

Designing for online, blended and synchronous learning for computing students

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December 2022

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TechLauncher: Group Computing Project

- Developed by Dr Shane Flit, now run by Dr Charles Gretton
- Combines five ANU undergraduate & postgraduate project courses
- Students work on a *real* project, in a team for a *real* client, such as CEA.



HMAS Perth with a Phased Array Radar
from CEA Technologies in Canberra

See: R. Awasthy, S. Flint, and R. Sankaranarayana, "Lifting the constraints—closing the skills gap with authentic student projects," in 2017 IEEE Global Engineering Education Conference (EDUCON). IEEE, 2017, pp. 955–960.

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2020 Flip to Online Learning

2019: Blended delivery: Tasks set online, F2F workshops.

2020/21: Online delivery due to COVID-19 emergency: workshops via Zoom.



Applying the AT framework

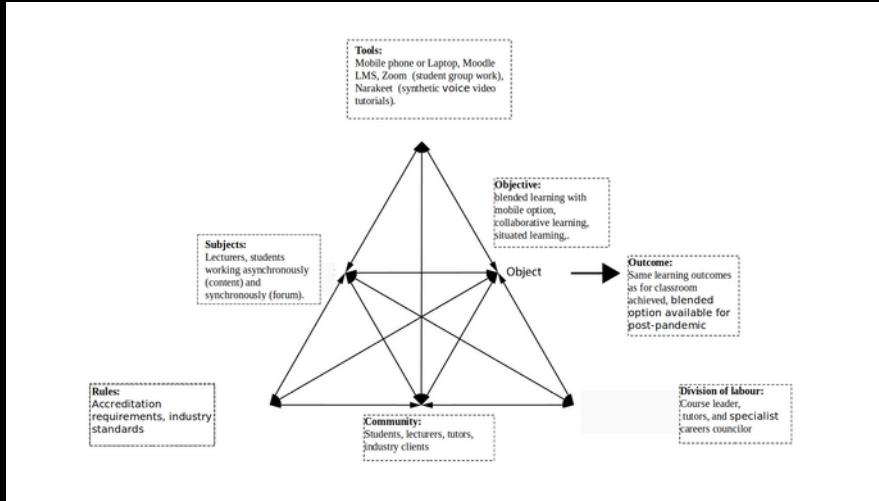


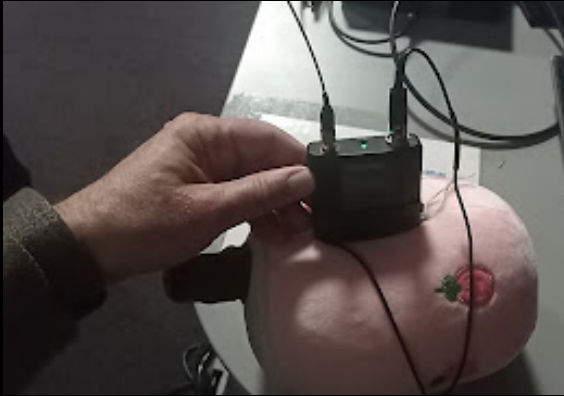
Figure 12. Online, blended and synchronous learning for computing students as applied to an AT framework (Case 6), from Cochrane, Et al., 2022.

DTML-PAH Matrix analysis



Figure 13. DTML-PAH Matrix analysis (DTML-PAH Matrix score = 18), Case 6, from Cochrane, Et al., 2022.

Some Fun With Hybrid Learning



Inserting microphone into a \$10 soft toy



Makes a throw-able microphone

One Future: Teaching Like a TV Chat Show?



Frankly set, ABC TV, 2022

Conclusion

Replacing lectures with online exercises, group workshops, and peer-assessed progressive tasks is viable.

Replacing F2F workshops with video conferences is viable. Hybrid mode with some students in classroom, & some online, increases staff workload, but is feasible.

There is no need to design, & administer separate F2F & online versions of courses.

This reflects a social constructionist approach to scaffolded peer learning (Lindley, 2007).

