

Unitec Research Symposium 2020

Alternative Practice Lab Methodologies for Remote Teaching

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Karakia Timatanga

KARAKIA TO OPEN MEETING

Manawa mai te mauri nuku
Manawa mai te mauri rangi
Ko te mauri kai au
he mauri tipua
Ka pakaru mai te pō
Tau mai te mauri
Haumi e, hui e, taiki e!

Embrace the life force of the earth
Embrace the life force of the sky
The life force I have gathered is powerful
And shatters all darkness
Come great life force
Join together, gather together, let it be done!

Agenda:

1. Karakia (Opening)
2. Introduction
3. Purpose of experimental lab
4. Experimental lab floor design
5. Experimental lab form
6. Interpreting experimental data
7. Learning techniques and their application
8. General consideration
9. Other useful tools
10. Q&A
11. Karakia (closing)



Manaakitia te Rito

Our purpose, strategic priorities and values



Introduction:



1. Needless to say that Covid-19 pandemic changed our daily live significantly.
2. Looking at the Positive end of this event, it stimulates us to look at all aspect differently from how to live, work and study.
3. The traditional structure of teaching and learning via hands on practical lab courses were the first to be affected in educational sector.
4. We must seek on the alternative way to reduce the impact of no access to experiment lab under lockdown.

***Why are we doing labs
in the first place?***



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TE WHARE WĀNANGA O WAIRAKA

The purpose of the Laboratory

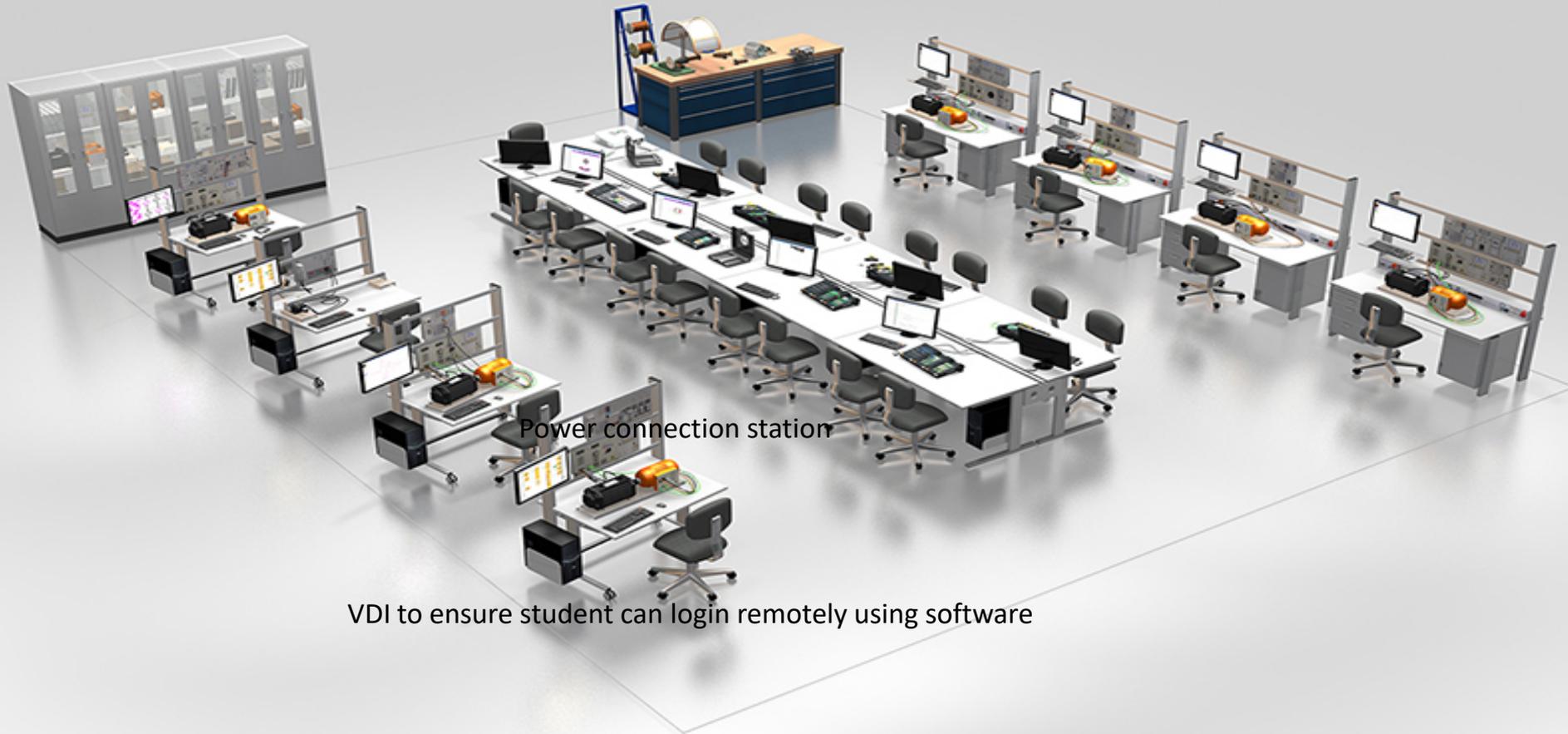
- 1. To provide an experimental foundation for the theoretical concepts introduced in the lectures. It is important that students have an opportunity to **verify** some of the ideas for themselves.
- 2. To **familiarize** students with experimental apparatus, the scientific and practical method, To teach how to make careful experimental observations and how to think about and draw conclusions from real life equipment.
- 3. To introduce the methods used for **estimating** and dealing with experimental uncertainties. This is essential in understanding what valid conclusions can be deduced from experimental data and that, properly obtained, these conclusions are valid, notwithstanding the uncertainty of the data.
- 5. To provide **student cantered** activities for problem solving inquiry and exploration of phenomena.
- 6. TO COVER ALL THE PRESCRIBED LEARNING OUTCOMES!

