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Responding to New Zealand's Early Career Researcher Crisis During the Pandemic

The New Zealand Association of Scientists Council finds that analysis and evidence point to significant problems with early career paths in the science, research and innovation sector. Early in the pandemic, we spelled out how these early career researcher (ECR) issues would be exacerbated by travel restrictions and institutional budget cuts and might be mitigated[1]. Paths to solutions are now clearer and must be chosen.

This issue matters because a nation's success in science, research and innovation results in no small part from the drive, energy and ideas of early career researchers. Our early career paths must perform better to provide a workforce that keeps our industries and particularly our start-up innovation sector competitive in the transformations expected post-pandemic. Except for a few elite Rutherford post-doctoral fellows appointed on academic tracks each year, we have no systematic funding or measures of early career numbers or career path progression. Our 3-year PhDs are short by international standards, and often lack intersection with industry and the independence and leadership development needed to bridge into successful careers leading our sectors.

The evidence for a very serious problem is high uncertainty in our national ability to even define how our early career research pathways are disrupted by the pandemic. In our recent panel[2], all political parties acknowledged serious issues but lacked clear solutions. We need to create a functioning system largely from scratch, following the best international examples.

What we know now includes:

- New Zealand's treatment of 'post-docs' is unusual internationally: we lack both the expected number of centrally funded fellowships, and a willingness to reduce institutional overheads to make post-docs cost-competitive with PhD students in new grants and projects.
- No functional postdoctoral programme has existed since the old FRST post-doctoral scheme was eliminated[3].
- The "New and Emerging Researcher" category and incentive in PBRF showed a negligible effect suggesting a more systemic problem.
- With no post-doctoral fellowship scheme, limited institutional career tracking schemes, and no functioning NZRIS, we lack a national system for tracking the career pipeline, or assessing impacts of a shock such as the pandemic on the availability of a future workforce in science, research and innovation. In short, we lack our own national evidence framework and are forced to combine overseas data with a growing basis for concern.

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[1] https://scientists.org.nz/resources/Documents/PressReleases/NZAS-Statement-ScienceAsStimulus.pdf

[2] https://scientists.org.nz/news/9210641

[3] We note its elimination resulted from an error in analysis uncovered through OIA, leading to the incorrect conclusion it was not needed to maintain early career pipelines.

- This lack of functional early career paths has exacerbated a serious diversity problem in academia, including gender disparity, under-representation of Māori and Pacifica in academia, and no progress in Māori or Pacifica representation in science over 12 years.
- There are significant impacts of the pandemic on the scientific workforce's productivity internationally, that vary substantially with gender.
- Our institutions depend strongly on appointments from overseas during early career stages.

We specifically highlight the following risks of a business-as-usual strategy:

- We risk having a missing cohort in our science system in a decade's time. This will impact on the training and mentoring of future generations of researchers.
- The loss is not just for academia and research institutes, but perhaps more from industry, innovative start-ups and environmental governance sectors.
- We already misunderstand the role played by post-doctoral researchers - it is not just their careers that are at stake. It is their value to the wider research system. The well-trained, focused, energetic researcher unencumbered by administration and wider duties is initially at the centre of vibrant, productive research teams. With their skills and networks from early career roles, we expect many to be engaged in dynamic careers in and *beyond* academia, that are essential to industry, innovation and government.
- We risk further failure on Treaty obligations right when we have begun to understand the value of Māori and Pacifica representation in science, including science roles in government and industry.

To have a strong, resilient economy and society across the next twenty years, we strongly recommend:

- A system is needed to track early career paths from the entry to higher degrees (PhDs) through early career positions, in academia, research organisations, industry and government. Due to the length of New Zealand PhDs being shorter (three years) than most international counterparts, functional post-doctoral roles are likely to be critical in establishing future leaders and we need to know the pipeline is performing well and preserving diversity to provide a future workforce, including for the industry-driven innovation sector.
- Two good alternatives for funding early career positions as a response to Covid-19 are:
    1. Restore a fellowship scheme resembling the discontinued FRST postdoctoral fellowships at a level of at least 50 new positions per year, and with mechanisms to improve links with industry and government, and paths into permanent positions.
    2. Fund research institutions to support at least 50 new early career path positions each year that improve the future workforce available for academic research, industry, and government, and report on the development of these paths.
- Evaluate the total cost of a solution – likely to be a very small fraction of total science funding.
- Compare to successful national systems, including but not limited to small advanced economies, to identify successful strategies delivering a well-trained workforce to academic research, industry and government.
- Consider and continue to evaluate the appropriate institutional overheads or fellowship/incentive schemes (such as the PBRF multiplier) to ensure that post-doctoral roles are not out-competed by overtraining more doctoral students.

We conclude by suggesting that the best combinations of these recommendations will be flexible to the need for rapid changes in the workforce in coming years, providing stable income for well-trained researchers, and able to provide sound statistics to manage the role of PhDs and post-docs in the research and innovation system.

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