Emergency Online Delivery of a Freshman Physics Course to Multiple Cohorts

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School Profiles

DEAKIN UNIVERSITY

- 51,000 students
- 30% off-campus (distance/on-line)
- Off-campus students scattered around Victoria, Australia and overseas.

SEB101 ENGINEERING PHYSICS

- Taught twice per year.
- 200 “on-campus” students.
- 100 “off-campus” students.

DEAKIN COLLEGE

- Part of the Navitas Group
- 2500 students
- Cohorts from Australia, Southeast Asia, China, Africa, Middle-East.

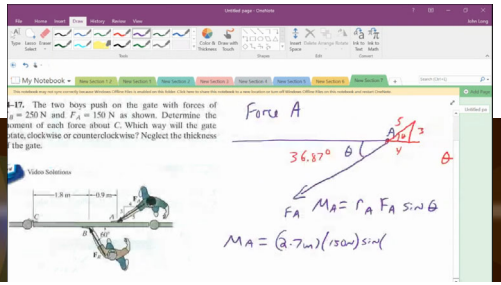
SEB101 ENGINEERING PHYSICS

- Normally taught on-campus at Geelong, three times per year.
- Average enrolment 25 students (around 10 Australia, 15 overseas).

Challenges from CoVid-19

- Early days of semester one (students were still enrolling- Deakin College).
- Short time frame to transition on-campus to online.
- 1 week's notice for Deakin University; 2-3 days for Deakin College.
- Effective use of teaching tools (Teaching platforms- Like Zoom and BB-Collabrate).
- All lab practicals had to go online, some experiments had to be changed.
- Educating educators to effectively use technology – tutors and lab assistants.
- Assessments went from in-person to online, including the exam.

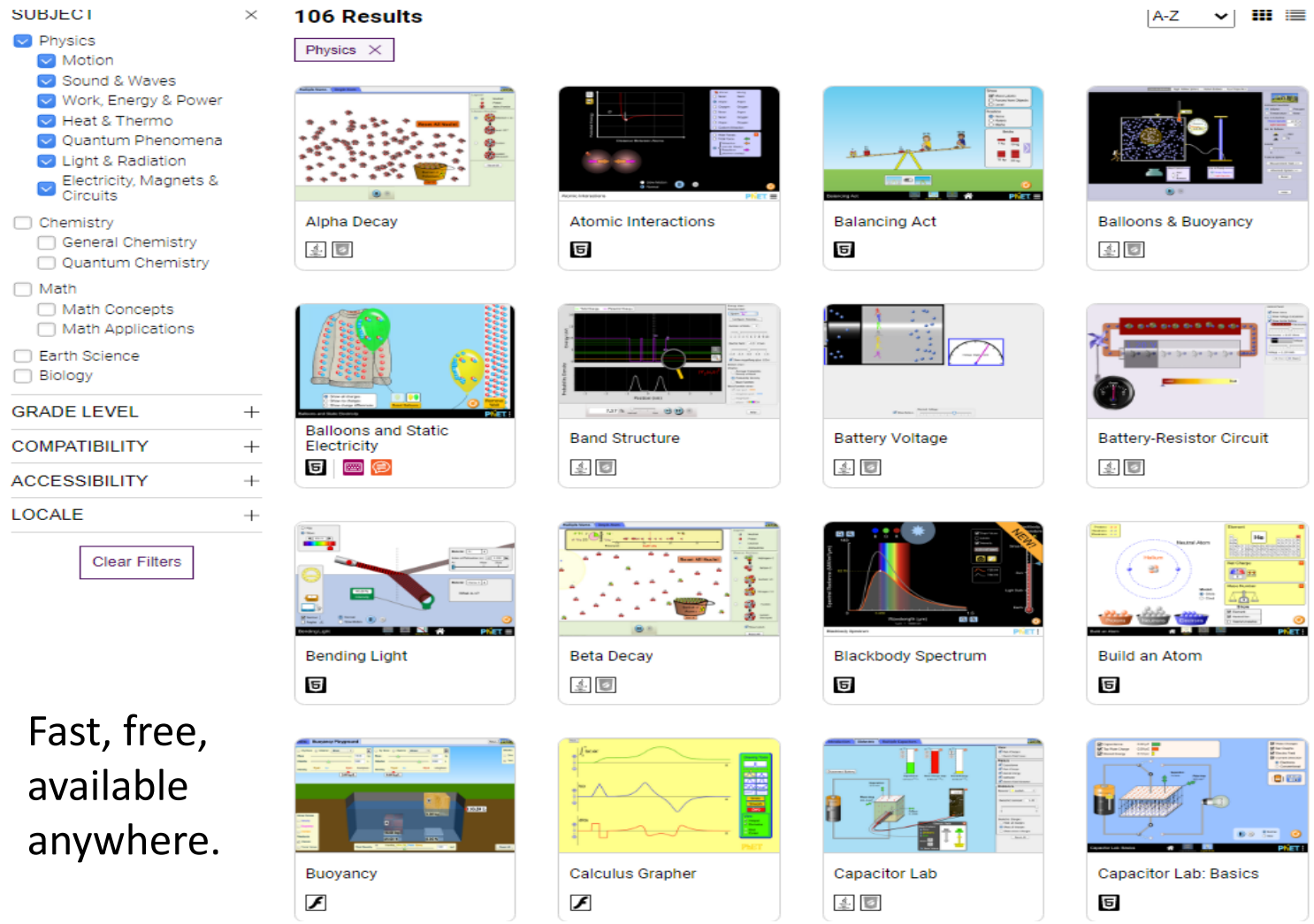
Students were in different countries and time zones:
Australia, India, Pakistan, Vietnam, Malaysia, Sri Lanka, Africa.



