







# USING FEEDBACK

How to get students to actually read feedback in order to improve and grow

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# Today's Presentation

- Introduction
- The Problem
- The Solution
- Implementation
- Sample Scoring
- Your Own Rubric



Copy of this  
Presentation,  
plus more!

Do you remember the last time you gave students feedback on their work, only to have them ignore it and focus solely on their grades?





"FEEDBACK IS MOST EFFECTIVE WHEN IT IS  
TIMELY, SPECIFIC, AND ACTIONABLE."



*HATTIE & TIMPERLEY, 2007*




"SELF-REFLECTION IS A CRITICAL

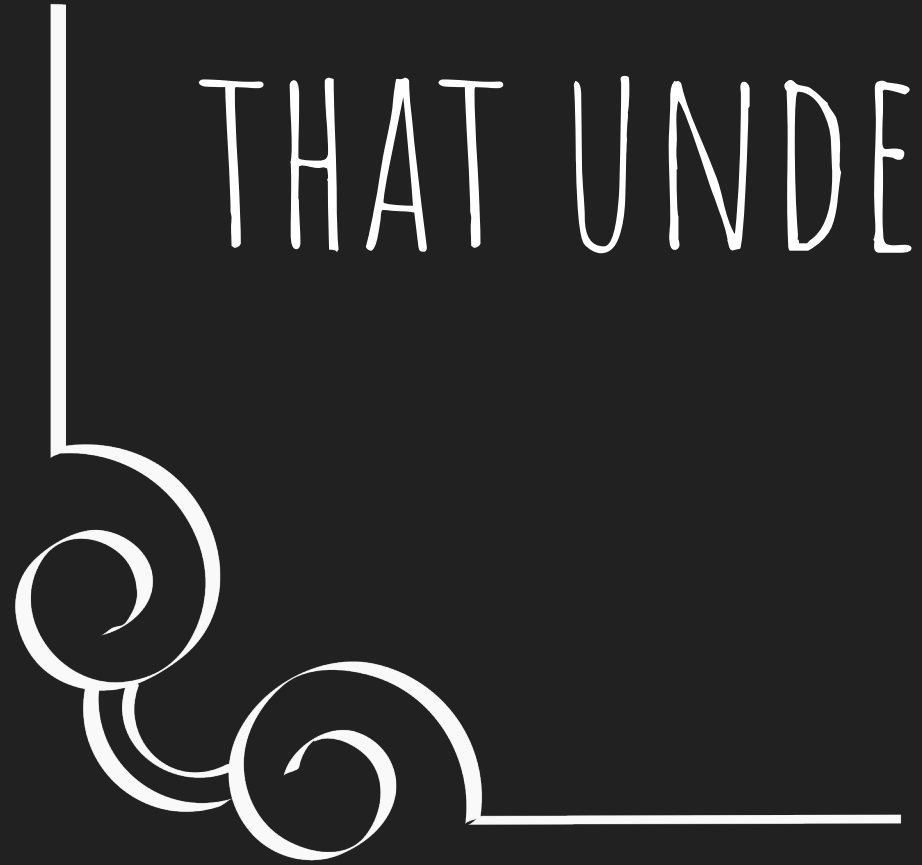
COMPONENT OF EFFECTIVE FEEDBACK USE."

BUTLER & WINNE, 1995






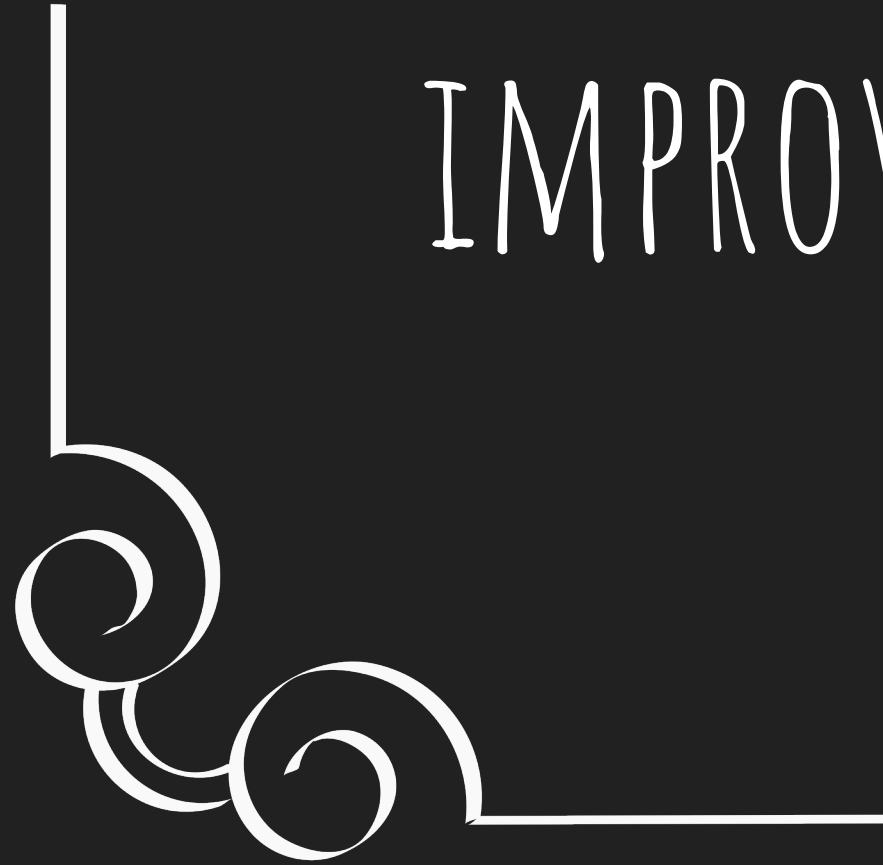
"LEARNERS WHO ARE ACTIVELY INVOLVED IN  
CONSTRUCTING THEIR OWN UNDERSTANDING WILL  
BE MORE SUCCESSFUL IN RETAINING AND APPLYING  
THAT UNDERSTANDING."



