**Research Orientation**

This is a lesson on researching conducted by your teacher. You may have this orientation lesson any day in week one.

- Definitely something that has real use.

Biology / Chemistry

Possible Ideas:

- Can a bleeding tooth be stopped at a faster rate using some artificial method?
- Identifying the way to detect bacterial growth on food.
- Something to do with hygiene!!

Very important to all people.

Hygiene？？

Already been invented by someone else - Veiga!
LOGBOOK - DAY 2 DATE: 16 JUNE

INTRODUCTION/READING THIS DOCUMENT/CLASS DISCUSSION/QUESTIONS

Initial ideas:

1. How do hand dryers affect spread of microbes in a bathroom? (Possible Question)
   
2. Too hard to measure.

Do hand dryers affect microbial growth on hand palates? (Most likely question to investigate)

Let's test the bathrooms and use agar plates to test microbial growth in specific areas.

Decided to use agar plates to see microbial growth in the bathrooms before and after using hand dryers in a pilot test. Tomorrow: do see e-ears, pre-experiment.

Teacher Sign Off that you have read and understood the SRP instructions

Teacher Sign Off that you have written background notes
**LOGBOOK - DAY 4**

**RESEARCH AND OUTLINE A METHOD**

Make a list of sites you are visiting and record references
Decide on a general question

References
1. New et al. (2015): Reported use of air dryer was associated with greater spread of airborne microbes than other drying methods.
2. New et al. (2019): Reported use of air dryers resulted in increased microbial cross contamination via airborne dissemination to environment.
3. Huang et al. (2002): Revealed varying evidence and individual concern over bacteria by warm air dryers might be affected by handwashing technique. They also reported that warm air dryers removed less bacteria than paper towels.
4. Yanamoto et al. (2003): Reported that after hands were washed with non-anti-bacterial soap, both warm air dryers and paper towels reduced bacterial counts, with paper towels removing more bacteria than warm air dryers.
5. Fast et al. (2000) reported after the use of non-anti-bacterial soap, the use of warm air dryers in removing bacteria from washed hands did not affect from paper towels.

- Key Variables:
  - Microbiological counts
  - Drying time and technique
  - Washing time and technique
  - Temperature of incubator
  - Time in incubator of agar plate

- Equipment:
  - Agar Plate x2
  - Cotton Bud x3
  - Sticker, Tape, Ruler, Scissors
  - Warm air dryer, (SD: McDonald)
  - Streaked on a solid (Agar) plate
  - Sample size: N = \[ \frac{\text{Sample Size}}{2} \]

Teacher Sign Off that you have written down and come up with a general or specific question

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**LOGBOOK - DAY 5**

**WRITING THE METHOD AND ORDERING EQUIPMENT**

What variable (factor) will you change? (This is called the independent variable)

To make the investigation fair, you will need to keep everything else the same. Write a list of everything you will need to keep the same.

It is important to repeat an investigation several times. Why?

How many times will you repeat your investigation?

What variables need to be controlled?

What will you measure in this investigation?

What equipment do you need to order? Your teacher will collect your equipment order.

- Use vs. No use of air dryer

- Microbiological counts

- Controllled Variables:
  - Drying time and technique
  - Washing time and technique
  - Temperature of incubator
  - Time in incubator of agar plate

- Equipment:
  - Agar Plate x2
  - Cotton Bud x3
  - Sticker, Tape, Ruler, Scissors
  - Warm air dryer, (SD: McDonald)
  - Streaked on a solid (Agar) plate
  - Sample size: N = \[ \frac{\text{Sample Size}}{2} \]

Teacher Sign Off that you have written the method and ordered equipment

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20 June

LOGBOOK - DAY 5 CONTINUED

WRITING THE METHOD AND ORDERING EQUIPMENT

<table>
<thead>
<tr>
<th>Task</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Palm</td>
<td>140</td>
<td>50</td>
</tr>
<tr>
<td>Hand Back</td>
<td>87</td>
<td>12.9</td>
</tr>
<tr>
<td>Lower Body</td>
<td>300</td>
<td>230</td>
</tr>
<tr>
<td>Upper Body</td>
<td>120</td>
<td>200</td>
</tr>
<tr>
<td>Middle Body</td>
<td>110</td>
<td>120</td>
</tr>
</tbody>
</table>

From these results, I believe that hand sanitisers do get rid of bacteria on the palms of the hands, confirming previous studies that they work (see Harris et al. and Konradt et al.). The pilot test also confirms that the hand sanitisers spread more bacteria into the environment and nearby hydrophobic and hydrophilic areas, the count on the body dramatically increased (see Bent et al.).

