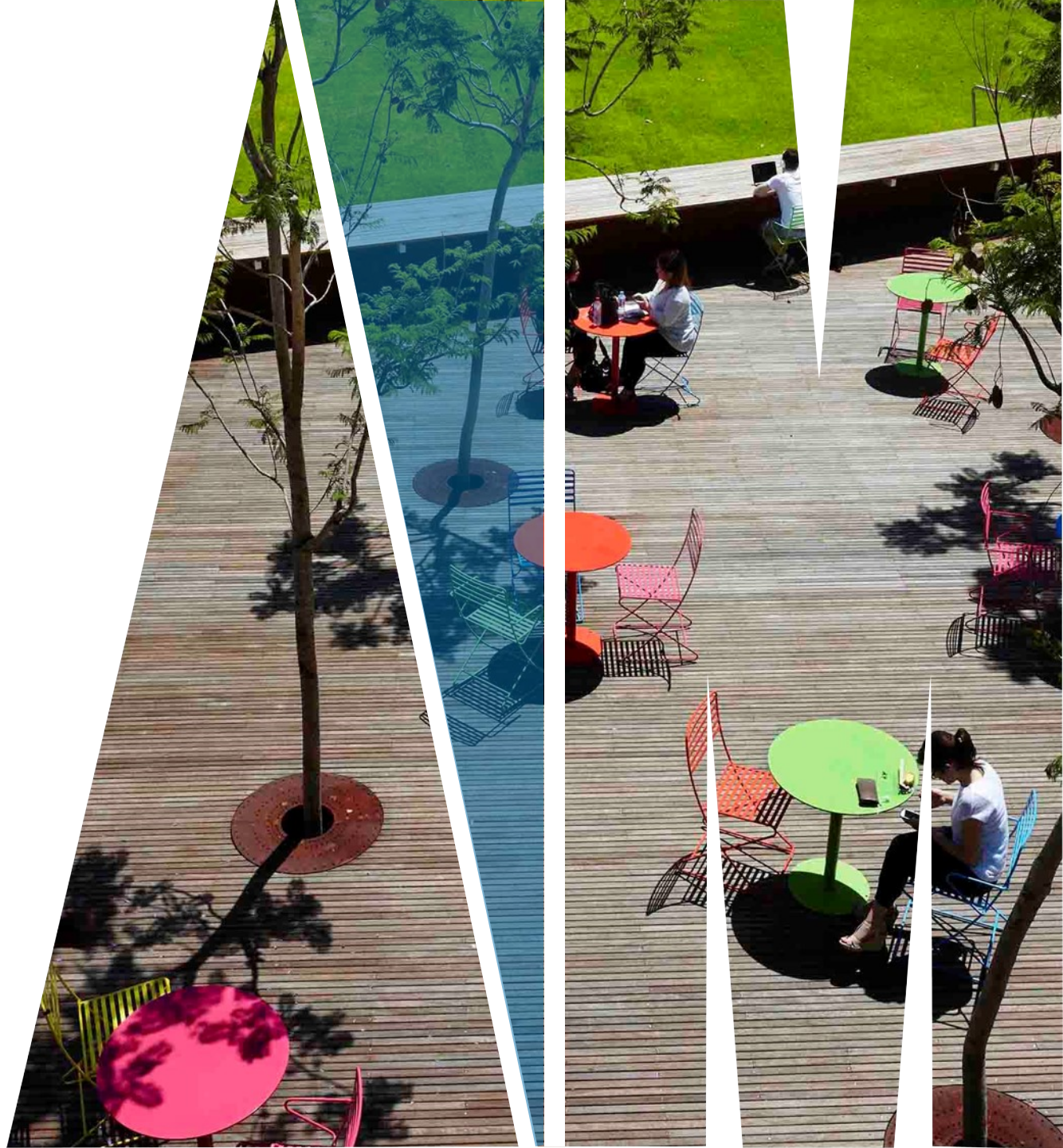
MONASH University

# Changing a School's Curriculum

David Albrecht, Deputy Dean (Education) Faculty of IT

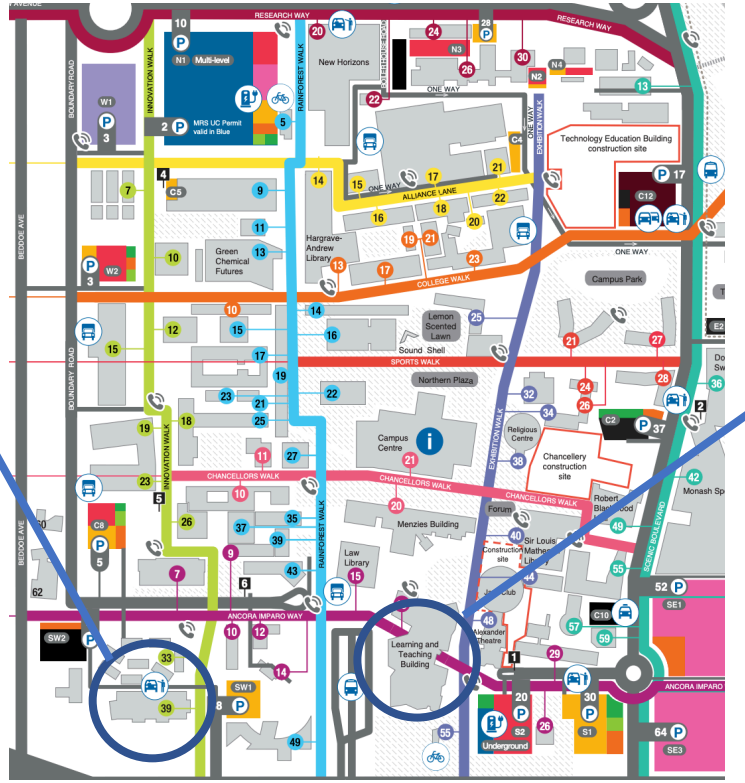


JOHN MONASH
SCIENCE SCHOOL

Started 2009


JMSS

LTB



# Digital Technologies curriculum

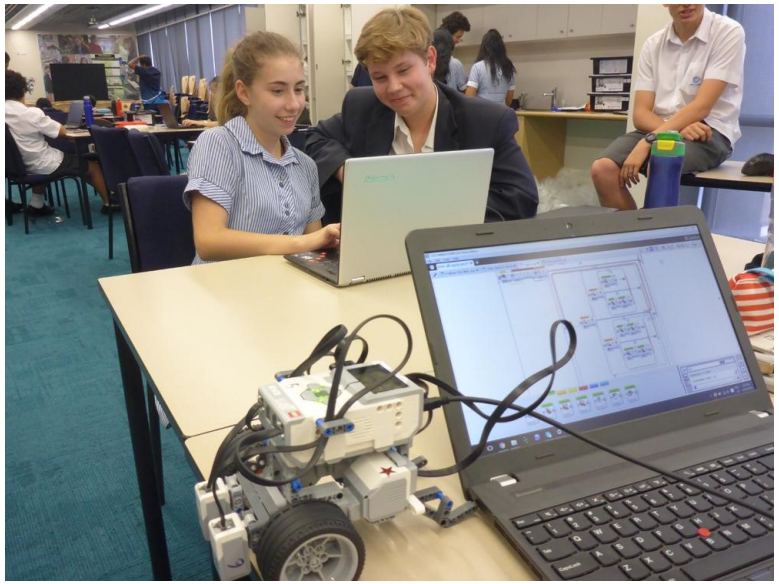
*(Abramson and Albrecht) mounted a compelling case for the incorporation of technologies teaching in science, simply because, in their view, contemporary science research cannot happen unless technology is involved. So much experimentation in things like astrophysics through to molecular biology is not necessarily in test tubes and wet-labs anymore, it is through mathematical and computer modelling ... It was quite clear that we needed to capture some ground and skill our kids up (in digital technologies) if they were going to head into a career, let alone a university course, that was starting to champion the use of digital technologies.*

