Auditory adaptations in the science-learning environment: Towards independent learning

Raymond Harvey, Scientrific Pty Ltd

Welcome audience

- Presenter introduction of self
- Scientrific has been supplying science equipment to high schools for over 25 years
- We are the Australian distributor of Vernier dataloggers

Q: What is a Data logger and why should I care?

A: A data logger is an electronic device used to record information about an experiment.

- Combined with the increase in technology available to schools and the decrease in the cost of that technology, data loggers are now seen as an essential part of the science curriculum
- The new National Curriculum specifically mentions data collection devices
- And some states have mandated specific experiments to ensure students gain the necessary lab experience

- While most of my time is spent demonstrating and training teachers on these devices…
- There are a surprising number of people who question their value
- That's surprising because…

While some of us remember high school labs like this…well, that's what it FELT like compared to today!

- Today's kids will probably experience this at school…this is Miami SHS in QLD
- The world is a different place now and universities expect students to come to them aware of data collection devices

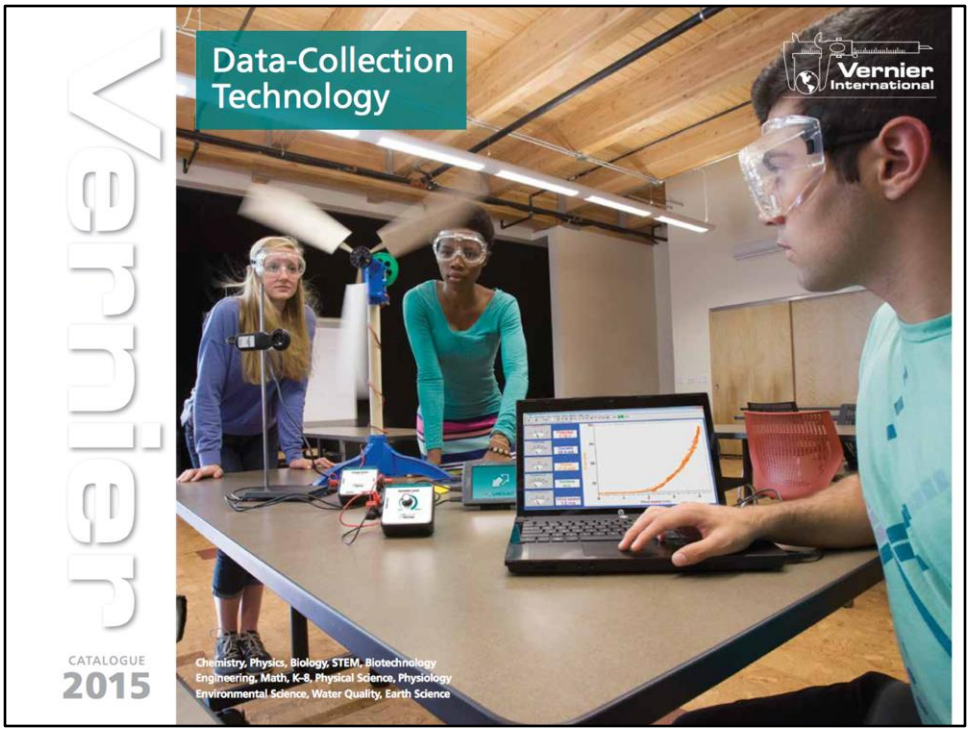
- This is Curtin University's School of Biomedical Sciences
- Take note…lots of equipment and not a user manual in sight

- And this is the ideal customer for universities…industry at its best
- In this environment, technology is essential to goals of the organisation
- GIVE A BRIEF DEMO OF TEMPERATURE COLLECTION HERE

“If you want to teach people a new way of thinking, don’t bother trying to teach them. Instead, give them a tool, the use of which will lead to new ways of thinking.”

