Show What you Know (SWUN)

STAO Project Innovation 2015/16

Differentiating *Assessment of Learning* Tasks - Show What You Know

Show What you Know (SWUN)

- Like many teachers, I feel I have mastered differentiated instruction, but am still evolving when it comes to differentiated assessment. Combine that with the challenge of motivating students to fully engage with formative assessment tasks; all while building the growth mind set required for success in competitive academic environments.
- For several semesters I have been using summative assessments tasks that I have nicknamed - *Show What you Know's* (SWUN's). Students have the opportunity to build a portfolio of work, (a series of *assessment for* and *assessment as* learning activities), that can then be used open book style to complete summative assessment tasks (*assessment of learning*).
- This year there was three areas of focus for the *Show What you Knows* (SWUN); scientific inquiry skill development, data analysis and evaluation of evidence. Scaffolding of each component led to levels of mastery, before moving forward with the next component.
- During inquiry based lab activities, students documented their observations and evidence on a "Show What you Know - Evidence Log". All students used the same evidence log, designed as a graphic organizer, to include all the required elements of the analysis section of a traditional lab report.
- Following a laboratory period, students would complete the written analysis the next lab period. Students completed the written portion independently, (referred to in class as a 'demand analysis'), and were permitted to use their evidence log during the writing period. Students were evaluated using a rubric that was co-constructed as a class. This procedure was followed for each inquiry activity throughout the semester. Student performance was tracked and modifications were made to the evidence log template.

Show What you Know in Context

A1, A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A1.8, A1.10 A1.11 A1.12 A1.13

Observations, Wonderings and Inferences

Developing a Theory of Action

Developing scientific inquiry skills

Interpreting and communicating data collected from an inquiry activity demonstrates comprehension of course concepts.

Model and practice different types of inquiry (Confirmation, Structured Inquiry, Guided Inquiry, Open Inquiry)

How can they engage in inquiry if they don't now what inquiry is or have vocabulary needed to communicate it?

Students memorize, but are challenged when required to demonstrate comprehension of a particular concept (critical thinking).

Can students justify claims with evidence?

Have I ever "taught" students how to observe, collect or analyze lab data?

Curriculum expectations. For example;

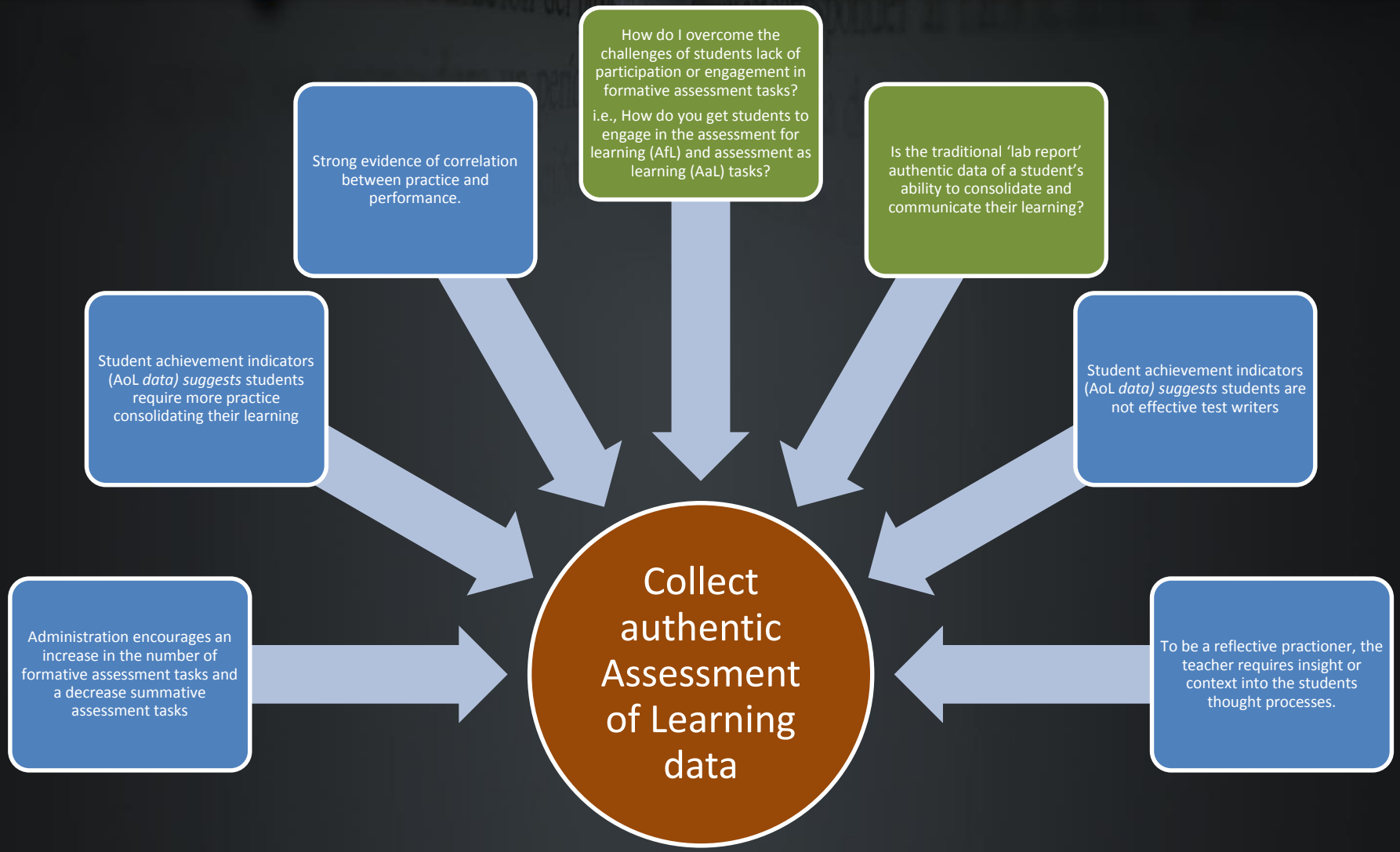
A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills

Promote curiosity and exploration – fundamental problem skills

How do you get students to see the merit in building behaviors or skills that will take them beyond memorizing or completing work for marks only?

Academic students feel the pressure to win at all costs. As a result students won't participate in formative assessment tasks out of fear of being judged as failures by their peers.

Challenge students to be accountable for their own learning and its outcomes


How do I overcome the challenges of students lack of participation or engagement in formative assessment tasks?
i.e., How do you get students to engage in the assessment for learning (AfL) and assessment as learning (AaL) tasks?
Strong evidence of correlation between practice and performance.
Is the traditional 'lab report' authentic data of a student's ability to consolidate and communicate their learning?
Student achievement indicators (AoL *data) suggests* students require more practice consolidating their learning
Student achievement indicators (AoL *data) suggests* students are not effective test writers
Administration encourages an increase in the number of formative assessment tasks and a decrease summative assessment tasks
Collect authentic Assessment of Learning data
To be a reflective practioner, the teacher requires insight or context into the students thought processes.

