



# *Using management students as markers in engineering project papers*

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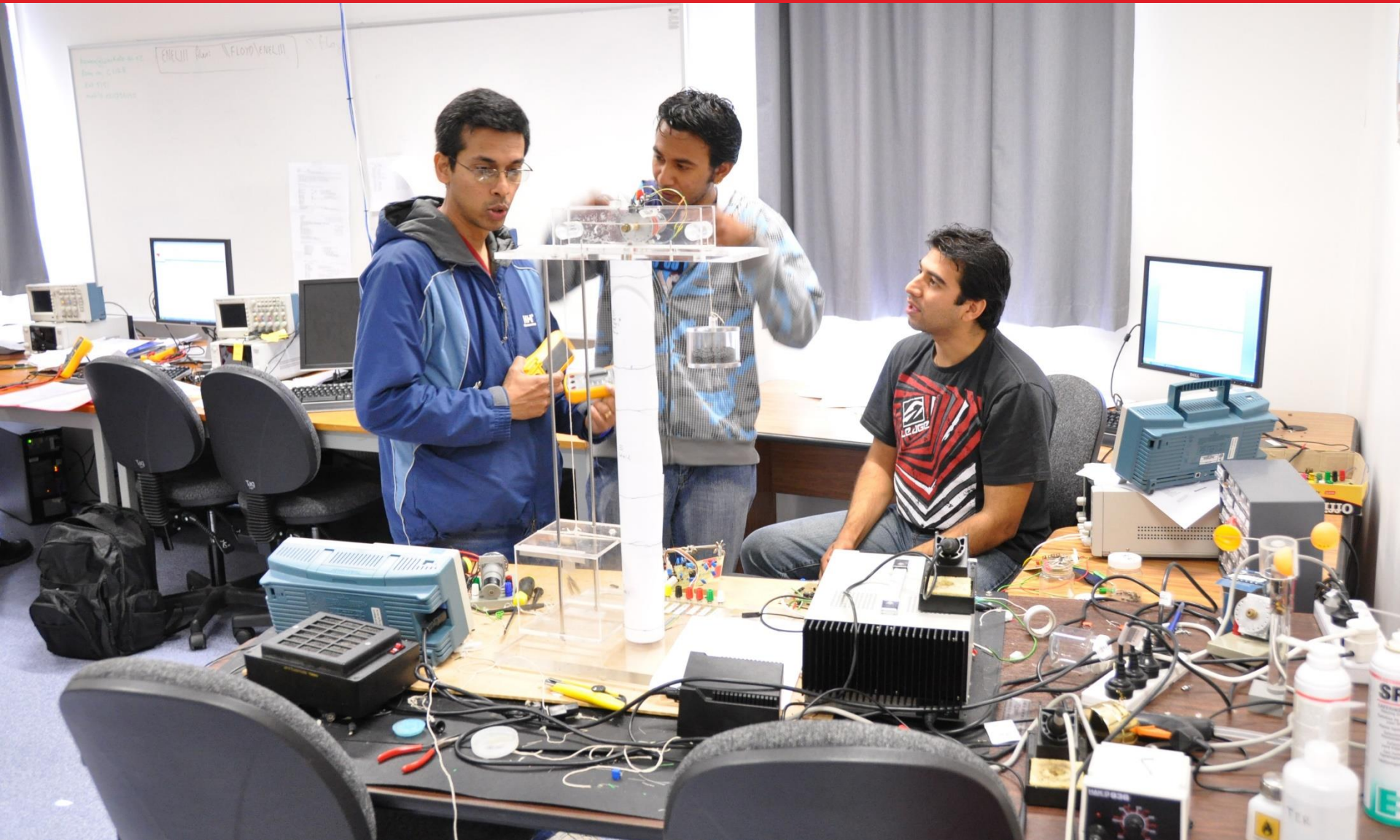
Sinduja Seshadri (Science)

- ENEL417 - final-year EE paper
- Brings together 3 years of learning
- Based on real-world engineering workplaces
- 2+ hours/day each week, 8-16 students
- PBL