*A. BANDURA 1997*

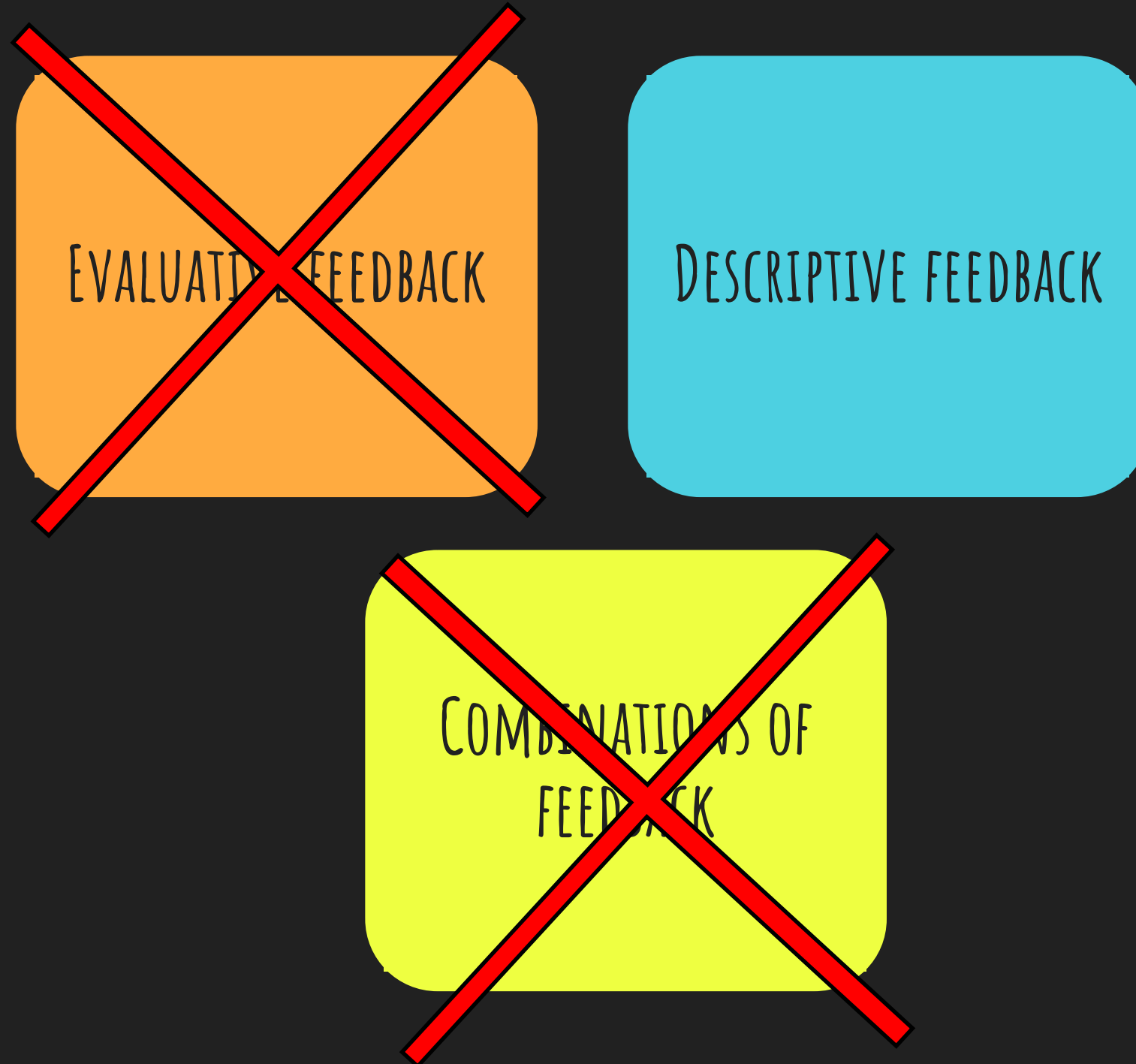


"FEEDBACK CAN PROVIDE INFORMATION  
ABOUT HOW WELL STUDENTS ARE CURRENTLY  
PERFORMING, WHAT THEY NEED TO DO TO  
IMPROVE, AND HOW TO DO IT."