As presented by Garfield Gini-Newman at STAO project innovation breakout session November 2016: "Using *Thought Books* to ncourage the habits of effective thinkers."

As presented by Garfield Gini-Newman at STAO project innovation breakout session November 2016: "Encourage reflection that is both generative and reactive."

As presented by Garfield Gini-Newman at STAO project innovation breakout session November 2016: "Help students to build networks of connected information around important

Ideas"

Do I expect my students to keep a daily record of their learning during a lesson? Does this record indicate a students ability to consolidate their learning?

Require students to document their learning

How does my classroom build a students sense of resiliency and confidence in their abilities?

Does my classroom environment encourage and accept failure and risk taking?

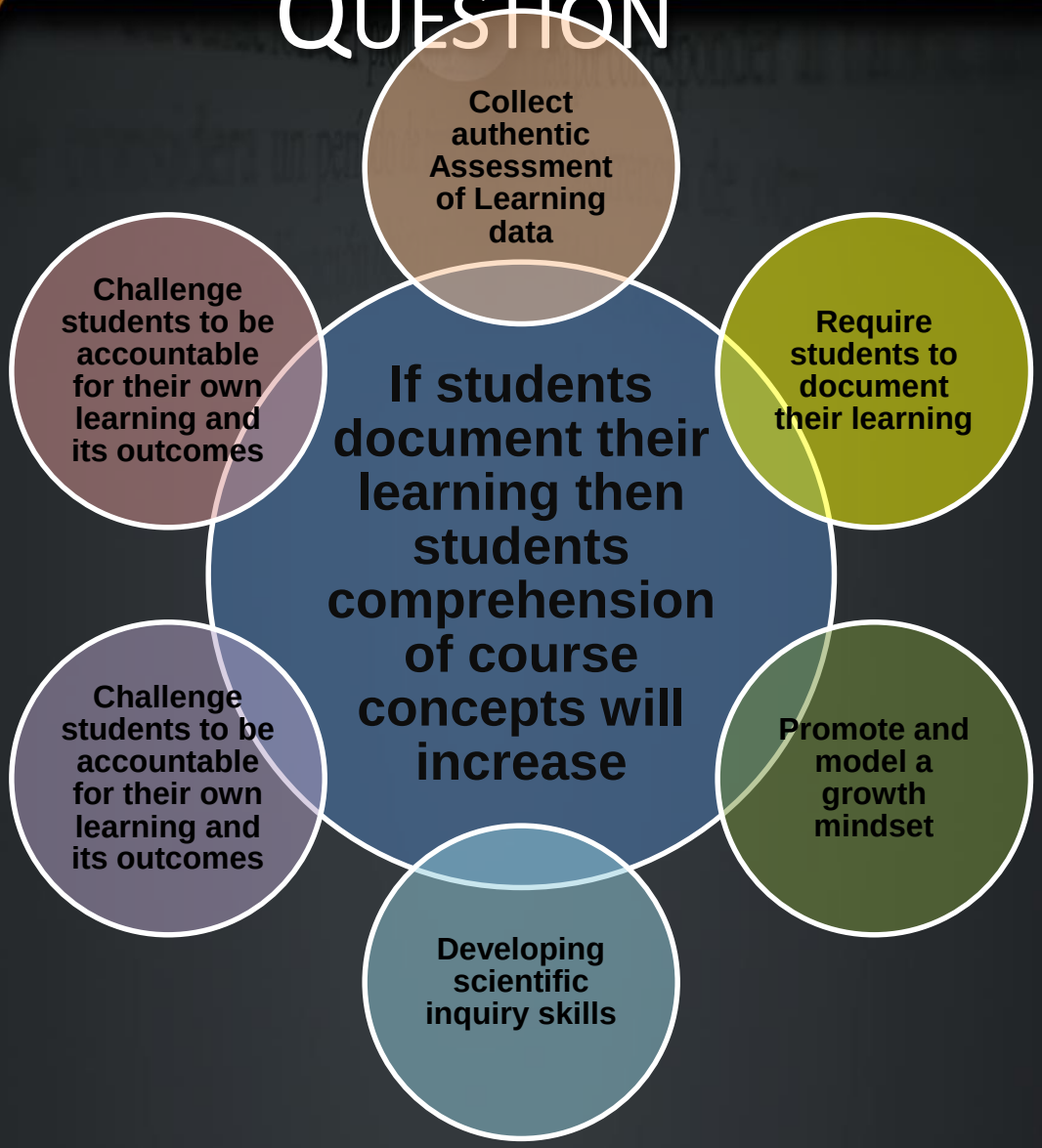
How do you get students to engage in the assessment for (AfL) and assessment as (AaL) learning tasks?

Does my classroom environment model learning as a process and not an end product?

Promote and model a growth mindset

Does my classroom foster curiosity and exploration? (fundamental skills that will lead to solving any problem)

Refining the Theory of Action Question



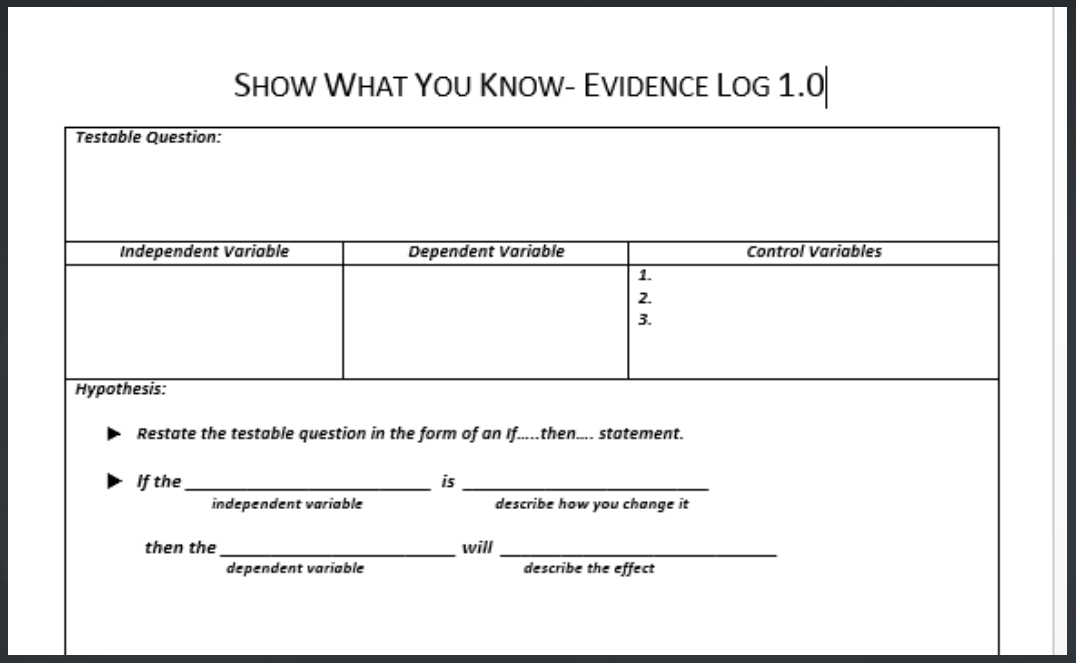
Theory of Action to Testable Question

Template:
Show what you Know
- Evidence Log

- If students **document** their learning then students comprehension of course concepts will increase.