# Background



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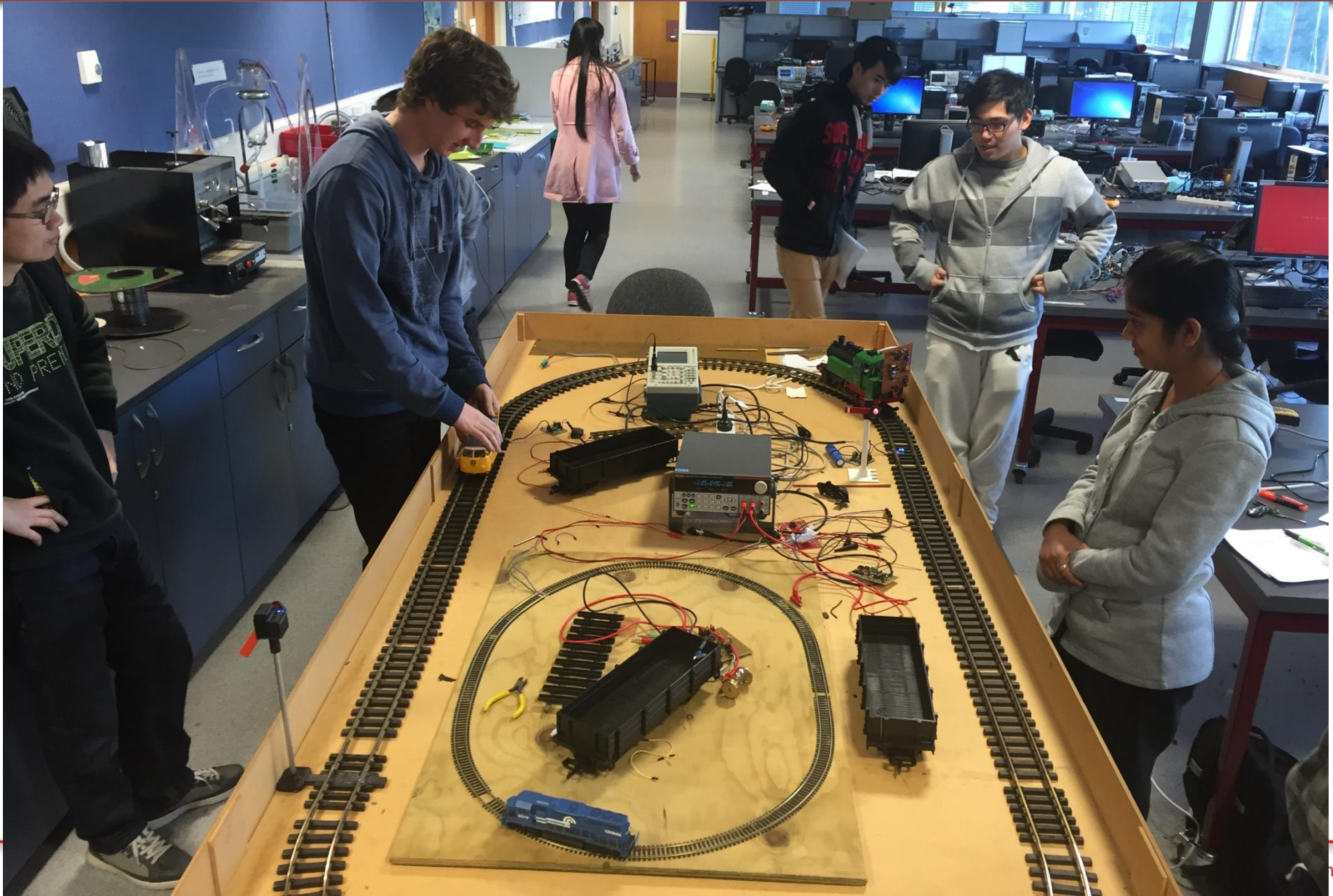
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- Lecturer available to provide tech assistance
- Issue: non-technical skills
  - planning
  - self-management
  - Progress reporting
- Students reluctant to plan milestones, articulate their thinking

- Trial: add a non-technical demonstrator
- Boss often does not know the tech in detail!
- 30% marks assigned to “keeping the boss posted”, “convinced you are progressing”, “you know what you are doing”.



