Research workloads in Australian universities

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This article provides insight into the nature of research workload allocation for Australian academics. It explores the distinction between research performance and research workload allocation. Research performance can be judged at an institutional level, a work group level or an individual level. The process by which an institution's research performance is judged is not necessarily suitable at the level of the individual academic. The research performance of individual academics is based on their 'research output', in the form of publications, grants or supervision of research students, but historically, little attention has been paid to the 'input' or the time required to achieve these outputs. To determine the real costs of research, and to examine academic working conditions, this paper argues the clear distinction must be made that 'output' is about research performance; whereas 'input' is about research workload allocation. Therefore, what is needed is a suite of reasonable time allocations which can be associated with research activities, as is the case for teaching related activities. The paper analyses data from an online survey, circulated to academics across Australia in 2016, in which staff estimated the typical time spent on a wide range of research related tasks. The findings from the 2059 respondents show staff strongly support a transparent and holistic approach to workload planning which acknowledges the full range of activities they undertake. Analysis of the times associated with the research tasks led to the development of a table of suggested time estimates, based on the median values, for many common research activities.

Keywords: Academic workload; time-based allocation; research tasks; academic workload models

Introduction: The research landscape

In the post-cold war global neoliberal economic agenda, the importance of knowledge for economic competitiveness was predicted to lead to universities becoming less autonomous and increasingly subject to 'performativity' (Lyotard, 1979). In practice, in the US (Giroux, 2002) and UK (Furlong, 2013) universities have experienced decreased government funding, increased managerialism and external accountability.The underlying higher educational policies, based on assumptions of 'globalisation, competition and meritocracy', have had a profound effect on educational institutions (Furlong, 2013, p. 32). Driving efficiency through funding reductions has resulted in increasing casualisation of the academic workforce which has significantly contributed to the loss of power and greater levels of stress reported by many academics (Anderson, 2006; Bexley, James & Arkoudis, 2011; Langford, 2010; Roberts, 2013; Ryan, 2012; Woelert & Yates, 2014).

In Australia, similar policies have driven efficiency and productivity measures in universities and required institutions to become more entrepreneurial and responsive to industry needs (Marginson, 2006; Marginson & Considine, 2000). University rankings have assumed increasing importance, due to their ability to enhance reputation and attract lucrative international fee-paying students.The *Australian Financial Review* estimated the overseas student market was worth $20 billion in 2015, making it the third-largest export after coal and iron ore (Dodd, 2016).

Gill (2014) lamented that, through this extended period of neoliberal change, there has been a 'dearth of research on academic labour' in the UK (p. 12) with the effects of

these changes 'almost entirely undocumented at the level of university workers' experiences' (Gill, 2014, p. 13). To address this gap in the literature, the authors surveyed academic staff from across the Australian higher education sector to obtain data on the time they typically take to perform a wide range of tasks associated with the teaching, research and service related aspects of their work.

This paper aims to explore how the changes outlined above have affected the work of individual academics in Australian universities. The key question of concern was 'Can the essential intrinsic motivational and self-managing aspects of academic work, in teaching, research and service, be preserved in an ostensibly hostile managerial environment?' Given the global nature of these trends, the findings may also have implications for academics elsewhere.

Determining research performance

Research is defined as 'investigation undertaken to gain knowledge and understanding or to train researchers' (NHMCR, ARC & AVCC, 2015). Given the importance of research for a competitive economy, it is not surprising that governments around the world have established elaborate mechanisms to measure research performance to target their spending (Kwok, 2013). Improving their comparative performance on research has become a vital strategic goal in most institutions. They monitor their performance relative to competitors, in the chase for limited funds and a better relative position on international rankings tables (Edwards & Roy, 2017). Excellence in Research Australia (ERA) is the current methodology used to determine and compare the research performance of Australian universities. Australian universities have a legal obligation to be involved in both teaching and research (Commonwealth of Australia, 2015), but only about 35 per cent of the cost of university research is directly provided by the Australian Government (Productivity Commission, 2017, p. 44). The remaining research funding relies heavily on cross-subsidies from teaching revenues, often across disciplines (Productivity Commission, 2017, p. 49).

The effectiveness of these research performance regimes has been questioned due to their cumbersome nature, associated compliance costs, and often perverse impact on the work of academics (Edwards & Roy, 2017; Henkel, 2005; Kwok, 2013). However, their persistence and evolution continues, as evidenced by a recent review of research policy and funding conducted by Ian Watt (2015). This review has led to a further revision in key metrics of research. Over the four years from 2017, university funding for research is set to transition, from the largely publications-based metric under the ERA, to a process more connected to research grant income and research candidate completions as proxy measures of research excellence. The results will be used to determine allocation to universities of the $1.9 billion each year through the Australian Government Research Block Grant (Pettigrew, 2015). These changes are already having direct implications for the development of research strategies and policies within universities and will directly impact decisions about how each organisation will support its researchers and gauge performance.

Thus, as Franco-Santos, Rivera and Bourne (2014) argued, externally driven performance regimes (such as the ERA) have direct consequences at the organisational level, the work unit level and at the level of the individual academic. This has led to the widespread adoption of corporate based performance management policies intended to improve the research output of individual academics (Franco-Santos, *et al.*, 2014; Kenny, 2016; Morris, 2011; Winter & Sarros, 2002). Research shows that workplace stress arising from demands for greater productivity often adversely affect the ability of academics to undertake research (Anderson, 2006; Cannizzo & Osbaldiston, 2016; Houston, Meyer & Paewai, 2006; Langford, 2010; Roberts, 2013; Ryan, 2012). These findings indicate that something may be amiss with the way external performance drivers are translated into institutional policies around research, especially as they pertain to individual academics.

Franco-Santos *et al.* (2014) surveyed 1000 employees in UK higher education and interviewed 110 of them. They identified two basic types of performance management system – stewardship and agency. Stewardship approaches 'focus on long-term outcomes through people's knowledge and values, autonomy and shared-leadership within a high trust environment.' Moreover, they found that stewardship approaches are associated with higher levels of staff well-being as well as higher student satisfaction (p. 7). By contrast, agency approaches 'focus on short-term results or outputs through greater monitoring and control' (p. 7). While suggesting that universities should 'adopt and use those performance management mechanisms that are fit for purpose', they noted that increased accountability pressures on universities had caused a shift towards more agency-based performance management approaches (p. 8).