The purpose of the Laboratory

- The laboratory is NOT to get the "right answer." The purpose is to learn how to gain knowledge by looking at reality, not an attempt to make reality conform to preconceptions. The important thing is to learn how to be observant, to really see what happens, and to deal with this information. And to understand, or learn to understand, the meaning of what happens.
- Even if student get results totally at variance with theory (as may happen due to a mistake, or a systematic uncertainty) students will get a high grade if report it honestly and demonstrate understanding how this results occurred. On the other hand, if students get perfect agreement with theory by faking data. they will fail.
- Practical ability to do experiments and analyse data is usually acquired through practice and experience. Practice is very important in learning any new discipline; for example, learning how to play piano. A good piano teacher may be very helpful but not fully useful without actual practice. In hands on lab, practice involves solving many problems (i.e. homework) and performing a variety of experiments (i.e. labs). Practice is essential to being able to make the connection between theory and experience.

Experiment Lab Floor Design

Get student to formalize and understand lab physical set up



Power connection station

VDI to ensure student can login remotely using software

Experiment Lab forms

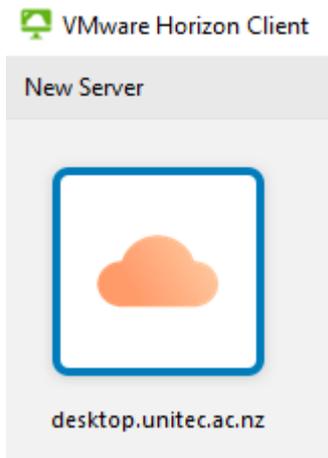
- Normally comes in 3 forms observed across Unitec Electrical pathway.
- Integrated as components of larger lecture course (70%)
- Comprise the entirety of smaller lab courses (20%)
- Research like experiment lab courses (10%)

Interpreting experimental data

- Extracting datasets from the published literature that are aligned with the experiments, students would have encountered in lab and develop problem sets or projects that focus on the interpretation of the data. (<https://www.transpower.co.nz/power-system-live-data>)
- Provide students with sample data, perhaps in the form in which it would have been collected, and ask students to complete the analysis as if they had collected the data themselves. (took some harmonic spectrum photos and ask student to analysis)
- If observations are part of the process, consider recording yourself completing the lab and ask students to take the necessary measurements and observations from the video. (echo 360 could be used to assists)

Learning techniques and their application

- Online simulations that may cover at least **portions** of or entirety of course.
- Lucus-Nuelle training system in collaboration with the E-Learning Moodle page.
<https://moodle.unitec.ac.nz/course/view.php?id=4513§ion=9>
- VDI tools: VMware Horizon Client
- https://my.vmware.com/en/web/vmware/downloads/info/slug/desktop_end_user_computing/vmware_horizon_clients/horizon_8





General Consideration for remote labs

Be clear in your expectations, and also flexible. Set clear expectations for the work, but keep in mind that students may require more flexibility and understanding as everyone gets accustomed to new ways of doing things.

Access to software. Identify which software your students might currently only have access to on campus-based computers as opposed to their personal computers. [[Virtual VDI Vmware Horizon Client](#)]

Ask students for feedback along the way. Check in with students to find out how these new activities and methods are working for them. [[survey monkey](#), [Moodle online student forum](#)]

Hold live sessions in Zoom. You can still hold your pre-lab lectures or have lab sections while running on ZOOM. Students can use Zoom breakout rooms to explore the virtual tools or work through lab data exercises with a partner. Then, you can be there to give assistance by popping into a breakout room or being available for questions. Of course, still remember flexibility as not all students might be able to make it or have access. [[ZOOM](#), [breakout room](#), [share screen](#), [Ipad](#), [Notability](#), [stylets](#)]



Other useful tools

- PhET interactive simulations: Fourier Making Waves
<https://phet.colorado.edu/sims/cheerpj/fourier/latest/fourier.html?simulation=fourier>
- Harvard's LabXchangeOpens: Portable Electrical Power
<https://www.labxchange.org/library/pathway/lx-pathway:7da9cfef-98b6-4869-aa69-50f5f015f0ac>
- Phone Apps Oscilloscope:
<https://www.instructables.com/OscilloPhone-Use-your-Smartphone-as-an-Oscilloscop/>
- Merlot open source virtual lab: AC DC electric motor theory:
<https://www.merlot.org/merlot/viewMaterial.htm?id=239175>
- Virtual Electrical Manual 3D virtual reality (VR) lab
- Keep your mind open and keep exploring

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Te Whare Wānanga o Wairaka

Q&A

Keep it short, you don't want to miss your lunch 😊

Karakia Whakamutunga

KARAKIA TO CLOSE MEETING

Ka wehe atu tātou
I raro i te rangimārie,
te harikoa, me te manawanui
Haumi ē! Hui ē! Taiki ē!



Let us depart
Under the mantle of peace,
happiness and joy
Bind it, fasten it, it is steadfast!