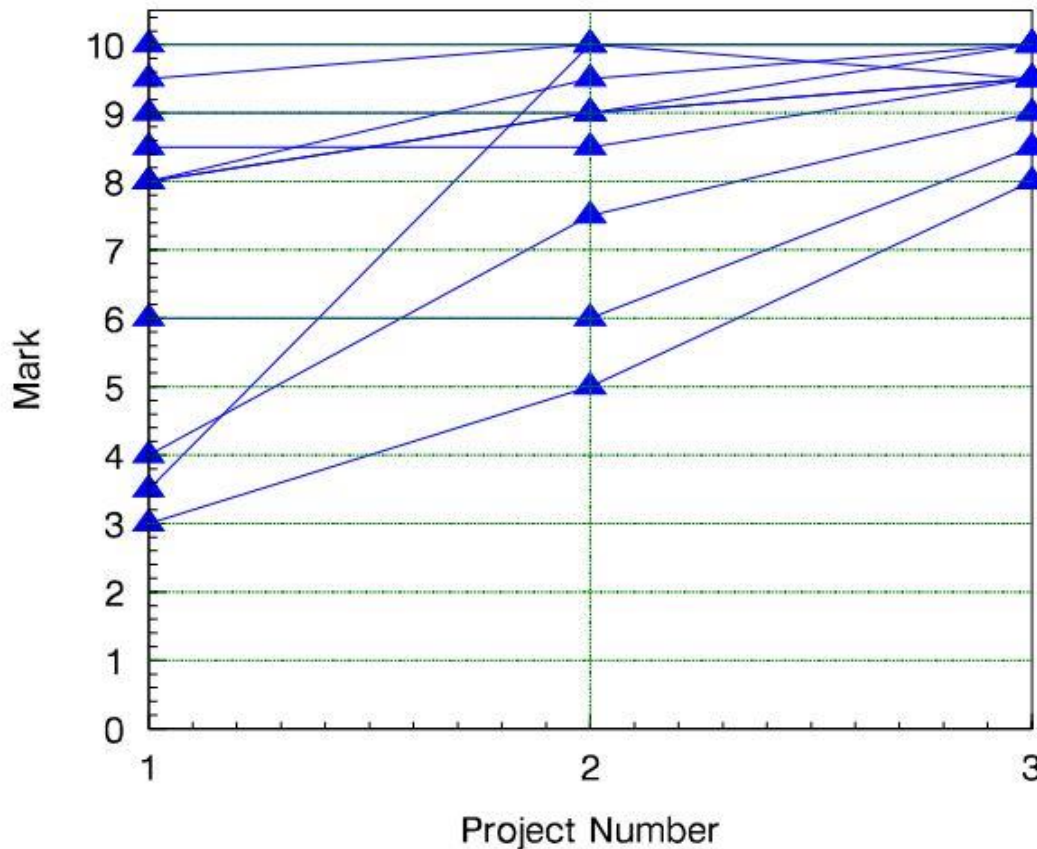
- Demonstrator - science UG student with a previous commerce degree as a course tutor
- Visit students on a weekly/ad hoc basis in lab
  - Packard’s (1985) Management By Walking Around
- Demonstrator had little technical knowledge
  - Could not be subverted
  - Needed students to plan their own work
  - Needed non-detailed explanations
  - Was an “outsider”

## Marking criteria

1. Student understanding of their project [1 mark]
2. Student ability in planning and organising their project (i.e. milestones with time frames) [4 marks]
3. Student ability in explaining issues that they ran into [2 marks]
4. Student ability in resolving project issues [2 marks]
5. Student providing evidence of their progress [1 mark]