Similarly, Pink (2010) argued that corporate style performance management systems, based on extrinsic motivators such as performance-based pay, can be counter-productive when applied to staff whose work involves even mildly cognitive tasks. Therefore, to avoid

perverse outcomes, it is essential that any mechanisms to monitor academic performance are designed to suit the underlying nature of academic work, which is largely based on intrinsic motivation, recognition and prestige amongst their peers (Blackmore & Kandiko, 2011; Edwards & Roy, 2017; Fredman & Doughney, 2012). However, although performance management processes have been in widespread use for many years in Australian universities (Morris, 2011), across the sector they were found to be largely incoherent and poorly conceptualised (Kenny, 2016).

Time-based approaches to academic workload allocation are the most widely accepted, due to their ability to account for the complexity and range of demands on academic time (Vardi, 2009; Watson, King, Dekeyser, Bare & Baldock, 2015). However, the credibility of these time-based approaches, in the eyes of academics, rests on their ability to reflect the work actually done. This is associated with the degree of consultation in their development, the level of transparency in their application and their capacity to cater for a wide range of disciplinary variations in academic roles (Houston *et al.*, 2006; Kenny & Fluck, 2014; Vardi, 2009; Woelert & Yates, 2014).

This implies the processes for managing the workload of individual academics and the ways in which individual research performance is determined are important aspects of worker satisfaction and quality research outcomes for an institution (Kenny, 2016; Kenny & Fluck, 2017). Poorly designed individual research performance processes and/or ineffective academic workload allocation processes can actually be counter-productive for an organisation (Franco-Santos, *et al.*, 2014; Houston *et al.*, 2006; Kenny & Fluck, 2014; Pink, 2010). To be truly effective in terms of their research performance, as Gill (2014) suggested, there must be a better understanding of how external accountability mechanisms, such as the ERA, affect the day to day work of academics within their institutions.

The context for this study

When determining academic workload, teaching is generally accepted as an 'input-based' activity, with some form of time-based method used to pre-determine an individual's teaching load (Watson *et al.*, 2015; Vardi, 2009). By contrast, an individual academic's research load has typically been seen as an 'output-based' activity, derived from the resultant products of the activities undertaken. The problem is that outputs are a time lagging measure, which may often refer to work completed up to two years earlier. It does not necessarily measure an individual's current research workload. It also does not account for work undertaken that may not have resulted directly in outputs. Essentially, outputs are more suited as a measure of an individual's research performance rather than their research workload (Kenny, 2016). The examples below illustrate how this may cause problems for individual academics.

As an example, consider the time and effort required when an academic applies for a competitive research grant. In the US, Edwards and Roy (2017) outline some concerns arising from a focus on shrinking grant income, including distortion of the research agenda, costs of staff time spent generating applications and the compliance costs of administering grants. In Australia, success rates for the highly competitive Australian Research Council grants is around 10-15 per cent in some discipline areas (ARC, 2015). Thus, it is highly likely within the existing funding frameworks, that any given grant application will be unsuccessful. However, in many universities, with the focus on outputs, only successful grants are acknowledged in academic research workloads. This means that, for the majority of academics, the workload associated with submitting a grant is not acknowledged or accounted for in any way. This provides a disincentive and hides the true costs of research to the institution and the sector. It is already widely recognised that universities in Australia do not receive funding for the full cost of research, and so most internally subsidise their research activities from money received to support their teaching programs (Allen Consulting Group, 2009; Norton & Cherastidtham, 2015). A lack of accountability for research related work time only exacerbates this point.

Clearly, individual academics have little control over national funding and other sector priorities. A range of external factors may affect grant outcomes, such as limited funds, or government funding priorities (Carter, 2014). Worse still, for the individual academic concerned, where the organisational research performance expectations require success in winning competitive grant funding as a component of an individual's research performance, it can be very demotivating and disempowering (Kenny, 2016; 2017). If a grant application is unsuccessful, it is not necessarily because the research proposal was poor.

The examples above also illustrate the need to clearly distinguish between the processes used to determine the institutional research performance and internal processes used to manage the research performance of individual academics. For individuals, it also highlights the need to distinguish between research workload allocation (input activities) and research performance (the resultant outputs). The existence of a credible mechanism to estimate the actual time spent by academic

staff on research related activities, such as preparing a grant application, would contribute greatly to the ability of universities to estimate the direct staffing costs of research, which then could be amortised across the institutions and the sector.

As alluded to earlier, studies have shown that the performance management process for individual academics cannot be separated from the workload allocation process (Kenny & Fluck, 2014; Kenny, 2016). To gauge an individual's research workload, there needs to be some means to estimate the effort required to undertake research related activities. In their case study, Houston *et al.* (2006) used existing workload allocation models in an institution to provide some estimates for a limited number of teaching and research related activities (p. 26). These further illustrate the difficulty of estimating meaningful allocations for academic work due to individual variations (Kenny & Fluck, 2014). A previous paper by the authors, (Kenny & Fluck, 2017), reported on the teaching data from the survey and used statistical analysis to suggest reasonable time standards for a range of teaching related activities. This article follows a similar approach to examine the data provided for a range of research related activities. To the Authors' knowledge, there is little in the literature, or in university research performance policies, exploring this important difference between the research input (workload) and research output (performance). There appears to be no comparable data supporting time standards for research related aspects of academic work.

Method

The questionnaire that forms the basis of this study was sent to academics working in every university across Australia. The questions asked individual academics to estimate the time they spent on a wide range of teaching, research and service related activities. With the cooperation with the National Tertiary Education Union (NTEU), an online questionnaire was circulated in early 2016 to 8,000 academics across the Australian university sector, including both members and non-members of the union. Responses were received from academics at each of the 39 Australian universities. The respondents included a spread of academic levels, years of experience, disciplines and gender which broadly reflect the general academic population. This paper presents an analysis of the research related aspects of the questionnaire.

