

## Perspective: Can The Entrepreneurial University Solve The Postdoc Problem?

**Thomas J. Simmons, PhD**

Biochemistry Department, University of Cambridge, Cambridge, CB2 1QW, UK  
Email: tjs84@cam.ac.uk

### ABSTRACT

Recently numerous commentators have raised serious concerns over the inability of the academic system to appropriately deal with the rapid growth in the number of postdocs it is training – particularly in light of the far more moderate growth in the number of permanent academic positions. Concomitantly, in the context of an increased emphasis for universities to contribute to economic activity, many commentators have criticised the poor entrepreneurial performance of universities. Here I explore various proposed remedies to the postdoc problem and to the poor entrepreneurial performance of universities. I highlight shared interests in each other’s missions and suggest that a solution to the postdoc problem could be found in the vision of the ‘entrepreneurial university’.

**Keywords:** entrepreneurship, university, academia, postdoc, commercialisation

### THE POSTDOC PROBLEM

Over recent decades, there has been a rapid and profound transformation in the composition of university laboratories across the globe. The number of postdoctoral researchers has exploded: in the US for example, postdoc numbers more than tripled between 1979 and 2012, to over 61,000<sup>1</sup>. But during that time, there has been no substantial growth in the number of permanent academic positions—those roles that the postdoc is designed to train for. The result is a large generation of postdocs traversing increasingly lengthy and unfulfilling postdoctoral stints in the unlikely hope of winning increasingly rare academic positions. In the UK now as few as 12% of postdocs will ultimately become permanent research staff<sup>2</sup>.

This is a particular problem because, despite the number of postdocs who must now take positions outside of academia, the position of the postdoc remains ostensibly a stepping-stone into an academic career. Most postdocs continue to be trained solely for academia, and some young scientists see “no way to exit [academia] positively,” with many “unaware that careers in science exist [outside of academia]”<sup>3</sup> (this is strange, given that doctoral graduates are actually better paid when they do not work as researchers<sup>4</sup>). The skills they have nurtured through years

of study too easily become a cage from which they must fight to escape, rather than a platform from which they can build a career.

An increasingly vocal chorus of criticism from commentators across the academic spectrum are now demanding that academia must finally face up to the situation, lest a glut of newly minted yet disgruntled doctors derail its career ladder<sup>1,3,5,6</sup>. Numerous national bodies have voiced similar concerns<sup>2,7</sup>.

How might academia solve its postdoc problem? Various solutions have been proposed by both observers and stakeholders, though many differ substantially in their interpretation of the problem: those that see the postdoc as a training programme solely for academic positions prescribe solutions that seek to limit postdoc numbers to what the academic system can accommodate, while those that see the postdoc as a training programme for a broad range of careers prescribe solutions that better enable the current excess of postdocs to successfully navigate their way into other careers. Some of the key proposals are critiqued below:

- *Permanent postdoc positions* – Proposals for a new type of permanent postdoc position seek to free up the career paths of aspiring professors by separating them from

“talented and experienced postdocs who do not want to, or cannot, lead a research team”<sup>5</sup>. The would-be PIs would continue as currently but with a less congested route to tenure, while those who choose otherwise can look toward secure and professionalised laboratory positions. However, it is not obvious how permanent positions should be funded, given they are not wholly compatible with contract-based nature of conventional funding streams. For both camps in this vision, the postdoc is an academic training programme, but for different roles within academia.

- *Fewer postdocs* – Some suggest that limiting the number of postdocs would be a solution to the postdoc problem, as it would rebalance the system to be more consistent with the tenured faculty numbers<sup>1</sup>. Supporters of this idea would have to be aware of the risk that in these substantially reformed labs, the burden postdocs presently bare doesn't end up simply placed on PhDs. Regardless, again the presumption seems to be that postdocs should be trained solely for academia.
- *Limit postdoc terms* – Those who advocate for limited postdoc terms (e.g. 5 years max), do so to force postdocs to think proactively about their career, and to stop them chasing academic careers when they have missed the boat. This tough love approach, which has been instituted at a range of universities<sup>1</sup>, doesn't alone help postdocs build post-postdoc careers, but it does explicitly recognise that the postdoc cannot be a long-term career option.
- *Professional training for postdocs* – Those who advocate for professional training for postdocs (e.g. Theodosiou et al.<sup>6</sup>), seek not to help promising postdocs get academic positions but to help them find jobs

outside of academia. It is an answer to the lack of ‘real-world’ skills – such as communications, marketing, intellectual property and business development – and to the unclear route to transfer to industry, that have been recognised by postdocs themselves as deficiencies in the system<sup>3</sup>.

