



# Engaging 21<sup>st</sup> Century Learners using Digital & Physical Technology

Association of Science Teachers (AST)  
October 25, 2024

Presented By: Matthew T. Ngo | [mngo@hrce.ca](mailto:mngo@hrce.ca)  
PhD Student (Year 2) | MEd, BEd, BSc  
Physics Educator at Citadel High School

**COMPUTER LOGIN: You can log in using GNSPES**

# A LITTLE ABOUT ME

## Career Information

- 15 years teaching in the Halifax Regional Centre for Education (HRCE).
- Primarily teaching Physics 11 and 12, and the IB Physics Curriculum.
- Presenter for AST for 4 Years (Online and in-person)
- Part-Time Facilitator for StFX's Centre for Online and Professional Studies.

## Education

- Inter-University PhD program in Educational Studies at St. Francis Xavier University (Year 2).

### Dissertation Working Title:

*The ideology of success for Black Nova Scotian students in high school sciences.*

- Master of Education in Educational Leadership and Administration (StFX; 2017)
- Master of Education in Curriculum and Instruction (StFX; 2014)
- Bachelor of Science in Physics and Mathematics (DAL; 2007)



In high school, there are many factors and circumstances that lead to the success of students. Because success can mean different things to different individuals, it is context specific. Authors such as Duckworth et al.

[Show more](#)

### Speaker



#### Speaker

Matthew T Ngo  
St. Francis Xavier University



# Items of Focus for Today's Workshop

We're going to figure out practical tools to help engage learners in our classrooms:

- 01 Plickers:** Interactive formative assessment tool (free) **\*\*collaborative\*\***
- 02 Mentimeter:** Interactive engagement and assessment tool (free) **\*\*collaborative\*\***
- 03 Miro:** Online collaborative tool (free) **\*\*collaborative\*\***
- 04 Podcasts:** Teacher centric: Recording activities to support additional learning
- 05 Crayon Physics**
- 06 PASCO Sensors:** Motion sensors for graphing activity

There will be allotted time to explore some of these tools to support learning activities!

# PLICKERS

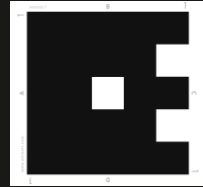
 plickers



# Instructions for Using plickers

Please do not bend or mark on these Plicker Cards!

**Do not share the card # to people nearby 😊**



## READY TO PLAY?



### Tools Needed

- Computer (Internet and Projector)
- Smartphone with Internet (for the Teacher)
- Plicker Cards
- Question Bank for Your Class



### Ideas to Support Learning

1. **Not assigning names to the number on the card:** It encourages all students to take part without risk of being “outed” for incorrect responses. You can randomize the cards each time. Or, you can tell them to hide their card numbers forever.
2. **If you choose to assign names to numbers:** You can have the formative assessments recorded on the Plickers system.

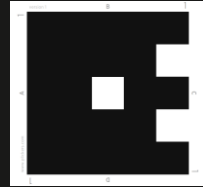
User: [mngo@hrce.ca](mailto:mngo@hrce.ca)

Pass: Same, without #s

# Instructions for Using plickers

Please do not bend or mark on these Plicker Cards!

**Do not share the card # to people nearby 😊**



## All our printable card options

We offer free cards in a range of formats:

**Standard** - for a set of 40 cards, [click here](#)

**Expanded** - for a set of 63 cards, [click here](#)

**Large Font** - for a set of 40 cards, designed for those who prefer larger lettering, [click here](#)

**Jumbo** - for a set of 63 oversized cards (one per page), [click here](#)

**I highly recommend** just printing them on cardstock via photocopier (cheaper)

### plickers free

**\$0.00** / month

- ✓ Unlimited Classes
- ✓ Unlimited Reports
- ✓ Create Sets with Unlimited Questions
- ✓ Unlimited Media Search
- ✓ Shared Packs
- ✓ Unlimited Scoresheet
- ✓ Priority Support