Assessment of learning (AoL) data

Scaffolding – Testable Questions - Variables - Hypothesis



Show What You Know- Evidence Log 1.0

Testable Question:

Independent Variable	*Dependent Variable*	*Control Variables*
		1. *2.* *3.*

Hypothesis:

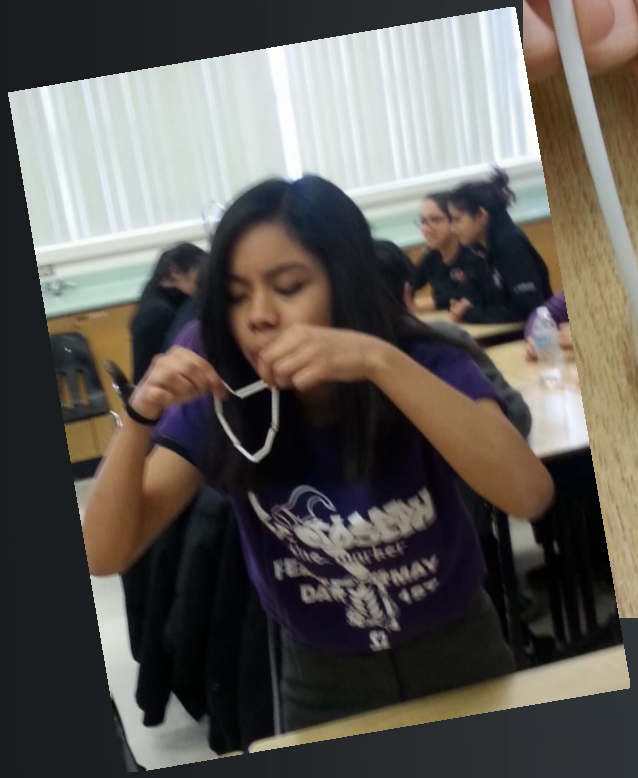
- *Restate the testable question in the form of an If…..then…. statement.*
- *If the* _____ *is* _____
  independent variable *describe how you change it*

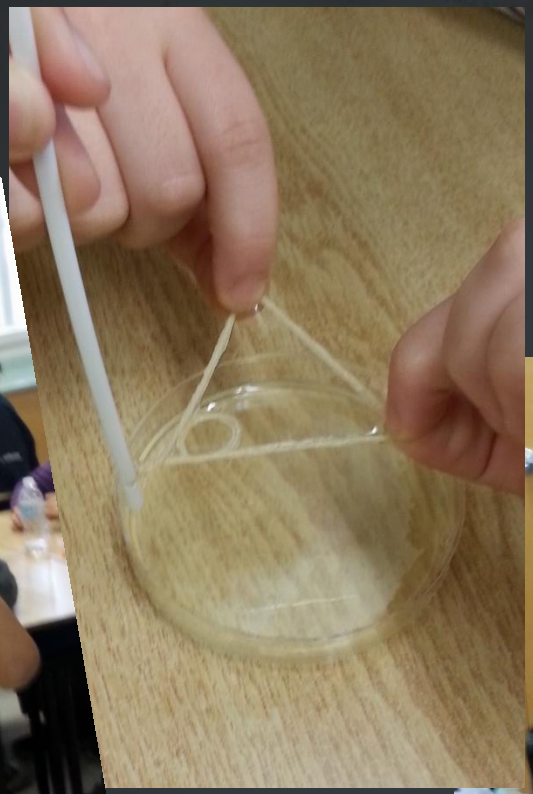
  then the _____ *will* _____
  dependent variable *describe the effect*

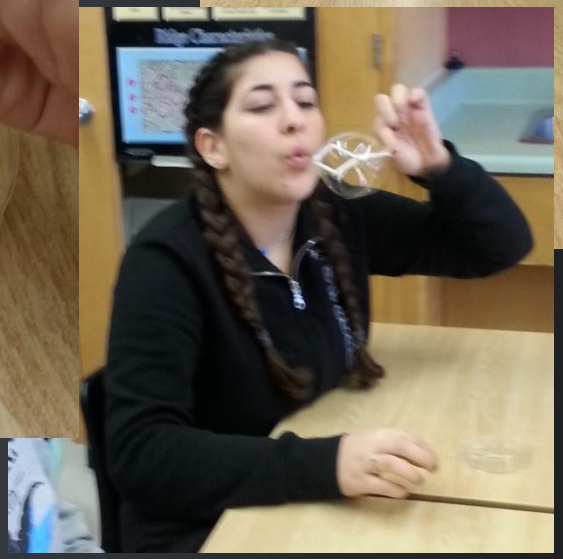
- Paper airplane ▪ Alka-Seltzer rockets ▪ Pendulum ▪
- Bubbles and the Cell Membrane ▪ Plants and Cobalt chloride paper
- The science of M&Ms ▪ Pencil electrolysis ▪ Cell transport Osmosis
- Iron & breakfast cereal ▪ paper clip enzymes

Scaffolding - Testable Questions & Variables

- Bubbles and the cell membrane







Evidence Log 1.0

SHOW WHAT YOU KNOW- EVIDENCE LOG 1.0

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Independent Variable	*Dependent Variable*	*Control Variables*
		1. *2.* *3.*

Hypothesis:

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- *If the* _____ *is* _____
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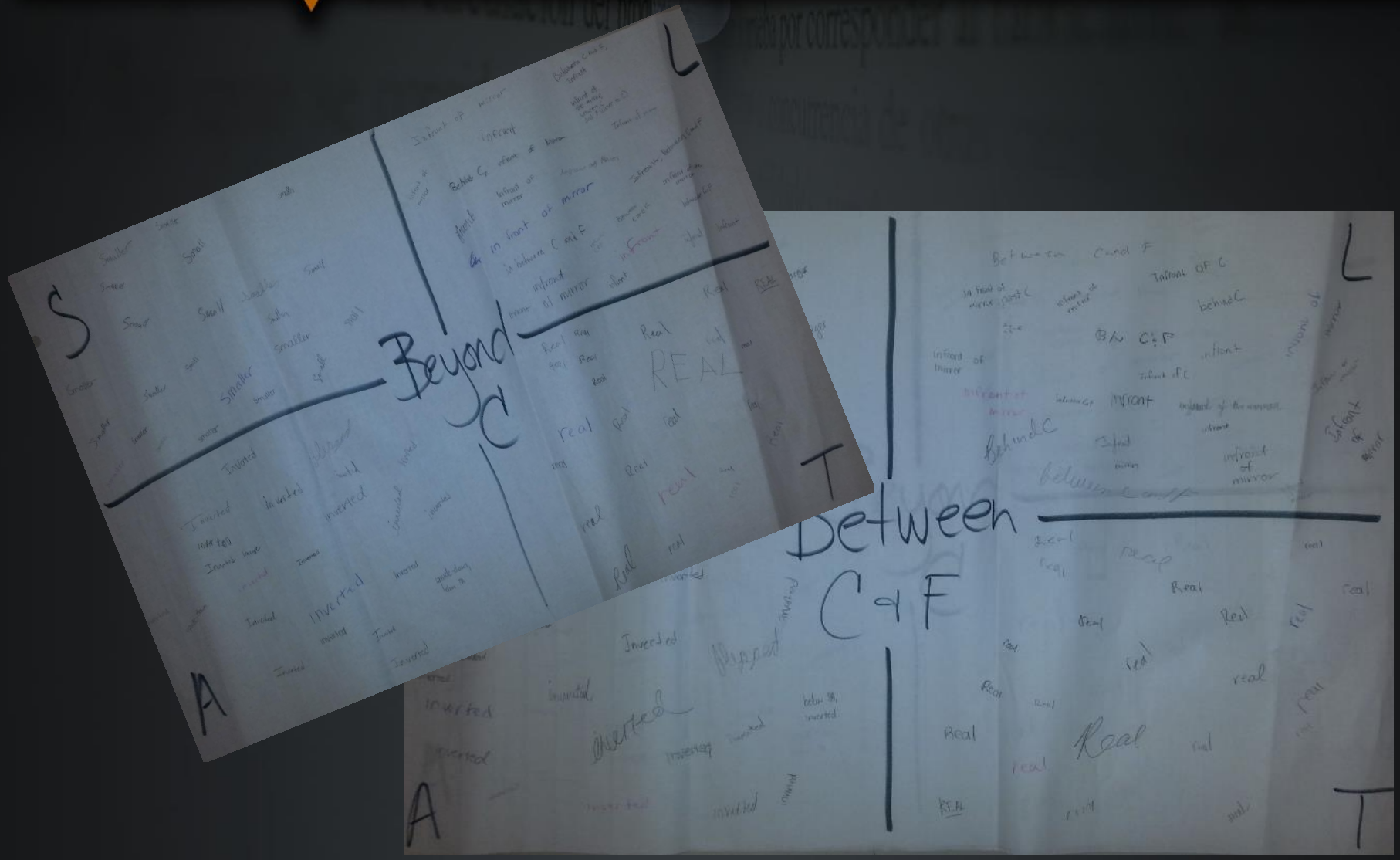
  then the _____ *will* _____
  dependent variable *describe the effect*

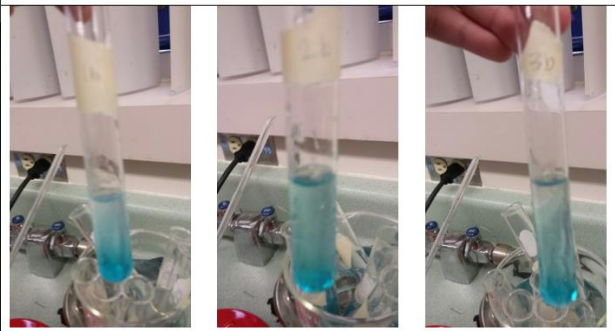
Evidence to support or refute hypothesis:

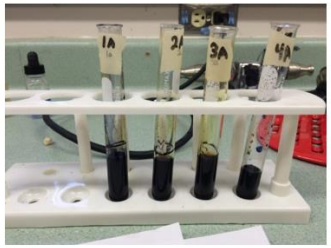
Experimental errors:

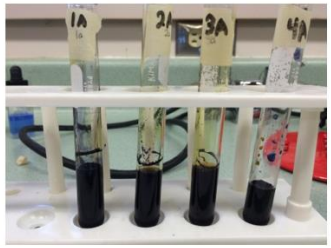
New Trial – Testable Question:

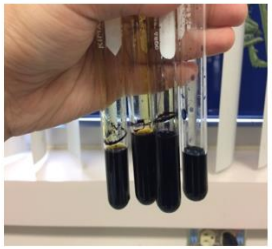
Locating Images in Curved Mirrors (SALT)











Tube 1a containing starch, water and iodine indicator turns dark blue black with precipitate which indicates the presence of starch. Tube 2a containing starch, amylase and iodine indicator and tube 3a containing starch, amylase, hydrochloric acid and iodine indicator turned brown with precipitate which indicates no presence of starch. Tube 4a containing starch, boiled amylase and iodine indicator turned dark blue with no precipitate which indicates the presence of starch.

presence of starch.

Tube 1b containing starch, water and benadicts indicator turns light blue which indicates no presence of glucose. Tube 2b containing starch, amylase and benadicts indicator turns light which indicates no presence of glucose. Tube 3b containing starch, amylase, hydrochloric acid and benadicts indicator turns light blue which indicates no presence of glucose. Tube 4b containing starch, boiled amylase and benadicts indicator turns light blue which indicates no presence of glucose. Tube 2b was suppose to turn green to indicate presence of glucose that would provide the digestion analysis of having the best digestion.

Grade 11

Show What You Know- Evidence Log

Testable Question:How does the test tube solution affect the colour of the indicator?

Independent Variable	*Dependent Variable*	*Control Variables*
Test tube solution	*Colour of indicator*	Temperature, amount of enzyme, triglyceride etc. and time

Hypothesis:

- ***Restate the testable question in the form of an If.....then.... statement.***
- ***If the test tube solution*** *is changed*
  (independent variable) *(describe how you change it)*

  then the colour of indicator will change
  (dependent variable) *(describe the effect)*

Grade 10

5 A) acetic acid + sodium carbonate ===> sodium acetate + carbon dioxide + water.

B) $NaHCO_3 + HC_2H_3O_2 \rightarrow NaC_2H_3O_2 + H_2O + CO_2$

6. A)

Before **After**

B) The carbon dioxide made the mass of the objects lighter. Another example is that once the two pure substances got mixed they realized enough gas to make it lighter thats why in (6A) we got a lighter weight after we mixed the two substances together.