A longitudinal study of this approach would be of value.

D. Lindley, "Computer professional education using mentored and collaborative online learning," in SEARCC 2007, Proceedings of the South East Asia Regional Computer Conference, 2007, pp. 18–19.

Questions & More Information

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Paper on the blended design:

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TechLauncher:

https://cs.anu.edu.au/TechLauncher/current_students/

Learning to Reflect Module for TechLauncher, Blog posts 2018 to 2022, with drafts, & commentary: https://www.tomw.net.au/technology/education/learning_to_reflect/

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Designing for online, blended and synchronous learning for computing students, by Tom Worthington, School of Computing, the Australian National University, December 2022.

For the paper “Analysing mobile learning designs: A framework for transforming learning post-COVID” (Cochrane and others, 2022), I provided the sixth case study. This was on “Designing for online, blended and synchronous learning for computing students”.

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About the Speaker: Tom Worthington is an independent computer professional, educational designer and an Honorary Senior Lecturer in the School of Computing at the Australian National University.

A Certified Professional member of the Australian Computer Society, in 2015 Tom received a national gold Digital Disruptors Award for "ICT Education" and in 2010 was Canberra ICT Educator of the Year. Tom previously worked on IT policy for the Australian Government, and in 1999 he was elected a Fellow of the Australian Computer Society for his contribution to the development of public Internet policy. He is a Past President, Honorary Life Member, Certified Professional and a Certified Computer Professional of the society as well as a member of the Institute of Electrical and Electronics Engineers, and Fellow of Advance HE (UK)..

Tom has a Masters in Education (specializing in Distance Education) from Athabasca University, a Graduate Certificate in Higher Education from the Australian National University and a Certificate IV in Training and Assessment from the Canberra Institute of Technology. He blogs as the HigherEducationWhisperer.com.

While an Honorary Lecturer in Computer Science at the Australian National University, a member of the Blockchain Technical Committee and the Professional Education Governance Committee of the Australian Computer Society, his views here do not necessarily reflect those of either organization.

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TechLauncher is an Australian National University computer science program developed by Shane Flit, and now run by Dr Charles Gretton. It combines students from several undergraduate and postgraduate computer science project management courses, to work on real projects for a real client (Awasthy, Flint, & Sankaranarayana, 2017). As an example, several teams of students have worked on testing phased array radar for the Australian military.

After working as a team, the students last task for assessment is to prepare an e-portfolio and reflect on their learning. Student found this a very abstract task. As this was one of the last tasks to complete before graduating, it was changed to have the student apply for a job, a PhD program, a grant to set up a company, or whatever else they may be planning to do next. The student still has to document what they have done, what they have learned, and how they learned it, but in a practical form.

All of the students at the Australian National University have to opportunity to make an appointment for a personal consultation with the Careers unit, to help with job finding. Online tools are also provided for students to prepare a resume, practice responding to selection criteria, and preparing application letters. However, students are reluctant to avail themselves of these services while busy studying. To overcome this reluctance, the process of preparing an application has been integrated into their capstone course, as their last assessed task. Tempe Archer and staff of the ANU Careers unit teach job finding techniques, with assessment and support of School of Computing staff.

References

Work Portfolio Package (WPP), TechLauncher, ANU, 2019

https://cs.anu.edu.au/TechLauncher/current_students/evaluation/work_portfolio_package/

R. Awasthy, S. Flint, and R. Sankaranarayana, "Lifting the constraints—closing the skills gap with authentic student projects," in 2017 IEEE Global Engineering Education Conference (EDUCON). IEEE, 2017, pp. 955–960.

2020 Flip to Online Learning

2019: Blended delivery: Tasks set online, F2F workshops.

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For 2020, the computer project management course at the Australian National University switched from blended to pure e-learning (Worthington, 2019). The course consolidates learning at the end of a degree, with a reflective portfolio (Browne et al., 2020).