*HATTIE & TIMPERLEY, 2007*

# Evaluative vs. Descriptive Feedback





# Evaluative Feedback = Ego-Involving

A summary for the student of how well she or he has performed on a particular task or during a term. Often in the form of letter grades, numbers, check marks, or other descriptors or coded symbols.

Examples:

- “Well done”
- “Needs help”
- “Excellent”
- “Your writing has definitely improved.”
- 89%! B+! Good work! I am proud of you. You should be thrilled with your progress.
- You are so close to proficiency. With a little more work, you should be at a level 3.

# Descriptive Feedback = Task-Involving

Specific information in the form of written comments or conversations that help the learner understand specific steps necessary to improve the work.

- Examples
- "I like the way you describe the character because it makes me feel like I know him."
- "Next time add a second supporting idea to more thoroughly persuade your audience to your point of view."
- "You show nearly all the steps of the problem-solving process, which is a big improvement. See me for help so I can show you how to more accurately use your calculator."
- "You made some errors on your graph. Go back and check the names of your title, x-axis, and y-axis."

# The Learning Progression

Break down the process of using feedback into specific levels to provide a clear roadmap for improving their performance over time.

<b>Not Enough Evidence</b>	<b>Beginning</b>	<b>Developing</b>	<b>Proficient</b>	<b>Advanced</b>	<b>Expert</b>
I did not identify changes that I made since the previous lab report.	I identify changes that I made since the previous lab report.	I describe at least 6 changes that I made since the previous lab report, correlated to feedback from my peers, the instructor, class discussion, or my own understanding of this rubric.	I explicitly state why changes needed to be made (or not made) based on relevant physics or skills requirements.	I correctly and appropriately make changes based upon the feedback received, or correctly state why I chose not to do so. In addition, I request specific feedback from the instructor, identifying areas with which I am uncertain or struggling.	I communicate and document the rationale behind alternate approaches to similar (but not identical) situations, based on feedback received prior to the current attempt. I communicate areas of weakness and document the methodical application of strategies that I used to improve.

# Unveiling the Target Levels

Not Enough Evidence	Beginning	Developing	Proficient	Advanced	Expert
I did not identify changes that I made since the previous lab report.	I identify changes that I made since the previous lab report.				

Student view of the description of the Learning Progression for LP4 – Using Feedback  
The using feedback section is where you annotate your lab, highlighting the changes you made from the previous lab. The goal is to communicate what changes you made, why you made them, and how you have improved over time.

# How do I use this in my class?

- Choose type of assessment for primary focus.
- Collect student work.
- Provide feedback.
- Teach “Using Feedback”: what is required for the target level.
- Have students annotate work before collecting.
- Provide feedback on their reaction to your feedback.

Repeat frequently.

# Introducing Brianna Lab 4

## The Loop Rule

LAB: The Loop Rule

10/7/22

**Question:** What is the relationship between the voltage supplied by the battery and the voltage used by the load(s) in a single loop?

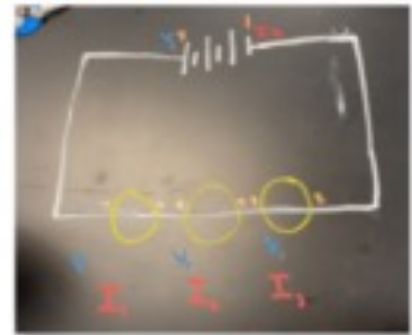
### Methods and Materials:

I set up the circuit in a series with the required materials. I connected the voltmeter to different points throughout the circuit. I also set up a circuit in a parallel with the required materials. Again, I connected the voltmeter to different points throughout the circuit. I measured the voltage between the two circuits and then I recorded my data in the table below.

### Data:

Placement	Series (V)
1 to 2	0.023
2 to 3	0.969
3 to 4	0.123
4 to 5	0.857
5 to 6	0.132
6 to 7	0.942
7 to 8	0.006

Placement	Parallel
1 to 2	0.087
2 to 3	0.291
2 to 4	0.032
2 to 5	0.075
6 to 9	0.195
7 to 9	0.229
8 to 9	0.175
9 to 10	0.092



*need details as shown in Fig*

*important to state, add capacitor use*

*include time*

Analysis (do any or all of the following depending on the lab)

### 1. Circuit A

Examine the measurement of overall voltage to the value derived from the Loop Rule. Does Circuit A seem to obey the Loop Rule, experimentally? Why do you think this?

Circuit A does seem to obey the loop rule experimentally because it is separating its voltage throughout the light bulbs evenly to then go back to the load to pick up some more voltage.

### 2. Circuit B

Examine the measurement of average bulb voltage to the value of the battery voltage. Does Circuit B seem to obey the Loop Rule, experimentally? Why do you think this?

Circuit B seems to obey the Loop rule experimentally because the voltage is being distributed equally to the bulbs. The voltage will then come back together as the full Voltage that was already started.

### Source of Experimental Error:

- When using the voltage sensor, the value fluctuates rapidly. I had to judge which value to use, because the meter is so sensitive it picks up even small variations.
- I had to use my eyes to judge if the bulbs were lit. When the bulbs are especially dim, it may be difficult to see if they are on or not.