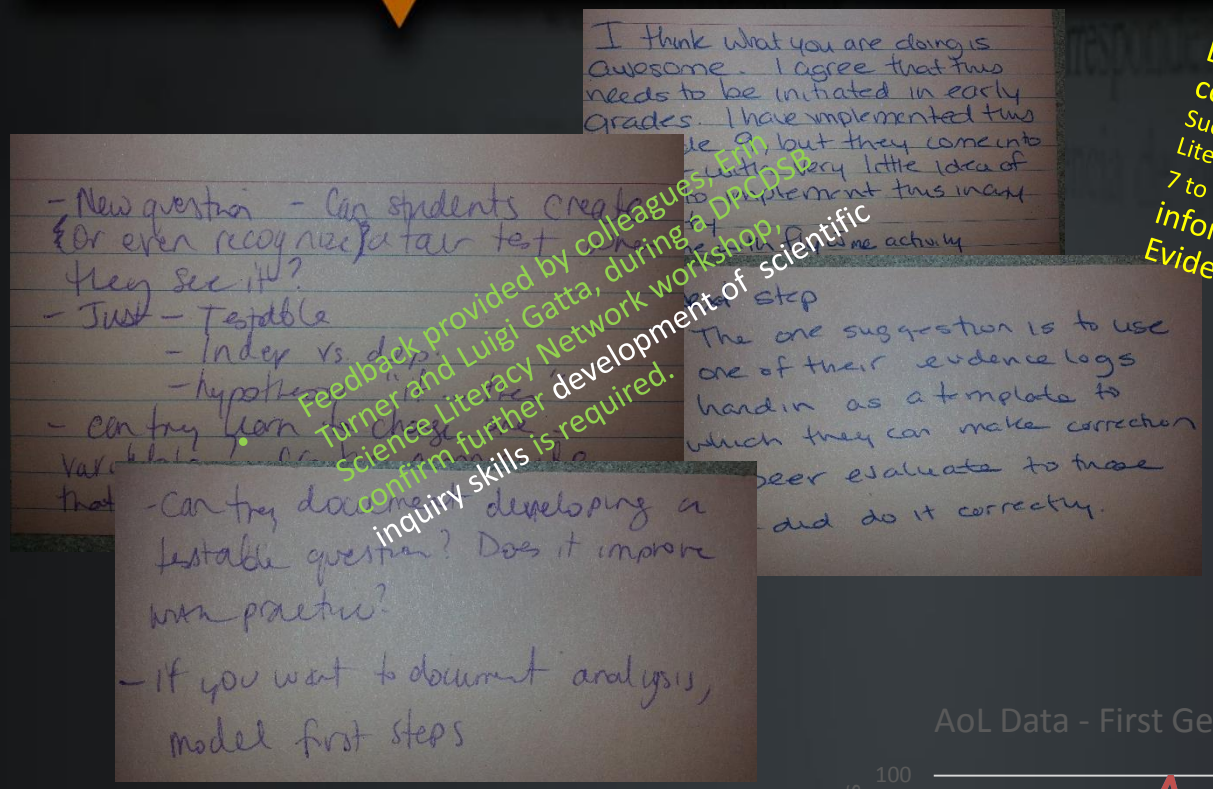
C) Some errors/problem that we had was that we that the bottle wasn't sealed properly, it was hard to get the vinegar out of the test tube when we flipped flask, and the two substances didn't get mixed as well.

Experimental errors:

- Exact amount of a substance was not put in
- Test tube solution was not mixed properly (did not flick test tube properly to mix the solution)
- Exact time was not elapsed
- Substances were put in the wrong test tubes
- Test tube/hot water bath was at the incorrect temperature

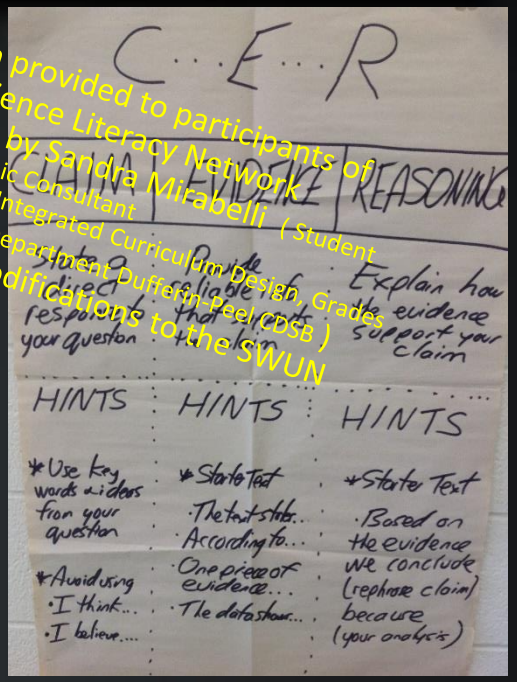
New Trial – Testable Question: Does the temperature in a specific test tube solution affect the amount of digestion?

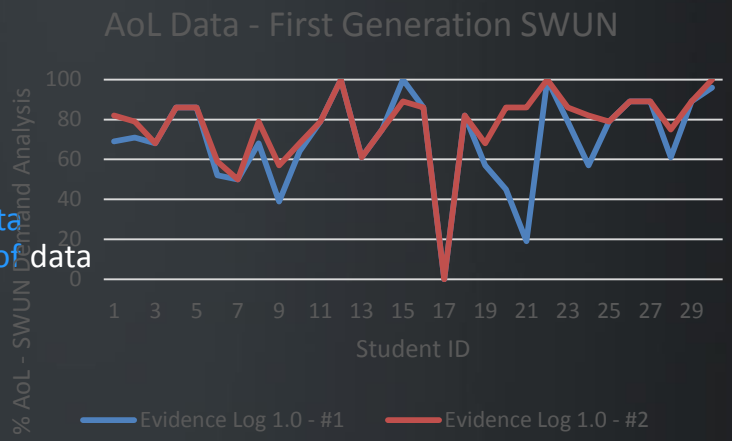
THE MAKING OF EVIDENCE LOG 2.0



Feedback provided by colleagues, Erin Turner and Luigi Gatta, during a DPCDSB Science Literacy Network workshop, confirm further development of scientific inquiry skills is required.