Deakin College Practicals: Simulations from PhET - University of Colorado

https://phet.colorado.edu/en/

- Pendulum
- Hooke's law
- Motion inclined plane
- Projectiles
- Friction
- Ohm's law
- Standing waves



Fast, free, available anywhere.

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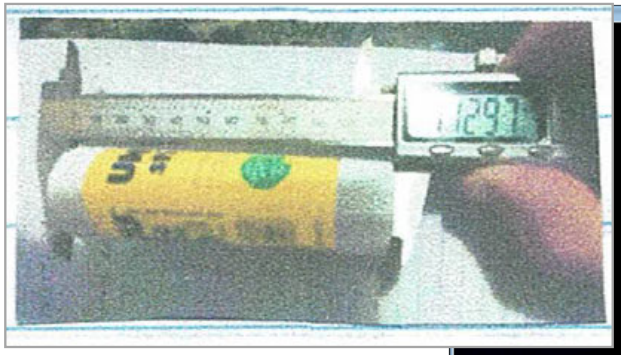
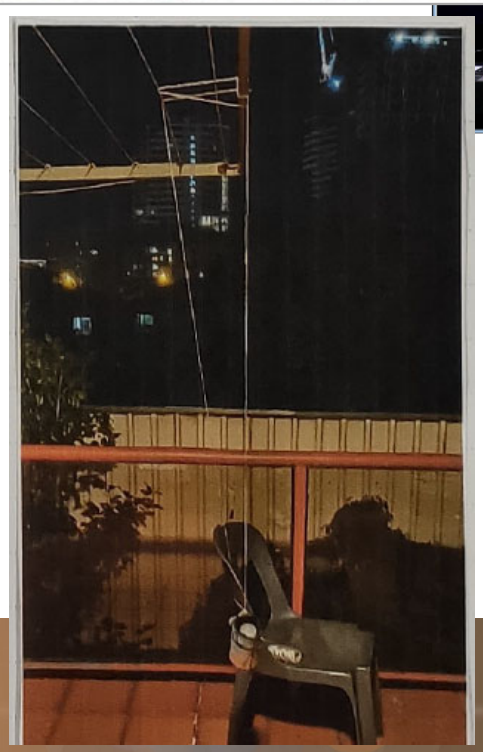
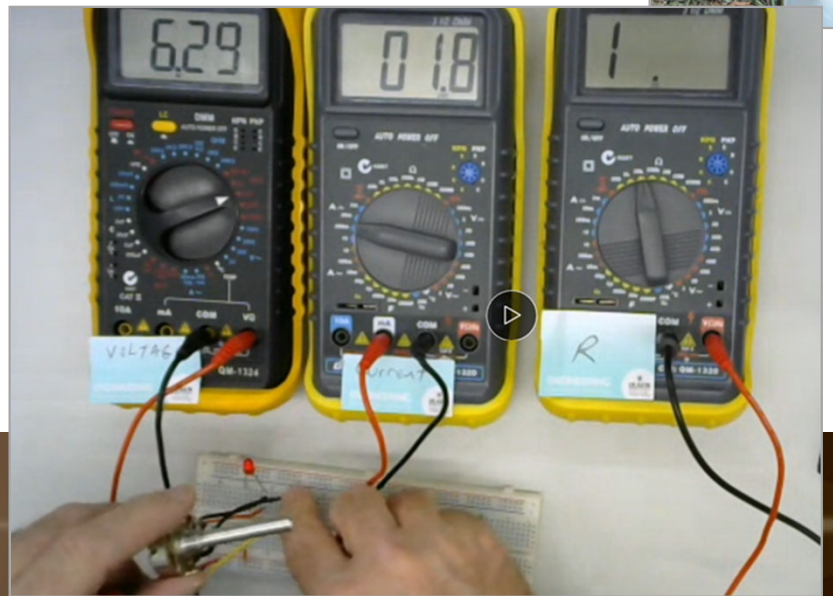
Deakin University Practicals: Mix of at-home and online activities

- Measurements and uncertainties
- Pendulum
- Hooke's law
- Ohm's law web-cast
- Standing waves videos (2 parts).