-R. Buckminster Fuller
Designer, inventor, futurist

- I came across this quote in a business journal while preparing this presentation
- While it is initially a somewhat heretical view, I believe it is in fact a truism
- You cannot teach people to change their way of thinking, nor can you insist that they must
- The most effective way to change the thinking of an individual, is to help them discover the change for themselves



- I believe that data loggers are a tool capable of changing science education in ways we just don't appreciate yet
- But can a single idea be so powerful?

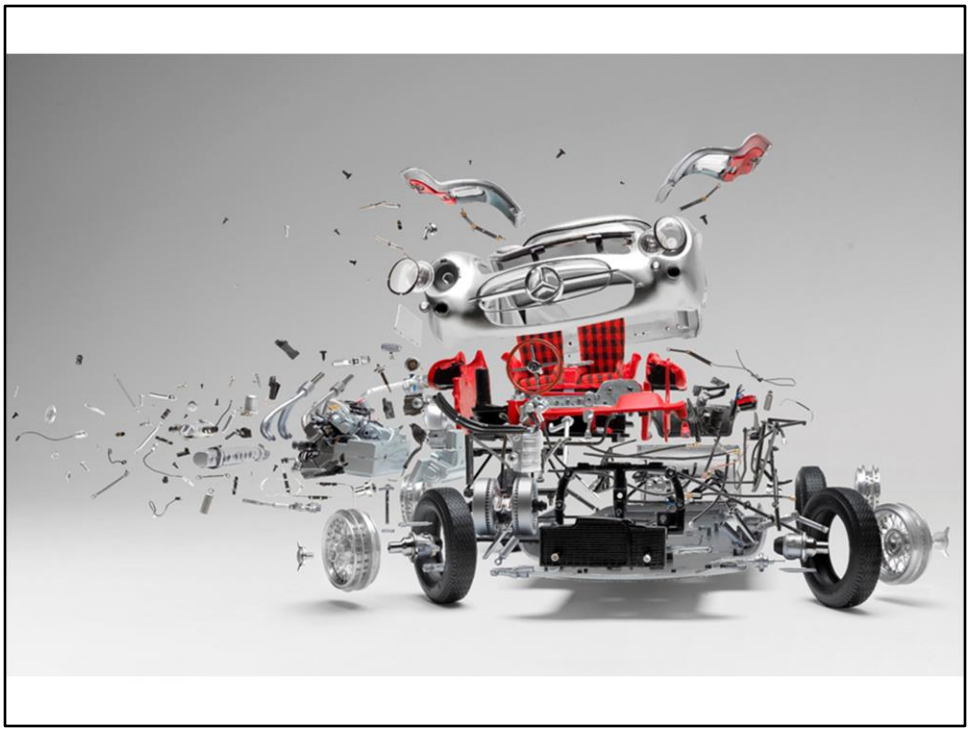
Imagine how different life would be if there were none of these…

- There have been so many bad jokes made about these that the industry now refers to them as “Fastners”…well may we laugh!
- Until these came along, wooden products used joins, miniature wooden pegs (carved by hand…probably by apprentices!) and glue
- Getting a dining set took weeks…imagine going to IKEA today and being told to “come back in a month”. I think some people might get violent!

Over time this humble little idea has grown into uncountable varieties that literally hold the 21st century together