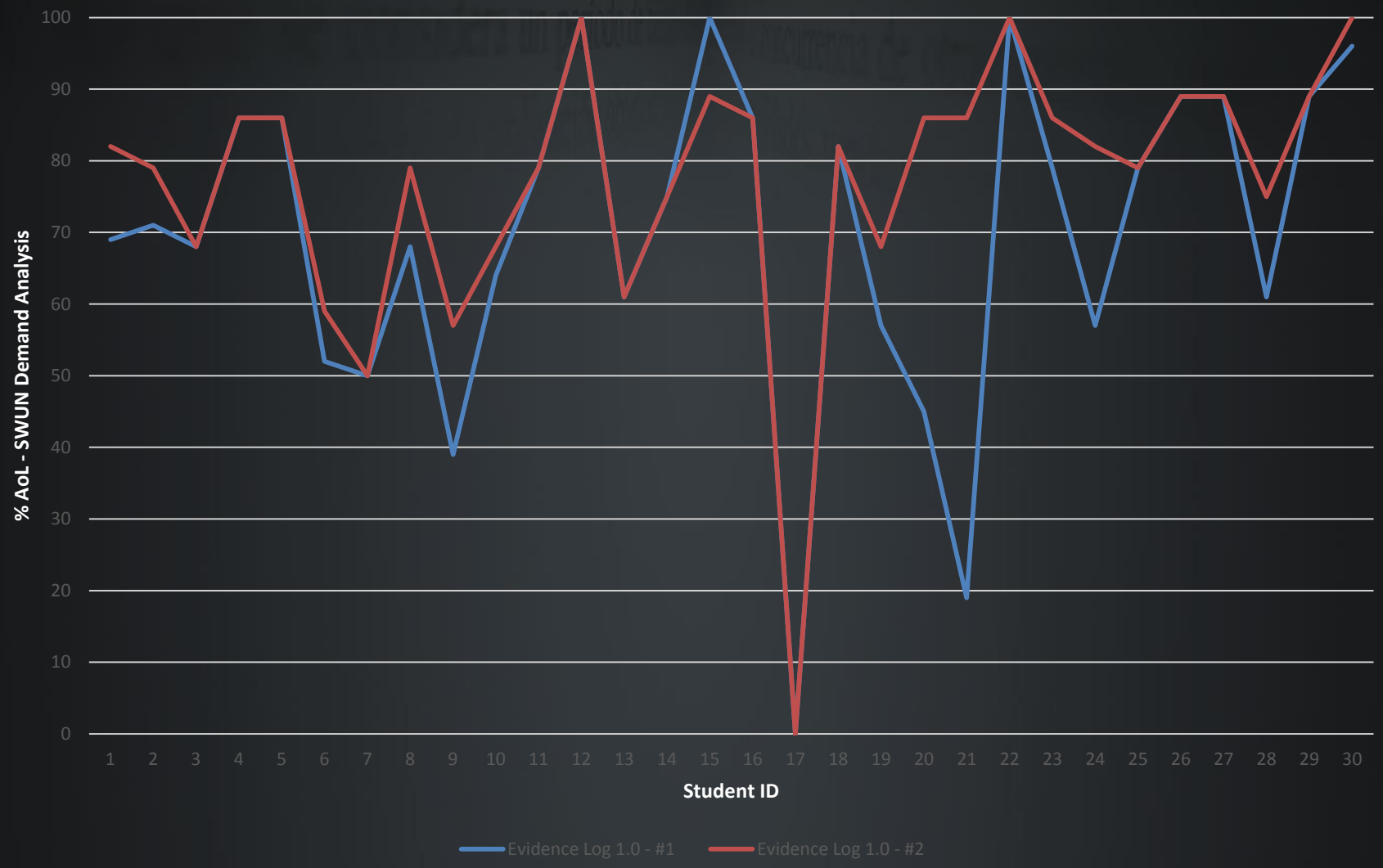
- Instruction provided to participants of DPCDSB Science Literacy Network coordinated by Sandra Mirabelli (Student Success: Academic Consultant Literacy/Science/Integrated Curriculum Design, Grades 7 to 10 Program Department Dufferin-Peel CDSB) informs the modifications to the SWUN Evidence Log.



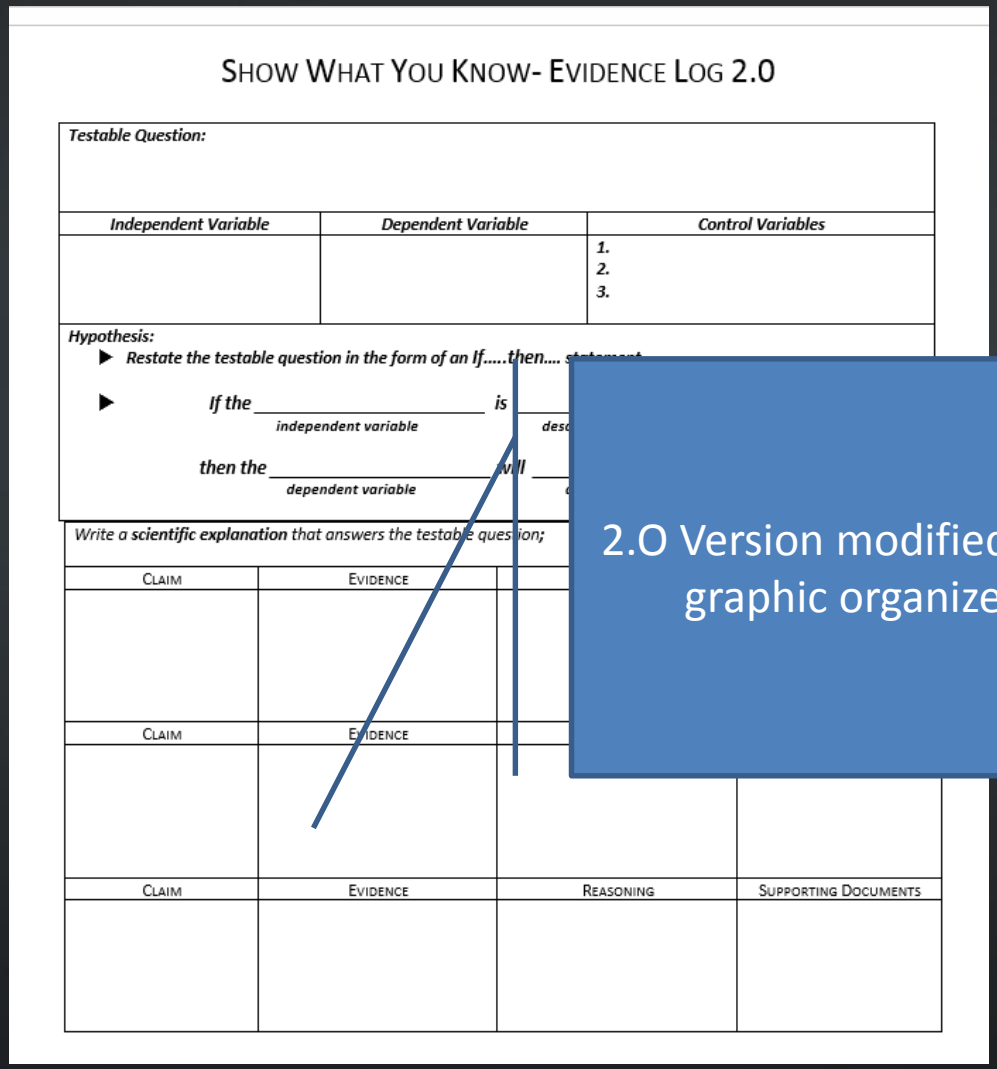


- Review of student achievement data (AoL) indicates further scaffolding of data analysis and evidence evaluation is required.

AoL Data - First Generation SWUN



Evidence Log 2.0



SHOW WHAT YOU KNOW- EVIDENCE LOG 2.0

Testable Question:

Independent Variable	*Dependent Variable*	*Control Variables*
		1. *2.* *3.*

Hypothesis:

- *Restate the testable question in the form of an If.....then.... statement*
- *If the* _____ *is* _____
  independent variable *desc*

  then the _____ *will* _____
  dependent variable

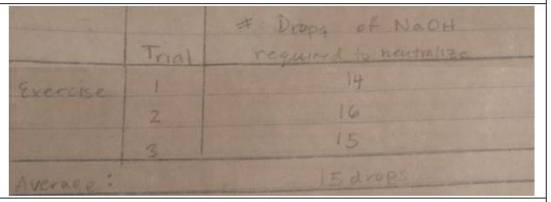
*Write a **scientific explanation** that answers the testable question;*