- *Academic openness to alternative career paths* – Calls for changes in academic culture to be more open to alternative career paths (e.g. McDowell et al.<sup>3</sup>; Jones<sup>8</sup>) aim to fight perceived prejudices within academic culture, to make it easier, while still in the lab, for postdocs to explore non-academic career paths and thereby avoid becoming stuck in careers they don't want.

Many of these decisions will require drastic reconsideration of how universities, funding bodies, and the rest of the academic ecosystem, are assembled. The ramifications of these decisions will impact other areas of university policy and, in turn, other policy will itself have profound effects on their success. Indeed, the postdoc problem has not developed *in vacuo*.

#### THE ENTREPRENEURIAL UNIVERSITY

Over a similar time period there has been a noted impetus across the world for universities to generate revenues – and establish prestige – through entrepreneurial and/or commercial activities. Many universities now enshrine their ambitions to foster innovation in their strategy documents<sup>9-11</sup> and, reciprocally, both regional and national government innovation policies almost universally recognise academic institutions as key players in their respective entrepreneurial eco-systems<sup>11-14</sup>. This vision for universities to play a primary role in both the creation and the nurturing of new business ventures is the core of the ‘entrepreneurial university’ concept.

Perhaps not unrelated to the drive toward academic entrepreneurialism, the postdoc

bulge has been greatest in those disciplines with most perceived commercial promise, such as biomedicine<sup>15</sup> and computer science<sup>8</sup>. But the concept of the entrepreneurial university underlying the movement constitutes an ambition broader than merely the direct application of university discoveries and inventions<sup>9,14</sup>. Aspiring entrepreneurial universities across the globe have developed system-wide infrastructures to develop intrinsic relationships with local and international innovation systems: from entrepreneurship schools<sup>16</sup>, to technology transfer offices (TTOs<sup>17</sup>), to business incubators<sup>18</sup> and science parks<sup>19</sup>. Some of the world's leading academic-innovation eco-systems have epitomised this approach, such as Stanford University and MIT which played founding roles in Silicon Valley the Boston entrepreneurial eco-system respectively.

But despite this promise, the broad success and sustainability of the entrepreneurial university concept remains questionable. Studies of the performance of universities as generators of start-up companies suggest that the influence of universities on economic growth is small at best<sup>20,21</sup>, indicating that their influence is well below expectations. Currently, less than 13% of universities generate enough from their licensing deals to cover the cost of organising them<sup>22</sup>. Many commentators are now deeply sceptical of the way the entrepreneurial university is held up as a 'silver bullet' for regional economic development (e.g. Harrison and Leitch<sup>20</sup>); Armbruster<sup>23</sup> has gone as far as to say that "the entrepreneurial university is a failed idea."

So, how might universities improve their entrepreneurial efficacy? Some of the most promising proposals are outlined below:

- *Change the nature of intellectual property (IP) ownership* – It has been argued that the current system of IP ownership within universities is sub-optimal. Kenney & Patton<sup>24</sup> advocate either a system (a) in which intellectual property lies in control of the academic inventors, such that

university TTOs do not hold absolute control over it; or (b) in which all inventions are immediately made publicly available.

- *Improve staff attitudes toward entrepreneurship* – As stated above, academic culture often eschews careers outside the academic bubble<sup>3</sup> and even postdocs motivated by application of their research often admit of not being interested in pursuing that commercialisation themselves<sup>25</sup>. As well as alleviating the postdoc problem by better encouraging postdocs to consider non-academic careers, improving academic attitudes to entrepreneurship and business could be a major boost to university innovation: Louis et al.<sup>26</sup> recognise "local group norms" as the most important predictor of academic commercialisation.
- *Improved entrepreneurial training programmes (for both staff and students)* – Entrepreneurial training, which constitutes the development of skills including communications, marketing, intellectual property and business development, is a widely employed tool to attempt to encourage entrepreneurship<sup>16,27</sup>. And though there is some doubt whether entrepreneurship education is able to increase the intention of students to become entrepreneurial<sup>28</sup>, the diversity of entrepreneurial training courses available are a valuable resource to promote the entrepreneurial university's mission, including making postdocs properly skilled for non-academic jobs.
- *Strong links with industry* – Entrepreneurial universities foster deep collaborative relationships with external companies<sup>11,29</sup>, in order for the most efficient commercialisation of university research and to co-develop impactful and innovative research programmes. Other universities could tackle

entrepreneurial under-performance by improving such industrial links.

