

Experimental Design Diagram (EDD)

Independent/Manipulated variable:

Values of variable (note which is the control)	Control (used as a comparison)	Manipulated Variable (1st) (Level/amount described)	Manipulated Variable (2nd) Add more boxes as needed	Manipulated Variable (3rd) etc. Add more boxes as needed IB IA will need 5
# of Trials	# trials	# of trials		IB IA will need 3 trials

(Increasing the number of trials makes your experiment **reliable**; repeated trials should give similar results if the procedure was followed exactly.)

Dependent/Responding Variable(s): include units

Research Question: What is the effect (relationship between) of the independent (manipulated) variable on the dependent (responding) variable?

Hypothesis: If the (manipulated variable) is (describe how you changed it), **then** the (responding variable) will (describe the effect). Provide reasoning.

Constants/Controlled Variables: Include all of the variables you should try to hold constant; explain why they need to be controlled and how you are going to control them. (This makes your experiment **valid** by increasing the number of controlled variables, measuring with accuracy, having a control group, knowing that the IV caused the change in the DV. You will refer back to this table to help you determine if you had any errors in your data collection.)

Uncontrollable factors: Which factors might be difficult to control and therefore pose as a potential limitation to your data?

Application Statement: why is it important to study this question? How will it benefit our understanding or application of science?

Safety/Ethics Statement: Explain how you will ensure that performing the experiment won't cause any harm to you, test subject, or environment.

Example:

Independent/Manipulated Variable: method of hand drying

Air dry (shake) control	Use of paper towel	Use of cloth towel	Forced air drier	Leg of pants
5 trials	5 trials	5 trials	5 trials	5 trials

Dependent/Responding Variable: Change in bacterial colony count before and after hand washing procedure. Change in different types of bacteria present.

Research Question: What is the effect of hand wash drying method on the reduction in bacteria colony counts and types of bacteria present?

Hypothesis: If the hands are washed and then dried with various methods **then** the greatest reduction in bacteria colony counts and types of bacteria will be seen with the paper towel. The paper towel shouldn't be contaminated and it will help rub off any bacteria present on the hands. The cloth should be second best, there might be a chance that it is harboring bacteria if not recently cleaned. Air drying and forced air drying leave the possibility of remaining moisture and bacteria. The pant leg will be the worse due to exposure to dirt.

Constants/Controlled Variables:

Controlled Variable	Why	How
Same finger	To make sure the source of bacteria is the same and the area of exposure is the same	Use the right forefinger
Method of touching agar	To make sure the same amount of area on agar is exposed, more area would mean more bacteria	Light touch from tip of finger to first joint
Temperature of water	To ensure that water temp isn't affecting bacteria count	Use cold water from tap
No soap	To ensure that soap is not removing or killing bacteria	Just wash with water
Method of washing	To ensure that each person is rubbing their hands the same way and for the same amount of time, a change in method might alter bacteria amount	Wash for 30 sec, rubbing hands in a back and forth, up and down manner
Time for drying	To ensure that more or less drying doesn't change results	30 sec of drying
Extraneous touching	Touching other objects after washing will re-contaminate the hand with potential bacteria	Subject does not touch sink or faucet handle

Uncontrollable factors:

That the subject(s) is not consistent on how much surface area of agar is touched, that they accidentally touch a contaminated surface prior to agar, that the test subjects don't consistently wash & dry their hands the same way.

Application Statement:

Hand washing is one of the best ways to avoid illness and infection. One criterion for proper hand washing is the method of drying. Some restrooms offer hand towels and

other blow driers, this experiment will help determine if one method of drying is better at reducing hand bacteria than another.

Safety and Ethics: None of the agar plates will be opened once bacteria have started growing; they will be sealed with parafilm to prevent exposure. Gloves will be worn while examining the plates. All plates will be disinfected with a 10% bleach solution by the teacher.

Brainstorm:

Variables we could change or manipulate-----Independent variable:

1 2 3 4 5 6

Variables we could observe or measure-----Dependent Variable:

A B C

Choosing Variables:

Let's change: #3

Let's observe/measure: B

We will need to keep these the same: constants/controlled variables

1 2 4 5 6

Asking a Research Question:

When we change #3 What will happen to B ?

Table of Results:

3	<input type="text"/>	B	<input type="checkbox"/>
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