The 2,059 valid responses constituted a very good response rate of 22.2 per cent, with an estimated 43 per cent of those likely to be Union members. At the time, the NTEU claimed 31.7 per cent of all academics were members of the Union (personal email communication, 2016), which is consistent with a figure of 31 per cent provided by the Australian Bureau of Statistics for the education and training industry divisions (Australian Bureau of Statistics, 2016). Thus, while the sample completing the questionnaire probably consisted of a higher proportion of union members than the general academic population, nevertheless it is reasonably representative of the 52,974 academics in Australia at that time (Department of Education and Training, 2016).

Using the same methodology as the earlier paper (Kenny & Fluck, 2017), the data provided by individual academics for a range of research related activities was analysed and the median work hours for each activity determined. The data were then interrogated by sub-group to identify any statistically significant differences by academic level, years of experience, academic discipline and academic workload category (i.e. teaching and research, research intensive, research only or teaching intensive). With respect to these workload categories, 72.9 per cent of our sample identified as teaching and research, 9.8 per cent as research intensive/only and 17.2 per cent as teaching intensive/only. The Australian Government (2016), through the Department of Education and Training website, reported that 32.2 per cent (14,617) of ongoing academic staff (excluding casual academics) in Australian universities were classed as Research Only. Of the remainder, 59.6 per cent (26,963) held Teaching and Research positions, with 8.2 per cent (3,696) classed as Teaching Only. Therefore, the data is slightly skewed towards teaching and research staff.

Results and discussion

Attitudes of Australian academics to research workload management

Bearing in mind the discussion above concerning the links between research workload and performance, this question was explored in detail in the survey and the results are shown in Table 1. This table summarises the percentage of staff who 'agreed' or 'strongly agreed' with each statement on a five-point Likert scale from 'Strongly disagree' to 'Strongly agree'. The questionnaire also provided for the respondents to add open text comments.

The results in Table 1 are consistent with the literature and re-emphasise the connection between research workload and performance (Kenny, 2016) since 94.7 per cent of academics believed their research performance must be judged holistically in the context of the teaching,

Table 1: Agreement with statements about research workload and performance

Statement (n)	*% agree or strongly agree*
Research workload performance must be considered holistically, taking account of my teaching, administration, service and community engagement duties (1361)	94.7
Research workload must be considered as part of a holistic allocation process that is fair and transparent (1362)	93.7
The minimal expectations should be transparently applied and adjusted pro-rata to match the actual research time allocated to the individual (1319)	88.6
Research performance should specify transparent minimal expectations, suited to each discipline, that are achievable by a competent academic within their allocated research time (1333)	87.9
Minimal research expectations on an individual must consist only of tasks that are achievable by and within the control of the individual academic (1321)	86.8
My research workload allocation process should take account of planned (input) activities for the coming year such as supervision, grant applications, article submission, etc. (1363)	86.2
The minimal research performance expectations should be considered as a demonstration of satisfactory performance by a competent academic in their discipline (1324)	78.7
Research expectations may describe aspirational levels of performance above the minimum which are clearly not mandatory (1315)	67.4
I am able to self-manage my research workload (1369)	58.1
I have adequate time provided in my workload allocation to conduct my research (1377)	11.6

administration, service and community engagement demands on their time (N=1361). In addition, 93.7 per cent agree that their research workload must be considered as part of a workload allocation process that is fair and transparent (N=1362). This is consistent with findings by Kenny (2016) who reported 97 per cent of academics, 'irrespective of academic level or discipline' held a similar view. However, while a majority (58.1 per cent) of academics said they can self-manage their research workload, only 11.6 per cent (N=1377) of the respondents believed they were provided with adequate time in their workload to conduct research.

The vast majority (over 85 per cent) also agreed that: their research performance must be based on activities over which they have control; that expectations should be directly proportional to the time they have available within their workload to undertake research and; that discussions about their workload should include consideration of planned research input activities for the coming year. Over two thirds believed in a clear separation between minimal performance expectations and aspirational expectations.

As discussed earlier, research performance is linked to outputs, while workload is linked to the time academics are expected to spend on research activities to produce research outcomes. While this statement might be obvious, it is not reflected in the research performance policies of most universities in Australia, in which Kenny (2016) found substantial lack of coherence.This mismatch could explain to some degree the level of frustration and stress reported in the literature, especially if academics are working within a performance culture that is agency-based and emphasises outputs.

The open text comments about their experience with research performance expectations, revealed a lack of satisfaction and understanding of the process by many respondents. Many criticised the lack of disciplinary awareness amongst managers. There was also uncertainty about the performance 'expectations': 'I receive conflicting information in this area. Possibly there is confusion between minimal, negotiated as per position description and aspirational' (Female, Level C). Negative sentiment about research performance expectations was expressed in phrases like 'the pressure is relentless';'there is an increased focus on short-term economic gain';'They are ludicrous and unachievable year on year.'; 'there are little incentives and recognition for the staff who are doing their best'; 'The constant stress of trying to get grants is exhausting';'Ludicrously unrealistic'.

Although fewer in number, there were some positive comments that included 'My Faculty has been reasonable on this so far';'I achieve my goals, so I am happy with them. For this year.'; 'very happy with them'; 'The expectations are reasonable and well-managed (updated annually in a suitably flexible way)'. And on a salutary note: 'Whatever you do, there will be at least one metric you won't manage

to meet'. 'The biggest challenge in research is not research itself, but in managing teaching and admin workload so as to protect time for research.'

Others expressed concern that a focus on outputs will privilege quantity of publications over quality: 'Simple quantitative measures (number of articles) do not measure the difficulty of writing'; 'I strongly believe that quality measures of publications should be included in measuring research performance'. Kenny (2016) reported that some universities attempted to build quality criteria into the design of their research performance policy by, for example, giving bonus points for publication in highly ranked journals. He argued for a clear distinction between 'minimum' research performance expectations, designed to encourage and support individuals to engage in on-going research activity and to demonstrate accountability associated with their research workload allocation, and more 'aspirational' research expectations, designed to encourage excellence. Logically, the question of quality of outputs fits with the aspirational expectations, along with:

> ...appropriate incentives likely to advance academic careers or prestige such as access to study leave, funds to attend conferences; payments of modest funds into the research accounts of published authors, becoming eligible to increase the research component of their workload and/or linking levels of high performance directly and transparently to certain academic promotion criteria (Kenny, 2016, p. 15).