Stay on Free Plan

### plickers pro

**\$8.99**

Save 33% when you pay annually

- ✓ Unlimited Classes
- ✓ Unlimited Reports
- ✓ Create Sets with Unlimited Questions
- ✓ Unlimited Media Search
- ✓ Shared Packs
- ✓ Unlimited Scoresheet
- ✓ Priority Support

Start Free Plickers Pro Trial

# MENTIMETER



Bring engagement to every class



## Lectures

Keep every student engaged

[Learn more](#)



## Assessments

Perfect for formative and summative

[Learn more](#)



## Seminars

Spark debate and discussion

[Learn more](#)



## Student events

Engage large audiences

[Learn more](#)

# Instructions for Using Mentimeter

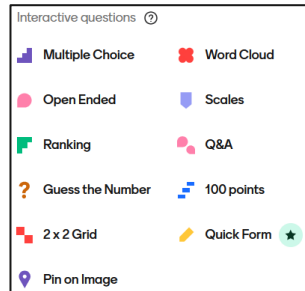
A 'free' Mentimeter account has 50 participants per month

Mentimeter can import PowerPoint, Google Slides, and Miro (next activity)!!!



## Tools Needed

- Computer (Internet and Projector)
- ChromeBook or Computer with Internet (Students)



## What can Mentimeter do?

1. **'Word Cloud' option** – You can use it to have students share their 'Big Ideas' that came out of a particular lesson.
2. **A private 'Q&A' space** – Suppose you are doing an activity and students are shy about asking for help. They can send a Q&A immediately through Mentimeter and have it appear anonymously.
3. **'Ranking Activity'** – Provide a context for feedback
4. **'100-points'** – Provide context for feedback

User: [mngo@gnspecs.ca](mailto:mngo@gnspecs.ca)

Pass: Same, without #s



# MIRO



miro Team Meeting



12



Present

Share

## Project brief

**Design Manager Sync Agenda**

Design Manager Sync Agenda  
Google Docs · Updated 10 minutes ago

## Brainstorm ideas

Add inspirational images to aid customers

Juan

Implement password reset functionality

Transfer data from Google Sheets

Miriam

## Action items

Develop task update functionality

In progress · Rubin Kotowicz

Set up email notification system

In progress · Adria Weinert

## Project plan

Timeline	Q1	
Releases	Release 1	
Desired Experience	Describe user experience and emotions	Collaborate with the team
Must-Have Capabilities	Service Catalog Version 1 · In progress · Jan 19	Calendar integration
User Experience Improvements	User onboarding To do · Jan 12 — Jan 23	New tem To do

# Instructions for Using

A 'free' Miro account has a single workspace with 3 editable boards!  
It is a good space for multiple groups of students to collaborate and share with teachers viewing.

**Once you create an account, let me know, and we can try it out together!**



## Tools Needed

- Computer (Internet and Projector)
- ChromeBook or Computer with Internet (Students)



## What can Miro do?

1. **Have students provide feedback on multiple topics**
2. **Students find key facts to a broader topic and share with the class**
3. **Keeping all groups of students connected!**

User: [matthew.ngo.hfx@gmail.com](mailto:matthew.ngo.hfx@gmail.com)

Pass: Same as HRCE

[Show Miro In Action Video](#)

# PODCASTS

0:00:03 0:15:41

Sept 30 Phys 11

**Physics 11 Update**  
Monday, September 30, 2024

Citadel High School (2023-24)  
Science 10 | Physics 11 (IB/Non-IB) | Physics 12

Contact Email: [mngo@hrce.ca](mailto:mngo@hrce.ca) | (avoid GNSPES)  
PhD Student (Yr. 2) | MEd, BSc (Physics & Math), BEd.  
Doctoral Examination Date Planned for Late Fall 2024.

Parent and Guardian Video Podcast!