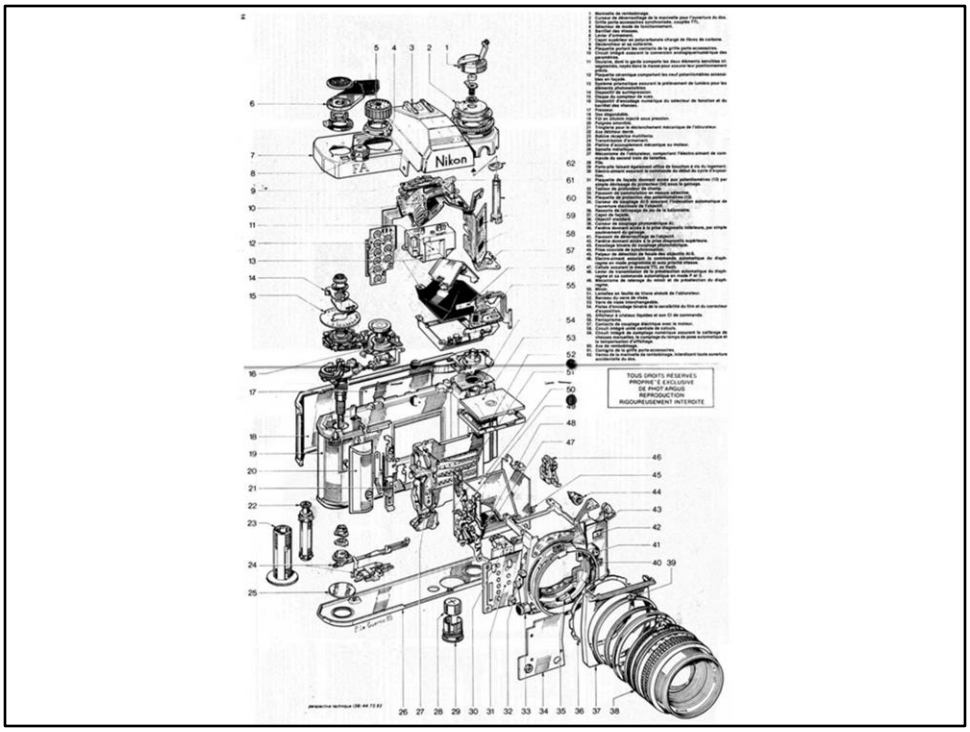
What would happen if you could just click your fingers and make them disappear?

Lets consider three icons of the 20th & 21st centuries as examples…



Well, turning corners would become “interesting”!

…and you might want to go easy on the brakes!



Whatever you do, don’t drop your camera..

…and this is what the original Apple Mackintosh would look like if Apple sold it “unassembled”!

Can you imagine any of those products succeeding if they relied on wooden pins and glue?

So for seven years now, the data logger has been revolutionizing high school for kids who can ***see*** this.

Unfortunately, there are some who can only see this…

…and that’s how things might well have stayed, if it weren’t for this man!

"My experience has taught me that blindness need not be a barrier in the pursuit of one's ambitions to achieve whatever goals he or she aspires to achieve."

At seven years old, Cary Supalo lost his eyesight. In the following years his adaptation to new skills and unknown surroundings sparked his curiosity in our environment and why things are the way they are.

Cary first developed an interest in science at his high school in Bolingbrook, Illinois and pursued his studies at Purdue University where he graduated with a B.S. in Chemistry and a B.A. in Communications in 1999. Cary then furthered his studies at Penn State University where he obtained his Master's Degree in Inorganic Chemistry. During research for his degree completion, he found that "sighted assistance" was an extremely variable and unreliable method for accurate, objective data collection. With this realization and the work of the ILAB (Independent Laboratory Access for the Blind) Project the development of a method for him and every blind student to successfully access and independently collect real- time data was formed.

- Cary Supalo, founder of Independence Science in Indiana.
- Cary lost his sight at seven and the experience forced him to deal with the world in a different way
- Despite losing his sight, he obtained a masters degree in Inorganic Chemistry at Penn State University in the US
- During this, one of his frustrations was the highly variable skill level of his sighted assistants…a vital element to his success as a post-grad student.

Origins of ISci: Independent Laboratory Access for the Blind (ILAB)

The ILAB project was originally developed by Dr. Cary Supalo and the researchers at Penn State University, Truman State and partners at High Schools.