The contradictions evident in these statements are consistent with earlier comments that the processes used to judge the research performance of academics are not always fully conceptualised and can be counter-productive. Many academics will accept performance expectations that are seen to be reasonable and are transparently applied. However, they remain concerned that they have some control over their work (Cannizzo & Osbaldiston, 2016; Fredman & Doughney, 2012; Houston *et al.*, 2006; Kenny 2016).

In this context, the authors contend that a suite of realistic time allocations for research related activities would enable individual academics to negotiate a reasonable research workload in their annual performance management discussions. If this also operated alongside a research performance process that recognised input as well as output activity, it could foster high performance and risk taking by acknowledging genuine individual effort. This would still reward aspirational achievement based on intrinsically motivational incentives such as promotion, funding for research, conferences or additional resources or time for research (Kenny, 2016). The development of such a suite of research time allocations is the purpose of the following analysis.

Estimates of reasonable time allocations for research activities

The analytical approach will be illustrated using the data provided for one research activity: preparing an academic article for submission for peer review in a journal. This is widely regarded as a core activity for academic researchers across most disciplines. Clearly there are many factors which might impact on the time any given individual academic may take to complete this task including: the experience level of the academic, the nature of the research topic, the discipline, the intended audience, the chosen journal, etc. Nevertheless, the survey asked academics to estimate the time typically spent on this task. On analysing the responses, as was found for the teaching related data, there was wide variation in the time estimates provided by individuals. Figure 1 shows the distribution of data was positively skewed, and there were many outliers. In this case, twelve responses were identified (e.g. 6,480, 4,800, 3,150, 2,400, 1,500, 1,120, and 1,000 hours) which are omitted from the figure.

The same standard statistical analysis process, as outlined in (Kenny & Fluck, 2017), was followed. Statistical measures reliant on a normal distribution were inappropriate. The mean time for this task was found to be 139.51 hours (SD 137.05), with a median of 100

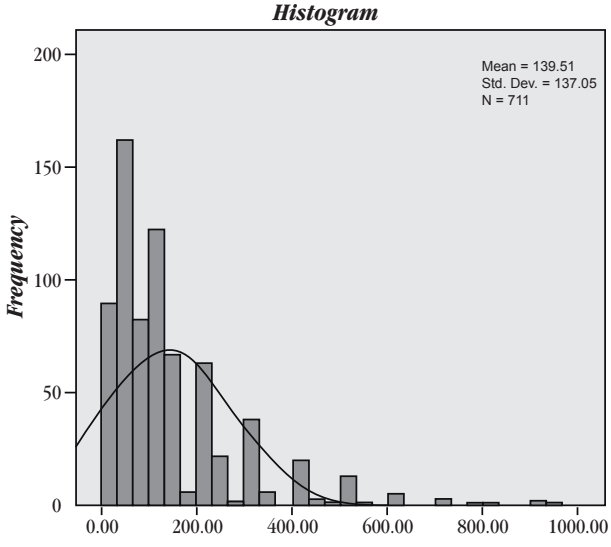

Figure 1: Distribution of hours for writing a refereed journal article

Table 2: Median estimated workload time for typical publication related activities

Research Activity	*Median hours* (N)	Median hours p.a .(N)	Typical quantum p.a.
Write a refereed journal article	100 N=723	240 N=737	2.4
Write a research chapter	100 N=394	100 N=364	1
Prepare a curated exhibition or performance	140 N=47	200 N=45	1.4
Prepare a registered design	30 N=14	N/A	N/A
Write a research book	300 N=234	200 N=203	0.67
Prepare a refereed conference presentation	40 N=517	62.4 N=494	1.6
Prepare a patent application	60 N=31	35 N=26	0.6

hours (interquartile range of 50-200 = 150 hours). The median and the interquartile range are the appropriate measures of central tendency and variability for skewed data (McCluskey & Lalkhen, 2007) as they are less affected by outliers than the mean (Australian Bureau of Statistics, 2013).

Given the characteristics of the data described above, the median (100 hours) is proposed as a reasonable time to undertake this research task. A similar analysis was done for a range of other research related activities and these are proposed as potential standard allocations. As previously shown for teaching, the medians of the 'typical time' for the range of tasks are not necessarily the actual time an individual academic might take to perform the tasks. However, the medians provide a reasonable estimate of the time required to do the tasks which, for the purposes of workload allocation, acknowledge the complexity of these tasks. Aggregating the allocated times for all the activities to be undertaken by an individual in a given year, would provide a meaningful and transparent way of determining and comparing their research workloads. It can similarly become a mechanism for a work group to plan a research program and estimate the associated research staffing needs.

Workload time estimates for research publication outputs and supervision of research students

Continuing this method of analysis for the range of research activities, the data were explored to obtain typical times associated with publications, supervision of research students and obtaining grants. Table 2 provides the median hours for typical publication-related activities, some of which are more common within certain disciplines (e.g. exhibitions). The second column refers to the median time spent on the given activity in a year. The third column, the typical quantum per annum was calculated by dividing column two by column one and indicates, for example, that academics typically write 2.4 articles per annum.

In the analysis that follows, these data were explored further to ascertain if there are variations by academic level, years of experience, academic workload category and discipline. Table 3 below, is presented as an example of the statistical calculations that were completed for all research related tasks, using SPSS version 23. Each exploration of the data involved a statistical calculation to test for any patterns in the data using the non-parametric Kruskals-Wallis one-way ANOVA.