This screenshot shows a video player displaying a presentation slide. The slide features a photograph of a man in a blue jacket and jeans standing next to a red telephone booth. The text on the slide provides an update for Physics 11, dated Monday, September 30, 2024, at Citadel High School. It lists the presenter as a PhD student in MEd, BSc (Physics & Math), and BEd, with a planned doctoral examination date for late fall 2024. The slide also includes contact information and a note about a parent and guardian video podcast.

0:00:02 0:16:57

Physics 11 Exam Review Podcas...

**Physics 11 Review Podcast for Exams**

Exam Review Summary Because of the Snow Day on Friday, January 20, 2023

Mr. Ngo Recorded on Friday, Jan. 20, 2023

This screenshot shows a video player displaying a presentation slide. The slide is titled 'Physics 11 Review Podcast for Exams' and features three images: a large building with a glass facade, a classroom with tables and chairs, and another classroom view. The text on the slide provides an exam review summary due to a snow day on Friday, January 20, 2023, recorded by Mr. Ngo. The video player interface shows the video is at the 2-second mark of a 16-minute and 57-second recording.

# Podcasts for Supporting Learning

Review Learning | Pre- and Post- Activities | Engagement with Families

## Review of Major Concepts

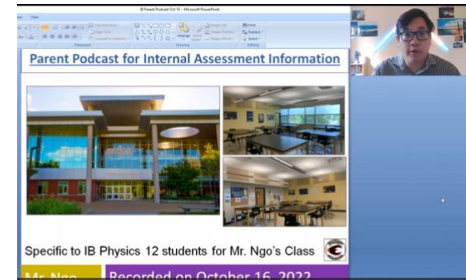
You can do a video recording of major examples done in class. That way, students who miss class or require review have another avenue to review.

## Pre- or Post-Lab Activities

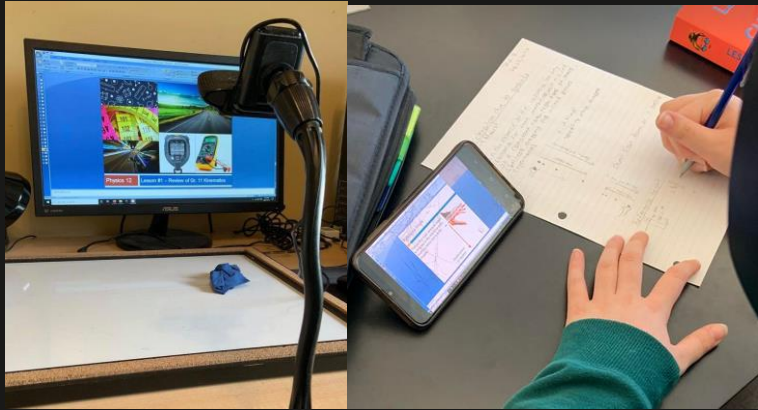
In my case, instead of repeating instructions on how to graph using Google Sheets, I recorded step-by-step instruction videos to help guide students. It helps develop self-learning and independence.

## Sharing Video Messages to Parents and Guardians

I use it to convey important information to parents and guardians. That way, they are informed of certain classroom events and practices.



# HOW YOU CAN ADAPT IT?



**Equipment Used: Logitech C922 Pro Webcam.** You can use others but for the purposes of this presentation, I'll be sharing my experiences using Logitech equipment. A 'streamer' webcam is highly advised.

## **Record an example with solutions using your device:**

Then, upload it on Google Classroom. The students take time to attempt the problem while you walk around and engage with students.

## **Provide lab instructions and have students watch it:**

Reduces the number of times you have to repeat instructions.

## **Have students make a multimedia presentation:**

An alternative way to express student learning.

## **Short video messages to parents and guardians:**

Shifts the responsibility for families to stay up-to-date.