### CER:

The relationship between the voltage supplied by the battery and the voltage used by the load in a single loop is that if there is a loop then the voltage will go to each bulb and light it up. If there is a junction then the voltage will just come back together after the voltage has lit up the bulbs. This is happening because the loop rule makes all the voltage be dropped at a light bulb to give it energy. There is no exact pattern but the voltage is distributed to each bulb.

*there is no evidence presented*

*Missing calculations to support those*

*not part of this exp.*

*this is true but doesn't answer the question*

# The Beginning Level

“Identify changes made since the previous lab report.”

The Beginning level is to simply identify changes that they made on the new assignment in response to my comments on the previous assignment.

# Beginning: Lab 5

## Ohm's Law

LAB: Ohm's Law

10/13/22

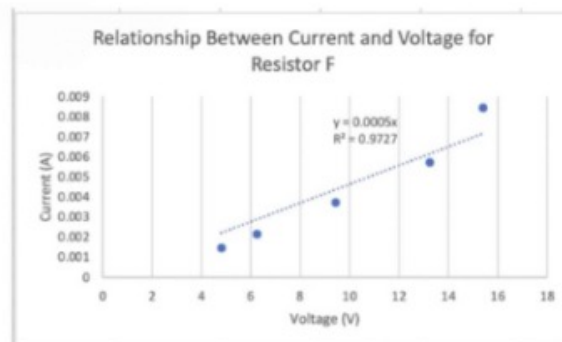
**Question:** What is the relationship between Voltage and Current for a resistor?

### Methods and Materials:

I set up the circuit with the assigned resistor which was point F. I connected the wires to the load and resistor. I also connected the voltmeter and ammeter to the circuit. I measured the voltage five different times with three different trials to receive the current.

### Data

Voltage (V)	Current (I)			
	Trial 1	Trial 2	Trial 3	Trial 4
4.8	0.00138	0.0015	0.0015	0.00146
6.25	0.0021	0.0022	0.0022	0.00216667
9.45	0.0037	0.0037	0.0038	0.00373333
13.25	0.00576	0.0057	0.0057	0.00572
15.4	0.00842	0.0085	0.0084	0.00844



### Source of Experimental Error:

- When using the voltage and current sensor, the value fluctuates rapidly. I had to judge which value to use, because the meter is so sensitive it picks up even small variations.
- I had to use my eyes to judge if the wires were fully connected. When there are no **bulbs** it is harder to tell if the wires are all properly connected.

### CER:

The relationship between Voltage and Current for a resistor is when the voltage increases so does the current. This is shown clearly in my data table. For Trial 2 it shows how when the voltage was 6.25 the current was 0.0022. When the voltage went up to 9.45 the current also went up to 0.0037. This is because Ohm's law states that the voltage is the same as the electrical current flowing in a circuit. This only applies when the resistance of the circuit does not change.

I did not list my materials I explained how I set them up

I did not list my materials I explained how I set them up

Reply

Use a different Source of Experimental Error that would fit this experiment better.

Use a different Source of Experimental Error that would fit this experiment better.

Reply

Not Enough Evidence	Beginning	Developing	Proficient	Advanced	Expert
I did not identify changes that I made since the previous lab report.	I identify changes that I made since the previous lab report.	I describe at least 6 changes that I made since the previous lab report, correlated to feedback from my peers, the instructor, class discussion, or my own understanding of this rubric.	I explicitly state why changes needed to be made (or not made) based on relevant physics or skills requirements.	I correctly and appropriately make changes based upon the feedback received, or correctly state why I chose not to do so. In addition, I request specific feedback from the instructor, identifying areas with which I am uncertain or struggling.	I communicate and document the rationale behind alternate approaches to similar (but not identical) situations, based on feedback received prior to the current attempt. I communicate areas of weakness and document the methodical application of strategies that I used to improve.



# The Developing Level

“Describe at least 6 changes made since the previous lab report, correlated to feedback from peers, the instructor, class discussion, or their own understanding of the rubric.”

They correlate it to feedback from peers, the instructor, class discussion, or their own understanding of this rubric.

Why 6?

# Developing: Lab 9

## Freefall

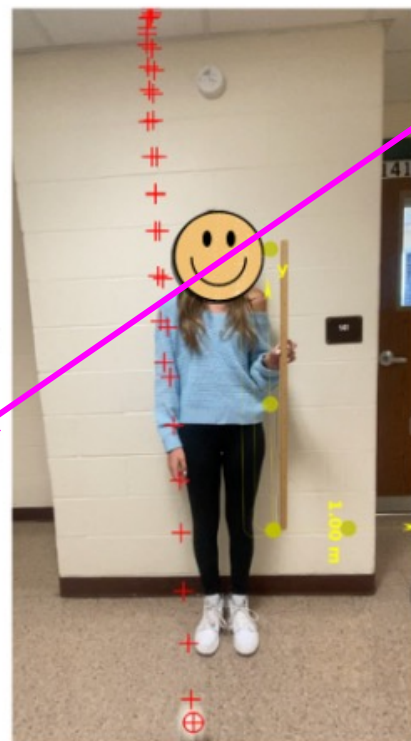
LAB: Freefall

11/23/22

Question: What is the value of acceleration due to gravity?