Where no significant difference was found, the overall median value was proposed as an acceptable and reasonable workload time allocation for a given research task. Where a significant difference was detected, pairwise comparisons using the Mann-Whitney U test occurred, using the Bonferroni correction of significance for multiple tests. To conserve space in the tables, only those measures for which a significant difference was found are discussed. Where there was no significant difference, the median values have been adopted and entered directly into Table 9, which provides a summary of the recommended time allocations for all research related tasks explored in this study.

Table 3: Exploring differentials in typical time required for preparing a refereed journal article for submission for peer review (median = 100 hours, N=723).

Academic Level #	*A*	*B*	*C*	*D*	*E*
Median (n)	120* (46)	100 (293)	100 (213)	100 (87)	80 (84)
Years of experience as an academic	0-5	6-10	11-15	16-20	>20
Median (n)	120 (133)	114.5* (192)	100 (129)	80 (113)	80 (156)

 # A – E: Associate lecturer; lecturer; senior lecturer; associate professor; professor, respectively.

** Significantly different*

Table 4: Median estimated research hours by discipline group (Cannizzo & Osbaldiston, 2016)

Research Activity	*Arts, Law and Humanities (559)*	*Social and Behavioural Sciences (76)*	*Science, Technology & Engineering (430)*	*Health and Medicine (496)*	*Business and Economics (201)*	*Education and Related (198)*
Preparing a refereed journal article for submission and peer review (n) [Overall median = 100 hours] N=702, test=25.174, df=5, p<0.001	150* (180)	100 (34)	85 (194)	60 (173)	200* (67)	100 (54)
Preparing a research book for submission and peer review (n) [Overall median = 300 hours] N=225, Test=27.244, df=5, p<0.001	500* (98)	640 (3)	160 (37)	120 (39)	140 (25)	250 (23)
Preparing a conference paper for submission and peer review (n) [Overall median = 40 hours] N=499, Test =50.591, df=5, p<0.001.	50 (124)	30 (17)	40 (122)	20* (128)	50 (57)	50 (51)
Supervise a Higher Degree by Research candidate (per year) (n) [Overall median = 60 hours] N=551, test=16.757, df=5, p=0.005	50 (146)	50 (30)	80 (156)	60 (122)	76 (48)	60 (49)

** Significantly different*

Table 3 provides the results in detail for the question of whether the typical time taken to prepare a journal article for submission for peer review varied by academic level, or by years of experience. The null hypothesis, that there was no significant difference, was rejected in each case if the p-value was found to be less than 0.05 (95 per cent confidence level).

Differences by Level and experience

A significant difference was found for preparing a journal article for both the academic level (test = 13.191, df=4, p=0.010), and years of experience (test=15.167, df=4, p=0.004). For the academic levels, the pair-wise comparison involved comparing each pair of levels, A to B, B to C, C to D, etc. And using the Bonferroni correction for significance. This revealed that level A academics tended to take the longest time for this task, followed by levels B, C, D and E in order. Level As took significantly longer that Level E academics (p=0.015). Similarly, the pair-wise analysis by years of experience indicates that less experienced staff tended to take longer. The pairwise analysis revealed that those with 6-10 years of experience take significantly longer than those with more than 20 years of experience (p=0.007).

The above analysis suggests less experienced academics, or those at level A, should be allocated 120 hours for this task (see medians in Table 3), whereas, with no significant differences found between the other academic levels, the overall median of 100 hours is an appropriate allocation for academic levels B-E.

Following a similar analytic process, we also explored the results of other publication related activities to see if there were variations by discipline. Amongst the respondents, 1960 provided their discipline area. As the numbers of respondents in some discipline areas were low, to ensure the analysis was valid, we combined disciplines into groupings based on those put forward by Cannizzo and Osbaldiston (2016) as illustrated in Table 4. When we tested for the variation of a selection of research activity across these groupings, we found only three research activities for which a significant difference was evident across disciplines. The time taken to prepare an ARC grant application did not vary across disciplines, but there was a significant difference detected in the four activities listed in Table 4.

With respect to writing journal articles, the pairwise comparisons and the Bonferroni correction showed two areas of significant difference (p<.05). Respondents from Business/Economics reported taking significantly longer to prepare a journal article for submission than the three lowest disciplines and academics in Arts/Law take significantly longer than those in Science or Health/Medicine.

The low number of respondents from Social and Behavioural Sciences and the fact that the Economics data in the sample was heavily skewed towards the high end, left some doubt about the reliability of these figures. Arts/Law was the discipline with the largest response rate, and responses in this discipline area indicated the authorship of research books tended to take significantly longer than the three lowest other disciplines (p<.03).

With conference papers, preparing presentations for Health/Medicine tended to take significantly less time than in all other disciplines except Social/Behavioural

Table 5: Median estimated workload time for typical research grant related activities

Research Activity	*Median hours (N)*	*Median hours p.a. (N)*	*Typical quantum p.a.*
Prepare a nationally competitive research grant application (category 1)	120 N=490	150 N=457	1.25
Typical time spent managing a nationally competitive research grant application (category 1)	80 N=281	100 N=275	1.25
Prepare a cooperative research application with an external partner organisation	80 N=392	100 N=359	1.25
Typical time spent managing a cooperative research application with an external partner organisation	60 N-266	90 N=253	1.5
Typical time spent preparing an ethics application	16 N=558	30 N=535	1.9

(p<=.04). When it came to supervision of higher degree by research candidates, the only significant difference was between Science and Arts/Law (p=.004). These results suggest that disciplinary differences may exist for a limited number of research related tasks, and these are indicated with a range in Table 9. For other disciplines however, the relatively low numbers means the data may be unreliable and the overall median values should apply, pending further research.

Workload time estimates for research activities associated with grants

Five research activities associated with applying for, and managing, research grants were explored. Table 5 summarises the overall median values. As discussed earlier, these data are becoming very important for ascertaining the true costs of research. The Allen Consulting Group (2009) was commissioned by the Australian Government through the Department of Innovation, Industry, Science and Research to develop a methodology to estimate the indirect costs of research, including academic salary costs and other costs such as professional support staff costs, infrastructure, consumables, equipment, depreciation etc.Their report highlighted the growing international interest in developing a reliable methodology to determine this information, but acknowledged the underlying assumptions made the task very difficult.

