq6RaepomskC?usp=share_link and read the information below.

Score Sheet - Worth 7 Points

- *Background information is related to the research question*
 - Make sure your background information is about your research question.
 - Talk about what is known about the topic and why the study is needed.
- *Background information is referenced using correct in-text APA citations for 4 sources.*
 - Resources used to explain background information are to be cited in the text (See handout on In-Text Citations).
 - All in-text citations are the **same ones** that will be on your reference slide.
- *Background information is cited from at least two academic resources.*
 - Government Agencies, Google Scholar, other databases.
- *Background information has at least two facts from each source, totaling at least 8 sources*
 - You will use at least four references and from each reference you will have at least two facts listed, totaling at least eight facts.
- *Background information is highlighted in bulleted format, not in paragraph form.*
 - Your background should be a summary of what you have learned about your observation/topic.
 - Do not write paragraphs on these slides.
- *Background information is not plagiarized.*
 - Everything should be a summary of what you have learned **in your own words**.
 - Limit the number of direct quotes used.
 - Plagiarism is a severe problem and could result in a discussion with the Local Governing Board.
- *Background information is limited to 20% of quotes.*

Tips

1. When you research websites, take notes on what you read and write down the link so that you can come back to it later.
2. You need to explain what your topic is, why it is important to the community, and set the tone for your research project. Think of this as a funnel - you start with a broad opening and end with a narrow opening. You need to start your background research with basic information about your topic then narrow it down, so it leads right into your research question.



You want to give your audience a little more information about the topic you are researching before you start talking about the actual research project. Here is an exercise that might help develop and write your background slides.

Step 1: Write down your community problem. Try to sum this problem up in one or two words.

Step 2: Write down your research question.

Step 3: You want to have a general slide about the community problem. You want to talk about the topic in a broad way with community data if you can.

Step 4: Now you want to start getting more narrow, leading background information to your research question. Take the question apart and list your variables.

Step 5: You need to have a slide for each variable. Here you need to define and/or explain the importance of this variable. Something simple-you don't have to go into detail.

Step 6: You need to bridge the gap between the two variables. How are they connected?

Step 7: Before you leave the background slide, make sure you have led your audience to the research question.

In-Text Citations

Score Sheet – Worth 2 points (1 in Background Research and 1 in References)

Background information was referenced using correct in-text APA citations from four sources.

- *Reference slide had ONLY in-text citations that were included as full references.*

Tips

1. When using APA format, follow the author-date method of in-text citation. This means that the author's last name and the year of publication for the source should appear in the text.
 - a. For example, **(Parrish & Linder-VanBerschot, 2010)**, and a **complete reference should appear in the reference list at the end of the paper.**
 - b. **Multicultural instruction is an important tool in the classroom, however it is often difficult to incorporate. (Parrish & Linder-Vanberschot, 2010).**
2. When citing 2 to 5 authors, list all the authors' last names with the ampersand (&) between the last 2 author's names. **(Kernis, Cornell, Sun, Berry, & Harlow, 2014)**
3. When citing 6 or more authors, use the first author's name followed by et al. **(Harris et al., 2009)**
4. If "Anonymous" is used by the author, treat it as the author's last name. On the Reference list, use Anonymous as the author. **(Anonymous, 2012)**
5. If the author is an organization or a government agency, cite the organization as the author. **(American Psychological Association, 2015)**
6. If the work does not have an author, cite the source by its title.
7. Titles of books and reports are italicized or underlined. **(*Report on Lung Cancer in WV*, 2010)**
8. Titles of articles, chapters, and web pages are in quotation marks. **(*"High Blood Pressure in Youth"*, 2005)**
9. If the work does not have a date, use the abbreviation n.d, which stands for no date. **(*Tips to help you organize*, n.d.)**
10. **Once again, MAKE SURE that EVERY in-text citation is also listed on your Reference list.**

References

Score Sheet - Worth 3 Points

- 4 or more academic references present.
- ONLY in-text citations are included as full references.
- On reference slide, all references are in the correct APA format.

Tips

1. APA (American Psychological Association) style is most used to cite sources within the social sciences.
2. The reference list provides the information necessary for a reader to locate and retrieve any source you cite in the body of the paper.
3. **EACH source you cite in the paper must appear in the reference list.**
4. **LIKEWISE, every entry in the reference list must be cited in your text.**
5. References are always listed in alphabetical order, are double spaced, and have a hanging indentation. Indent after 1st line (one half inch).
6. Author names are inverted (last name first and then only initials of author(s) first name and/or middle name).
7. If there is no author, the reference citation starts with the first word of the article title.
8. Capitalize the major words in a journal title, but capitalize only the first letter of the first word of an article title.
9. Put the date that you accessed the information off the internet.

Citation for a book:

Author. (Date of publication). *Title*. Place of publication: Publishing company.
Smith, J. (2007). *How to succeed in college*. Littletown, Ohio: Jones Publishing.

Citation for a journal article: Journal article with a doi (digital object identifier)

Author. (Date of publication). Title of article. *Italicized title of journal, magazine or newspaper*, Volume(Issue), Pages. doi (digital object identifier)

Ke, F., & Hoadley, C. (2009). Evaluating online learning communities. *Educational Technology Research & Development*, 57(4), 487-510. doi: 10.1007/s11423-009-9120-2

Citation for a journal article: without doi – list home page URL for the publisher of the journal, newsletter, or magazine in the reference citation.

Author. (Date of publication). Title of article. *Italicized title of journal, magazine or newspaper*, Volume(Issue), Pages. Retrieved date from <http://www.xxxxxxxxx>

Parrish, P. & Linder-VanBerschoot, J. (2010). Cultural dimensions of learning: Addressing the challenges of multicultural instruction. *International Review of Research in Open & Distance Learning*, 11(2), 1-19. Retrieved August 18, 2016 from <http://www.irrodl.org/index.php/irrodl>

Citation for an Internet site:

Author. (Date of publication). Title of page OR *Italicized title of site*. Retrieved date from web address.

1. Newspaper article found on the Internet:

Baker, J. K. (2000, January 23). Is your profile on Facebook? *New York Times*. Retrieved August 18, 2016 from <http://www.nytimes.com>

2. Stand-alone document (site) on the Internet, no author, title of site, no date:

Tips to help you organize. (n.d.). Retrieved August 18, 2016 from <http://www.organizetips.com/course2.htm#5ds>

3. Article found on the Internet from the WebMD website:

Hypertension/high blood pressure center: Symptoms of high blood pressure. (2012, May 19.) Retrieved August 18, 2016 from <http://www.webmd.com/hypertension-high-blood-pressure/guide/hypertension-symptoms-high-bloodpressure>

References

- Baker, J. K. (2000, January 23). Is your profile on Facebook? *New York Times*. Retrieved August 18, 2015 from <http://www.nytimes.com>
- Hypertension/high blood pressure center: Symptoms of high blood pressure. (2012, May 19.) Retrieved August 18, 2016 from <http://www.webmd.com/hypertension-high-blood-pressure/guide/hypertension-symptoms-high-bloodpressure>
- Ke, F., & Hoadley, C. (2009). Evaluating online learning communities. *Educational Technology Research & Development*, 57(4), 487-510. doi: 10.1007/s11423-009-9120-2
- Parrish, P. & Linder-VanBershot, J. (2010). Cultural dimensions of learning: Addressing the challenges of multicultural instruction. *International Review of Research in Open & Distance Learning*, 11(2), 1-19. Retrieved August 18, 2016 from <http://www.irrodl.org/index.php/irrodl>
- Smith, J. (2007). *How to succeed in college*. Littletown, Ohio: Jones Publishing. *Tips to help you organize*. (n.d.). Retrieved August 18, 2016 from <http://www.organizetips.com/course2.htm#5d>

Background Information Worksheet

Directions: Look over the score sheet and make sure you address all the items. Fill in the information below and type your responses in your PowerPoint. **(You will have two meetings to complete your background research.)**

Source #1

Write or copy and paste the website link:

What is the title?

Who wrote it?

When was it written?

What date did you access it?

In-Text Citation

Full Reference

Write two facts from this source (Remember to summarize in your own words)

Fact #1

Fact #2

Source #2

Write or copy and paste the website link:

What is the title?

Who wrote it?

When was it written?

What date did you access it?

In-Text Citation

Full Reference

Write two facts from this source (Remember to summarize in your own words)

Fact #1

Fact #2

Lesson #8: Background Information and Measuring your Taste Threshold with Salty

Objectives:

- Students will research information about their research project.
- Students will find two facts from each of their four sources.
- Students will cite references using correct APA format.
- Students will test their taste threshold for saltiness.
- Students will complete Part 2 of the Measuring Your Taste Threshold.
- Students will work on CITI Training or register with (or sign in to) OnTrack.

Materials:

- Internet
- Pencil and paper
- Measuring Your Taste Threshold – Part 2 Salty
 - Consumables:
 - Table salt, or sodium chloride (10 g)
 - Water preferably distilled.
 - Cotton swabs (at least 12)
 - Paper or plastic cups (at least five per group)
 - Paper towels (five squares per person)
 - Coffee Stirrers (at least five per group)
 - Reusables from Part 2:
 - Marker for Labeling
 - Stirring rod or spoon
 - Gram balance
 - 100 mL graduated cylinder
 - 10 mL graduated cylinder

Activities:

1. Research background information about project
2. Measuring Your Taste Threshold: Part 2

Lesson 8

Direct Link for Main Lesson 8 Folder:

https://drive.google.com/drive/folders/1h6O6OynPePLJoW6JJphrbgnoLbQ1-jVg?usp=share_link

Hands on Activity: Measuring your taste threshold—Part 2 Salty

Continue with Part 2 to determine your own taste thresholds for salty solutions. Use your data tables from Part 1.

1. Measure 90 mL of distilled water and pour it into a paper or plastic cup. Add 10 grams (g) of salt. Stir until dissolved. **This gives you a 10% salt solution.**
2. Rinse your mouth with plain tap water and wipe your tongue dry with a clean paper towel.
3. Dip a clean cotton swab into the 10% salt solution and smear it all around your tongue. If you can taste the saltiness, put a + in your data table for 10% sodium chloride. Note any other observations that you make.
4. Now measure out 10 mL of the 10% salt solution and pour it into a clean paper cup. Add 90 mL of distilled water and stir. (*Note:* Use a clean stirrer, or else thoroughly rinse and dry the previous stirrer, so that you don't carry over concentrated solution into the dilute solution.) **This will give you a 1% salt solution.**
5. Repeat step 2. Then dip a clean cotton swab into the 1% salt solution and smear it all around your tongue. If you can taste the saltiness, put a + in your data table for 1% sodium chloride. Note any other observations that you make.
6. Continue making serial dilutions (by repeating step 4), rinsing, and drying your tongue, and testing each new solution with the cotton swab procedure until you no longer taste the saltiness. Record the results in the data table in your lab notebook. The lowest concentration at which you can still taste the saltiness is your approximate taste threshold.

Background Information Worksheet

Directions: Look over the score sheet and make sure you address all the items. Fill in the information below and type your responses in your PowerPoint.

Source #3

Write or copy and paste the website link:

What is the title?

Who wrote it?

When was it written?

What date did you access it?

In-Text Citation

Full Reference

Write two facts from this source (Remember to summarize in your own words)

Fact #1

Fact #2

Source #4

Write or copy and paste the website link:

What is the title?

Who wrote it?

When was it written?

What date did you access it?