### Methods and Materials:

I took a video of myself holding a meter stick and throwing up a ball. I filmed the ball reaching its max height and hitting the ground. I made a good recording by following the three rules. To do this I could not move the phone. I filmed the video parallel to the motion of the object. I put a meter stick in the plane of motion. I uploaded my video to capstone and clicked on a certain point of the car until it hit the end point. I used the Axis tool to show capstone where my x and y axis is and I used the calibration tool to show how long the meter is.



### Data

#### Analysis

$$\text{PercentError} = \frac{|\text{theoretical} - \text{experimental}|}{\text{theoretical}} \times 100$$

$$-9.8 - (-11.6) / -9.8 = 0.184$$

$$0.184 \times 100 = 18.4$$

$$\% \text{Difference (method1)} = \frac{|\text{average} - \text{individual}|}{\text{average}} \times 100$$

$$-10.9 - (-11.6) / -10.9 = 0.0642$$

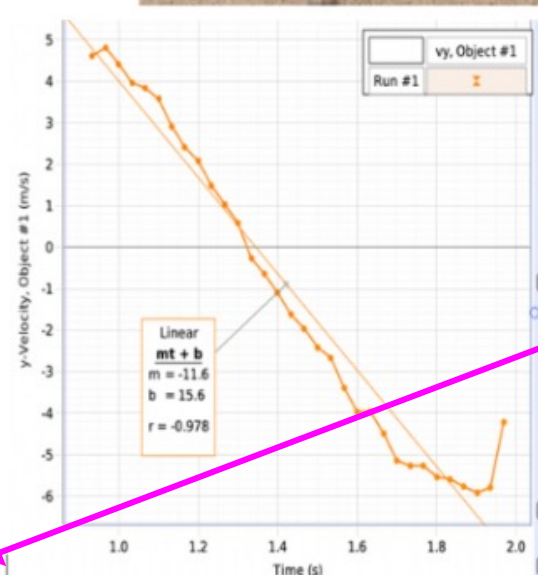
$$0.0642 \times 100 = 6.42$$

### Source of Experimental Error:

I had to make sure the axis was set up in the correct spot. Sometimes it can be crooked or not on the exact point.

I had to use my eyes to line up the camera in parallel to the ball and meter stick. Sometimes the camera could be crooked or not focused.

CER: The value of acceleration due to gravity is -11.6. The equation of the line is  $-11.6x + 15.6$  with an R value of -0.978. The average was 0.956 which is the R<sup>2</sup> value. The acceleration due to gravity is the rate of velocity change for any object moving under the sole influence of gravity.



In the last lab I did not reword as a question, but this time I did.

Reply

In the last lab I did not show the object in the frame, but this time I showed the ball before it hit the ground.

Reply

In the last lab I did not use the right definition that I needed to define, but this time I did.

Reply

In the last lab I did not use the right definition that I needed to define, but this time I did.

Reply

value, but in this lab I used the R<sup>2</sup>.

Reply

In the last lab I did not use the right definition that I needed to define, but this time I did.

Reply

In the last last lab I did not explain what tools I used in capstone, but this time I did.

In the last lab I did not use the right definition that I needed to define, but this time I did.

Not Enough Evidence	Beginning	Developing	Proficient	Advanced	Expert
I did not identify changes that I made since the previous lab report.	I identify changes that I made since the previous lab report.	I describe at least 6 changes that I made since the previous lab report, correlated to feedback from my peers, the instructor, class discussion, or my own understanding of this rubric.	I explicitly state why changes needed to be made (or not made) based on relevant physics or skills requirements.	I correctly and appropriately make changes based upon the feedback received, or correctly state why I chose not to do so. In addition, I request specific feedback from the instructor, identifying areas with which I am uncertain or struggling.	I communicate and document the rationale behind alternate approaches to similar (but not identical) situations, based on feedback received prior to the current attempt. I communicate areas of weakness and document the methodical application of strategies that I used to improve.

# The Proficient Level

“Explicitly state why changes needed to be made (or not made) based on relevant physics or skills requirements.”

Enables students to better understand the underlying principles and apply them in new contexts.

# Proficient: Lab 17

## The Law of Conservation of Momentum

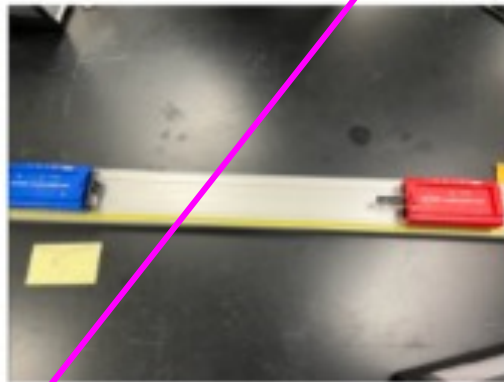
### LAB: The Law of Conservation of Momentum

2/17/23

**Question:** Given 2 colliding carts of various masses, what is the relationship between the total final momentum and the total initial momentum?