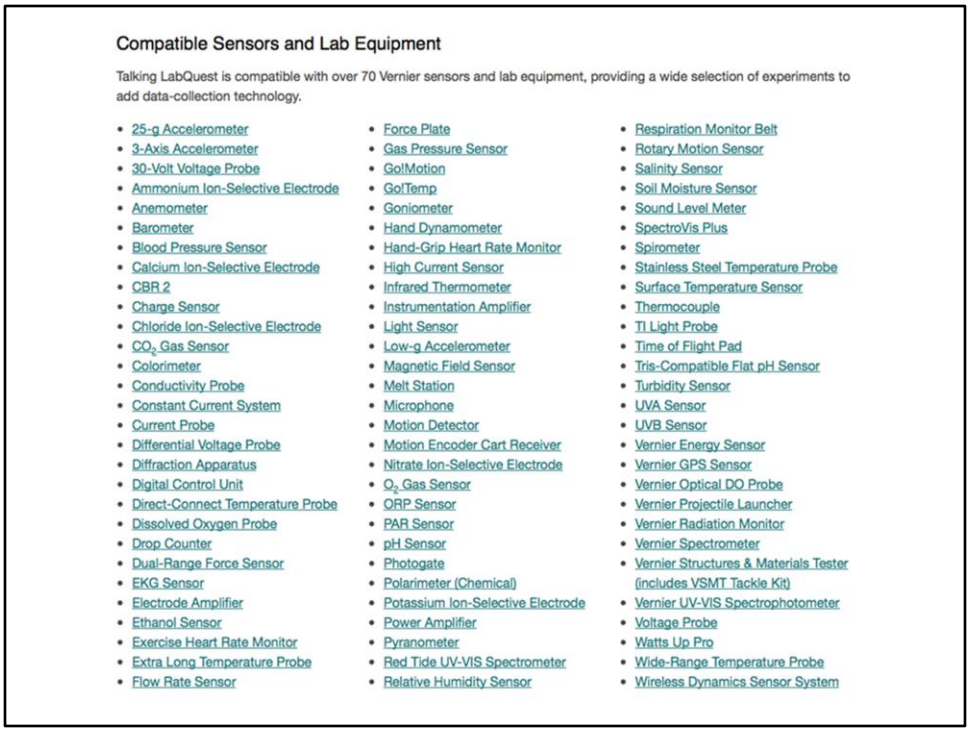
ILAB seeks to raise the expectations of high school and college students who are blind and visually impaired (VI), as well as educators of these students, with the goal of encouraging them to consider careers in Science, Technology, Engineering, and Mathematics (STEM) professions.

This new active role allows students a hands-on experience in the science classroom, providing greater concept development and understanding of presented materials.

In conjunction with researchers at Penn State, Truman State and high schools, Dr Supalo developed the ILAB (Independent Laboratory Access for the Blind) project to encourage blind and visually impaired students to consider careers in science.

Not content with this, Cary founded a company with the intention of developing broader opportunities for students with Vision Impairment.

- Sci-Voice Access Software has grown out of that effort.
- Vernier's award winning hardware is coupled with custom software designed to convert the visual queue's most of us take for granted, into an auditory cue (either speech or tone) that connects the student to the data being recorded by the instruments.
- This data can then be transferred to a computer for futher analysis.