In-Text Citation

Full Reference

Write two facts from this source (Remember to summarize in your own words)

Fact #1

Fact #2

Lesson #9: Hypothesis and Measuring your Taste Threshold with Sour

Objectives:

- Students will determine their alternative and null hypotheses.
- Students will evaluate their peers' hypotheses.
- Students will test their taste threshold for sourness.
- Students will complete Part 3 of the Measuring Your Taste Threshold.
- Students will work on CITI Training or register with (or sign in to) OnTrack.

Materials:

- Measuring Your Taste Threshold – Part 3 Sour
 - Consumables:
 - Vinegar (4 mL)
 - Water, preferably distilled
 - Cotton swabs (at least 12)
 - Paper or plastic cups (at least five per group)
 - Paper towels (five squares per person)
 - Coffee Stirrers (at least five per group)
 - Reusables from Part 2:
 - Marker for Labeling
 - Stirring rod or spoon
 - Gram balance
 - 100 mL graduated cylinder
 - 10 mL graduated cylinder

Activities:

1. Writing the alternative and null hypothesis
2. Measuring Your Taste Threshold: Part 3

Lesson 9

Direct Link for Main Lesson 9 Folder:

https://drive.google.com/drive/folders/14dfNCEjCF8fGsj3N35Cpe8fV-1lz1O3h?usp=share_link

Hands on Activity: Measuring Your Taste Threshold – Part 3 Sour

Continue with Part 3 to determine your own taste thresholds for sour, and solutions. Use your data tables from Part 1.

1. Measure 36 mL of distilled water and pour it into a paper or plastic cup. Add 4 mL of vinegar. Stir until mixed. **This gives you a 10% vinegar solution.**
2. Rinse your mouth with plain tap water and wipe your tongue dry with a clean paper towel.
3. Dip a clean cotton swab into the 10% vinegar solution and smear it all around your tongue. If you can taste the sourness, put a + in your data table for 10% vinegar. Note any other observations that you make.
4. Now measure out 10 mL of the 10% vinegar solution and pour it into a clean paper cup. Add 90 mL of distilled water and stir. (*Note:* Use a clean stirrer, or else thoroughly rinse and dry the previous stirrer, so that you don't carry over concentrated solution into the dilute solution.) **This will give you a 1% vinegar solution.**
5. Repeat step 2. Then dip a clean cotton swab into the 1% vinegar solution and smear it all around your tongue. If you can taste the sourness, put a + in your data table for 1% vinegar. Note any other observations that you make.
6. Continue making serial dilutions (by repeating step 4), rinsing and drying your tongue, and testing each new solution with the cotton swab procedure until you no longer taste the sourness. Record the results in the data table in your lab notebook. The lowest concentration at which you can still taste the sourness is your approximate taste threshold.
7. As a club, discuss your findings for all three thresholds.

Hypothesis

Today we will start with watching a short video about [What is a hypothesis?](https://www.youtube.com/watch?v=G4LPPS-8Co0) Direct Link: <https://www.youtube.com/watch?v=G4LPPS-8Co0>. Next, read the information below about hypotheses. Use your background information and hypothesis tips to begin writing your project's hypotheses.

Score Sheet - Worth 4 Points

- *Hypothesis is based on research questions and variables.*
 - Hypothesis must match the research question and variables.
- *Hypothesis is testable by a statistical test.*
 - If you can't use a statistical test on your hypothesis, then it is not testable.
- *Explain why this is your hypothesis using some of your background research.*
 - Explain why you expect these results based on what you've learned from your background research.
- *Null Hypothesis is stated correctly.*
 - States that there is no significant difference between your study population(s).

Tips

- Hypothesis (plural: hypotheses) is a prediction about the outcome of study and based on a person's observations, previous knowledge, and/or experience.
 - The Null Hypothesis states that we will observe no difference, or we will observe no change. This is what we assume in research.
 - The Alternative Hypothesis is what we are testing or seeking to find in the research. It states that there will be a change or a difference.
- Use background information to help you take a stance on what you believe will happen and why.
- If you get stuck just go back to basics: **If... then... because...**
 - If [*we compare something about the independent variable*], then [*this is the outcome we expect*], because [*rationale*].
 - If [*something happens to the independent variable*], then [*this is the outcome we expect*], because [*rationale*].

Hypotheses Worksheet

1. Use your research question and variables to write your hypothesis and null hypothesis.
2. They don't have to be perfect or correct, just write down what you think they should be.
 - The Null Hypothesis states that we will observe no difference, or we will observe no change. This is what we assume in research.
 - The Alternative Hypothesis is what we are testing or seeking to find in the research. It states that there will be a change or a difference.
3. Read back over the examples of hypotheses. Rewrite your hypotheses.
4. Now switch with another group or individual. Have them read through your hypotheses. Give each other feedback.
5. Read over the feedback and rewrite your hypotheses again.
6. Enter this into your PowerPoint.

Hypothesis Draft 1

Null:

Alternative:

Group Feedback

Null:

Alternative:

Hypothesis Draft 2

Null:

Alternative:

Lesson #10: Guest Speaker and Data Collection Sheet

Objectives:

- Students will continue work on their research project.
- Students will learn about working in a STEM field by listening to a guest speaker.
- Students will submit their Background Research and Hypothesis.
- Students will differentiate between categorical and numerical variables.
- Students will determine the type of statistical test that they will be using.
- Students will set up a data chart based on their statistical test.

Materials:

- Internet
- Pencil and paper
- Lesson Worksheet/Handout
- Research Guide PowerPoint
- Guest Speaker

Activities:

1. Finish Background Research and Hypothesis
2. Determine the type of statistical test they will use for their research project.
3. Set up data chart

Lesson 10

Direct Link for Main Lesson 10 Folder: https://drive.google.com/drive/folders/1GzUH4oq-mObe1tJ-dHv_P4WpQKNp3czF?usp=share_link

Statistical Test Chart

Let’s determine what type of statistical test you will use based on your variables. There are two types of variables that you might use in your project:

1. **Categorical:** these variables contain a certain number of categories or groups
For example: Yes/No; Gender; Ratings from 1-10
2. **Numeric:** numeric variables that have an infinite number of possibilities
For example: height, weight, amount of time, temperature

Revisit the chart you created on pages 84 and 88. Then use the chart below to look for your independent variable type first, then your dependent variable. The statistical test will be where the two variable types meet. Circle that statistical test. Some boxes have more than one statistical test, read the description and best the circle that one that best fits your research question. Exchange charts and have another group check your work.

		Dependent Variable (Y)	
		Categorical	Numeric
Independent Variable (X)	Categorical	<p><u>Chi Square</u></p> <p>Difference among gender (male/female) and if they have had the flu shot (Yes/No)</p> <p>Difference among grade levels (ninth, tenth, eleventh, and twelfth) and if they are present at an event (Yes or No)</p>	<p><u>T-Test</u> (compares two groups) Difference among gender (male/female) and social support scores?</p> <p><u>ANOVA</u> (compare three or more groups) Difference among age groups (13-19; 20-29; 30-39) and weight (examples: 100, 110, 150, 97)?</p>
	Numeric	<p><u>Logistic Regression</u></p> <p>Does body weight (example 100, 97, 250, 116) influence heart attacks (Yes/No)?</p>	<p><u>Correlation</u> (Tells how much one variable tends to change when the other changes) Does rain fall (example 11, 12, 13 inches) relate to temperature (example 60, 80, 75 degrees)?</p> <p><u>Regression</u> (IV influences DV) Weight (example 100, 110, 120, 97) influence cholesterol level (example 160, 170, 180 mml)?</p>

Statistical Test: _____

Research Project: Data Collection Sheet

Make sure your PowerPoint is up to date with **Observation, Background, In-Text Citations, Research Question, Variables, Hypothesis, and Reference Slide**. Let's think about how you might collect your data and how data you will collect. Then select or set up a data chart that you will use to collect data.

Review the Data Collection Sheets below and select the one that best fits your research question and variables.

Prevalence Example: Is there a difference among gender and math scores?

- Project that has summation to get a total score.
- After you score each 'test/survey,' enter your total scores for each participant.
- Run an unpaired t-test because there are two different groups.

Total Score - High Score = 100/100		
Participant #	Female	Male
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

Intervention Example: Is there a difference in stress scores after the intervention?

- Test/Survey will need to have a ‘code’ to match pre and post to the same participant.
- After you score each ‘test/score,’ enter your total scores for each participant. Surveys will have a coding system, replacing words with numbers (categorical coding).
- Run a paired t-test because the same people took the pretest/survey as the posttest/survey.

Total Score - High Score = 100/100		
Participant #	Pre Survey	Post Survey
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

Project that has individual questions. Make sure to enter all the data.

- If you have a Likert Scale (Strongly Dislike, Dislike, Neutral, Like, Strongly Like) – you can label the ‘words’ with numbers (categorical coding). Strongly Dislike = 1, Dislike = 2, Neutral = 3, Like = 4, Strongly Like = 5.
- Make sure to write in the questions or summarize the questions. Then enter the categorical coding in the blanks.
- Example research question: Is there a difference among 9th and 12th graders and question number 1?
- Run an unpaired t-test because there are two different groups.

Participant #	Question 1		Question 2		Question 3		Question 4		Question 5	
	9th	12th	9th	12th	9th	12th	9th	12th	9th	12th
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										

Project that has Yes or No.

- Make sure to enter the question or summarize the question. Then enter Yes or No in blank boxes.
- Research Question: Difference among grade levels and if they are present at an event? You would run a chi square, no need to use “categorical coding.”

Participant #/Code	Present at Event	
	Yes	No
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Project that has three groups.

- Make sure to label your columns to match what you are collecting.
- Research Question: Difference among age groups and weight?
- You would run an ANOVA because you have three groups to compare.

Participant #/Code	Age Groups		
	13-19	20-29	30-39
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Project where you are looking for how much one variable tends to change when the other changes, collecting both the independent and dependent variable.

- Make sure to label your columns. Column Rainfall and Temperature will be collected at the same time, then repeated.
- Procedures will need to explain how and when records were collected.
- Research Question: Does rainfall relate to temperature?
- You would run a correlation.

Record	Rainfall	Temperature
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Project where you are wanting to see if independent variable influences dependent variable, looking for cause and effect.

- Make sure you label your columns. Column Weight and Cholesterol Level will be collected at the same time, then repeated. In this case, you would record at least 100 individuals' weight and cholesterol level.
- Research Question: Does weight influence cholesterol level?
- You would run a regression.

Participant #/Code	Weight	Cholesterol Level
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Non-human study, collecting data over time.

- Make sure to set up your data sheet to collect data over time and record data for each group.
- Research Question: Does plant height differ among fertilizer?
- You would run an ANOVA.

Height of plants, 4 different treatments: water, water with 10% fertilizer, 20% fertilizer,				
Trial	Plant 1 - Control (cm)	Plant 2 - 10% solution (cm)	Plant 3 - 20% solution (cm)	Plant 4 - 30% solution (cm)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				

Lesson #11: Procedures

Objectives:

- Students will write procedures on how to wrap a present.
- Students will review prevalence, intervention, human, and non-human experiments so they will know which procedure to use.
- Students will complete the procedures for their research project on the Procedures PowerPoint slide.

Materials:

- Internet
- Pencil and paper
- Lesson Worksheet/Handout
- Research Guide PowerPoint
- Wrapping a Present
 - Wrapping paper
 - Scissors
 - Tape
 - Present
 - Bows/Ribbons
 - Tag

Activities:

1. Wrap a present with procedures written by another student.
2. Complete procedures for research project

Lesson 11

Direct Link for Main Lesson 11 Folder:

https://drive.google.com/drive/folders/1hituhHQ6A9OK-Z9lW6_4bqZ9oe10vviS?usp=share_link

Hands on Activity: Wrapping a Present

To conduct a study, it is important to have a set of directions on how to complete it. We refer to these directions as procedures. One of the reasons procedures are important is because other scientists must be able to repeat the study and see if they get similar results. Today you will be writing procedures for a very important task: wrapping a present.

