

*This issue of CDTL Brief on **Balancing Teaching and Research** discusses the delicate relationship between teaching and research and offers tips on how to balance them optimally.*

Strengthening the Teaching-research Nexus

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In the study of language planning, particularly when looking at how languages are accommodated in multilingual societies, it has been observed that language policies typically adopt a strategy of ‘unilingualism’, where they attempt to carve out unique spaces for individual languages. For example, a language like Mandarin may be specifically assigned to particular domains of social life while some other language such as English is assigned to yet other domains. The goal here is to avoid overlapping functions so that there is minimal competition between the different languages. But despite the intentions behind such policies, actual linguistic practices indicate that speakers, rather than formally separating the two languages, may sometimes instead code-switch back and forth between Mandarin and English within the same situation. The result, over time, may even be the emergence of a hybridised variety that contains elements originally traceable to Mandarin and English, but this new variety is in fact a distinct and fully developed language in its own right, no longer reducible to its linguistic parents.

The same considerations, I believe, apply to any attempt to balance those activities that are more concerned with teaching and those concerned with, say, research. A common mindset is that specific blocks of time must be set aside for each activity. In extreme cases, one sometimes hears the lament that term time is completely dedicated to teaching and it is only during term breaks (or sabbatical or study leave) that research becomes a real possibility.

While it is certainly useful to try to create separate ‘time-zones’ dedicated to teaching and to research, it is also unrealistic to wait until teaching is ‘done’ before beginning research. So, rather than aiming for a ‘unilingual’ approach to balancing teaching and research, one should seriously consider attempting to intertwine the two, switching and mixing them such that the boundaries become blurred. The advantage to having such an interaction between teaching and research means that one can view teaching as an opportunity to do better research, and research as an opportunity to improve one’s teaching. Time spent on one activity does not necessarily detract from the other, as it would in a zero-sum game. Consequently, the idea of balancing teaching and research does not mean finding the time to do each of them separately, but finding ways of creating synergy between them so that one is regularly involved in a research-teaching nexus.

As a result, one’s teaching becomes ‘porous’ in the sense that it is infused with research-oriented considerations. And importantly, ‘porous’ teaching means that one should not have to apologise for tailoring a module syllabus to cater to one’s own research agenda. Students can only benefit from the teaching once they realise that the issues being discussed are not purely pedagogical but are intimately linked with ongoing scholarly debate, in which their module lecturer is actively engaged. Conversely, the lecturer herself can find renewed vigour and enthusiasm in teaching a module if the topics reflect

research questions that she is dealing with even outside of the class. The passion of the lecturer can come through as she runs through different theoretical or analytical perspectives; the students can sense this passion and oftentimes, themselves become infected so that their own learning is no longer just viewed with a kind of cynical detachment; and it is even entirely possible that they might provide critical viewpoints and comments that could contribute to the research outcome.

In my own case, I regularly issue a caveat that the readings and topics in my modules are subject to change, both in response to the students' own interests and to new research directions that might offer themselves in the course of the semester. I have also adopted the practice of using the 'Notes to contributors' section of international refereed journals as part of my instructions to students concerning their submission of essays. This is to encourage the students to see themselves as potential members of a research community, and to concretise for them the idea that essays are not merely written to fulfil some form of assessment, but that there are people who actually spend a significant amount of time and effort in trying to publish their work, because of their intellectual commitment to the ideas that they are

trying to develop. I also habitually incorporate into the module ideas and articles that I am grappling with in the papers I am attempting to complete. And if in the course of a semester, I receive drafts of papers from overseas colleagues that are relevant to what I am teaching, I happily incorporate these into the class discussions so that rather than receiving knowledge that has the veneer of final authority, students are given an appreciation of how the process of academic debate may or may not lead to some kind of scholarly consensus.

Perhaps it is appropriate to end this article by acknowledging that arriving at an optimal research-teaching nexus is never easy. No doubt, there are external constraints that some of us can do little about. For example, it is probably much easier to incorporate research into teaching if one is chairing an Honours or postgraduate module rather than a first year introductory module. But what this serves to highlight is that the search for an optimal balance between teaching and research is an ongoing process. To use an Asian metaphor, it is much like the desire to balance one's yin and yang, where one has to continually make sure that one eats appropriate amounts of cooling and heaty foods; there is no final state except death. ■

Balancing Teaching & Research: The Struggles of a New Assistant Professor

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When CDTL first approached me to share my experiences on balancing teaching and research, I must admit to no small measure of surprise. While I have a fair amount of experience with *struggling* to effectively combine my commitment to teaching and research, I cannot claim to have discovered any definitive solution to the challenges I still continue to face. I would like to believe that as a fairly fresh PhD graduate and new member of faculty, my difficulties are a consequence of adapting to new tasks and systems. The following account offers some brief insights into the problems I have encountered attempting to both teach and do research.