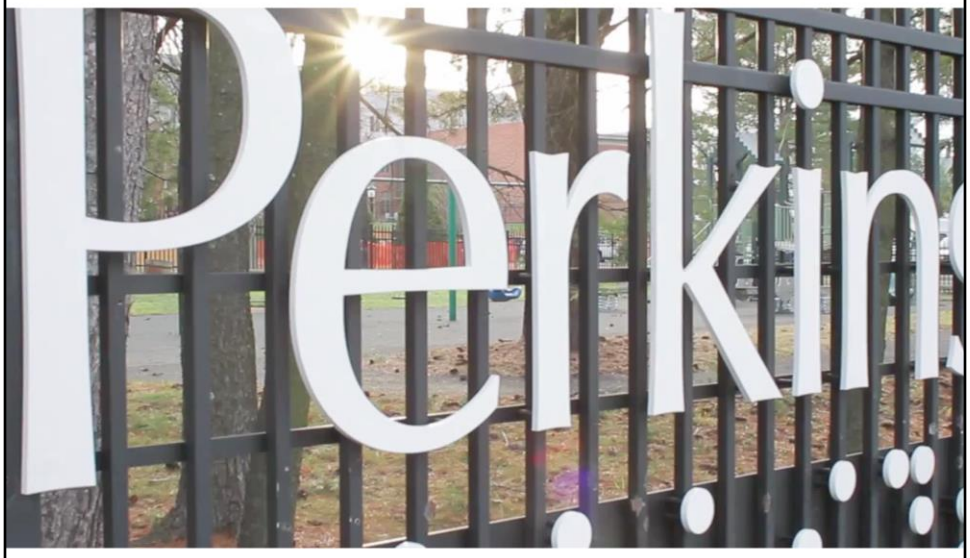


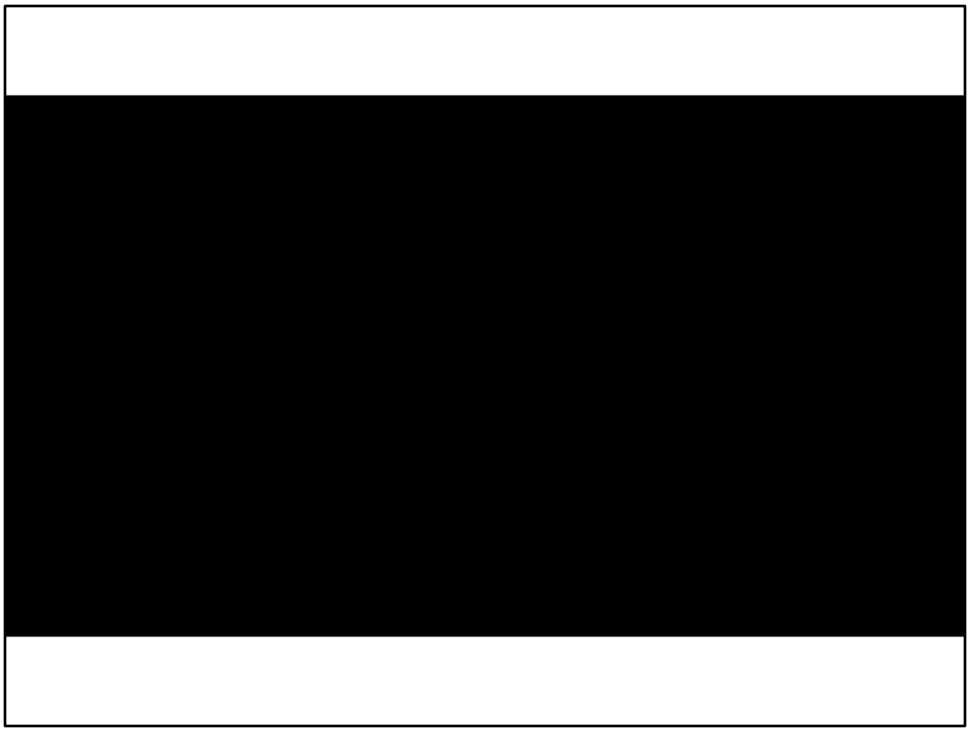
Compatible Sensors and Lab Equipment

Talking LabQuest is compatible with over 70 Vernier sensors and lab equipment, providing a wide selection of experiments to add data-collection technology.