As I believe that the lower body cannot detect a large amount of the bacteria, due to the fact that the hands, particularly the fingers, are the main source of contamination. The air flow and air recirculation in the room are moving towards other areas of the body.

BEGIN TO CARRY OUT THE TASK AND COLLECT DATA

New data results is recorded here.

Part 1 of the project is to record the bacteria count of the hands six times, at different times during the day, I will record the results, 2 cm in and 8 cm in to the six times, at 8:00, 12:00, 16:00, and 20:00. I scrubbed the six times because for each time, this will be done on 2 days.

Part 2 requires 10 volunteer to wash their hands with and anti-bacterial soap for 15 seconds before drying one of their hands with a hand dryer and the other hand using nothing, to make it from cleaning and recording of both hands, and then make an agar plate and inoculate.

Teacher Sign Off that you have begun the task
LOGBOOK – DAY 7 DATE: 20 JUNE

CONTINUE TO CARRY OUT TASK AND COLLECT DATA

20/06

Today I carried out Part 2 of my project, which was to investigate the yeast growth at different periods of time. In the morning I went to the same bathroom and scrubbed the edge of the WAD, at 9.00, using a cotton bud. I then stuck tape on the agar plate, and labelled the areas on the agar plate. I repeated this at 11.00, 13.00 and 15.00.

22/06

Today I went to the incubator to check on the agar plates after 48 hours in 36°C. Most of it had grown yeasts, and there were more brands. I noticed that the edge had the most bacteria and the number continued to grow. The day passed, but the mistakes were decreased. In the day passed, I can observe the WAD. This result was very interesting, so I need to do this test again tomorrow.

<table>
<thead>
<tr>
<th>Time</th>
<th>9:00</th>
<th>11:00</th>
<th>13:00</th>
<th>15:00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yeast</td>
<td>10</td>
<td>11</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td>Peroxide</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Yeast</td>
<td>5</td>
<td>7</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Teacher Sign Off that you have continued to carry out the task and begun to collect data

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LOGBOOK – DAY 8 DATE: 22 JUNE

CONTINUE TO CARRY OUT TASK AND COLLECT DATA

22/06

Time to the bathroom. I told everyone except the teacher volunteer to stay outside the bathroom and asked for those who were ready to participate. I told the participants to apply two drops of agar after washing their hands with soap, water, and rub their hands together for 5 seconds before interest in fingers and rub all surfaces for another 10 seconds and close their hands for 15 seconds. They then shook their central hand, rub to rid excess water while the other hand was dried using a hand dryer. For 15 seconds, I then randomized their hands. I took pictures of the WAD and the bathroom for further research. To illustrate data better, I also repeated Part 2 again today. (See, previous page)

Teacher Sign Off that you have continued to carry out the task and begun to collect data

20 | Year 10 SRP 2016
Today...1...did...the...final...12...samples...for...Part...2,...but...this...
time...1...did...the...samples...in...groups...of...3...because...the...prepar... 
...time...volunteers...complained...it...was...time...consuming...If...was...more... 
efficient...today...so...I...finished...quicker...quickly...I...placed...the... 
agar...plates...into...the...incubator...I...also...checked...the...results...of... 
the...first...12...samples...of...Part...2...after...96...hours...of...incubation... 

The...results...mostly...showed...that...all...incubated...hands...had...more...calories...than...controlled...hands...but...some...of...the...colony... 
numbers...were...quite...erratic... 

Came...to...school...today...to...check...samples...from...Part...2...and...Part...3... 
Agar...plates...from...Part...2...have...been...incubated...for...96...hours...which... 
is...double...the...amount...of...time...from...the...other...bunch...The...results... 

<table>
<thead>
<tr>
<th>Time</th>
<th>Control</th>
<th>Treat</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00</td>
<td>12</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>11:00</td>
<td>13</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>13:00</td>
<td>16</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>16:00</td>
<td>17</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

The...results...found...that...less...inside...hand...indistinct... 
results...possibly...due...to...temperature...further...tests... 

Agar...plates...from...Part...2...were...incubated...for...72...hours...but... 
they...still...followed...the...trend...that...aired...hands...had...more...bacteria... 
than...controlled...hands.