On page 44, the report notes the median time spent preparing grant applications per year is 21 days. In referring to Table 5, the median time reported by academics in this survey was found to be 150 hours per annum for this activity, which at 7.5 hours per day, equates to 20 days.This independent result validates our choice of the median figure and our analysis of this item.

The five grant related research activities listed above were then explored to establish if there were any variations by academic level, years of experience, academic or workload category and a summary is shown in Table 6. No significant differences (nsd) were identified for most activities, so the overall median values for these tasks have been included in Table 9.

The two areas with a significant difference were associated with academic levels and were analysed using the same analysis as above. The results are given in Table 7. Curiously, Level B academics tended to report spending significantly less time preparing cooperative grant applications than level E professors (p=.001). It would of course be interesting to see what the relative success rate was for this activity. Level A academics took significantly longer to prepare an ethics application than all other levels except B (p.>.05). Level B academics took significantly longer than professors did at level E (p=.029). As the time for this task is generally relatively low and did not seem to vary with discipline, we suggest using the median value of 16 hours as academics seem to get better at it with experience.

Table 6: Test for differences for research grant related activities

Research Activity	*Academic level**	*Experience**	*Workload category**
Prepare a nationally competitive research grant application (category 1)	nsd	nsd	nsd
Typical time spent managing a nationally competitive research grant application (category 1)	nsd	nsd	nsd
Prepare a cooperative research application with an external partner organisation	.002	nsd	nsd
Typical time spent managing a cooperative research application with an external partner organisation	nsd	nsd	nsd
Typical time spent preparing an ethics application	.027	nsd	nsd

** No statistical difference*

Table 7: Test for differences in median grant-related workload estimates (hours) by academic level

Research Activity	*A*	*B*	*C*	*D*	*E*
Prepare a cooperative research application with an external partner organisation	99 (19)	60* (130)	80 (123)	80 (59)	100 (61)
Typical time spent preparing an ethics application	35* (33)	20 (222)	15 (181)	13 (64)	11 (58)

** Significantly different*

Other research activities

Respondents were also asked to describe any other research related tasks not included in our list. 475 participants replied with an open text comment. The principle activities described were: peer-reviewing for journals, conferences and grant applications; editing for journals; data collection/field work; travel to attend conferences/collect data; analysis of data; and mentoring of colleagues. Significant time was required for travel to collect data in the field or attend conferences. Some respondents preferred to describe these activities by giving time estimates for 'actually carrying out the research' and combined the processes of collaboration, data collection and analysis into one large overall estimate. The times presented by each individual varied, and the medians per year are presented in Table 8.

While the number of responses is relatively low, they indicate two distinct stages in the research process. For example, collecting data (whether in a laboratory, a survey or a field trip) is a necessary stage that has to occur before writing a paper. Other activities such as peer-review, underpin our scholarly work. While these activities do not, of themselves generate outputs, they are the essential 'grease' that keeps the process going and enable researchers to be productive. As such, they need to be acknowledged in any discussion about the research workload of an individual.

Table 8: Median estimates for 'other' research related activities

'Other' research related activity	*Median hours for this research task (N)*
Peer review (e.g. Articles, grant applications, examine theses)	50 (62)
Edit a scholarly journal or conference proceedings	200 (40)
Data collection/Field trips	70 (17)
Research process-combined: collaboration, data & collection, analysis	400 (26)
Travel to collect data, collaborate with colleagues or attend conferences	80 (17)

Consolidated research workload allocations

Following these investigations, a consolidated table of proposed time allocations for academic research activities was compiled (see Table 9).

Table 9 incorporates an adjustment for journal article writing by academic level (taken to be broadly similar to that identified by years of experience). However, based on the preceding analysis, there is also a case for adjusting

Table 9: Median estimated hours for Australian academics to complete research tasks

Research related activity (n)	*Median hours for this research task*
Prepare a nationally competitive research grant application (category 1) (490)	120
Prepare a cooperative research application with an external partner organisation (392)	80
Manage a research project (category 1) (per year) (281)	80
Conduct a collaborative research project (per year) (266)	60
Prepare an ethics application (558)	16
Write a refereed journal article (723) [variations for level A, discipline]	100-150[1]
Write a research book (234) [variation by discipline]	300-500[2]
Write a research chapter in a book (394)	100
Write a peer reviewed conference paper (517) [variation by discipline]	40-50[3]
Prepare a Registered Design (14)	30
Prepare an art work/exhibition (47)	140
Prepare a patent application (31)	60
Supervise a higher degree by research candidate (per year) (564)	60
Study for a higher degree (132)	500
Other research tasks (per year) e.g. presenting at conferences/seminars, examining theses, editorial board duties/peer reviewing, reading, stakeholder engagement and other miscellaneous tasks to be negotiated (337)	50-400[4]

1. Refer to variations by academic level (in Table 3) and discipline (in Table 4).
2,3. Refer to variations by discipline (in Table 4).
4 . Refer to tasks (in Table 8)

these overall figures to account for the disciplinary differences detected. These have been for journal article writing, where it takes nearly twice as long in Business and Economics; and for writing books, where there is a significant increase for Arts/Law. No reduction is suggested for level B academics to prepare cooperative grant applications, since data on successful outcomes were not available, nor any increase for level A's or by gender to prepare ethics applications since the difference over an entire year is negligible.

The time allocations in Table 9 are suggested as reasonable indicators of the time required to perform these research tasks. The figures should not be interpreted as indicating how long any given individual may take on the task, but as reasonable and transparent indicators of the time associated with each task in order to estimate the research workload of individual academics, in a transparent manner, which can be compared within and across institutions. Emerging as they have directly from the profession, these figures provide a useful and transparent means to assist both academic staff and performance managers in the negotiation of reasonable and equitable research workloads. They will also enable the reasonableness of existing institutional performance expectations to be checked.

Conclusions

This study suggests that, to improve the research performance of institutions, there needs to be much more careful thought given to how organisational research performance criteria are translated into internal processes to judge the productivity of individual researchers. Institutional research performance is more aptly measured over the longer term as an aggregation of the output of individuals through, for instance, publication levels in the ERA. Similarly, institutional grant income levels are sensibly measured at the organisational unit or School/Faculty level, because individual academics have little control over the outcome, other than submitting a reasonable application.