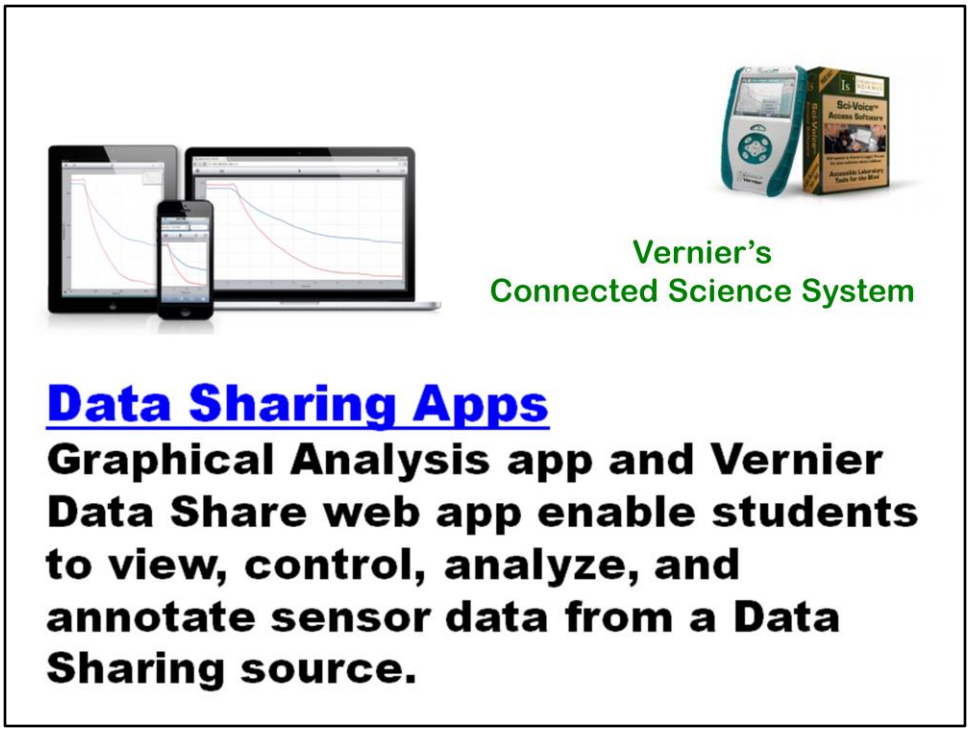
- 25-g Accelerometer
- 3-Axis Accelerometer
- 30-Volt Voltage Probe
- Ammonium Ion-Selective Electrode
- Anemometer
- Barometer
- Blood Pressure Sensor
- Calcium Ion-Selective Electrode
- CBR 2
- Charge Sensor
- Chloride Ion-Selective Electrode
- CO_2 Gas Sensor
- Colorimeter
- Conductivity Probe
- Constant Current System
- Current Probe
- Differential Voltage Probe
- Diffraction Apparatus
- Digital Control Unit
- Direct-Connect Temperature Probe
- Dissolved Oxygen Probe
- Drop Counter
- Dual-Range Force Sensor
- EKG Sensor
- Electrode Amplifier
- Ethanol Sensor
- Exercise Heart Rate Monitor
- Extra Long Temperature Probe
- Flow Rate Sensor
- Force Plate
- Gas Pressure Sensor
- Go!Motion
- Go!Temp
- Goniometer
- Hand Dynamometer
- Hand-Grip Heart Rate Monitor
- High Current Sensor
- Infrared Thermometer
- Instrumentation Amplifier
- Light Sensor
- Low-g Accelerometer
- Magnetic Field Sensor
- Melt Station
- Microphone
- Motion Detector
- Motion Encoder Cart Receiver
- Nitrate Ion-Selective Electrode
- O_2 Gas Sensor
- ORP Sensor
- PAR Sensor
- pH Sensor
- Photogate
- Polarimeter (Chemical)
- Potassium Ion-Selective Electrode
- Power Amplifier
- Pyranometer
- Red Tide UV-VIS Spectrometer
- Relative Humidity Sensor
- Respiration Monitor Belt
- Rotary Motion Sensor
- Salinity Sensor
- Soil Moisture Sensor
- Sound Level Meter
- SpectroVis Plus
- Spirometer
- Stainless Steel Temperature Probe
- Surface Temperature Sensor
- Thermocouple
- TI Light Probe
- Time of Flight Pad
- Tris-Compatible Flat pH Sensor
- Turbidity Sensor
- UVA Sensor
- UVB Sensor
- Vernier Energy Sensor
- Vernier GPS Sensor
- Vernier Optical DO Probe
- Vernier Projectile Launcher
- Vernier Radiation Monitor
- Vernier Spectrometer
- Vernier Structures & Materials Tester (includes VSMT Tackle Kit)
- Vernier UV-VIS Spectrophotometer
- Voltage Probe
- Watts Up Pro
- Wide-Range Temperature Probe
- Wireless Dynamics Sensor System