Materials:

- Wrapping paper
- Scissors
- Tape
- Present
- Bows/Ribbons
- Tag

Directions: Review Tips for Writing Procedures before you start. Write procedures to instruct someone how to wrap a present. You can do this in groups of 2-3. After your group finishes, switch procedures with another group. Follow their directions to the letter. How did you do? Were you able to wrap a present following their directions?

Procedures

Writing Procedures

Start to think about how you will conduct your study. What steps do you need to complete? Read the helpful tips below and start writing your procedures. If you are working on the state survey, refer to page 142.

1. In the procedures section, you explain clearly how you conducted your study in order to: (1) enable readers to evaluate the work performed and (2) permit others to replicate your study.
2. You must describe exactly what you did: what and how experiments were run, what, how much, how often, where, when, and why equipment and materials were used.
3. You should maintain a balance between brevity (you cannot describe every technical issue) and completeness (you need to give adequate detail so that readers know what happened).
4. CITI training. Why do you need to include it in the procedures? Even if you have completed this training (training is good for four years), you still need to include it as a procedure step. It needs to be first on the procedure slide for everyone who is doing a human subject study. This shows that you were trained on how to complete a human subject experiment/intervention without harm to the human subject, etc. Names on list - The training list will need to be updated. This is a safety procedure.
5. Safety procedures need to be included in the main procedures. They are not separate from the other procedures. They need to be included as a step as you complete them.
6. Order your procedures chronologically or by type of procedure and then chronologically within the type of procedure using subheadings, where appropriate, to clarify what you did. Number the procedures as steps (Don't write the procedures like you would in a research paper, i.e., paragraph form.)
7. Use the past tense and the third person to describe what you did. For example: "The sample was incubated at 37°C for 3 days." - NOT: "I incubated the sample at 37°C for 3 days." This is very important for the final presentation, because when you present the final presentation you have already completed the whole project.
8. Describe your experimental design clearly, including the hypotheses you tested, variables measured, how many replications you had, controls, treatments, etc.
9. Explain why each procedure was done.
10. Identify the source of any specific type of equipment, tool, etc. which is critical to the success of the experiment. Describe in detail any modifications to equipment if needed.
11. Identify treatments using the variable or treatment name, rather than an ambiguous, generic name or number (use "healthy donors" rather than "group 1").
12. Describe statistical tests and the comparisons made; ordinary statistical methods should be used without comment; advanced or unusual methods may require a literature citation.
13. Show your procedures slides to other students, teachers, parents, etc. and ask whether they would have difficulty understanding and/or repeating your study.
14. Don't mix results with procedures.
15. Omit all explanatory information and background - save it for the discussion.

Scientific, Medical and General Proofreading and Editing. "Twelve Steps to Writing an Effective Materials and Methods." Retrieved Nov 2013 from <http://www.sfeddit.net/methods.pdf>

Procedures – Pictorial Evidence

All HSTA projects require pictorial evidence, photos, of your research. This is a way to document your data collection. If you are doing a human subject research project, remember our lessons of ethics. You can photograph humans participating in your project but do not include their faces. Suggestions: photography hands completing a survey, the back of their bodies participating in an intervention or experiment, a photo of a blank survey, a photo of a recruitment social media post.

Types of Projects - Procedures

<u><i>Prevalence</i></u> <input type="checkbox"/>	<u><i>Intervention</i></u> <input type="checkbox"/>	<u><i>Human Experiment</i></u> <input type="checkbox"/>	<u><i>Experiment</i></u> <input type="checkbox"/>
Procedures were numbered <input type="checkbox"/>	Procedures were numbered <input type="checkbox"/>	Procedures were numbered <input type="checkbox"/>	Procedures were numbered <input type="checkbox"/>
Procedures identified all safety precautions (including how participants' identity will be kept confidential, i.e., CITI Training completed) <input type="checkbox"/>	Procedures identified all safety precautions (including how participants' identity would be kept confidential, i.e., CITI Training completed) <input type="checkbox"/>	Procedures identified all safety precautions (including how participants' identity would be kept confidential, i.e., CITI Training completed) <input type="checkbox"/>	Procedures identified all safety precautions (i.e., completed lab safety training) <input type="checkbox"/>
Procedures explained who the study population was <input type="checkbox"/>	Procedures explained who the study population was <input type="checkbox"/>	Procedures explained who the study population was <input type="checkbox"/>	Procedures explained what plant, natural resource, invertebrate (other) the project was experimenting with <input type="checkbox"/>
Procedures explained what the study population did <input type="checkbox"/>	Procedures explained details of the of the intervention <input type="checkbox"/>	Procedures explained what the study population did <input type="checkbox"/>	Procedures explained details of the experimental environment and/or change in environment (if you have more than one experimental group explain differences among all groups) <input type="checkbox"/>
Procedures explained how at least 100 participants were recruited <input type="checkbox"/>	Procedures explained how at least 30 participants were recruited <input type="checkbox"/>	Procedures explained how at least 30 participants were recruited for EACH group (experimental & control) <input type="checkbox"/>	Procedures included a control group <input type="checkbox"/>

<u><i>Prevalence</i></u> <input type="checkbox"/>	<u><i>Intervention</i></u> <input type="checkbox"/>	<u><i>Human Experiment</i></u> <input type="checkbox"/>	<u><i>Experiment</i></u> <input type="checkbox"/>
Procedures included a copy of the measurement tools (Example: Survey/observation sheet) <input type="checkbox"/>	Procedures included a copy of the pre and post measurement tools (Example: Survey/observation sheet) <input type="checkbox"/>	Procedures included a copy of the measurement tools (Example: Survey/observation sheet) <input type="checkbox"/>	Procedures included a list of materials <input type="checkbox"/>
Procedures included a participant cover letter explaining the project <input type="checkbox"/>	Procedures included a participant cover letter explaining the project <input type="checkbox"/>	Procedures included a participant cover letter explaining the project <input type="checkbox"/>	Procedures explained that there were at least 5 replications per experimental group <input type="checkbox"/>
Procedures included data collection sheet <input type="checkbox"/>	Procedures included data collection sheet <input type="checkbox"/>	Procedures included data collection sheet <input type="checkbox"/>	Procedures data collection sheet <input type="checkbox"/>
Procedures explained how data was collected <input type="checkbox"/>	Procedures explained how pre and post data was collected <input type="checkbox"/>	Procedures explained how data was collected <input type="checkbox"/>	Procedures explained how data was collected <input type="checkbox"/>
Procedures included how data will be analyzed <input type="checkbox"/>	Procedures included how data will be analyzed <input type="checkbox"/>	Procedures included how data would be analyzed <input type="checkbox"/>	Procedures included how data would be analyzed <input type="checkbox"/>
Procedures provided clear description of project <input type="checkbox"/>	Procedures provided clear description of project <input type="checkbox"/>	Procedures provided clear description of project <input type="checkbox"/>	Procedures provided clear description of project <input type="checkbox"/>

Tips for Cover Letter – Human Subjects

1. You need a paragraph explaining what your project is about and what you are asking participants to do.
2. You can also use this cover letter as a recruitment flyer/letter.
3. Explain in simple terms
 - Display transparency of project
 - Who you are
 - Why you are doing this project
 - What the project is about
 - What participants have to do in the project
 - How their data will be protected
 - Remember to tell participants this is voluntary
 - What you will do with the data/results

Tips for Intervention

1. An intervention is a ‘program’ designed to make a change among a group of individuals. This change can be a behavioral change (eating healthy) or improvements in health status (lowering blood pressure).
2. Interventions can be educational programs, change in policies, improvements to the environment and/or health promotion campaigns.
3. Interventions that use a mixture of approaches are usually the most effective in producing change.
4. Interventions should run for at least 6 weeks.
5. Intervention needs to be more than just one 20-minute presentation during a class period.
6. Be creative when you design your intervention.
7. You can also find lots of interventions from online searches – see what others have already done. (Remember to cite your resources.)
8. Find a community member that is an expert on your topic.

Helpful Resources for Writing Procedures:

- <https://ctb.ku.edu/en/table-of-contents/analyze/where-to-start/design-community-interventions/main>
- <http://trythiswv.com/>
- <https://www.cdc.gov/violenceprevention/pdf/chapter1-a.pdf>
- <https://jech.bmj.com/content/jech/early/2015/11/15/jech-2015-205952.full.pdf>
- <https://thisispublichealth.org/>

Submitting Surveys and Intervention to CRA/GA and HSTA Teacher

1. If you are running the intervention, then all materials need to be submitted for review:
 - a. Handouts, PowerPoint, detailed outline of what individual will do, etc
2. If you have a guest speaker coming in, you still need to submit a detailed outline of what that person will cover.
3. If you have a ‘program,’ the individuals need to submit that ‘program.’
4. If you have lessons you are teaching, submit the lessons.

Tips for Survey: Part A

1. Start on your survey early to get feedback.
2. See if there are surveys already published. There are many surveys that have been published that measure stress levels, environmental safety, community walkability, etc.
3. Think about how you will ‘score’ data. Will you look at all the questions or individual questions?
4. Think about how you will record data into Excel. See example data collection sheets.
5. Does your survey measure what your research question is asking?
6. For your pre and post surveys, make sure you have asked the same questions on both surveys.
7. If you have an intervention, make sure the questions on your survey are based on information presented in the intervention. Don't ask questions that you aren't going to present information on during the intervention.
8. You want to measure the change in the scores, weight, BMI, etc. between pre and post surveys. Therefore, you DO NOT want to ask questions like "Have you ever had energy drinks?", but instead "How many energy drinks have you had in the last 2 weeks?" The answer to the first question would not change even after an intervention, but the answer to the second question could change after an intervention.
9. The number of survey questions depends on the project – talk with CRA/GA and/or HSTA teacher for help.

Tips for Survey: Part B

1. **Make sure that every question is necessary.** You’re building your survey to obtain important insights, so every question in the survey should play a direct part. It’s best to plan your survey by first identifying the data you need to collect and *then* writing your questions.
2. **Keep it short and simple.** Respondents are less likely to complete long surveys, or surveys that bounce around haphazardly from topic to topic. Therefore, make sure your survey follows a logical order and that it takes a reasonable amount of time to complete.
3. **Ask direct questions.** Vague or poorly worded questions confuse respondents and make your data less useful. Strive for clear and precise language that will make your questions easy to answer.
4. **Ask one question at a time.** Take a closer look at questions in your survey that contain the word “and”—it can be a red flag that your question has two parts. Here’s a sample: “Which of these cell phone service providers has the best customer support *and* reliability?” In this case, a respondent may feel that one service is more reliable, but another has better customer support.
5. **Avoid leading and biased questions.** Some descriptive words and phrases may interject some bias into your questions or point the respondent in the direction of a particular answer. Scrutinize adjectives and adverbs in your questions. If they’re not needed, take them out. In addition, an unbalanced response scale can lead a respondent in the same way a poorly worded question might. Make sure your response scales have a definitive midpoint (aim for

odd numbers of possible responses) and that they cover the whole range of possible reactions to the question.

