Engineering e2e – an evaluation

In late 2017 an evaluation of Engineering Education to Employment (Engineering e2e) was undertaken by New Zealand Council for Educational Research (NZCER) Chief Researcher Karen Vaughan. This was a high-level review of documentation and 16 interviews with Steering Group members and initiative or project leaders asking about the ways in which Engineering e2e acted as a systems integrator and what can be learned from this. This is a summary of its findings.

About Engineering e2e

Engineering e2e is a programme designed to increase the number of engineers in New Zealand. It was established in 2014 by the Tertiary Education Commission (TEC) in response to Government concerns about the economic impact of a forecasted shortfall of engineers, especially for Level 6 and 7 graduates. It represents a partnership between TEC the institutes of technology and polytechnics (ITPs), Business NZ, Engineering New Zealand and a number of organisations that employ engineers or benefit from their services.

The programme is guided by a Steering Group representing key stakeholder groups from the engineering sector including education and employment in a wide range of disciplines.

Engineering e2e as a systems integrator

Engineering e2e acts as a systems integrator– one that catalyses, coordinates and monitors education-employment activity. Systems integration is a high-level, flexible, all-encompassing approach that focuses on how best to work in order to decide what actions to take. Deciding on actions depends on how the system is conceived (its nature, its scope), and any decision naturally brings some advantages and some trade-offs.

Engineering e2e has a *workforce development approach* focused on coordinating individual opportunities, organisational goals, and national priorities for economic growth. This is distinct from a *career development approach* which provides information and support to help people manage their careers at different stages.

The review of Engineering e2e documentation and interviews with Steering Group members and initiative or project leaders identified a number of benefits to this approach:

- Project leader interviewees emphasised the role of funding in freeing up attention to see the bigger picture and imagine different ways of working.
- Steering Group interviewees emphasised the value in being part of something not "owned" by any one organisation, and having a collaborative approach with a mandate to try things.
- All interviewees picked out new or stronger relationships as the key to success because it was the relationship that enabled new or deeper understandings, fostered open communication and created collaboration possibilities.
- All interviewees saw value in realigning their work with others.

Engineering e2e's successes in its role as systems integrator

Catalysation:

- Taking a systems-view helps counter the accepted idea of competition between providers
- Influential leadership lends weight and creates momentum
- Establishment and oversight of new relationships, leads to opportunity-spotting
- This includes new things tried in curriculum, pedagogy, and pathways in secondary and tertiary education
- Opening up of 'space' through funding and resource for project leaders to work differently and consider possibilities
- Focused approach has attracted engaged stakeholders
- Raised awareness of engineering careers in general, and of specific sub-fields of engineering
- Creation of possibility for changes to credential design.
- Operation outside of the business-as-usual model promotes new possibilities for stakeholders

Coordination:

- Provision of direction and funding for initiatives and projects
- Liaison and interaction with stakeholders: tertiary educators, employers, professional and advocacy groups and Government agencies
- Oversight of, and guidance for, partnership projects that enable changes to curriculum, pedagogy, pathways
- Oversight of new pathways to provide clarity and flexibility to stakeholders
- Cross-organisation groupings create new or deeper understandings, and some new alignment possibilities
- Steering Group leverages networks.

Monitoring:

- More understanding of the value of data-sharing among project leaders and Steering Group members
- Development of new communication channels that pull together, and clarify, information from multiple sources and stakeholders, for multiple stakeholders.

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Emerging and ongoing challenges

- While the goal of 500+ engineering graduates has been achieved, they were not the Level 6 and Level 7 graduates most needed.
- Different stakeholders have conflicting priorities and perspectives. The Government and National Engineering Education Plan (NEEP) report highlight an economic demand for engineer graduates qualified at Levels 6 and 7. However, students, families and whānau have a career opportunities demand that prompts them to favour Level 8 qualifications and professional engineer status.
- The public awareness campaign Make the World raised awareness of engineering as a career option, particularly amongst Māori, Pasifika and women. However, evaluation of the campaign indicates that ITPs have a relevance problem for young people, who don't have a good understanding of what they offer. In this context the campaign may have inadvertently helped increase enrolments for the Level 8 Bachelor of Engineering (with Honours) at the expense of the ITP pathway.
- Some employers, especially small-to-medium sized ones, may employ Level 8 graduates in positions for which they are overqualified in order to cover the widest scope of work and get the most 'bang for their buck'. It may also be that individuals and their influencers see Level 8 qualifications as offering them the widest range of career options. However it is also likely that Level 8 graduates in Level 6 or 7 roles are underpaid and under-utilised. Further, potential students uninterested in engineering at Level 8 may be missing out on the opportunities of engineering at Level 6 or 7, and there are employers who have been seeking these graduates.
- New Zealand's history of very little coordination between education and employment sectors, and a lack of esteem for vocational education, is hampering progress.

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Reflections on the past and future

- All interviewees thought the role of a designated integrator supporting the engineering education to employment system was important.
- Some interviewees questioned the mix of stakeholders and forms of engagement or interaction with them – for example, the lack of representation from the compulsory schooling sector.
- Some interviewees thought that Engineering e2e was driven by a focus on credentials targets at the expense of other considerations.
- Most interviewees agreed that systems integration in the engineering sector could only happen though a designated entity acting as an integrator; some went further and suggested that its scope should range beyond this sector.
- Secondary-Tertiary Pathways Project leaders thought that creating/maintaining pathways between schools and tertiary education providers required specific resources or funding.

The future of Engineering e2e

At this stage, two Engineering e2e initiatives in particular may increase in importance:

- Employer engagement has the potential to address leakage within the engineering pipeline, through retention and professional development measures for qualified engineers.
- Growth Through Diversity has the potential to address recruitment of a more diverse group of people into engineering, at a time when the school leaver population is shrinking. This could enrich the industry, as well as adding economic value.

Engineering e2e is a partnership managed by one Government agency that operates across education and employment sectors, with a collaborative approach to its work. In many ways it operates 'below the radar' as do some of its project leaders, who negotiate the boundaries and accountabilities of their own institutions and organisations in carrying out their Engineering e2e work. The downside is that the status quo remains fundamentally unchanged. Engineering e2e has potential to shift that status quo over time but if Engineering e2e ceases to exist, that potential for change could be lost.

Engineering e2e has certainly created some positive working relationships and collaborations. The challenge for sustaining the work may be in dealing with conflicting measures between the different stakeholders and organisations involved, and how to continue the work if and when personnel changes occur.

Current tertiary education organisation settings, for example, tend to discourage education providers from collaborating or innovating (see the Productivity Commission's 2017 work on tertiary education models). Within these constraints, Engineering e2e has had some success in orienting some individuals and organisations to a line of sight beyond their immediate concerns and harnessed their immediate concerns (such as recruitment) in support of a bigger goal for the country.

Overall, taking a systems integration approach to engineering education-employment activity has so far proved to be worthwhile. An evaluation focused on the individual initiatives and projects funded by Engineering e2e could usefully determine their impact and Engineering e2e's longer-term effectiveness.

FIND OUT MORE...

For the full report see:
www.engineeringe2e.org.nz/Discoveries/What_we_discovered.cfm
More information on the Engineering e2e programme can be found at **www.engineeringe2e.org.nz**

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