Teacher Sign Off that you have taken notes on referencing
### COMPLETE THE REPORT

Start to write the electronic copy of the report. When completed it must uploaded to “Assignments” on your class canvas page by the due date.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Aired</th>
<th>Control</th>
<th>Sample</th>
<th>Aired</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3 L</td>
<td>33 R</td>
<td>13</td>
<td>5 R</td>
<td>5 R</td>
</tr>
<tr>
<td>2</td>
<td>20 R</td>
<td>9 L</td>
<td>14</td>
<td>11 R</td>
<td>1.6</td>
</tr>
<tr>
<td>3</td>
<td>38 L</td>
<td>4 R</td>
<td>15</td>
<td>50 I</td>
<td>50 I</td>
</tr>
<tr>
<td>4</td>
<td>100 R</td>
<td>7 L</td>
<td>16</td>
<td>12.6</td>
<td>1 R</td>
</tr>
<tr>
<td>5</td>
<td>30 L</td>
<td>12 R</td>
<td>17</td>
<td>16 L</td>
<td>16 R</td>
</tr>
<tr>
<td>6</td>
<td>27 L</td>
<td>43 R</td>
<td>18</td>
<td>2 R</td>
<td>39 L</td>
</tr>
<tr>
<td>7</td>
<td>25 R</td>
<td>11 L</td>
<td>19</td>
<td>24 L</td>
<td>2 R</td>
</tr>
<tr>
<td>8</td>
<td>24 R</td>
<td>16 L</td>
<td>20</td>
<td>33 L</td>
<td>4 R</td>
</tr>
<tr>
<td>9</td>
<td>19 R</td>
<td>7 L</td>
<td>21</td>
<td>3 L</td>
<td>6 R</td>
</tr>
<tr>
<td>10</td>
<td>3 R</td>
<td>12 L</td>
<td>22</td>
<td>4 L</td>
<td>11 R</td>
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<tr>
<td>11</td>
<td>2 R</td>
<td>5 L</td>
<td>23</td>
<td>50 I</td>
<td>50 I</td>
</tr>
<tr>
<td>12</td>
<td>12 R</td>
<td>7 L</td>
<td>24</td>
<td>50 I</td>
<td>50 I</td>
</tr>
</tbody>
</table>

*50I - Sample obtained. Inconclusive. Will reduce sample size to 21*  
*and will use non-parametric Wilcoxon Ranked Test (Matthews & Newson)*

R: Right Hand  L: Left Hand

Teacher Sign Off that you have continued to write your report

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Notes

Flow Chart: Pilot Test

1. Gather all necessary equipment
   ➔
   - Label all agar plates

2. Swab 5 sections (Hand, Palm, Hand Back, Upper/Middleshoulder, Body)
   ➔
   - Swab agar plates with samples

Toilet: Wash hands for 15 secs

Bathroom

   1. Hand dry stationary
   ➔
   - Wash hands for 10 secs (10 cm away)

   2. Swab 5 sections immediately (see above)
   ➔
   - After drying hands

3. Swab agar plates with samples
   ➔
   - Place in incubator in room P21

Collect results after 48 hours

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...Flow Chart: WAD Investigation

- Go to bathroom at 9:00 with necessary equipment stored

   ➔
   - Gather necessary equipment from pocket

   ➔
   - Label all agar plates

Bathroom

   1. Swab edge: 2 cm to 1 cm
   ➔
   - Inside WAD

   ➔
   - Swab agar plates for each sample (stored in locker)

   ➔
   - Repeat process at 11:00, 13:00 and 15:00

   ➔
   - Place in incubator in room P21

   ➔
   - Repeat process another day

   ➔
   - Collect results after 48 hours*

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* Because agar plates were not available before Wednesday afternoon, the second batch of samples was completed on Thursday. Because I checked with teachers that Saturday was unavailable, I counted microbial growth on samples on Friday (24 hours) and Monday (96 hours)
Flow Chart: Hand Investigation

1. Gather necessary equipment
2. Gather volunteers and ask for consent
3. Label all agar plates

T | H | Swab 3 sections
H | H | Do coin toss randomisation for left/right hand and sample sections
T | H | Wash hands with anti-bac soap for 15 secs (standardised hand washing method)
H | T | Dry hands stationary with WAD
Bathroom T | T | Dry 1 hand naturally by shaking
Swab 1 section of palm on both hands immediately after drying onto agar plate
Re: Repeat process with next samples on each volunteer
Place in incubator
Collect results after 48 hours*

* 24 hours and 72 hours visual check