Let me begin with a little personal information. I graduated with my PhD in 2002 and returned to Singapore and joined NUS in May of that year. I have been at the Department of English Language & Literature for the last two years, teaching film and media studies. I know the importance of maintaining a healthy publishing record while also attending to my teaching responsibilities. The fact remains that effectively accomplishing either one of the tasks would have been an exciting challenge, but doing BOTH has been a continuing struggle.

One of my first realisations is that it is difficult to split your time equally between teaching and research because the demands on teaching are generally so very much more present and unavoidable, and the rewards so much more immediate. While the demands of teaching in terms of time spent in class, meeting with students and on grading never actually decrease across semesters, teaching a course for the first time is particularly challenging and the amount of time spent on preparation especially heavy. As new members of faculty, most of us do not have already existing lectures and teaching materials to modify or fall back on. Instead, all lectures, PowerPoint slides, lecture handouts, readings and tutorial tasks need to be generated, often from scratch. My attempts to do so are also often hindered by the lack of much actual experience in producing effective materials. Consequently, a tremendous amount of time and energy is focused on these tasks. Furthermore, after the class has been taught, I find myself spending a significant amount of time on revising and refining my materials, my approach and my techniques. For it is only then that I have any perspective on which strategies worked and which were less successful. Consequently, in the two years that I have been teaching, my teaching-oriented preparations have shifted to trying to find solutions for the less effective aspects of my earlier teaching sessions so as to improve my abilities for future class sessions. This is an extremely time consuming and exhausting series of tasks. As a result, my research is often neglected and forced to take a back seat.

In the last two years, I have attempted two strategies to 'correct' this imbalance. Let me offer an account of what I have tried as well as some comments about how useful I found them.

1. The Reading/Research Group

The idea behind establishing a small reading group was to create a situation in which research became as important a priority as teaching. Each week, one of the group's members would submit his/her work for comment. As members of the group agreed to meet weekly, this would serve as motivation and encourage members to focus on their research in anticipation of each weekly session. The meeting also gave the researcher the opportunity to gather feedback and support from colleagues.

One of the strong points in this approach is the motivational force provided by a deadline, and the knowledge that colleagues were setting aside time

to go over the material. The feedback and comments generated can also be extremely helpful for all the participants.

It is worth noting that this strategy depends greatly on shared interests and areas of research. In many cases, the usefulness and relevance of the feedback is dependent on readers familiar with the field. While colleagues from unrelated fields can offer helpful comments, these tend to be of a more general nature. One drawback is that group sessions can actually add to work stress as it means additional work to complete within a limited amount of time—not only do you have to work on your own research, additional time must be set aside to go over colleagues' submissions.

2. Blocking off Research Hours

The plan here is to set aside a block of time every day, or over a week solely for research. This strategy can be fairly helpful for the disciplined and those who have some control in planning their schedule. This was quite effective for me in a lighter semester when my classes were in the late afternoon and evening. This schedule freed up the morning so that I could focus on research and writing. Because I could set aside a few hours, without interruption, I was able to spend that time effectively attending to a single, focused pursuit.

One key benefit here is the luxury of immersing yourself in research for a fairly substantial amount of time each day/week. The time set aside also allowed for more effective concentration on a single task.

The greatest problem with this approach is that it is much harder to implement in a busy semester. When I taught two undergraduate courses and had classes every day of the week, my time and attention at that time was focused on the many teaching oriented tasks, including a tremendous amount of marking. The schedule that resulted consisted of limited pockets of free time, but these were often too short to truly immerse myself in the work. I usually had to stop before I had achieved my set goals, which often resulted in some frustration and annoyance. However, I found this particular strategy one of the more effective and helpful ones.

I cannot claim to have found a way to effectively balance my research and teaching, nor am I in any position to advocate any particular technique. But I believe I have uncovered some possibly useful ways, and I continue to search and experiment in the hopes of one day finding a way that best suits me. ■

My Ride on the MRT: Marriage between Research and Teaching

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Like all others who have chosen their jobs with passion and are geared towards giving their best to the companies or sectors they serve, educators bear unique societal roles in helping to shape the country's young minds from pre-school to the higher levels. As the level of education rises, so does the level of complexity and emergence of new knowledge we want to see being imparted to our students. Here, teaching is seen traditionally as a mechanism for 'transferring' the knowledge, while research expects the 'creation' of new knowledge through extensive searching, testing and formulating new ideas. These two seemingly unrelated duties are undertaken by two branches of professionals, namely the teachers and researchers. But in actual fact, an important and complex element of congruence and connection does exist between the two. Various studies are now trying to define this teaching/research nexus and to accurately capture the essence of the two underlying principles of education. Is this relationship between teaching and research really complex? Or is it a subtle one? Is there a 'critical point' where these two might or should meet?