6. **Speak your respondent's language.** Use language and terminology that your respondents will understand. Make words and sentences as simple as possible and avoid technical jargon. However, don't oversimplify a question to the point that it will change the way the question will be interpreted.
7. **Use response scales whenever possible.** Response scales that give the direction and intensity of attitudes provide rich data. By contrast, categorical or binary response options, such as true/false or yes/no response options generally produce less informative data.
8. **Avoid using grids or matrices for responses.** Often respondents don't fill in grids correctly or accurately according to their true feelings. Also, grids aren't mobile-friendly. It's better to separate questions with grid responses into multiple questions in your survey with regular response scales.
9. **Rephrase yes/no questions if possible.** Many yes/no questions can be reworked by including phrases such as "How much," "How often," or "How likely." Make this change whenever possible and include a response scale for richer data.
10. **Take your survey for a test drive.** Ask at least five people to test your survey to help you catch and correct problems before you distribute it.

from <https://www.qualtrics.com/blog/10-tips-for-building-effective-surveys/>

Procedures for recruiting subjects.

Respect: When recruiting subjects to participate in a survey, you first explain to them what the survey is about, (subject), why you are conducting it, (for a research project for HSTA to learn about _____), how you are going to protect their autonomy, (they can chose to not participate or may cease to participate if they become uncomfortable), and how you will protect their anonymity, (no names or identifiers will be used). Then, depending upon the level of research, you have a 1) permission slip signed and returned or 2) you obtain consent (and assent if the subject is under 18) on the IRB permission forms if it is an IRB project.

Beneficence: Explain to the subjects how your research may benefit them or others by increasing or improving the knowledge about what you are testing. For instance, explain how 10 minutes of morning exercise might improve math scores.

Justice: Make sure that you treat everyone equally. This means being fair. You need to offer participants the same opportunity (to use equipment, earn a prize, learn material).

Care: Be sure that what you are doing does not pit one faction against another.

Procedures for State Survey 2023-2024

Below are basic procedures for the State Survey 2023-2024. Change the words in green to fit your project. Feel free to edit and add your own words/experience. Procedures should tell a story of how you collected data. It should also be a list that someone can follow and repeat your project.

1. We used the HSTA State Survey 2023-2024 to collect community data on **topic**.
2. We selected variables that we were interested in and asked a research question.
3. We worked on background research and other presentation elements during our HSTA Club.
4. We completed CITI Training to learn about research ethics as freshmen in high school.
5. We shared the survey link from October – December of 2023 (**Students should show a picture of how they shared the survey i.e. social media post, email**).
6. Participants read a cover letter before they started the survey to learn about what types of questions were asked (**Show cover letter in presentation**).
 1. Our project focused on (**Show the set of questions in presentation that you used**).
7. We learned about statistics and graphing through HSTA club lessons.
8. We completed **DATA ANALYSIS** to see if our data supported or rejected our hypotheses.
9. Finally, we made a conclusion.

Cover Letter for 2023-2024 WV State Survey

Dear Participant,

This letter is a request for you to take part in a research project understanding our community health. This project is being conducted by HSTA Students.

If you decide to participate, you will be asked to complete a health survey about stress, sleep, exercise, nutrition, environment, habits, and COVID. Your participation will take approximately 15 - 20 minutes.

You must be at least 13 years of age or older to participate.

Your involvement in this project will be kept as confidential as legally possible. All data will be reported in the aggregate. You will not be asked any questions that could lead back to your identity as a participant. Your participation is completely voluntary. You may skip any question that you do not wish to answer and you may discontinue at any time. West Virginia University's Institutional Review Board approval of this project is on file.

If you have any questions about this research project, please feel free to contact the researchers by e-mail at slkuhn@hsc.wvu.edu. If you have any questions about your rights as a research participant, please contact the WVU Office of Human Research Protection by phone at 304-293-7073 or by email at IRB@mail.wvu.edu.

We hope that you will participate in this research project, as it could help us better understand local communities.

Thank you for your time and consideration. If you want to continue, please click Next Page.

Sincerely,
HSTA Researchers

Procedures for Menu

Direct link:

https://drive.google.com/drive/folders/1IBY_7pFZ5Fbf4iytYqQ5wDKr_3YOZZ60?usp=drive_link

– revisit your menu option for help with procedures.

Lesson #12: Procedures

Objectives:

- Students will review prevalence, intervention, human, and non-human experiments so they will know which procedure to use.
- Students will complete the procedures for their research project on the Procedures PowerPoint slide.
- Students will submit their procedures (survey, intervention, recruitment plan, materials list, etc)

Materials:

- Internet
- Pencil and paper
- Research Guide PowerPoint

Activities:

1. Feedback from peers.
2. Turn in your survey, intervention, recruitment plan, materials list, and anything else you may need for your project https://redcap.link/submission23_24
3. Exchange your PowerPoint with another group and give them feedback on things they can do to improve their PowerPoint.
4. Makes corrections if necessary.

Lesson 12

Direct Link for Main Lesson 12 Folder:

https://drive.google.com/drive/folders/1LF1j6eLHO5Y4kZuUH0UHp0kUDI2BIx64?usp=share_link

Lesson #13: Title and Review of Ethics

Objectives:

- Review Ethics and Lab Safety
- Complete Taste Test

Materials:

- Internet
- Pencil and paper
- Research Guide PowerPoint
- Snacks Sugar/Sugar Free or Low Sugar

Activities:

1. Review Ethics and Lab Safety
 - a. Complete Taste Test Activity
2. Write Title for presentation.
3. Taste test snacks

Lesson 13

Direct Link for Main Lesson 13 Folder:

https://drive.google.com/drive/folders/1fyUrIH8uvGFGr17jhsLT7GLdMCt_kNU4?usp=share_link

Review of Ethics and Lab Safety

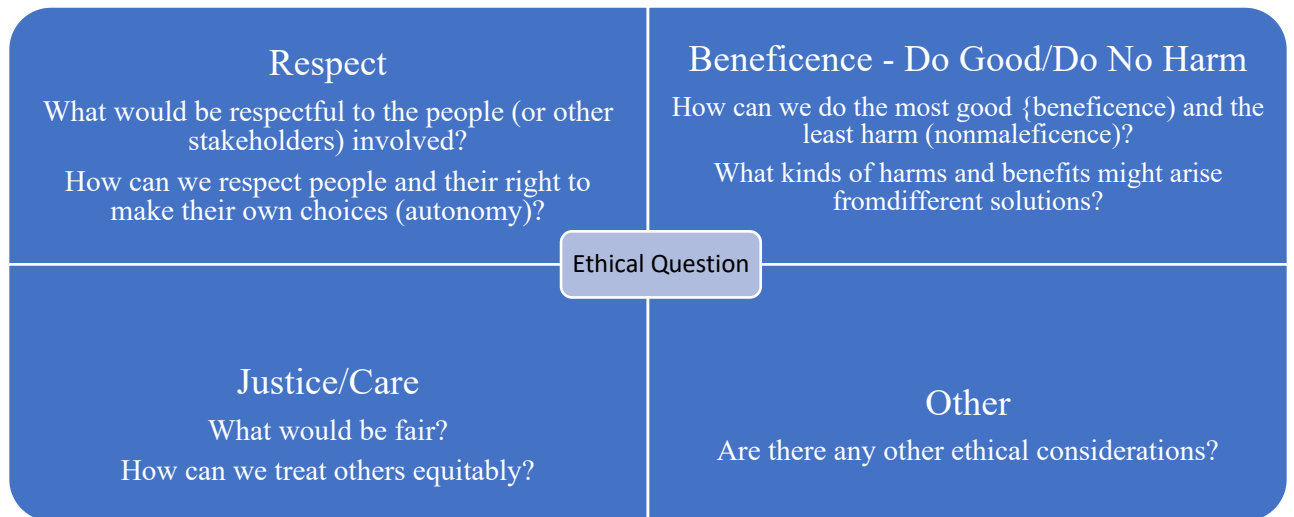
Ethics Review

There are three main ethical principles:

- **Respect** – The first principle focuses on respect of individuals. Part of respecting an individual has to do with respecting their autonomy. The word autonomy comes from the Greek autos (self) and nomos (governance). Autonomy emphasizes the responsibility individuals have for their own lives. Individuals have the right to self-determination and to make their own decisions and choices.
- **Beneficence (Do good)** – The second principal stresses directly helping others, acting in their best interest, and being a benefit to them. It requires positive action. Do No Harm, nonmaleficence, relates to one of the most traditional medical guidelines, the Hippocratic Oath (First of all, do no harm). It required individuals to not intentionally or directly inflict harm upon others.
- **Justice (Be fair)** – The third principle relates to “Giving to each that which is his due.” (Aristotle). It dictates that persons who are equals should qualify for equal treatment, and that resources, risks, and costs should be distributed equitably.

www.nwabr.org

What the short video to review the [Summary of Belmont Report](#) and/or [Summary of Belmont Report](#)



Lab Safety Review

There are many fun and hip videos/posters that try to teach lab safety. Check this one out: <https://www.youtube.com/watch?v=BRDapYgvDqQ>. Funny and sometimes uncomfortable as they are to watch; the main goal is to make sure you are safe in the lab. Before you do the next hands-on activity, review the safety contract for lab rules on page 26.

Sugar Taste Test

Directions: Walk around the room and sample each snack. Record the snack letter and determine if the snack is sugar free/low sugar or not. If you think the snack is sugar free/low sugar put a – in the box. If you think the snack is ‘regular sugar’ put a + in the box. Discuss as a club.

Snack Letter	sugar free/low sugar – regular sugar +	Observation	Snack Name

Project Section Title

The last step in the project preparation is writing the title. The title is the name of your presentation. It tells what your project is about, your name/group names, grade level, HSTA teacher/s, and where you are from. Read the information below about the Title.

Score Sheet – Worth 3 points

- *Title is a complete statement/question*
- *Title matches the research question*
- *Title clearly defines the purpose of the project*

Tips for Writing Titles

1. Brainstorm ideas and phrases.
 - a. Write down on paper some thoughts and ideas of what your title could be.
2. Match the project content to the title.
 - a. Your title has to be descriptive.
 - b. It needs to clue your audience in to what your project is about (Look at your Research Question).
3. Use what you have.
 - a. May find a title buried in your project.
 - b. Copy down any sentence that may work for a title.
 - c. Shorten it to make it more useful.
4. Take some time to play with the title.
 - a. Try to rearrange and play around with it to get the best title.
 - b. Trade in less specific words for more specific words.
5. Make sure you include your main point.
 - a. When you're writing your title, it's good to include at least an indication of your conclusion in your title.
 - b. Make sure you include the key words.

Summary of writing a title:

- **Matches your research question**
- Condenses the project's content into a complete statement and/or question
- Has no spelling errors, no abbreviations, no technical jargon
- Clearly defines the purpose of your project
- Should also include:
 - First and last name (all students in the group)
 - School name
 - Region
 - HSTA teacher's name

Submit a final copy of the proposal to REDCap if you are ready. One submission for each group is fine for this round. Make sure to email your HSTA teacher a copy of your submission

https://redcap.link/submission23_24.

Lesson #14: Final approval.

Objectives:

- Students will submit their final project: Title – Procedures, References.
- Students will continue with OnTrack and 9th Grader Registration
- Students will listen to a Guest Speaker.

Materials:

- Internet
- Research Guide PowerPoint

Activities:

1. Complete the research PowerPoint: Title-Procedures, References.
2. Guest Speaker

Lesson 14

Direct Link for Main Lesson 14 Folder:

https://drive.google.com/drive/folders/1HRof5WUgTH7CWmmQXsWsS2QqvtAHjx9F?usp=share_link

Students should submit a final copy of the proposal to REDCap. One submission for each group is fine for this round. Make sure they email you a copy of the presentation
https://redcap.link/submission23_24.