#### Methods and Materials:

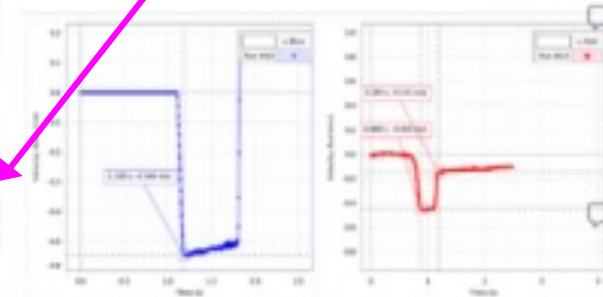
The first thing that we did to start this lab was we set up our excel spreadsheet and graph. We then connected our cart to capstone. We created two of the same graphs but for two different carts. We used the velocity x time graph because we needed to find the initial and final velocity of both carts. We measured the two carts by using the balance. For the blue cart the balance gave us 272g but we converted it to kg so it would be 0.272. For the red cart the balance gave us 250g but we converted it to kg so it would be 0.25. We changed the frequency to 250 hertz and then we started our trials. Our first trial was taking the two carts and colliding them softly. Our second trial we took the two carts and collided the two carts with a stronger force. The third trial was an explosion; the two carts were next to each other and we would click a button for the two carts to explode in the opposite direction of each other. The fourth trial was the red cart hitting the blue cart in the positive direction. The last and final trial was the blue cart hitting the red cart in a negative direction. For each trial we had to find the initial and final velocity for each cart; we would click the important movement points. This is shown in the graph below. We then added 0.25kg to the red cart and repeated all trials. After 5 trials with the weight on the red cart; we removed the weight that was on the red cart and placed 0.25kg on the blue. We did another 5 trials and then recorded all the data in the table below.



In the picture above are the two carts on opposite ends of the rail. The blue cart is on the negative side and the red cart is on the positive side.

#### Data

These are the time x velocity graphs. The left graph is for the blue cart and the right graph is for the red cart. The points that are chosen are the numbers of the initial and final velocities.



Run Number	Mass (kg)	Velocity (m/s)				Momentum		Total Initial Momentum	Total Final Momentum
		m1 (initial)	m2 (initial)	m1 (final)	m2 (final)	m1v1	m2v2		
1	0.272	0.25	-0.182	0.283	0.237	-0.182	0.01826	0.01464	
2	0.272	0.25	-0.834	0.955	0.88	-0.83	0.014623	-0.0906	
3	0.272	0.25	0	0	0.378	-0.52	0	-0.098812	
4	0.272	0.25	0	0.482	0.488	0	0.1705	0.148812	
5	0.272	0.25	-0.483	0	0	-0.483	-0.13052	-0.13025	
6	0.272	0.5	-0.384	0.298	0.202	-0.25	0.049902	0.059944	
7	0.272	0.5	-0.753	0.571	0.808	-0.278	0.060684	0.060736	
8	0.272	0.5	0	0	1.005	-0.591	0	-0.02214	
9	0.272	0.5	0	0.445	0.546	0.141	0.2225	0.119012	
10	0.272	0.5	-0.483	0	0.101	-0.308	-0.12948	-0.119028	
11	0.522	0.25	-0.298	0.48	0.157	-0.483	-0.03506	-0.030296	
12	0.522	0.25	-0.258	0.435	0.162	-0.439	-0.023826	-0.017686	
13	0.522	0.25	0	0	0.51	-1.046	0	0.00472	
14	0.522	0.25	0	0.551	0.354	-0.162	0.12775	0.144288	
15	0.522	0.25	-0.302	0	0.382	-0.496	-0.16412	-0.081036	

In the last lab I did not explain what was in the picture, but in this lab I did. It is important to tell the reader what is shown in the picture so they can get a better understanding of how to set up the lab.

In this how we reader we did import know so they can use similar ways on testing the carts and finding the initial and final velocities.

Reply

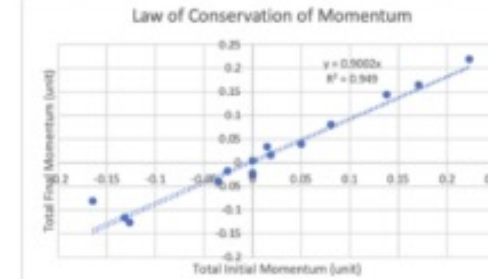
In the last lab I did not explain what was in the picture, but in this lab I did. It is important to tell the reader what is shown in the picture so they can get a better understanding of how to set up the lab.

Reply

In the last lab I did not explain what was going on in this picture, but in this lab I did. It is important to tell the reader what these graphs are showing so they can get a better understanding of how to select the initial and final velocities.

Reply

In this lab I used a better definition to help the reader understand what I was trying to find. It is important for the reader to have a better understanding of certain terms so it can be easier to answer the main question.



The total initial velocity x the total final velocity graph shown above is a direct relationship. Our trials had consistent data which made it a direct relationship. We used a linear line to connect the data points together. Our equation is  $y = 0.9002x$  with the  $R^2$  value of 0.949.