While an agency-based approach may be suitable for determining the performance of an institution, this study indicates that a stewardship-based approach is appropriate for determining the research performance of individual academics. To encourage research productivity by individual academics the research performance process must be designed to suit the nature of academic work: it must recognise the intrinsic motivational aspects of the work and the wide range of demands on academic time. It must clearly distinguish between research workload allocation (input activities) and research performance (outputs over time). Seventy per cent of technology start-ups in the United Kingdom fail within the first three years (Kirkham, 2017). Thus, research polices to encourage risk-taking by academic staff should be based on an understanding of the separate but interdependent requirements for research success of the institution and those pertaining to individual success processes.

A range of credible standard time allocations for research related activities, such as those in Table 9, enable the research workload of any individual academic to be easily estimated (and meaningfully compared) as the cumulative total of the tasks undertaken. The ability to quantify research workload as an 'input' activity, in much the same way as teaching workload has historically been, may be of particular benefit to research intensive and research only staff. Their workload has traditionally been determined retrospectively, in relation to research outcomes. All research active staff engage in the listed activities to some degree, but research only staff would engage in them more often. Of course, the outcomes of the research activity undertaken remain important for judging research performance. Further, the data in Table 9 would enable institutions to aggregate these individual allocations to get a better estimate of the real academic staffing costs associated with research, a problem for which many governments around the world are attempting to devise a solution (Allen Consulting Group, 2009).

The application of a suite of credible time allocations for research related activities, as outlined in this paper, provides a transparent platform for constructive conversations between academic staff and their managers about their research aspirations. This would fit well within a stewardship-oriented performance management context. Within the stewardship-based approach to individual performance, there needs to be a clear distinction between the allocation of individual research workload and research performance over time. The performance management process should use figures in Table 9, along with the previously published figures for teaching related tasks (Kenny & Fluck, 2017), to enable reasonable workloads to be negotiated for individuals in a transparent manner. This would ensure research expectations are proportionate to an individual's research workload category (teaching and research, or research only, etc.) for accountability purposes. With 45,276 full and part-time staff in the workforce, this study, therefore has implications for 91.8 per cent of academics in Australia, since the academics in this proportion have a

research element in their employment basis (Department of Education and Training, 2016).

Encouraging aspirational performance outcomes must be based on incentives that support the self-managed and intrinsically motivational aspects of academic work and recognise the inherent risk associated with generating new knowledge. In acknowledging the efforts involved in developing and maintaining industry collaborations and innovation, such policies will be more likely to succeed. If research is vital for the national interests, then this paper proposes an important step in conceptualising a more constructive and productive approach to research productivity that serves the interests of individual academics and their universities. In the next phase of this research, and using the same methodology, we intend to analyse time associated with academic service related roles.This will enable a holistic and credible estimation to be made of an individual academic's full workload.

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References

Allen Consulting Group. (2009). *The indirect costs associated with research funded through Australian Competitive Grants.* Author. Retrieved from https://docs.education.gov.au/system/files/doc/other/acgindirectcostsuniresearch.pdf

Anderson, G. (2006). Carving out time and space in the managerial university. *Journal of Organisational Change Management, 19*(5), 578-592. doi 110.1108/09534810610696698.

ARC. [Australian Research Council]. (2015). *Australian Research Council Discovery Projects: Selection report for funding commencing in 2015.* Canberra: Australian Government.

Australian Bureau of Statistics. (2013). Statistical Language – Measures of Central Tendency. Belconnen, ACT, Australia: Author. Retrieved from http://www.abs.gov.au/websitedbs/a3121120.nsf/home/statistical+language+-+measures+of+central+tendency.

Australian Bureau of Statistics. (2016). 6333.0 – Characteristics of employment, Australia, August 2016. Retrieved from http://www.abs.gov.au/ausstats/abs@.nsf/mf/6333.0.

Bexley, E., James, R. & Arkoudis, S. (2011). *The Australian Academic Profession in transition: Addressing the problem of reconceptualising academic work and regenerating the academic workforce.* Report for the Department of Education, Employment and Workplace Relations, Canberra. Centre for the Study of Higher Education, The University of Melbourne.

Blackmore, P. & Kandiko, C.B. (2011). Motivation in Academic Life: A Prestige Economy. *Research in Post-Compulsory Education, 16*(4), 399-411.

Cannizzo, F. & Osbaldiston, N. (2016). Academic work/life balance: a brief quantitative analysis of the Australian experience. *Journal of Sociology, 52*(4) 890–906. DOI: https://doi.org/10.1177/1440783315600803.

Carter, O. (2014). A razor-sharp line determines funding success and a bit of luck helps avoid the cut. *The Conversation* (25th July). Retrieved from https://theconversation.com/a-razor-sharp-line-determines-funding-success-and-a-bit-of-luck-helps-avoid-the-cut-29673.

Commonwealth of Australia. (2015). *Higher Education Standards Framework (Threshold Standards) 2015.* Retrieved from https://www.legislation.gov.au/Details/F2015L01639.

Department of Education and Training. (2016). Selected Higher Education Statistics – 2016 Staff data. Retrieved from https://www.education.gov.au/selected-higher-education-statistics-2016-staff-data.

Dodd, T. (2016). Education revenue soars to become Australia's $20 billion export. *Australian Financial Review,* Feb 3, 2016.

Edwards, M.A. & Roy, S. (2017). Academic research in the 21st Century: Maintaining scientific integrity in a climate of perverse incentives and hypercompetition. *Environmental Engineering Science, 34* (1)51-61. doi:10.1089/ees.2016.0223.

Franco-Santos, M., Rivera, P. & Bourne, M. (2014). Performance management in UK higher education institutions: the need for a hybrid approach. *Research and development*, series 3, publication 8.1. London: Leadership Foundation for Higher Education.