# Overall student achievement

- Overall improvement in student achievement & non-technical ability to explain and report on their project



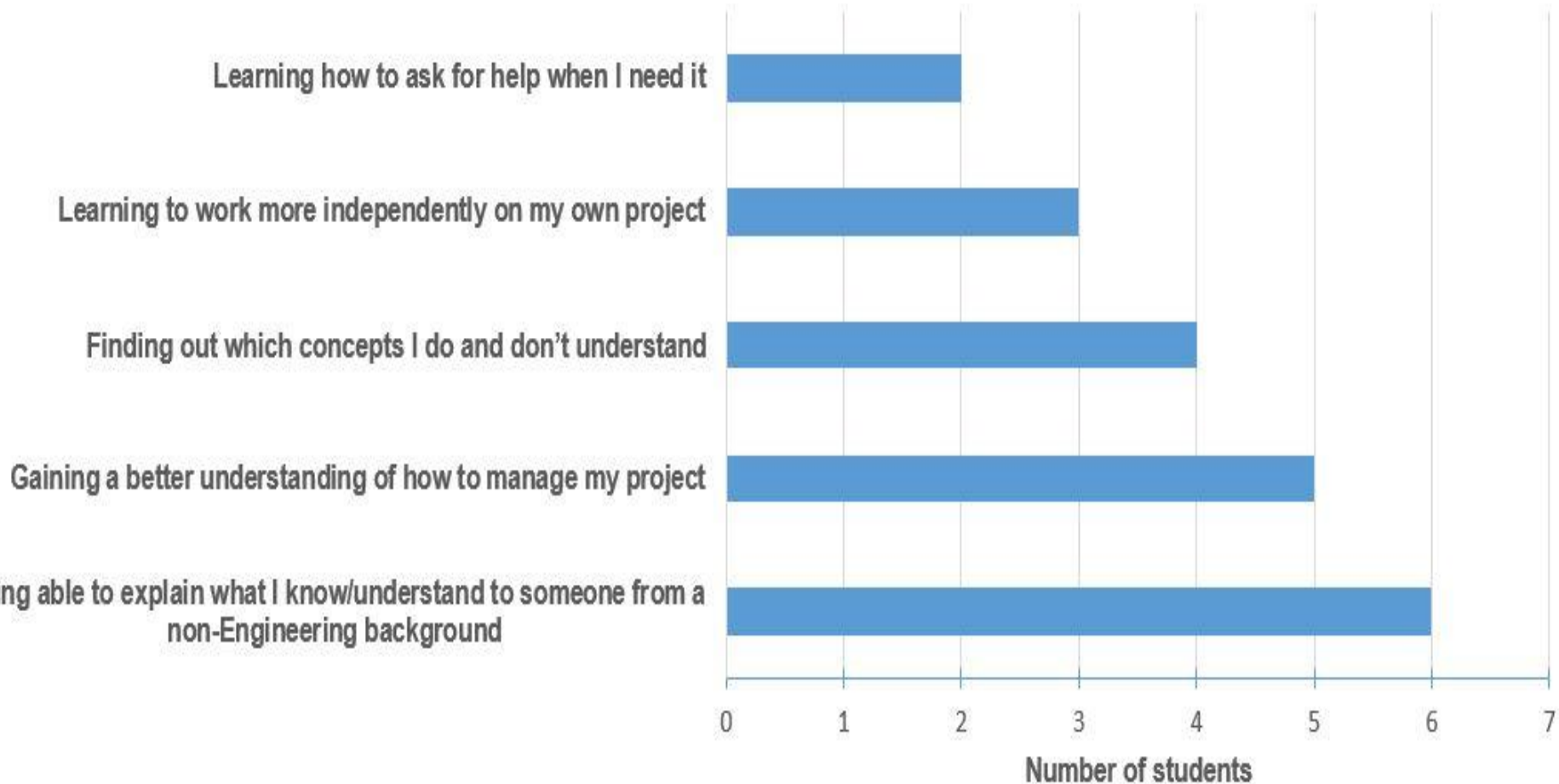
# Overall student achievement



*It worked really **best for the average students**. The good ones already had it under control. It's the ones that were in the middle range who benefited most. The weak ones probably benefited but still struggled a bit....There's a **definite trend of improvement**, most had got it by the second one [project] but by the third one they've all pretty much got it. The non-technical skills, they [students] are starting to get more organised, aiming for the deadline. The students struggling to achieve the midway assessment in the third project by the end had caught up. They all passed that last bit comfortably (Lecturer 1).*