#### Analysis

$$\text{Percent Error} = \frac{|\text{theoretical} - \text{experimental}|}{\text{theoretical}} \times 100$$

$$|(1 - 0.9002/1) \times 100 = 9.98\%$$

1 is what the slope should have been for the graph and that is called the theoretical value. If we did everything precisely and correct then this would have been the number we should have gotten. 0.9002 is the slope we got with our results and data.

#### Source of Experimental Error:

A source of experimental error can be when you are selecting a data point on the graph. Clicking a certain part of the data is based on a person's judgment and it can be different each time. To correctly do this you need to get the correct point depending on its action, but sometimes the person doing the selecting will select an unnecessary point. Selecting different points can lead to the data not being consistent every time. Another source of experimental error is that the track could have been unbalanced. This can mess up the experiment because the unbalanced ramp can cause the carts to accelerate before we click record on capstone. This can also make the carts move slower or faster depending on where the incline of the ramp is. To fix this mistake, you need to make sure the carts are leveled and not moving when placed there. You can use paper to balance the rail.

#### CER:

The relationship between the total final momentum and the total initial momentum is direct. The mathematical model of the graph of the total initial velocity vs. the total final velocity is  $y = 0.9002x$  with a correlation coefficient of 0.949. This means that 95% of the data was on the trendline that I chose. Initial velocity is how fast an object is moving when gravity first starts to apply force on the object. Final velocity is a vector quantity that measures the direction and speed of a moving object after it has reached the max acceleration.

In the last lab I did not choose a correct source of experimental error, but in this lab I did. The ramp not being balanced will lead to an experimental error and will cause the data to be different. This is important to know so the reader will make sure to check the ramp before starting the lab.

but in this lab I did not, I showed that y is final velocity by using vf and I used x as the initial velocity by using vi. This is important because it shows what the x and y value truly stand for.

Reply

In the last lab I did not choose a correct source of experimental error, but in this lab I did. The ramp not being balanced will lead to an experimental error and will cause the data to be different. This is important to know so the reader will make sure to check the ramp before starting the lab.

Reply

In this lab I used a better definition to help the reader understand what I was trying to find. It is important for the reader to have a better understanding of certain terms so it can be easier to answer the main question.

	Not Enough Evidence	Beginning	Developing	Proficient	Advanced	Expert
<b>LP.4 - Using Feedback</b>	I did not identify changes that I made since the previous lab report.	I identify changes that I made since the previous lab report.	I describe at least 6 changes that I made since the previous lab report, correlated to feedback from my peers, the instructor, class discussion, or my own understanding of this rubric.	I explicitly state why changes needed to be made (or not made) based on relevant physics or skills requirements.	I correctly and appropriately make changes based upon the feedback received, or correctly state why I chose not to do so. In addition, I request specific feedback from the instructor, identifying areas with which I am uncertain or struggling.	I communicate and document the rationale behind alternate approaches to similar (but not identical) situations, based on feedback received prior to the current attempt. I communicate areas of weakness and document the methodical application of strategies that I used to improve.

# The Advanced Level

“Correctly and appropriately make changes based upon feedback received, or correctly state why changes were not made. Request specific feedback from the instructor, identifying areas of uncertainty or struggle.”

By requesting specific feedback from the instructor, students are able to focus their efforts on areas where they need the most support.

# The Expert Level

“Communicate and document the rationale behind alternate approaches to similar (but not identical) situations, based on feedback received prior to the current attempt. Communicate areas of weakness and document the methodical application of strategies used to improve.”

A true scholar knows their strengths and weaknesses, and can leverage resources to their advantage.

# Let's practice scoring.

In each of the following examples, evaluate the quality of the statement. We will pretend that the student includes at least the minimum of 6, but examine just a single example.

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# Example 1:

“Added in photos of methods and materials because teacher recommended I do so a couple of times in my previous lab reports.”

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# Example 2:

“2 New things that I have started doing because teacher told us to add these in.”

<b>Not Enough Evidence</b>	<b>Beginning</b>	<b>Developing</b>	<b>Proficient</b>	<b>Advanced</b>	<b>Expert</b>
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# Example 3:

“I labeled my methods and materials set up, because annotated it on a previous lab. This is important because it helps the reader understand which item is which, and where they belong in this experiment.”

Not Enough Evidence	Beginning	Developing	Proficient	Advanced	Expert
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# Example 4:

“In the last lab I did not choose a correct source of experimental error, but in this lab I did. The ramp not being balanced will lead to an experimental error and will cause the data to be different. This is important to know so the reader will make sure to check the ramp before starting the lab.”

Not Enough Evidence	Beginning	Developing	Proficient	Advanced	Expert
I did not identify changes that I made since the previous lab report.	I identify changes that I made since the previous lab report.	I describe at least 6 changes that I made since the previous lab report, correlated to feedback from my peers, the instructor, class discussion, or my own understanding of this rubric.	I explicitly state why changes needed to be made (or not made) based on relevant physics or skills requirements.	I correctly and appropriately make changes based upon the feedback received, or correctly state why I chose not to do so. In addition, I request specific feedback from the instructor, identifying areas with which I am uncertain or struggling.	I communicate and document the rationale behind alternate approaches to similar (but not identical) situations, based on feedback received prior to the current attempt. I communicate areas of weakness and document the methodical application of strategies that I used to improve.