# TOOLS I USE FOR MY PODCASTS:



## **Recommendation #1: Ensure your Webcam Has “Camera Stand Threads”**

What you are seeing is a “Smatree Adjustable Jaws Flex Clamp Mount with 13.4” Gooseneck Extension.” It allows me to clamp the Webcam to my desk when recording video focused on the desk whiteboard or notes on paper

## **Recommendation #2: Buying a Dedicated Microphone with Diffuser**


This will ensure higher sound quality in your videos. Last year I bought this and all my videos have a much more professional feel to it. Buy it on sale (usually during the holidays)



# QUESTIONS SO FAR?

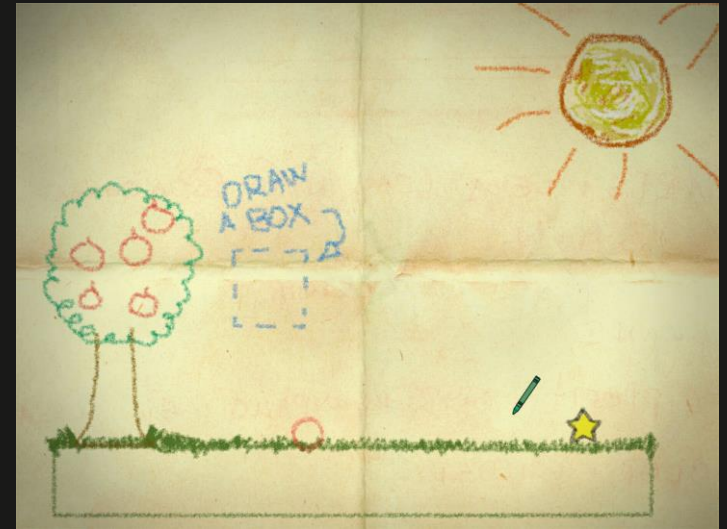
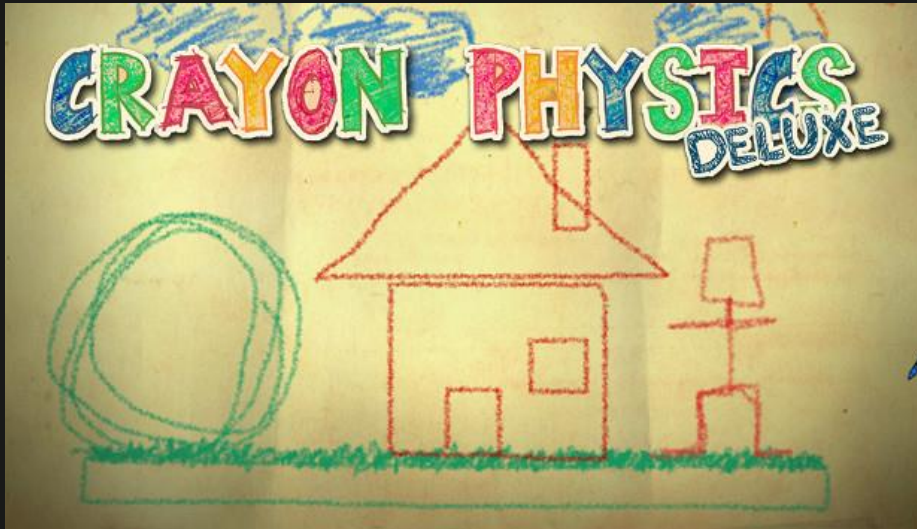
Feel free to reach out to me at any time

In addition to my email, my web site is [www.mrngolearning.com](http://www.mrngolearning.com)



# CRAYON PHYSICS

These activities are geared for Upper Elementary and All Secondary



The objective of the game is to draw Newtonian objects to get a ball to a star. **Most useful for solving complex problems visually. You can build levers, pulleys, ropes, and ramps (and more) to solve an objective. You can have students draw on the whiteboard for ideas to solve problems.**



# PASCO SENSORS

**PASCO**

**PASCO**

SUBJECTS

PRODUCTS

PASCO PORTAL

DOWNLOADS

RESOURCES

TRAINING & EVENTS

SUPPORT



## PASCO PORTAL

The content and equipment you want. The functionality and support you expect,



SUPPORT



HOW TO'S



PRO DEV



The hands-on science learning environment you've been looking for.