Lesson #15: Exploring and Sorting Data

Objectives:

- Students will be introduced to the State Survey Data.
- Students will learn how to sort data in Excel.
- Students will continue with OnTrack.

Materials:

- Computer with Excel
- State Survey Data

Activities:

1. Learn how to sort and filter data in Excel.
2. Explore state data.
3. OnTrack.

Lesson 15

Direct Link for Main Lesson 15 Folder:

<https://drive.google.com/drive/folders/1WHvRucZcRX3uHQRgHi7Mv13SsezeUSYy?usp=s>
[hare_link](#)

9th and 10th Grader Descriptive Statistics

You have been sharing the state survey with family and friends. Great job! Now you will use the data collected to answer your research question.

Watch the following video

https://drive.google.com/drive/folders/1WHvRucZcRX3uHQRgHi7Mv13SszeUSYy?usp=share_link

During this activity we will learn or refresh our skills on how to sort data from an excel sheet. The data sheet you get will include all the data from the survey. You only want to look at your variables, therefore you need to sort and filter data.

Watch the following videos to help you learn or refresh your skills:

[Using Google Sheets to filter and sort data](#) (Only watch this video if you are using Google Sheets).

[Sorting in Excel - Basics and Beyond](#)

NOTE: There are many ways you can work and prepare data for analysis. You can use formulas, you can sort, you can use the filter icon, etc. There are many ways! Below is one method.

Watch the video to walk you through the directions to sort your data for analysis:

https://drive.google.com/drive/folders/1WHvRucZcRX3uHQRgHi7Mv13SszeUSYy?usp=share_link. Written directions are listed below.

1. You need to download the excel file with the raw data from the state survey.
 - a. Raw Data. Link: https://drive.google.com/drive/folders/1FI1E9-qz5f-85S2saqcHR2EKzaq_yH7R?usp=drive_link
2. You need to download the Data Code Book. Using the Data Code Book, you will find the columns that match your research variables.
 - a. Data Code Book. Link: https://drive.google.com/drive/folders/1FI1E9-qz5f-85S2saqcHR2EKzaq_yH7R?usp=drive_link
 - b. Survey Questions. Link: https://drive.google.com/drive/folders/1FI1E9-qz5f-85S2saqcHR2EKzaq_yH7R?usp=drive_link
3. Open the excel file and ‘Save As’ in a location you can access during your HSTA club meetings and that your group members can access.
4. Before you start sorting, know that the data before you has been ‘cleaned.’ This means any incomplete survey was deleted from the spreadsheet. Check with your HSTA teacher about the total number of surveys that were submitted. Then write down how many surveys are in the raw data sheet. This number is the number of surveys that were completed. A completed survey is a survey that answered all the questions. This is part of your descriptive analysis.
 - a. Total Number of Surveys Submitted _____.
 - b. Total Number of Surveys Completed _____.
 - c. Completion rate of the HSTA State Survey _____. (To find the completion rate divide the total number of surveys in the Raw Data by total number of Surveys Submitted. Multiply this number by 100 to get a percentage. This percentage will tell us the percentage of completed surveys for all HSTA surveys collected.
5. From here, look at the Data Code Book and your research question, hypothesis, and variables slides. What column are the research variables in?
 - a. Variable Name/Survey Question – The question from the survey you selected as on of your variables.
 - b. Variable Role – Variables can be independent, dependent, controls, or constants.
 - c. Variable Type – Variables can be Categorical or Numerical.
 - d. Column – Find the variable in its column. There will be a letter for each column.

Variable Name/Survey Question	Variable Role	Variable Type	Column

6. Find the column for each variable and highlight them.

7. On the next tab copy and paste all your highlighted columns. This will limit the data you need to look at.
8. Next, filter out any responses you do not need. Examples. If one of your variables is gender and you only want to examine female, filter for females only. If you are only looking at two specific counties (Raleigh and Mercer), filter counties for Raleigh and Mercer.
9. When you have all the data you need, how many completed surveys are you doing to use?
 - a. Total number of surveys being used in your project: _____.
10. Create your first descriptive statistics slide.
 - a. Example

Descriptive Statistics – WV State Survey

- Total Number of Surveys Submitted _____.
- Total Number of Surveys Completed _____.
- Completion rate of the HSTA State Survey _____.

- Total number of surveys being used in our project: _____.

11th and 12th Grader Descriptive Statistics

Check in with your HSTA Teacher and CRA/GA. How is your project going? Follow up if you need help. Next week, we will discuss What is Statistics, entering data into excel, frequency, percentages, mean, median, and mode. Even if you don't have data collected, it would be good to go over the information for when you have data.

Lesson #16: Descriptive Statistics: Mean, Median, Mode

Objectives:

- Students will learn descriptive statistics – frequency and percentage.
- Students will differentiate between mean, median, and mode.
- Students will continue with OnTrack.

Materials:

- Computers
- Excel

Activities:

1. Learn about descriptive statistics, entering data into excel, frequency, sort data and count if, percentages.
2. Measure of Central Tendency: Mean, median, mode.

Lesson 16

Direct Link for Main Lesson16 Folder:

https://drive.google.com/drive/folders/1xLe0TjrwGDgY4oiXvhgTNW-SiChxXVWj?usp=share_link

Descriptive Statistics Part 1

We start our statistical journey with descriptive statistics. We will work through videos and examples to learn the basics of descriptive statistics to use in your own research project.

What is statistics?

Watch the video [What is Statistics?](#) to better understand statistics and why we use statistics.

Entering Data into Excel

If you are a 9th or 10th grader, your data will already be entered into excel. If you are an 11th or 12th grader, you may have to enter your data from surveys or observation sheets.

First let's discuss [What is a Data Set?](#)

[During this semester we will spend a lot of time in excel. To sharpen your excel skills, watch the video about Entering Data into an Excel Worksheet](#)

Extra Resources: [Google Sheets for Beginners](#)

Frequency

Now that we know what a data set is, we can talk about frequency. **Frequency** is the number of observations for each variable in your study. To find the frequency, you count the number for each response.

- Example: If you have a group of 20 people, and 13 are females and 7 are males, you can say females have a frequency of 13 and males have a frequency of 7.

Frequency could also mean the number of responses for a particular variable.

- Example: If you have five test scores: 98, 95, 82, 89, and 60, you can say the scores between 100-90 have a frequency of 2, the scores between 89-80 have a frequency of 2, and the scores below 79 have a frequency of 1.

Our example is only 20 test scores. Data sets will get much larger and excel will be easier to use.

Watch the [How to create a frequency table in excel](#)

Sort Data and COUNTIF

This data set above is easy to count by hand. However, if you have a large data set you would want to sort and/or count it. The resources below will be very useful later.

- [How to Sort Data in Excel](#)
- [How to Use COUNTIF in Excel](#)

Percentages

Watch the video [What are percentages?](#) to review percentages. A **percentage** represents a fraction of the total. This total is always equal to 100.

Measures of Central Tendency: Mean, Median, Mode

Watch the video about [Mean, Median, and Mode](#)

Follow the video [Helpful video about how to find mean, median, and mode](#) to work through an example by hand.

- **Mean** is a common way to find the average of a set of numbers or numeric variables.
 - To find the mean, add up all the values and divide by the total number of data.
 - Example:
 - Data Set: 2, 4, 2, 4
 - Sum of the Data Set: $2+4+2+4 = 12$
 - There are four total numbers
 - Mean is $12/4 = 3$
 - The mean or average of the example data set is 3.
- **Median** is the value that is in the exact middle of a data set.
 - To find the median, put all the numbers from least to greatest and find the number in the middle.
 - Example A:
 - Data Set (The total number of data is even, therefore you find the mean of the two middle numbers): 2, 4, 2, 4
 - Data Set in order: 2, 2, 4, 4
 - The mean of the 2 middle numbers is 3.
 - Therefore, the median is 3.
 - Example B:
 - Data Set: 2, 4, 2, 4, 3
 - Data Set in order: 2, 2, 3, 4, 4
 - The middle number is 3.
 - The median is 3.
- **Mode** is the value that appears most often in a data set. A data set can have no mode, one mode, or more than one mode.
 - To find the mode, put all the numbers from least to greatest and find the number(s) that occur the most.
 - Example:
 - Data Set: 2, 6, 4, 2, 4
 - Data Set in order: 2, 2, 4, 4, 6
 - The mode is 2 and 4.

The examples above are easy to find by hand. However, with a larger data set you want to use Excel to help you calculate the mean, median and mode. Watch the video [How to calculate Mean, Median, Mode using excel](#) and follow along as you learn how to find the mean, median, and mode using Excel.

Project Work: Descriptive Statistics Part A

After reading about Frequency, Percentages, Mean, Median, and Mode look at your variables. Does it make sense to run any of these descriptive statistics for any of your variables?

If you need help deciding, watch the HSTA video about descriptive statistics using the WV State Survey. Direct Link: https://drive.google.com/drive/folders/1xLe0TjrwGDgY4oiXvhgTNW-SiChxXVWj?usp=share_link

After the video, start running descriptive statistics in excel. Transfer the results into your PowerPoint. Visit the video's last part for a slide example.

Lesson #17: Descriptive Statistics: Range, Standard Deviation, Variance

Objectives:

- Students will become familiar with range, standard deviation, and variance.
- Students will find the measure of spread and percent change for their data.
- Students will continue with OnTrack.

Materials:

- Excel
- Computer
- Research PowerPoint
- Internet

Activities:

1. Distinguish between range, standard deviation, and variance.
2. Calculate the measure of spread and percent change.

Lesson 17

Direct Link for Main Lesson 17 Folder: https://drive.google.com/drive/folders/1pE1K77n-9l_EE1K9STPIIcczKWRyvjmU?usp=share_link

Descriptive Statistics Part 2

We will continue our statistical journey with descriptive statistics. We will work through videos and examples to learn the basic of descriptive statistics to use in your own research project.

Measures of Spread: Range, standard deviation, variance

Next we will look at the measure of spread. Watch the video about [Measures of the Spread](#) to learn more about range, standard deviation, and variance.

Range

The **range** of a data set tells us how spread out the responses are from each other. To find the range of a data set, we subtract the lowest value from the highest value.

Example: Find the range of the following data set: 88, 94, 72, 56, 84, 99, 78, 76, 82, 90, 78.

1. Put the numbers in order from least to greatest.
 - a.
2. Subtract the smallest number from the largest number.
 - a.
3. The range of this data set is _____.

Watch the video to learn how to find the maximum and minimum number of a data set as well as the range in Excel.

[How to Calculate Range in Excel](#)

Standard Deviation

The **standard deviation** (s or SD) is the average amount of variation or dispersion among the data. Standard deviation tells us, on average, how far each data value is from the mean. The bigger the standard deviation is the more spread out the data set.

Watch the following video to learn more about [Standard Deviation](#).

As always, you can find the standard deviation in excel. Yet, with a small data set, you can calculate the standard deviation by hand and check yourself in excel. Exercise your math skills!

Standard Deviation Formula

$$S_x = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n - 1}}$$

On average, each data point deviates from the mean by 1.72 points.

Watch the video about [Standard Deviation in Excel](#) to learn how to find the standard deviation in excel.

Variance

The **variance** (s^2) tells us how well the mean represents an entire data set. The larger the variance is to the mean, the more range the data set has. In other words, if there is a large variance, we could say the mean does not reflect the data set.

Watch the video on [Variance](#) to learn more.

To find the variance, s^2 , we will square the standard deviation.

If $s = 3.84$ then $s^2 = 3.84^2 = 14.75$

What is the variance for the example above?