Fredman, N. & Doughney, J. (2012). Academic dissatisfaction, managerial change and neoliberalism. *Higher Education, 64*, 41–58. Doi:10.1007/s10734-011-9479-y.

Furlong, J. (2013). Globalisation, neoliberalism and the reform of teacher education in England. *Education Forum, 77*(1), 28–50. doi:10.1080/00131725.2013.739017.

Gill, R. (2014). Academics, cultural workers and critical labour studies. *Journal of Cultural Economy, 7*(1), 12– 30. doi:10.1080/17530350.2013.861763.

Giroux, H. A. (2002). Neoliberalism, corporate culture, and the promise of higher education: the university as a democratic public sphere. *Harvard Educational Review, 72*(2), 425–463.

Henkel, M. (2005). Academic identity and autonomy in a changing policy environment. *Higher Education 49:* 155–176.

Houston, D., Meyer, L. H. & Paewai, S. (2006). Academic staff workloads and job satisfaction: expectations and values in academe. *Journal of Higher Education Policy and Management, 28*(1) 17–30.

Kenny, J. (2016). Academic work and performativity, Academic work and performativity. *Higher Education* pp. 1-17. DOI: 10.1007/s10734-016-0084-y.

Kenny, J. (2017). Re-empowering academics in a corporate culture: an exploration of workload and performativity in a university. *Higher Education* pp. 1-16. DOI: 10.1007/s10734-017-0143-z.

Kenny, J. & Fluck, A. (2014). The effectiveness of academic workload models in an institution: a staff perspective. *Journal of Higher Education Policy and Management, 36*(6), 585–602. doi:10.1080/1360080X.2014.957889.

Kenny, J. & Fluck, A. (2017). Towards a methodology to determine standard time allocations for academic work. *Journal of Higher Education Policy and Management, 39*(5) 503-523. DOI: 10.1080/1360080X.2017.1354773.

Kirkham, M. (2017) Cambridge innovation. *CAM magazine* 80 p. 7. Retrieved

from https://www.alumni.cam.ac.uk/sites/www.alumni.cam.ac.uk/files/documents/cam_80_0.pdf.

Kwok, J.T. (2013). *Impact of ERA research assessment on university behaviour and their staff*. NTEU National Policy and Research Unit. Melbourne: National tertiary Education Union. Retrieved from http://www.nteu.org.au/policy/research/era/documents

Langford, P. H. (2010). Benchmarking work practices and outcomes in Australian universities using an employee survey. *Journal of Higher Education Policy and Management, 32*(1) 41–53.

Lyotard, J-F. (1979). *The Postmodern Condition.* Manchester University Press, 1984. Retrieved from http://www.marxists.org/reference/subject/philosophy/works/fr/lyotard.htm.

Marginson, S. (2006). Dynamics of national and global competition in higher education. *Higher Education, 52* (1), 1-39.

Marginson, S. & Considine, M. (2000). *The enterprise university: power, governance and reinvention in Australia.* Cambridge: Cambridge University Press.

McCluskey, A. & Lalkhen, A.G. (2007). Statistics II: Central tendency and spread of data. *Continuing Education in Anaesthesia: Critical Care & Pain, 7* (4) 127-130.

Morris, L. (2011). *From collegial engagement to performance management: The changing academic landscape in Australia.* Melbourne: PhD Thesis, Victoria University, School of Management and Information Systems.

NHMCR, ARC & AVCC (National Health and Medical Research Council, the Australian Research Council and the Australian Vice-Chancellors' Committee). *National Statement on Ethical Conduct in Human Research 2007* (Updated May 2015). Canberra: Commonwealth of Australia.

Norton, A. & Cherastidtham, I. (2015). *The cash nexus: how teaching funds research in Australian universities.* Grattan Institute. Retrieved from http://apo.org.au/system/files/58285/apo-nid58285-13021.pdf.

Pettigrew, A. (2015). *The history and future of research block grant funding for Australian universities.* Melbourne, AU: LH Martin Institute for Tertiary Education Leadership and Management, The University of Melbourne. Retrieved from http://www.lhmartininstitute.edu.au/userfiles/files/Blog/Research_Block_Grant_Funding_300615_APettigrew_final.pdf.

Pink, D. (2010). *Drive: the surprising truth about what motivates us.* Edinburgh: Canongate books.

Productivity Commission (2017). *University Education, Shifting the Dial: 5 year Productivity Review, Supporting Paper No. 7*, Canberra.

Roberts, P. (2013). Academic dystopia: knowledge, performativity, and tertiary education. *Review of Education, Pedagogy and Cultural Studies, 35*(1) 27–43. doi:10.1080/10714413.2013.753757.

Ryan, S. (2012). Academic Zombies: a failure of resistance or a means of survival. *Australian Universities' Review, 54*(2) 3–11. Retrieved from http://www.aur.org.au/archive.

Vardi, I. (2009). The impacts of different types of workload allocation models on academic satisfaction and working life. *Higher Education, 57*(4) 499-508. Retrieved from http://link.springer.com/article/10.1007%2Fs10734-008-9159-8.

Watson, R., King, R., Dekeyser, S., Bare, L. & Baldock, C. (2015). Current practice in academic workload allocation processes in Australia. In I. Dobson and R. Sharma (Eds) *Proceedings of the Tertiary Education Management Conference: Leading Locally, Competing Globally,* 30 August-2 September, Wollongong, AU. pp. 203-213. Retrieved from https://eprints.usq.edu.au/28488/3/submitted-paper.pdf.

Watt, I.J. (2015). *Report of the Review of Research Policy and Funding Arrangements.* Department of Education and Training, Australian Government. Retrieved from https://docs.education.gov.au/

system/files/doc/other/main_report_final_20160112.pdf.

Winter, R. & Sarros, J. (2002). The academic work environment in Australian Universities: A motivating place to work? *Higher Education Research and Development, 21*(3) 241-258. Retrieved from http://dx.doi.org/10.1080/07294360220000020751.

Woelert, P. & Yates, L. (2014). Too little and too much trust: performance measurement in. Australian higher education. *Critical Studies in Education 56*(2) 175-189. doi:10.1080/17508487.2014.943776.