Vibrations on a wire. The lecturer calls out the data.





Outcome

- Deakin College online teaching was successful (two semesters 1 and 2) based on

  1) Student results very similar as compared to pre COVID.

  2) Student satisfaction enhanced for Deakin College.

  3) Future demand for continued online class, especially domestic students.

- Deakin Uni on-campus students made the transition well, but students were very anxious about it.
- Deakin Uni off-campus was almost business as usual. On-campus prac sessions could not run in semester one and will not run over summer. 2021, who knows?

The Future

- The University and the College look forward to campus reopening and resuming on-campus classes. This will not fully happen until later in 2021 (if we are lucky).
- In the meantime online teaching and at-home activities will continue.
- Developing more at-home, hands-on practicals.
  - Remote beam-bending experiment
  - Arduino kits for collecting real-time experimental data
  - Cell-phone apps for physical measurements
- Updating online teaching videos and other resources.

Bibliography

- S. Lal, A.D. Lucey, E. Lindsay, D.F. Treagust, M. Mocerino, J.M. Long, and M.G. Zadnik, "The Effects of Remote Laboratory Implementation on Freshman Engineering Students' Experience," *Proceedings of the 2018 American Society for Engineering Education National Conference* (Salt Lake City), 24-27 June, https://peer.asee.org/31094.
- J.M. Long (2020), "Anywhere-Anytime Engineering Education in a Complete Undergraduate Program," *International Journal on Innovations in Online Education* **4**(1), DOI 10.1615/IntJInnovOnlineEdu.2020033158, http://onlineinnovationsjournal.com/streams/editor-s-choice-articles/7c549ff75aba3cea.html.
- J.M. Long (2016), "Online Learning in an Engineering-Physics Course," OLC Effective-Practice Award, http://olc.onlinelearningconsortium.org/effective_practices/online-learning-engineering-physics-course.
- J.M. Long, S.W. Cavenett, E. Gordon, and M. Joordens, "Enhancing Learning for Distance Students in an Undergraduate Engineering Course through Real-time Web-Conferencing," *Proceedings of the 2014 American Society for Engineering Education International Forum*, (Indianapolis), 14 June 2014, https://peer.asee.org/1718.
- J.M. Long, K.L. Chenery, W.B. Stannard, and K.J. Fitzgerald (2013), "Use of Web-Conferencing Software to Enhance Practical Learning for Distance Students in a First-year Engineering Course," *Proceedings of the 24th Annual Conference of the Australasian Association for Engineering Education*, editors C. Lemckert, G. Jenkins, and S. Lang-Lemckert (Gold Coast, Queensland), 8-11 December (ISBN 978-0-9924099-0-6).
- J.M. Long and K. Chenery, "Teaching Physics Lab to Online Students," American Association of Physics Teachers 2018 Summer Meeting (Washington, DC), 28 July to 01 August (http://aapt.org/Conferences/sm2018).
- J.M. Long, P. Huf, A. Mahato, and R. Sian (2017), "Partnership Teaching in a First-Year Life-Sciences Physics Unit," *Proceedings of the 23rd Australian Conference for Science and Mathematics Education* (Melbourne), editors T. Overton and A. Yeung (Sydney: UniServe Science), p. 117 (ISBN 978-0-9871834-6-0, http://www.acds-tlcc.edu.au/wp-content/uploads/sites/14/2017/09/2017-ACSME-proceedings.pdf).
- J.M. Long, S.K. Thomas, A.M.V. Campbell, T. Crawford, R.K. Sian, W.B. Stannard, K.L. Chenery, A. Mahato, R. He, W. Cong, J.M. Dowthwaite, and M.A. Joordens (2014), "Video Presentations in Engineering-Physics Practicals to Increase the Efficiency of Teaching and Learning," *Proceedings of the 25th Annual Conference of the Australasian Association for Engineering Education,* editors A. Bainbridge-Smith, Z.T. Qi, G.S. Gupta (Wellington, New Zealand), 8-10 December. (ISBN 978-0-473-30428-7).
- C.E. Wieman, W.K. Adams, P. Loeblein and K.K. Perkins (2010), "Teaching Physics using PhET Simulations", *The Physics Teacher*, **48**, pp. 225-7.

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