Percent Change

We use percent change to find the difference between the starting value and the final value. The percent change formula is:

$$\text{Percentage Change} = \frac{\Delta V}{|V_1|} \times 100$$

$$= \frac{(V_2 - V_1)}{|V_1|} \times 100$$

V_1 = Starting Value

V_2 = Final Value

If the result is positive, it is an increase.

If the result is negative, it is a decrease.

Project Work: Descriptive Statistics Part B

After reading about range, standard deviation, variance, and percent change, look at your variables. Does it make sense to run any of these descriptive statistics for any of your variables?

If you need help deciding, watch the HSTA video about descriptive statistics using the WV State Survey. Direct Link: https://drive.google.com/drive/folders/1pE1K77n-9l_EE1K9STPIlcczKWRyVjmU?usp=share_link

After the video, start running descriptive statistics in excel. Transfer the results into your PowerPoint. Visit the video's last part for a slide reference.

Lesson #18: Descriptive Statistics: Graphing

Objectives:

- Students will learn the best graph for their research project.
- Students will label the parts of a graph.
- Students will differentiate between box and whisker plots, bar graphs, histograms, line graphs, and Pi charts.
- Students will demonstrate how to use each type of graph given specific data.
- Students will compare and contrast the organ systems of a sheep (eye, kidney, heart, and brain).

Materials:

- Computer
- Excel
- Research PowerPoint
- Dissection Kit

Activities:

1. Learn about graphs.
2. Dissection of sheep organs.

Lesson 18

Direct Link for Main Lesson 18 Folder:

https://drive.google.com/drive/folders/1553MURr0__pHpp2pvpF98ZBcjNiZo0Mz?usp=share_link

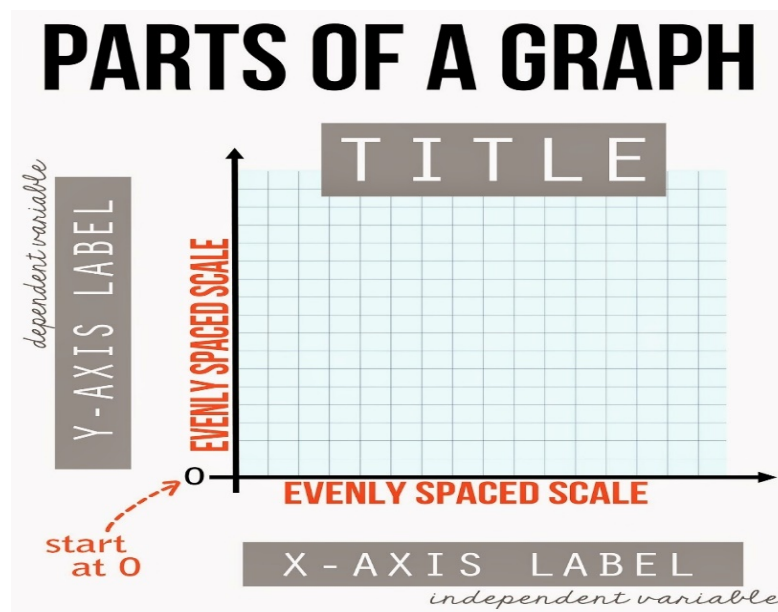
Basic Graphing

During the last two lessons we talked about Descriptive Statistics: frequency, measures of central tendency: mean, median, mode, measures of spread: range, standard deviation, and variance. This week we will learn about graphing data.

Watch the video about [Types of Graphs and when to use them](#)

Next, we will review four graph types. NOTE: This is in no way a comprehensive list of charts and graphs. There are others that may be used to describe statistics. **It is important to select the one that is appropriate for your data set(s). Use those directions to graph your data.**

The image below is a basic review of how to label a graph.



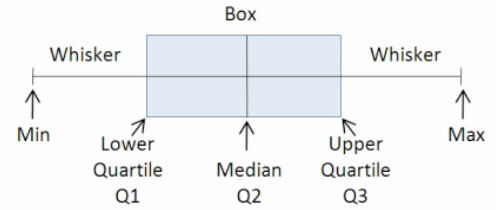
Types of Graphs

Below is a chart that will help you determine the best chart/graph for your research question.

	Dependent Variable is Categorical	Dependent Variable is Numeric
Independent Variable is Categorical	Chi Square results, displayed in a chart .	ANOVA and t-test results, displayed in a bar graph .
Independent Variable is Numeric	Logistic regression results, displayed in a histogram .	Correlation and regression results, displayed in a scatterplot or line graph .

Box and Whisker Plot shows measures of variation. See Lesson 16 Median as well as Measures of Spread where it talks about Max and Min.

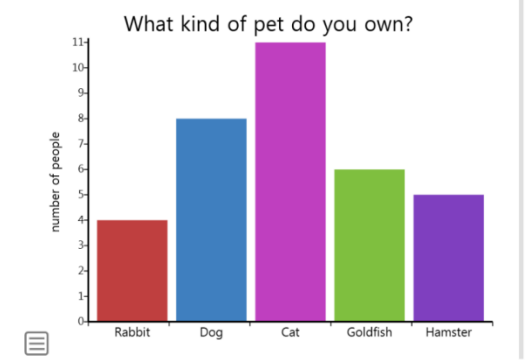
1. Put your data set in order from least to greatest.
2. Find the median of the data. (See Lesson 16). Remember the median divides the data into two halves.
3. Find the lower and upper quartile. To divide the data into quarters, we then find the medians of the two halves.
4. Find the Min and Max (See Lesson 16).
5. Half of the data will be in the box, and half will be outside the box in the whiskers.



Click on the video [How to create a box plot in excel](#) to learn how to create a Box and Whisker Plot in excel. As your data sets get larger, excel will be easier to use.

Bar Graph is a graph that uses horizontal or vertical bars to display data to compare quantities.

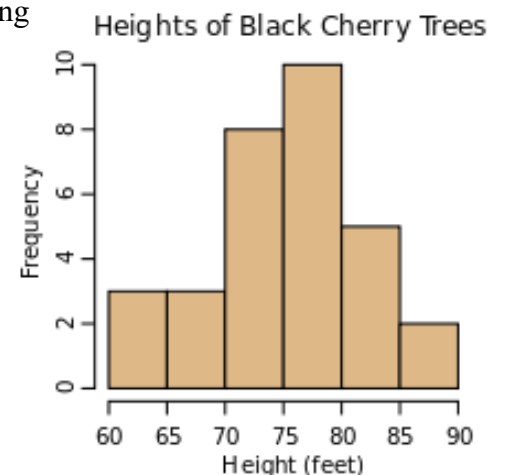
- It usually represents categorical data (i.e. how many people have brown, blonde, or red hair).
- If you have a frequency table (See Lesson 14), you can display this data in a bar graph.



Click on the video [How to create a bar graph in excel](#) to learn how to create a Bar Graph in excel. As your data sets get larger, excel will be easier to use.

Histogram is a visual way to represent continuous frequency data using bars.

- It usually represents numerical data (i.e. number of students who get certain scores on a test).
- The numerical data can be represented in ranges (i.e. scores of 71-75, 76-80, 81-85, etc.)
- The bars are connected because the data is continuous.



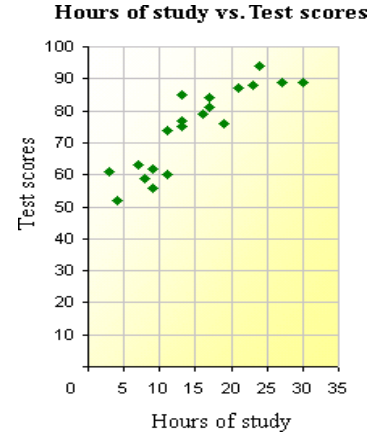
Click on the video [How to create a frequency table in excel](#) and [How to create histogram in Excel](#) to learn how to create a Histogram Graph in excel. As your data sets get larger, excel will be easier to use.

Extra Resource: [How to interpret a histogram](#)

Scatter Plot is a graph of plotted points that shows the relationship between two data sets.

- It is used when you are showing the relationship between two variables.
- Data is not continuous.
- It is used to show correlation between two variables.

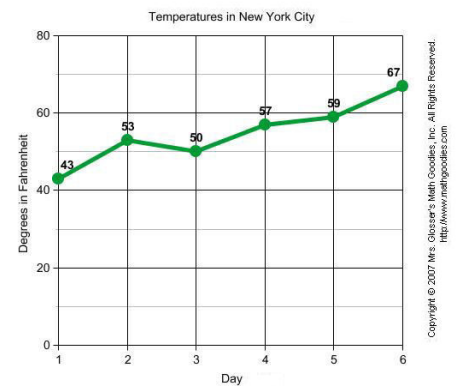
Click on the link [How to create a scatter plot in excel](#) to learn how to create a Scatter Plot in excel.



Line Graph is a graph that uses segments to connect data points to show changes in data.

- Data is continuous.
- May show how something changes over time.

Click on the link [How to create a line graph in excel](#) to learn how to create a line graph in excel.



Lesson #19: Understanding P-Values

Objectives:

- Students will recognize when to use a T-test, an ANOVA, a Chi-square, or a correlation.
- Students will learn what a P-value is and how it is used in statistics.
- Students will continue with dissection of sheep organs.

Materials:

Computer

Excel

Research PowerPoint

Materials from dissection kit in Lesson 18

Activities:

1. Learn how to do a T-test, ANOVA, Chi-square, and correlation.
2. Continue dissection of sheep organs

Lesson 19

Direct Link for Main Lesson 19 Folder:

https://drive.google.com/drive/folders/1KP8QNqbj2yZe-iWfEc6aug_-s5NmdaU-?usp=share_link

Understanding P-Values

Directions: Read the information below as a club and discuss. At the end confirm the statistical test you will perform with your data set.

The last few weeks we discussed descriptive statistics that help you describe your data by creating summaries through charts and graphs. Now, we will turn our focus to see if your data supports your hypothesis by using inferential statistics.

Make sure your research question, variables, and hypothesis match. This is a skill that all researchers practice.

Summary/Review:

- The **research question** asks a question that we can test. Review Lessons 4-6.
- The **variables** tell us our independent variable (this is what we change/manipulate), dependent variable (this is what we measure), control variable (this is the group that has no ‘treatment’ to compare to the ‘treatment’ groups to observe a change; not all projects have controls groups), and constants (elements that stay the same for the project). Review Lesson 8.
- Finally, our **hypothesis** states a prediction about the outcome of the study. You should have an alternative and null hypothesis. The alternative is how you think the outcome will happen. It can be directional or non-directional. Directional hypothesis tells us if the outcome will be more or less. Non-directional hypothesis tells us if there will be a difference. The null hypothesis states there will be no difference, no directional change. Review Lesson 8.
 - Make sure your hypothesis is written before you collect data.

If... then... because... If [we compare something about the independent variable], then [this is the outcome we expect], because [rationale].

If [something happens to the independent variable], then [this is the outcome we expect], because [rationale].
 - Now, make sure your hypothesis is a statistical hypothesis by saying if there will be a significant difference or if you will see a significant relationship.
- After data collection, you can use statistics to see if your data supports or rejects the hypothesis.

You should have circled one statistical test. Double check your work and circle it again here.