# Non-technical skills learnt

- Students' overall positive perception of the trial
- All students reported it was helpful





- *Communicating and demonstrating thinking:*

*Many papers in engineering asks students to **do some lab work and write up a report. This hardly happens in real EE companies.** You keep a lab book and you convey the outcome of some measurement to your colleagues in a meeting. One of the key skills you need is the ability to come up with some lab measurement and go ‘We have been doing this wrong and we need to [whatever]... or you say that, I did this and it worked quite well’. So **the way students communicate is not by writing report to people. It’s by telling them what is going on and showing them here is the proof** (Lecturer 1).*



- *Problem-solving, communication and being customer-focused:*

*If you are going to invest your time, money and training for an engineer, he/she should be able to set milestone, be able to solve problems, or give a time frame to the supervisor about the problem they have encountered. Because the customer wants the product in a certain timeframe. It's a very important skill to be able to communicate to the customer where you are at in the project-making process. Why would they [customer] choose your company if they can get the same product but with better communication from another company who is keeping in touch with the customer, taking the customer's needs into account (Tutor).*

*It was helpful to have a person that has a tangential understanding of what is happening but requires updates on what we were doing, this is a good comparison to what we will expect in the workplace (student).*

*It made it easier to explain things, we didn't need to go really basic, we could talk about our components and she'd understand. There are certain things you can take for granted that she knew; how components work, for instance using capacitors to filter things out. I don't have to stop and explain [otherwise] it will slow us down as well. You do need a certain degree of technical knowledge (Student, Focus group).*



# Maintaining regular planning & progress



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*I was so focused on what I was doing and not thinking about what it [part of the project] will be building onto but ...when you talk to the tutor and she asks 'What's next?' then you actually stop and think, 'Ok this is still what I have got to do'. Initially I didn't really set up milestones but when I started talking to her then I can tell her what it is going to look like. Milestones help to put the whole project in perspective, explaining to her [tutor], it quickly became apparent whether you are ahead or behind schedule (Student, focus group).*

*The best result I saw was their checklist through email. They would send me a checklist and they would print off the checklist or keep it up on the screen and show me each time I came in, [explaining] 'This is where I am at, I am doing this for this particular reason, for example, I am soldering this circuit because I want to read data off the tracks...' Every student did this towards the end (Tutor).*



You are trying to *change the language*, you are not thinking of specifically coding language. It's a separate thing, so you are *thinking of slightly different perspectives*. You don't need to consider how to build it on the schematic, it's just that *thinking in simple language*, 'What I need to do to get the motor driving is...' It does change the way you think in the language you won't normally use (Student).

I made sure to fully understand what I am doing to ensure that I could give her the correct information. This was helpful because at times *I would solve problems that I have been stuck on while trying to understand my project* (Student).

- Clarifying roles, expectations and responsibilities
- More flexibility in modes of reporting & pre-arranging reporting times
- Obtaining regular feedback about progress

*It would have been good to **get some feedback of how well we were communicating with the tutor throughout the projects instead of just at the end.** This would be so that we could work at improving during the current project instead of the next project.*

- Tertiary institutions tasked with responsibility to offer relevant and authentic curricula to enable students to develop important technical and non-technical/workplace competencies
- Our trial innovation of separating the technical and reporting assessments, and having the reporting handled by a non-technical demonstrator worked really well
- Next step: to implement across a number of project-based courses and assess any difference due to tutor background (science or non-science)

*Thank you...*



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