- Vernier produce a range of more than 100 different sensors and pieces of Lab Equipment.
- From this range, eighty six are compatible with the Sci-Voice Talking LabQuest.

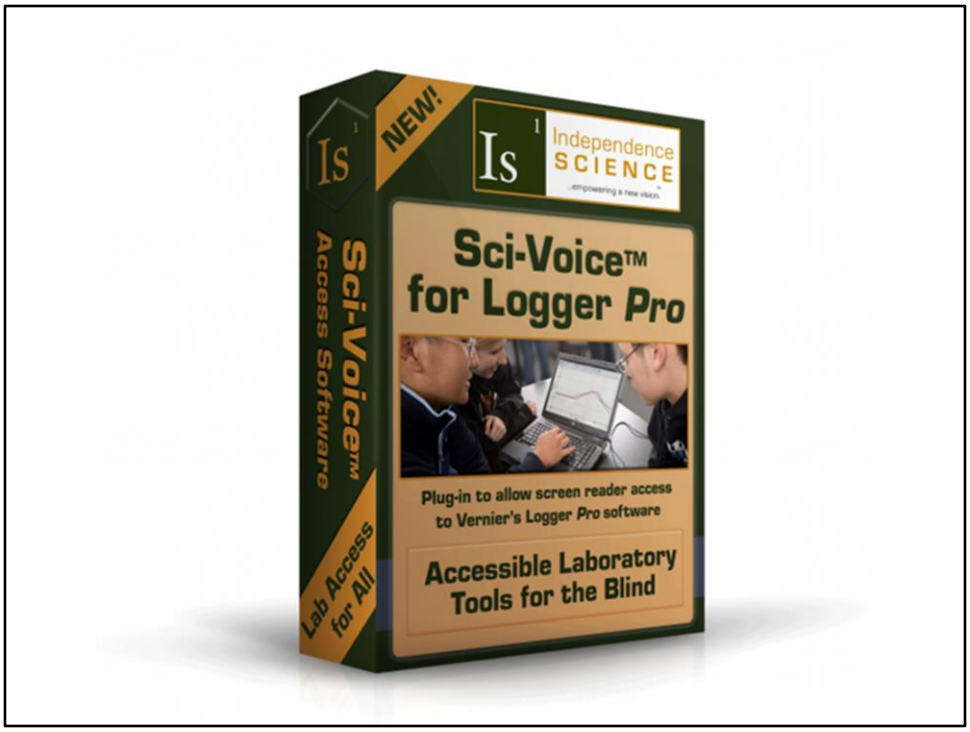

Perkin



- Here is a video on the highly important subject of lab preparation necessary for a Vision Impaired student
- It contains a wealth of information that will prove invaluable to enriching the education experience of a student with these needs.



- So we have a vastly improved tool for visually impaired students, but it's still way over here. (Slide One)
- Wouldn't it be awesome if we could have the visually impaired student collaborating in a group situation with their sighted peers? (slide 2)
- With Vernier's Connected Science System, students can work in collaborative teams
- Technology now allows the vision impaired student to go from the back of the science class, to lead investigator, streaming data to their peers through software



- Sci-Voice for Logger Pro enables Vernier's PC based logging software to communicate audibly with vision impaired students
- Logger Pro can broadcast data directly to iPads, Android devices and other computers through a web browser
- Each browser is connected in a dedicated link, without the need for an internet connection

Resources

- http://independencescience.com
- http://www.vernier.com/
- https://www.scientrific.com.au/
- ray@scientrific.com.au