CONTENT



SOFTWARE



EQUIPMENT

# PASCO SENSOR ACTIVITIES

These activities are geared for Grade 8-12 (Mid- and Upper-Secondary)



## TEMPERATURE PROBE

Specific Heat  
Capacity Lab  
(Graphing)



## WEATHER STATION SENSOR

Weather Forecasting  
Activities  
(Environment)



## MOTION SENSOR

Physics or Motion  
Activities  
(Graphing)

# EXPLORING THE TEMPERATURE PROBE

There are many pre-made lab activities (English and French) on the web site!



English

- Wireless Temperature
  - ▷ Greenhouse Gases 📈 ⚙️
  - ▷ Radiation Energy Transfer ⚙️ ⚙️
  - ▷ Specific Heat: Sand/Water ⚙️ ⚙️
  - ▷ Seasonal Pond Exploration ⚙️
- Wireless Motion
  - ▷ Mapping the Ocean Floor 🌿

Wireless pH

- ▷ Seasonal Pond Exploration ⚙️ 🌿
- ▷ Ocean Acidification 📈 ⚙️ ⚙️
- ▷ Soil pH 📈 ⚙️ ⚙️ 🌿
- ▷ Air Pollution & Acid Rain 📈 ⚙️ ⚙️
- ▷ Acid Rain ⚙️ ⚙️
- ▷ Carbon Cycle Chemistry ⚙️ 🌿

Wireless Weather

- ▷ Observing Clouds ⚙️ 🌿
- ▷ Investigating Evaporation & Condensation ⚙️
- ▷ Monitoring Microclimates ⚙️ 📈

Wireless CO2

- ▷ Decomposition 📈 ⚙️ 🌿

Wireless Soil Moisture

- ▷ Soil Type and Surface Moisture 📈 🌿
- ▷ Plant Growth and Water Content 📈 ⚙️ 🌿

Français

Température Sans Fil

- ▷ Gaz à Effet de Serre 📈 ⚙️
- ▷ Transfert d'Énergie par Rayonnement ⚙️ ⚙️
- ▷ Chaleur Spécifique : Sable/Eau ⚙️ ⚙️
- ▷ Exploration Saisonnière des Étangs ⚙️ 🌿

Mouvement Sans Fil

- ▷ Cartographie des Fonds Marins 🌿

pH Sans Fil

- ▷ Exploration Saisonnière des Étangs ⚙️ 🌿
- ▷ Acidification des Océans 📈 ⚙️ ⚙️
- ▷ pH du Sol 📈 ⚙️ ⚙️ 🌿
- ▷ Pollution et Pluies Acides 📈 ⚙️ ⚙️
- ▷ Pluies Acides ⚙️ ⚙️
- ▷ Chimie du Cycle du Carbone ⚙️ 🌿

Météo Sans Fil

- ▷ Observation des Nuages ⚙️ 🌿
- ▷ Étudier l'Évaporation et la Condensation ⚙️
- ▷ Surveillance des Microclimates ⚙️ 📈

CO2 Sans Fil

- ▷ Décomposition 📈 ⚙️ 🌿

Humidité du Sol Sans Fil

- ▷ Le Type de Sol et l'Humidité de Surface 📈 🌿
- ▷ La Croissance des Plantes et la Teneur en Eau 📈 ⚙️ 🌿

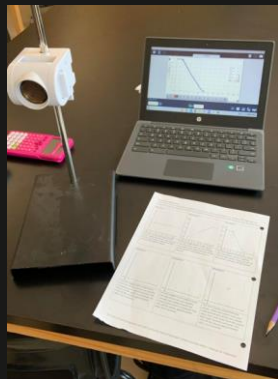
# EXPLORING THE WEATHER STATION

There are many pre-made lab activities (English and French) on the web site!