CLAIM	EVIDENCE		
CLAIM	EVIDENCE		
CLAIM	EVIDENCE	REASONING	SUPPORTING DOCUMENTS

2.O Version modified to include graphic organizer - CER

*Write a **scientific explanation** that answers the testable question;*

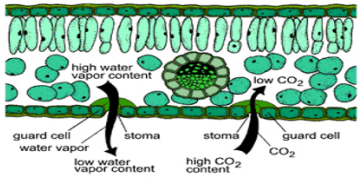
Claim	Evidence	Reasoning	Supporting Documents
Exercise effects breathing rate.	The amount of carbon dioxide increased.	Cellular respiration produces carbon dioxide.	The number of drops of sodium hydroxide required to neutralize the acidic solution increased. [Below is a picture of the lab results]

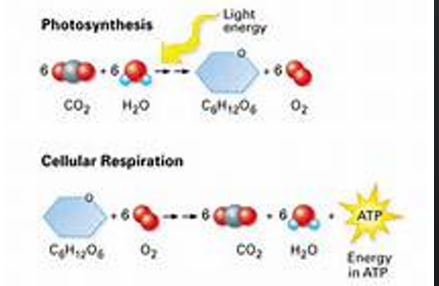


# Drops of NaOH required to neutralize		
	Trial	
Exercise	1	14
	2	16
	3	15
Average:		15 drops

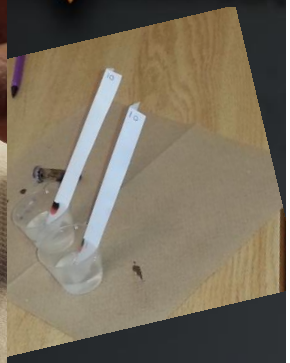
*Write a **scientific explanation** that answers the testable question;*

Claim	Evidence	Reasoning	Supporting Documents
Physical activity affects breathing rate.	Amount of carbon dioxide produced increased as physical activity increased/was intensified, going from a state of rest, to doing intense exercise on a stationary bicycle.	Carbon dioxide is produced as a product of cellular respiration. Body cells convert glucose and oxygen into carbon dioxide, water, and energy (ATP).	Chemical equation for cellular respiration (CO2 is a product). $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ATP$

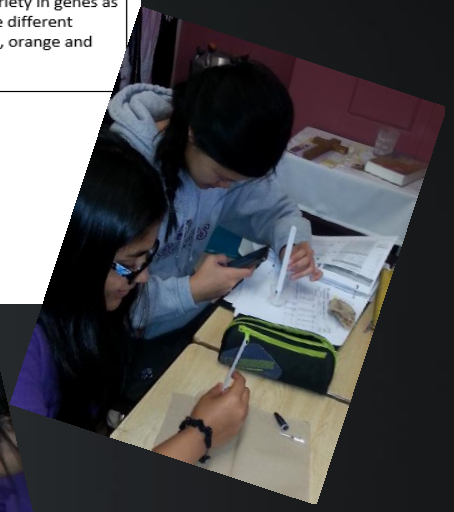
Claim	Evidence	Reasoning	Supporting Documents
More water is lost through the underside/bottom of the leaf.	After 15 minutes, the strip of cobalt chloride paper was a lighter purple colour while the strip on the top could be described as more of a pruple-blue colour.	There are more stomata on the underside/bottom of a leaf, which when open under the control of the guard cells, allow water to evaporate from the leaves to keep the plant cool, much like when humans sweat through their pores to keep cool	Stomata are located on the lower epidermis.  **Figure 25.** Stomata open to allow carbon dioxide (CO_2) to enter a leaf and water vapor to leave.

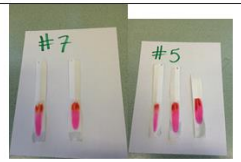
Claim	Evidence	Reasoning	Supporting Documents
The presence of water causes cobalt chloride paper to turn from blue to purple/pink.	Through the experiment, pressing the paper between fingers, breathing on it, and placing it on the leaves of a plant, the paper turned pink/purple.	Each of these processes involves water being released into the environment. This can be through cellular respiration or photosynthesis. In the case of plants, water leaves the plants' leaves through transpiration, during the process of photosynthesis along with oxygen.	Equation for cellular respiration. 

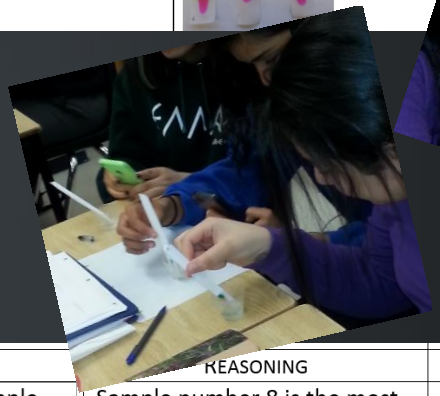
DNA Chromatography

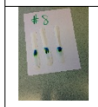


Claim	Evidence	Reasoning	Supporting Documents
DNA sample #4 has the most diverse genes.	Sample #4 has the most number of colours out of all of the samples.	More colours result in a larger gene pool. This increases the likelihood of the offspring to have a greater survival rate. Hence, it would result in this frog being a better choice for the breeding program.	Sample #4 has the most variety in genes as indicated clearly by the five different colours: blue, black, yellow, orange and pink. 