The course was delivered twice in blended mode, just before the pandemic in 2019. In 2020, the workshops moved to Zoom and students undertook the same small-group activities in Zoom rooms. No changes were required to the learning objectives, course notes, assessment, or the Moodle learning management system. The materials had been prepared using accessible design, to allow for a mobile device.

Applying the AT framework

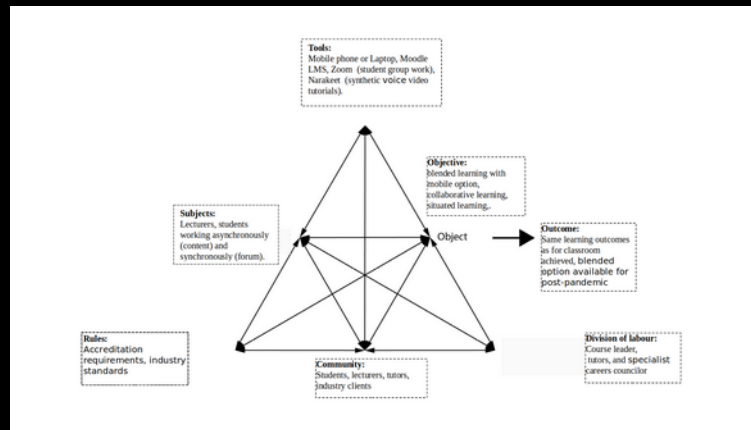


Figure 12. Online, blended and synchronous learning for computing students as applied to an AT framework (Case 6), from Cochrane, Et al., 2022.

As online tools common in the computer industry were already in use, no changes were required to the roles of those involved: student, tutor, client, lecturer and careers counsellors, while there was increased use of online tools to replace face-to-face meetings (see Figure 12)

DTML-PAH Matrix analysis

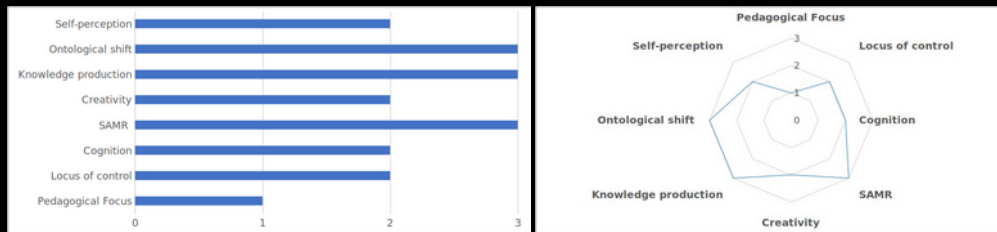
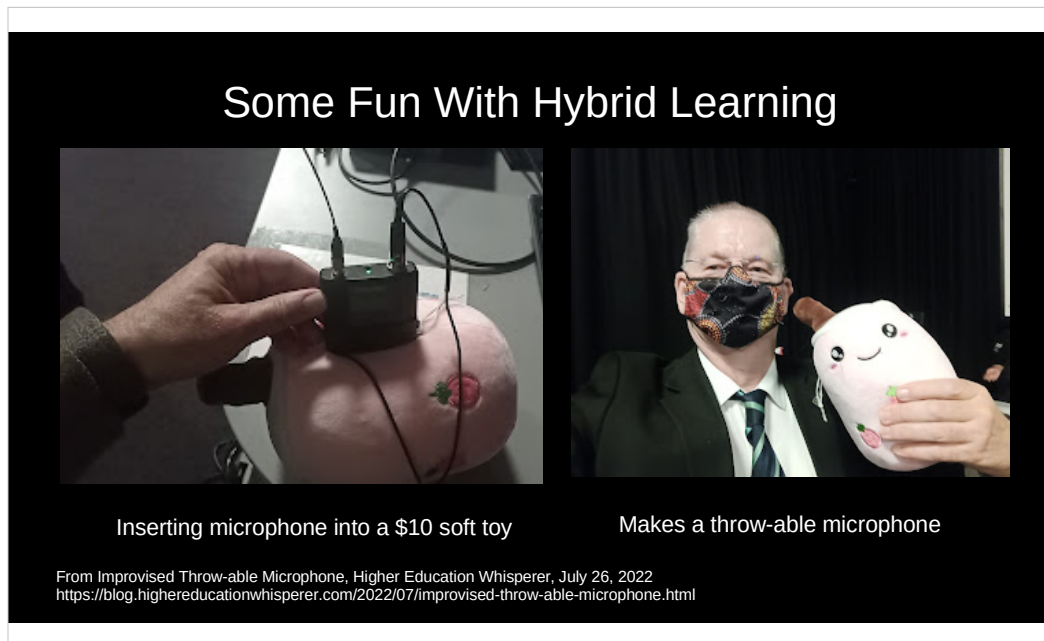