# EXPLORING THE MOTION SENSOR

There are many pre-made lab activities (English and French) on the web site!

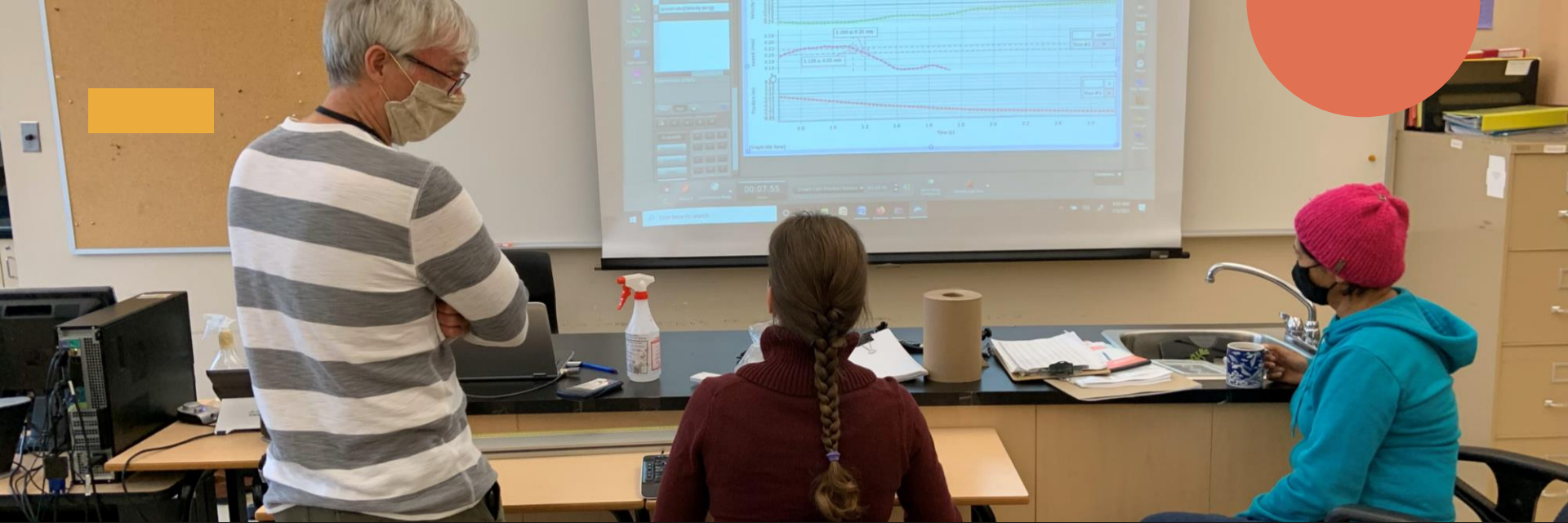


**MatchGraph Software** is the most intuitive way to teach motion graphing.

MatchGraph!™ software for Mac® & Windows® computers, and the MatchGraph! apps for iPad® and Android™ tablets.



**ACTIVITY:** Be prepared to move around for this activity. I use this activity to anchor students understanding of graphs prior to teaching them motion graphs in Science 10.



# Final Thoughts and Reflections

I **recognize** that we only have one provincial PD day a year. But **hopefully** I offered something of **value**.

I also **recognize** that we, as a profession, do very powerful things and are often **under appreciated**. Being away and looking in, I often see **incredible educators** do terrific work daily. **I wish to recognize that fact.**



# IT'S SO LOVELY TO MEET ALL OF YOU!

Thank you for listening.  
Feel free to reach out at [mngo@hrce.ca](mailto:mngo@hrce.ca)

Hope you have a great PD Day!