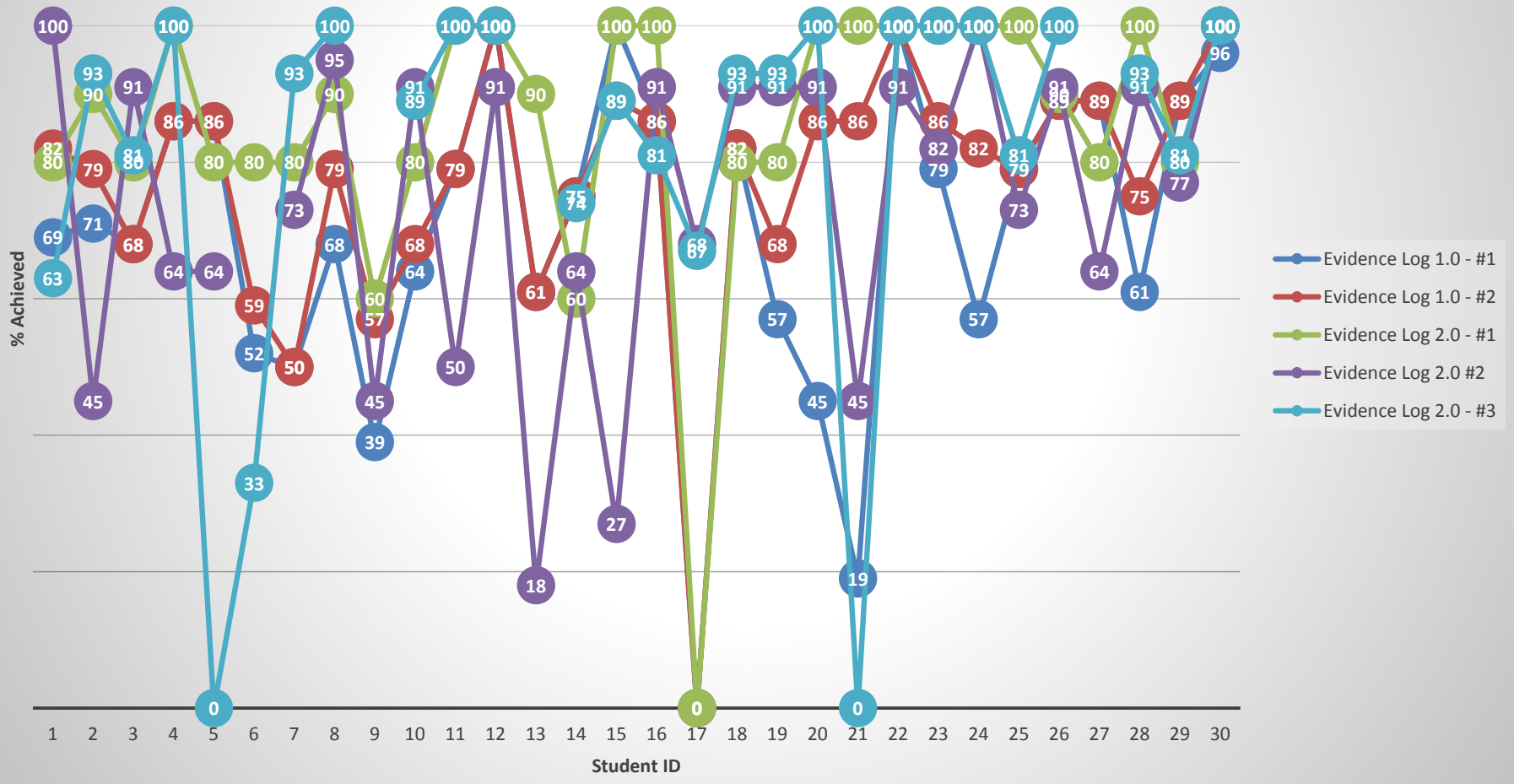


Claim	Evidence	Reasoning	Supporting Documents
Samples 5 and 7 would not introduce diversity to the program	Their colour patters are the same; the begin pink and fade into an orange colour, indicating genetic	The individuals who's DNA were tested are from the same area or are related	

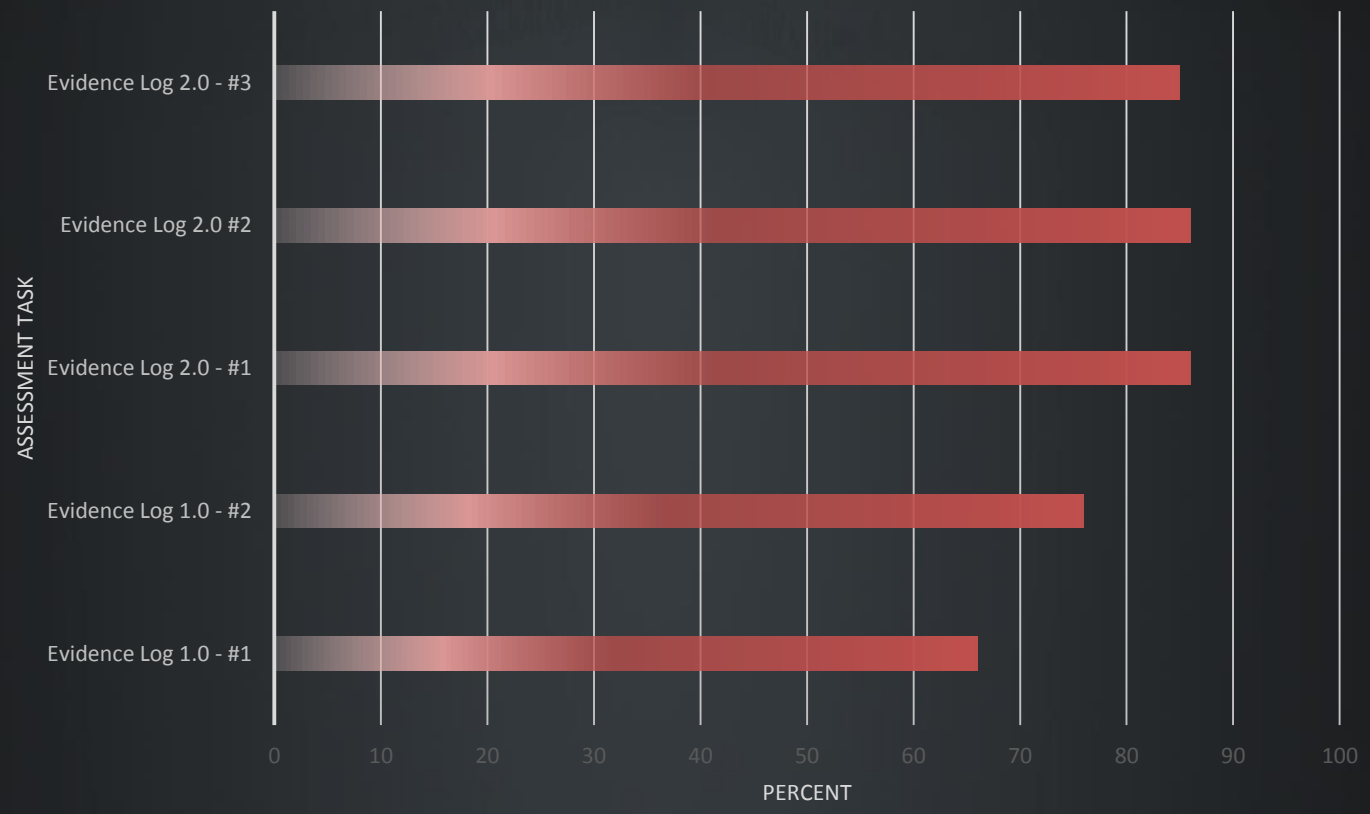


Claim	Evidence	Reasoning	Supporting Documents
Sample 8 is the best species for the breeding program.	Sample 8 is the only sample without pink, it has blue green and yellow which aren't common to the other samples.	Sample number 8 is the most diverse sample as it does not contain any pink at all while every other sample displays this colour. Therefore, the diversity of this species would be most helpful for this breeding program as it would ensure the greatest diversity which leads to an offspring with greater chance of survival.	Click here to enter text. 

Assessment of Learning
Show What you Know - Evidence Log



CLASS AVERAGE BY AoL TASK (BASED ON RAW DATA)



How can we expect students to engage in inquiry if they don't now what inquiry is, or have the vocabulary needed to communicate claims or evidence?

Share data with department head and teaching teams to support early and consistent exposure to inquiry skill development, data analysis and evaluation of evidence

Learning Extension –

Create Evidence Log 3.0

(Include a research component and APA references)

Next steps

SHOW WHAT YOU KNOW- EVIDENCE LOG 3.0

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  then the _____ ***will*** _____
  dependent variable ***describe the effect***

*Write a **scientific explanation** that answers the testable question;*

CLAIM	EVIDENCE
CLAIM	EVIDENCE
CLAIM	EVIDENCE

Research to support CER - APA Format

1.
2.
3.

3.O Version modified to include scientific research and APA referencing