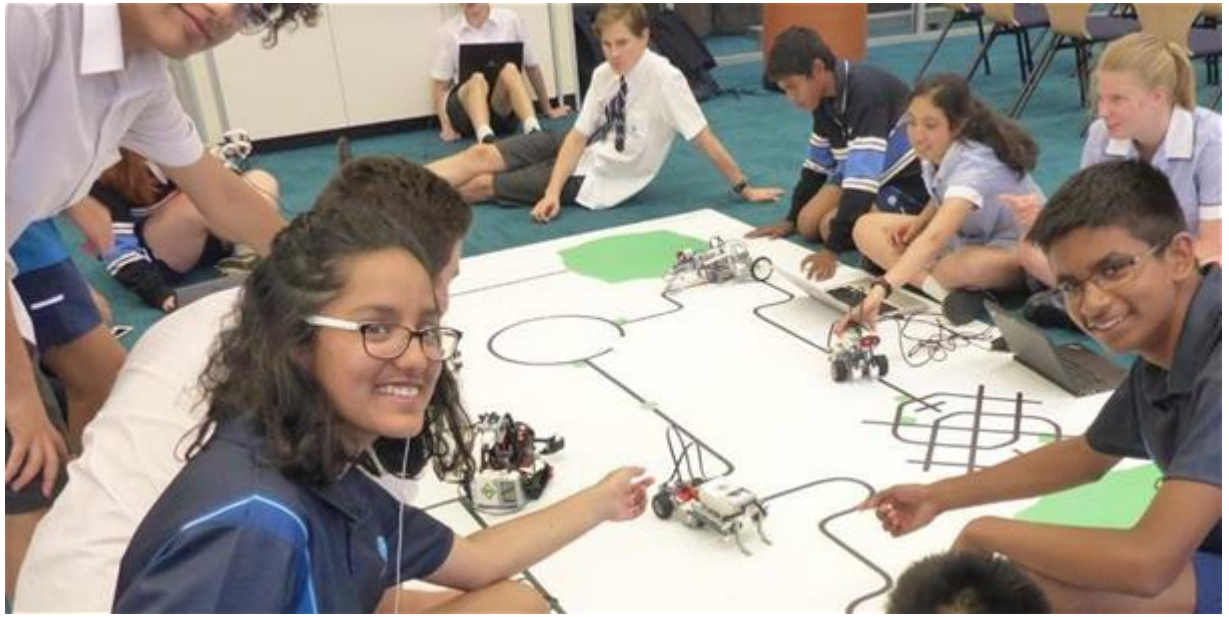
– Peter Corkill, Principal, JMSS.

# Creative Studies

Topics included:

- Simulations
- Algorithmic art
- Generative music
- Robotics
- Natural computation
- Python programming
- Introduction to AI





https://www.digitaltechnologieshub.edu.au/teachers/case-studies/secondary/john-monash-science-school

# Algorithmics


Topics include:

- Introduction to algorithms
- Abstract Data Types
- Algorithm design patterns, including brute-force search, greedy methods, decrease and conquer, backtracking, divide and conquer, and dynamic programming
- Graph traversal techniques: breadth-first search, depth-first search and best-first search
- Graph algorithms, including Prim, Dijkstra, Bellman-Ford, and Floyd-Warshall
- Algorithm complexity
- P and NP
- Master Theorem for solving recurrence relations
- Classic problems, including knapsack, graph colouring, and travelling salesman
- Turing machine
- Church-Turing thesis
- Chinese Room argument

# Computational Physics

- Combination of Physics and Specialist Mathematics
- Develop models in Mathematica

# Data Science

- Integrating Data Science into all the science subjects
- Terraforming Mars subject
- Training teachers in data science

# Cyber security

- Introducing a new subject on cyber security

https://www.123rf.com/photo_87102744_mars-planet-satellite-station-orbit-base-martian-colony-space-landscape-.html