		Dependent Variable (Y)	
		Categorical	Numeric
Independent Variable (X)	Categorical	<p><u>Chi Square</u></p> <p>Difference among gender (male/female) and if they have had the flu shot (Yes/No)</p> <p>Difference among grade levels (ninth, tenth, eleventh, and twelfth) and if they are present at an event (Yes or No)</p>	<p><u>T-Test</u> (compares two groups) Difference among gender (male/female) and social support scores?</p> <p><u>ANOVA</u> (compare three or more groups) Difference among age groups (13-19; 20-29; 30-39) and weight (examples: 100, 110, 150, 97)?</p>
	Numeric	<p><u>Logistic Regression</u></p> <p>Does body weight (example 100, 97, 250, 116) influence heart attacks (Yes/No)?</p>	<p><u>Correlation</u> (Tells how much one variable tends to change when the other changes) Does rain fall (example 11, 12, 13 inches) relate to temperature (example 60, 80, 75 degrees)?</p> <p><u>Regression</u> (IV influences DV) Weight (example 100, 110, 120, 97) influence cholesterol level (example 160, 170, 180 mml)?</p>

- You will learn four inferential statistical tests this semester: Chi Square, Correlation, T-Test (Pair T-Test), and ANOVA. You will carry out one of these tests to answer your research question by supporting or rejecting your hypothesis.
- You test at a level of significance of 0.05. This is a common significance level, and it tells us the probability of error in rejecting the null hypothesis.
- Each of these tests will calculate a p-value. This p-value will tell us if you can reject or support a hypothesis.

Watch [Statistics made easy! ! Learn about the t-test, the chi square test, the p value and more.](#)

What is a p-value? Imagine that one day, Michael Jordan (a famous basketball player) got into a 1 on 1 match with a ten-year-old kid. Piece of cake for Michael, right?

But it turned out that Michael lost the game. Whattttttttt?

Michael was beaten in a 1 on 1 match against a little kid! Fans were shocked, frustrated, and angry.

The reasoning goes like this: If Michael had played as usual, he would have been highly unlikely to be defeated. But he lost the game! So, fans had every reason to cast doubt on his fair play. (I'm so sorry, Michael).

To put it another way, the reasoning goes like this: We have a *hypothesis*: Michael rocks as usual. If the hypothesis had been true, the *probability of him losing* would have been sooo small, say, less than 5%. But he lost the game. So, the unlikelihood was considered as evidence against his fair play.

In medical studies, the authors do almost the same thing. They propose a hypothesis (the full name is *null hypothesis*), which is “a statement suggesting that nothing interesting is going on, for example, that there is no difference between the observed data and what was expected, or no difference between two groups.”

Then the authors calculate the *probability (p-value)* of the collected data, given that the null hypothesis was true. If the p-value is too small, they have every reason to cast doubt on the accuracy of the null hypothesis. Then, they reject the null hypothesis, and accept the alternative hypothesis.

The p-value reflects the strength of evidence against the null hypothesis. We'll encounter two situations: the strength is *strong enough* or *not strong enough* to reject the null hypothesis.

If the p-value is less than 0.05, we have enough evidence to reject the null hypothesis. We have a statistically significant difference.

If the p-value is more than 0.05, we have enough evidence to support the null hypothesis. We do not have a statistically significant difference.

From <https://www.students4bestevidence.net/p-value-in-plain-english-2/>

Lesson #20: Running inferential statistics.

Objectives:

- Students will run a T-test, an ANOVA, a Chi-square, or a correlation on their data.
- Students will calculate a P-value and how it is used in statistics.

Materials:

- Computer
- Excel
- Data collected from their research project
- Research PowerPoint

Activities:

1. Learn about a T-test, an ANOVA, a Chi-square, or a correlation.
2. Calculate their P-value.

Lesson 20

Direct Link for Main Lesson 20 Folder:

https://drive.google.com/drive/folders/1BzjJYPo3ABzsaAW7HcgUWMv9y14v1N3c?usp=share_link

Inferential Statistics

Directions: This week we will look at inferential statistics to find our p-values to support or reject our null hypothesis. Refer back to the chart on page 122. Find that test and read the directions. Run the test and determine if you will support or reject your null hypothesis.

Chi square

We use a Chi square when both our independent and dependent variables are categorical. Watch the following video [What is a Chi Square?](#) to learn about Chi Square. This is the formula for a Chi square:

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

χ^2 = chi squared

O_i = observed value

E_i = expected value

Follow the video to learn how to use the state data in a chi square. Direct Link:

https://drive.google.com/drive/folders/1BzjJYPo3ABzsaAW7HcgUWMv9y14v1N3c?usp=share_link

Additional resources: Watch the video [Chi Square](#) or [Chi Square in Excel](#) to learn how to do a chi square in excel. You can also use an online calculator [Chi Square Calculator - Up To 5x5, With Steps \(socscistatistics.com\)](#) to complete a Chi Square.

Correlation

Both the independent and dependent variables are continuous/numeric.

Simple linear correlation is a measure of the degree to which two variables vary together, or a measure of the intensity of the association between two variables.

You will see if one variable is affecting another variable.

The parameter being measured is ρ (rho) and is estimated by the statistic r , the correlation coefficient. r can range from -1 to 1 and is independent of units of measurement.

The strength of the association increases as r approaches the absolute value of 1.

If r is 1, then the columns of data are related 100% of the time.

If r is less than 1, then the columns of data are somewhat related.

As the correlation coefficient approaches 0, then the columns of data are less related.

Scatter plots or line graphs are a useful means of getting a better understanding of a correlation.

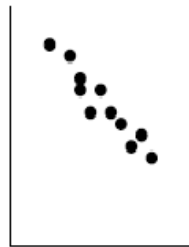
Interpreting a Correlation Coefficient	
Size of the Correlation	Coefficient General Interpretation
0.8 to 1.0	Very strong relationship
0.6 to 0.8	Strong relationship
0.4 to 0.6	Moderate relationship
0.2 to 0.4	Weak relationship
0.0 to 0.2	Weak or no relationship

In general, scatter plots may reveal a

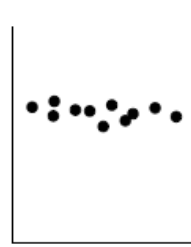
- **positive correlation** (high values of X associated with high values of Y)
- **negative correlation** (high values of X associated with low values of Y)
- **no correlation** (values of X are not at all predictive of values of Y).



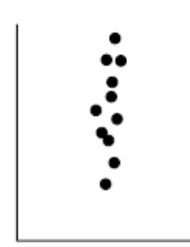
(A) Positive Correlation



(B) Negative Correlation



(C) No correlation



(D) No correlation

The formula is below:

$$r_{xy} = \frac{\Sigma(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\Sigma(x_i - \bar{x})^2 \Sigma(y_i - \bar{y})^2}}$$

r_{xy} = correlation coefficient between X and Y

x_i = the values of X within a sample

y_i = the values of Y within a sample

\bar{x} = the average of the values of X within a sample

\bar{y} = the average of the values of Y within a sample

Follow the video to learn how to use the state data in a correlation. Direct Link:

https://drive.google.com/drive/folders/1BzjJYPo3ABzsaAW7HcgUWMv9y14v1N3c?usp=share_link

Follow the video [How to Calculate a Correlation in Microsoft Excel - Pearson's r - YouTube](#) to learn how to do a correlation in Excel.

Extra Resources: [How to Calculate a Correlation \(and P-Value\) in Microsoft Excel - YouTube](#)

t-Test

Watch the following video [What is a t-Test?](#) to learn about a t-Test.

There are three t-Tests used to compare means: one-sample t-Test, two-sample t-Test and a paired t-Test. For a one-sample t-Test we are comparing our mean to the population mean. Usually in HSTA we use a two-sample t-Test or a paired t-Test. For a two-sample t-Test we are comparing two different groups. For a paired t-Test we are comparing the same group at two different times.

Now that you know a little more about t-Tests, we will do one by hand.

In a t-Test the independent is a categorical variable (two groups) and the dependent variable is a continuous/numeric variable.

The formula is below. Follow the steps as we break this formula down and find t.

$$t = \frac{(\sum D)/N}{\sqrt{\frac{\sum D^2 - \frac{(\sum D)^2}{N}}{(N-1)(N)}}$$

Follow the video to learn how to use the state data in a t-test. Direct link

https://drive.google.com/drive/folders/1BzjJYPo3ABzsaAW7HcgUWMv9y14vln3c?usp=share_link

Watch the video [Paired t-Test in Excel](#) and check our answers.

Watch this video if you need directions on how to do a [Two Sample t-Test in Excel](#).

Additional Video: [3 Types of t-tests \(paired, and 2-samples with equal or unequal variances\) with Excel](#)

ANOVA

Watch the following video [ANOVA](#) to learn about an ANOVA.

Now that you know a little more about an ANOVA, you will do one by hand. In an ANOVA the independent is a categorical variable (at least three different groups) and the dependent variable is a continuous/numeric variable.

The formula is below. Follow the steps as we break this formula down.

Analysis of Variance(ANOVA)

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares (MS)	F
Within	$SS_w = \sum_{j=1}^k \sum_{i=1}^l (X - \bar{X}_j)^2$	$df_w = k - 1$	$MS_w = \frac{SS_w}{df_w}$	$F = \frac{MS_b}{MS_w}$
Between	$SS_b = \sum_{j=1}^k (\bar{X}_j - \bar{X})^2$	$df_b = n - k$	$MS_b = \frac{SS_b}{df_b}$	
Total	$SS_t = \sum_{j=1}^n (\bar{X}_j - \bar{X})^2$	$df_t = n - 1$		

Follow the video to learn how to use the state data in a ANOVA.

Direct Link:

https://drive.google.com/drive/folders/1BzjJYPo3ABzsaAW7HcgUWMv9y14vln3c?usp=share_link

Lesson #21: Running Inferential Statistics and Finishing Results

Objectives:

- Students will run a T-test, an ANOVA, a Chi-square, or a correlation.
- Students will calculate a P-value is and how it is used in statistics.
- Students will build a Solar Science Station: Part A.

Materials:

- Computer
- Excel
- Research PowerPoint Presentation
- Materials in Solar Science Station kit

Activities:

1. Learn about a T-test, an ANOVA, a Chi-square, and a correlation
2. Calculate the P-value and determine whether to accept or reject the null hypothesis
3. Build a Solar Science Station

Lesson 21

Direct Link for Main Lesson 21 Folder:

https://drive.google.com/drive/folders/1O4S8DRA4jITN8q02tvK6ewX5U5H4Ap8Y?usp=share_link

Make sure you have finished your results. You should have descriptive and inferential statistics completed. Go through the score sheet items below and make sure your slides are complete. Have a peer, not in your group, go through the list of items and see if you are missing anything. If you have any questions, ask the HSTA teacher and/or email your CRA/GA.

Results

- Results display pictorial evidence of research study (photos). See page 135 for help.
- Results display raw data in a chart. See Lesson 16 for help.
- Results include descriptive statistics (averages, percentages, etc). See Lessons 16 & 17 for help.
- Results include a properly labeled graph(s) – (title, key, x-axis, y-axis). See Lesson 18 for help.
- Results, including graphs and charts, are explained well. See Lesson 18 for help.
- Results include the correct number of participants/replications. See Lesson 11 for help.
 - Prevalence – minimum of 100 participants
 - Intervention - 30 participants (Pre and Post)
 - Human subjects – 30 participants in each group (control and experimental)
 - Experiment - at least 5 replications in each group (control and experimental)
- Results display data that matches research question.

Data Analysis – Look over Lesson 19 & 20 for help.

- Data analysis includes a statistical test used to test the hypothesis.
- Data analysis includes an explanation of why that statistical test was used.
- Data analysis includes a P-value.
- Data analysis includes an explanation of the statistical significance of statistical test.