# Example 5:

“In the last lab I did not use the correct source of experimental error, but this time I used one that was more accurate.”

Not Enough Evidence	Beginning	Developing	Proficient	Advanced	Expert
I did not identify changes that I made since the previous lab report.	I identify changes that I made since the previous lab report.	I describe at least 6 changes that I made since the previous lab report, correlated to feedback from my peers, the instructor, class discussion, or my own understanding of this rubric.	I explicitly state why changes needed to be made (or not made) based on relevant physics or skills requirements.	I correctly and appropriately make changes based upon the feedback received, or correctly state why I chose not to do so. In addition, I request specific feedback from the instructor, identifying areas with which I am uncertain or struggling.	I communicate and document the rationale behind alternate approaches to similar (but not identical) situations, based on feedback received prior to the current attempt. I communicate areas of weakness and document the methodical application of strategies that I used to improve.

# Example 6:

“I did not list my materials I explained how I set them up.”

Not Enough Evidence	Beginning	Developing	Proficient	Advanced	Expert
I did not identify changes that I made since the previous lab report.	I identify changes that I made since the previous lab report.	I describe at least 6 changes that I made since the previous lab report, correlated to feedback from my peers, the instructor, class discussion, or my own understanding of this rubric.	I explicitly state why changes needed to be made (or not made) based on relevant physics or skills requirements.	I correctly and appropriately make changes based upon the feedback received, or correctly state why I chose not to do so. In addition, I request specific feedback from the instructor, identifying areas with which I am uncertain or struggling.	I communicate and document the rationale behind alternate approaches to similar (but not identical) situations, based on feedback received prior to the current attempt. I communicate areas of weakness and document the methodical application of strategies that I used to improve.

# Design Your Own “Using Feedback” Learning Progression

- Clear description of the skill development
- Generalize so it can be used on multiple assignments
- Omit repetition from one level to the next
- Use positive language... what *can* students do
- Add flexibility: “when appropriate,” “and/or”
- Try to avoid numerical requirements.

[shorturl.at/hBCV9](https://shorturl.at/hBCV9)

SCAN FOR TEMPLATE (GOOGLEDOC)

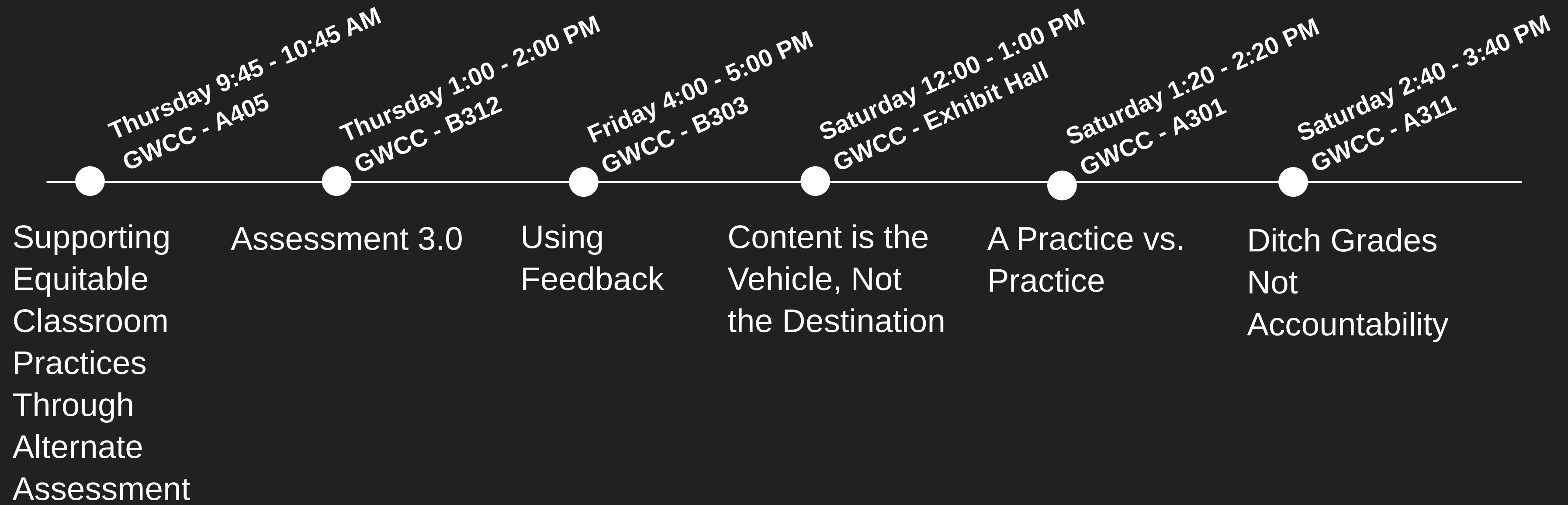


# Final Thoughts

Takeaway #1: If the skill is valuable to you (and your students), you have to provide instruction, provide feedback, and give further opportunities to practice.

Takeaway #2: This is easy to implement in nearly any context. Just do it regularly and frequently!

# Learn more about LPM at our other presentations at NSTA 2023:







**Elise Naramore**



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# Thank you!



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