#### AN ENTREPRENEURIAL ANSWER TO THE POSTDOC PROBLEM

The postdoc problem has many angles, but it's important to remember that workplace resentment, employment worries, loss of earnings, and all the other issues faced by postdocs are not inevitable consequences of the glut of postdocs that has recently grown. Rather, they are products of the lack of adaptation that the academic system has made to accommodate the growth in postdoc numbers. Therefore, the present abundance of technically adept postdoctoral graduates should itself not be looked at as a problem to be resolved, but an asset to be valued: "it is a good thing, for both the individuals and society at large, that these young people spend some of their most productive years tackling research. And it is a good thing that most take that independence into other occupations."<sup>30</sup> While the postdoc will always cater to the training of new academics, it would be foolish to ignore the value that graduates of postdoc programmes bring to the wider world. To recognise all this, is to recognise that any solution to the postdoc problem should include a means of supporting postdocs to pursue non-academic careers – not merely better enabling postdoc to survive within academia.

With this insight into the postdoc problem's solution, it is my aim here to highlight the shared interests of the mission to solve the postdoc problem, and the mission to improve the entrepreneurial efficacy of universities: a university that epitomised one would have significant benefits to the other.

For postdocs, an institution that epitomised the entrepreneurial university ideal would instinctively recognise the value of the postdocs it trains to the whole gamut of industries they might find employ in, not only the limited view career options many presently feel restricted to. It would maintain close relationships with external companies, which are potential employers of postdocs, and it would align many research

programmes with them, ensuring postdocs leave with expertise valued by industry. It would of course be an institution that encourages self-employment for those postdocs that are interested and able to start their own ventures. But the diverse set of skills, the risk-taking attitude, and the expansive social capital of the entrepreneurial university would prepare postdocs for many future non-academic careers<sup>6</sup>, including, but not restricted to, entrepreneurship.

Reciprocally, university policies that actively support the non-academic ambitions of their postdoc cohorts will themselves support universities' entrepreneurial ambitions. The fact that the success of entrepreneurial training programmes is contextual to the students' backgrounds<sup>31</sup> suggests that entrepreneurial/business programmes that are postdoc-targeted would prove most efficacious in promoting postdoc entrepreneurial ambitions. Commercially-minded postdocs with their 'ears to the ground' about the potential of their research would enable better application of new discoveries and inventions. And a new generation of commercially-minded postdocs would prove an unrivalled resource to the neighbouring community of established and start-up companies that are crucial to any entrepreneurial university<sup>32</sup>.

I suggest therefore that campaigners for a solution to the postdoc problem should join forces with advocates of improved entrepreneurialism within the walls of the university, to collectively frame arguments to key stakeholders, to make their missions more cost-effective, and to streamline solutions to both problems. Fruitful starting points would include:

- Building postdoc-targeted training courses to equip postdocs with skills such as intellectual property, business development and marketing. Such a course could form a fundamental part of the postdoc training experience, in addition to traditional laboratory skills.

- A concerted effort to encourage entrepreneurial and commercial awareness within the faculty, to better enable postdocs (and others) to explore alternate – including entrepreneurial – career paths, and to open staff's eyes to the commercial potential of their research. Such an effort could be spearheaded top-down through policy changes but should ideally be driven by entrepreneurially minded staff on the ground too.
- Development of core relationships between the university and established businesses, to align university research programmes with commercial opportunities and to align postdoc skillsets with those most in demand by industry. Such a situation would not be the product of any single individual agreement but extensive arrangements with numerous organisations built up over time and ingrained into the university's culture.

Together such moves could begin to do justice to the world-changing potential of both the researchers and the research leaving university laboratories worldwide.

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