Lesson #22: Conclusion

Objectives:

- Students will formulate their conclusion based on their data analysis.
- Students will accept or reject their null hypothesis.
- Students will use their Solar Science Station to record solar data (angle of degrees and time of day) as well as the voltage output of the LED voltmeter display.

Materials:

- Computer
- Research PowerPoint
- Materials in Solar Science Station

Activities:

1. Learn about how to write a conclusion
2. Continue building the Solar Science Station

Lesson 22

Direct Link for Main Lesson 22 Folder:

https://drive.google.com/drive/folders/1w6uMrAvDm9_Yy_OTr-K0rFcIRLX0JEs_?usp=share_link

Conclusion

- *Conclusion slide includes an accurate summary of the project.*
- *Conclusion slide Interprets the data to conclude if the data supported or rejected the hypothesis.*
- *Conclusion slide answers the research question.*
- *Conclusion slide discusses limitations.*
- *Conclusion slide discusses how students would implement change and/or bring awareness to their community.*

Final presentation will be submitted through REDCap. Each student will get an email to upload their presentation. ALL students must submit a final presentation by April 19, 2024 5PM.

Lesson #23: Practice and Peer Review

Objectives:

- Students will present their research PowerPoint presentation in front of their peers.
- Students will give constructive feedback to their peers' presentations.
- Students will answer the research question they chose for the Solar Science Station.

Materials:

- Computer
- Research PowerPoint Presentation

Activities:

1. Present PowerPoint presentations to peers.
2. Review peers' PowerPoint presentations.
3. Finish up Solar Science Station project.

Lesson 23

Direct Link for Main Lesson 23 Folder:

https://drive.google.com/drive/folders/1y9b4LJn99N2ikZyKEpcBh1b_L8YaThup?usp=share_link

Presentation Skills

- Students speak clearly during the presentations.
- Students can answer questions with confidence.
- Students didn't read slides word for word (used presentation and /or note cards for support).
- Students present slides in the correct order.
- Presentation has limited spelling/grammar errors.
- Presentation's background (color/animation) is not distracting.
- Presentation's text size/font are consistent throughout slideshow.

Final presentation will be submitted through REDCap. Each student will get an email to upload their presentation. ALL students must submit a final presentation by April 19, 2024 5PM.

Lesson #24: Practice and Peer Review

Objectives:

- Students will present their research PowerPoint presentation in front of their peers.
- Students will give constructive feedback to their peers' presentations.

Materials:

- Research PowerPoint presentation

Activities:

1. Present PowerPoint presentations to peers.
2. Review peers' PowerPoint presentations.

Lesson 24

Direct Link for Main Lesson 24 Folder:

https://drive.google.com/drive/folders/1DQRhNGTH_8r7kBgds-PSwvBYdgL7oR-2?usp=share_link

Final presentation will be submitted through REDCap. Each student will get an email to upload their presentation. ALL students must submit a final presentation by April 19, 2024 5PM.

Appendix

State Survey Selection

Notes: The first column will give you the survey question. The second column will give you the survey responses. Remember that survey responses/variables fit into two main types:

- Categorical: contains a certain number of categories or groups.
 - Example: Yes/No; Gender; Ratings from 1-10
- Continuous: numeric variables that have an infinite number of possibilities.
 - Examples: height, weight, amount of time, temperature

Demographics

<u>Question</u>	<u>Survey Responses</u>
Birth date	Continuous/Numeric Variable (13 to 99) OR Categorical Variable (Teen or Adult)
Weight	Continuous/Numeric Variable
Height	Continuous/Numeric Variable
BMI	Continuous/Numeric Variable OR Categorical Variable (Group below) <ul style="list-style-type: none"> • under 18.5 – This is described as underweight. • between 18.5 and 24.9 – This is described as the 'healthy range'. • between 25 and 29.9 – This is described as overweight. • between 30 and 39.9 – This is described as obesity. • 40 or over – This is described as severe obesity.
Are you Hispanic or Latino?	Categorical Variable 1, Yes 2, No 3, Don't know
How would you describe yourself? Select all that apply.	Categorical Variables 1, American Indian or Alaska Native(Eg: Navajo nation, Blackfeet tribe, Mayan, Aztec, Native Village or Barrow Inupiat Traditional Government, Nome Eskimo Community, etc) 2, Asian (Eg: Chinese, Filipino, Asian Indian, Vietnamese, Korean, Japanese, etc) 3, Black or African American (Eg: African American, Jamaican, Haitian, Nigerian, Ethiopian, Somalian, etc) 4, Hispanic, Latino or Spanish origin (Eg: Mexican or Mexican American, Puerto Rican, Cuban, Salvadoran, Dominican, Colombian, etc) 5, Middle Eastern or North African (Eg: Lebanese, Iranian, Egyptian, Syrian, Moroccan, Algerian, etc) 6, Native Hawaiian or Other Pacific Islander (Eg: Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, etc) 0, White (Eg: German, Irish, English, Italian, Polish, French, etc) 7, Other race, ethnicity or origin

With which gender do you most closely identify?	Categorical Variables 1, Woman 2, Man 3, Other
What state do you live in?	Categorical Variables List of all 50 States
What WV County do you live in?	Categorical Variables List of all 55 Counties
What is your zip code?	Categorical Variables List of Zip Codes in WV
What is your highest education level?	Categorical Variables 0, Less than 8th grade 1, Some high school, no diploma 2, Current high school student 3, High School Graduate 4, Completed a GED 5, Went to a business, trade or vocational school 6, Some college credit, but no degree 7, Current college student 8, Associate's Degree 9, Bachelor's Degree 10, Graduate Degree
What is your current occupation?	Categorical Variables 1, student 2, self-employed 3, employed 4, retired 5, military 6, part time 7, not able to work 8, homemaker 9, unemployed - looking for work 10, unemployed - not looking for work
Are you a first-generation college student (i.e. are you the first person in your immediate family to go to college)?	Categorical Variables 1, Yes 2, No

General Health	
In general, how would you rank your current physical health?	Categorical Variables 1, Excellent 2, Good 3, Fair 4, Poor
In general, how would you rank your current mental health?	Categorical Variables 1, Excellent 2, Good 3, Fair 4, Poor

<i>Family Health</i>	
<i>Have you, or anyone in your family, been diagnosed with:</i>	
Diabetes?	Categorical Variables 1, Yes 2, No
High blood pressure?	Categorical Variables 1, Yes 2, No
A mental illness (depression, anxiety, bipolar disorder, schizophrenia, etc.)?	Categorical Variables 1, Yes 2, No

Stress Survey – Score all the questions for a total stress score. A score of 50 is the highest stress level and a 0 is the lowest stress level. Continuous/Numeric Variable. If you work with this variable, you will only get the total score from each survey.

	Never	Almost Never	Sometimes	Fairly Often	Very Often
In the last month, how often have you been upset because of something that happened unexpectedly?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the last month, how often have you felt that you were unable to control the important things in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the last month, how often have you felt nervous and "stressed"?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the last month, how often have you felt confident about your ability to handle your personal problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the last month, how often have you felt that things were going your way?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the last month, how often have you found that you could not cope with all the things that you had to do?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the last month, how often have you been able to control irritations in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the last month, how often have you felt that you were on top of things?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the last month, how often have you been angered because of things that were outside of your control?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Self Esteem - Score all the questions for a total self-esteem score. A score of 40 is the highest self-esteem and a 0 is the lowest self-esteem. Continuous/Numeric Variable. If you work with this variable, you will only get the total score from each survey.

On the whole, I am satisfied with myself.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

At times I think that I am no good at all.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

I feel that I have a number of good qualities.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

I am able to do things as well as most other people.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

I feel I do not have much to be proud of.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

I certainly feel useless at times.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

I feel that I'm a person of worth, at least on an equal plane with others.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

I wish I could have more respect for myself.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

All in all, I am inclined to feel that I'm a failure.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

I take a positive attitude toward myself.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

COVID/Vaccines

Have you received your COVID-19 vaccine?	Categorical Variables 1, Yes 2, No
If you have not already, do you plan to receive your COVID-19 vaccine?	Categorical Variables 1, Yes 2, No
Does your school or workplace provide COVID-19 testing?	Categorical Variables 1, Yes 2, No 3, Don't know

Physical activity

In a typical week, how often do you engage in light exercise (ex. walking, yoga, gardening)?	Categorical Variables 1, Never 2, 1-2 hours per week 3, 3-4 hours per week 4, 5-6 hours per week 5, 7+ hours per week
In a typical week, how often do you engage in moderate exercise (ex. jogging/running, aerobics, swimming)?	Categorical Variables 1, Never 2, 1-2 hours per week 3, 3-4 hours per week 4, 5-6 hours per week 5, 7+ hours per week
In a typical week, how often do you engage in intense exercise (ex. weight lifting, team/competitive sports)?	Categorical Variables 1, Never 2, 1-2 hours per week 3, 3-4 hours per week 4, 5-6 hours per week 5, 7+ hours per week

Nutrition

<i>In a typical week, how often do you:</i>	
Eat meals from fast food restaurants?	Categorical Variables 1, Never 2, 1-2 times per week 3, 3-4 times per week 4, 5-6 times per week 5, 7+ times per week
Eat a serving of vegetables? (1 serving = 1 cup)	Categorical Variables 1, Never 2, 1-2 times per week 3, 3-4 times per week 4, 5-6 times per week 5, 7+ times per week
Eat a serving of fruits? (1 serving = 1 cup)	Categorical Variables 1, Never 2, 1-2 times per week 3, 3-4 times per week 4, 5-6 times per week 5, 7+ times per week
How often do you use the Nutrition Facts label when deciding to buy a food product?	Categorical Variables 1, Never 2, Rarely 3, Sometimes 4, All the time
In an average day, how many caffeinated drinks do you consume (ex. coffee, tea, soda, energy drinks)?	Categorical Variables 1, None 2, 1-2 drinks per day 3, 3-4 drinks per day 4, 5-6 drinks per day 5, 7+ drinks per day

Sleep

Approximately how many hours of sleep do you get in a 24 hour period?	Categorical Variables 1, Less than 3 hours 2, 3-5 hours 3, 5-7 hours 4, 7-9 hours 5, More than 9 hours
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Environmental

Do you have a smartphone(s) that can access the Internet?	Categorical Variables 1, Yes 2, No
Does your current home have reliable Wi-Fi/Internet access?	Categorical Variables 1, Yes 2, No
Does your current home have reliable cellular service?	Categorical Variables 1, Yes 2, No
Does your current home have access to clean drinking water?	Categorical Variables 1, Yes 2, No
Approximately how far away from your home is the nearest grocery store?	Categorical Variables 1, Walking distance, or less than 5 minutes by car 2, 5-10 minutes by car 3, 10-20 minutes by car 4, 20-30 minutes by car 5, More than 30 minutes by car
How often do you worry about where your next meal will come from?	Categorical Variables 1, Never 2, Rarely 3, Sometimes 4, Often/Most days
Do you or the head of your household (parents/guardians) have access to a working and reliable vehicle?	Categorical Variables 1, Yes 2, No
How often do you worry about your household's ability to pay necessary utility bills (heat, electric, water, gas, etc.)?	Categorical Variables 1, Never 2, Rarely 3, Sometimes 4, Often/Most days
Do you need to leave your home to do laundry?	Categorical Variables 1, Yes 2, No
Approximately how far away from your home is the nearest doctor's office or hospital?	Categorical Variables 1, Walking distance, or less than 5 minutes by car 2, 5-10 minutes by car 3, 10-20 minutes by car 4, 20-30 minutes by car 5, More than 30 minutes by car