Figure 13. DTML-PAH Matrix analysis (DTML-PAH Matrix score = 18), Case 6, from Cochrane, Et al., 2022.

Short videos were generated using a text-to-speech tool, with closed captions for the deaf (SDG10: Reduced inequalities; United Nations, 2016). This resulted in videos suitable for low-speed wireless broadband links and mobile devices.

Student engagement was encouraged through short online exercises and peer feedback with a few marks. No examinations were used, with teams of students working for a real client. This represents an andragogical approach, with each team of students responsible for planning their work, within a framework set by the course (see Figure 14).



With COVID-19, it has been a difficult few years in higher education. We can look forward to a better future. Without forgetting those we have lost, or lessons learned., there is time to have some fun.

Universities now need to either teach entirely online, or with some students in a classroom and some online (so-called *hybrid* mode). In a large classroom it can be difficult to get a microphone to a participant. So there are throw-able microphones available. These consist of a wireless lapel microphone inside a soft foam cube, or ball.

So I made my own throw-able microphone from a \$10 soft toy. The toy has a zip, so I inserted a wireless lapel microphone into the fiber-fill of the toy. I removed the metal tag from the zip on the toy, and replaced that with string, to reduce the risk of injury.

The idea is you can throw the unit to someone, without damage to the microphone. Some will automatically mute the sound while being thrown. But the improvised unit worked fine. The only problem was some of the toy's stuffing clung to the microphone, when I removed it.

One Future: Teaching Like a TV Chat Show?



Frankly set, ABC TV, 2022

One possible future is hybrid learning using a setup like the [ABC TV's Frankly chat show](#). *Frankly* uses a standard chat show format: the host sits stage left, with space for four guests beside them. There is a flat area in front for two of rows of small tables, for audience members who will appear in reaction shots. The rest of the audience are in theatre seating behind. ABC TV use movable cameras with operators. For education we can make do with fixed, voice operated cameras, preset on the presenter positions, and audience.

This room setup would combine features of the flexible flat floor classroom, with those of a traditional lecture theatre. It could be implemented by removing some rows of seating in a fixed lecture theatre, and more easily in rooms with retractable seating, by partial retraction, leaving enough space for tables. The idea is to provide a more interactive up-front (literally) experience for those students who want it, while those who prefer to sit back can. It will also provide a more lively experience for students participating online in real time, and those watching the recording later.

Conclusion

Replacing lectures with online exercises, group workshops, and peer-assessed progressive tasks is viable.

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Final year international graduate computer science students at an Australian university engineering college undertook online exercises, group workshops, and peer-assessed progressive tasks to assist students to learn to write about learning. The students trialing this approach in 2019 were able to achieve results comparable to a previous class using conventional lectures. These skills are difficult to acquire using conventional lecture and tutorial based teaching. Replacing lectures with online exercises, group workshops, and peer-assessed progressive tasks appears a viable alternative.

The aim of this work was to deliver a usable unit of instruction for students, rather than conduct formal research. What has been implemented reflects a social constructionist approach to scaffolded peer learning (Lindley, 2007).

A longitudinal study of this approach would be of value. However, it is possible that, as with other studies of conventional, versus technology-assisted learning, the "no significant difference" effect is in play. As teachers, we can only provide an environment for students to learn, and then leave it to them to learn.

Reference

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