My experience as a scientist for five years at a research institute followed by three years as an Assistant Professor in NUS has certainly helped me appreciate what seemed to have been missing from the institute then (discounting my role in supervising some graduate students): the wonderful opportunity of interacting with young minds and the chance to try new disciplines at an academic setting. For example, the structuring of new curricula where there is both exciting and 'enterprising' interaction between research and teaching. Still, one key issue that always remains is: 'What constitutes the best portfolio for a university professor, especially for the more junior staff?' Research, teaching and/or service? How are we going to optimise our effort and maximise the output in the research-intensive academic department without getting too paranoid about how teaching might affect the quality of research, AND at the same time

providing top-grade teaching? Since teaching and research are supposed to go hand-in-hand in higher-level education, these questions become less of an issue for me. Still, faced with constraints such as time and finite resources, plus the expectation to generate new ideas in the form of scientific publications, we need to take a closer look at how to happily bring about and survive the marriage between teaching and research. Hence, a more realistic and perhaps more optimistic question would be: 'How could teaching and research be synergised?' The answer must lie in their intricate chemistry of cross-catalysis mediated by two groups of key players, students and us.

Let me start by highlighting some major mutual benefits that can be derived from the synergising of teaching and research, and then briefly describe how they can be optimised by the 3T scheme of management framework: Time, Team and Topic (Figure 1). Here, the teaching element encompasses both undergraduate and postgraduate levels, and the research element can be applied to any discipline.



Figure 1: Creating and maintaining a healthy MRT through the 3T system. Please refer to text for details.

The Benefits from Extending Research to Teaching

1. *Master inspires disciples.* Teachers have effective means of ensuring good learning outcomes. If the teacher himself/herself is a 'master' researcher of a particular field, posing challenging concepts to

the students would have very positive influence on their learning culture. For example, Professor Salvador E. Luria's (Nobel Laureate in Physiology or Medicine, 1969) strong emphasis on exposing students right from their early undergraduate training had set the tradition for top guns from the Massachusetts Institute of Technology (MIT) and Whitehead Institute to lead and teach introductory courses, and not just the postgraduate modules.

2. *Fantastic discoveries promote students' interests.* By injecting the teacher's own learning experiences into the teaching process, for example, how the success of creating a transgenic fluorescent fish came about, would spice up the attention and interests among both students and the public.
3. *Depth follows breadth.* Following the broad-based studies structure and the strong interest background, students are then encouraged to practise critical thinking in solving research-type issues. This can be fostered by teachers doubling as researchers themselves to probe in-depth issues which are of great interest to both parties.
4. *Ice-breaker.* Having two separate and distinct departments to undertake research and teaching will tend to create unhealthy disparity. In addition to the merits described above, having more research staff to take up more teaching duties will help break the ice and promote research collaboration in the process.

The Benefits of Teaching to Research

1. *Good access to student pools.* Conducting classroom teaching immediately alerts teachers to enthusiastic students for projects at undergraduate and postgraduate levels. Building up the critical mass with excellent quality is important for maintaining dynamics in a research team.
2. *Foster excellence in communication skills.* Great researchers should speak and write well to relay the crucial information accurately and persuasively. Teaching is a unique art that helps to shape both the confidence and sharpness needed in delivering ideas. This partly explains why most great researchers are excellent teachers too.
3. *Diversify research programmes.* New ideas and concepts acquired during teaching certain multi-disciplinary courses e.g. bioinformatics, system biology, computational biology, biophysics, chemical biology etc. can enrich one's research

programme. This also allows for the rapid re-alignment of research programme when the old areas become stale. With focus on cell signaling, I have certainly enjoyed learning new tools in bioinformatics, proteomics and developmental biology that make our research more versatile and fun!

4. *Team-teaching promotes integration.* The spirit of team work develops when co-teaching with colleagues and could foster closer research collaboration.

Managing the Balancing Act: Time, Team and Topic

To maintain a healthy marriage between teaching and research, we ought to ensure that we enjoy what we are doing. While it is easier to say than done, the following 3T scheme can be our guiding principles towards this end.

1. *Time management:* Manage our time appropriately for either activity. Try to prepare lectures in a format that allows for rapid revision or updates whenever one comes across any new information from readings. Use small group tutorials for Q & A rather than meeting students individually unless there are exceptional cases.
2. *Team management:* Manage the research team by assigning each member a specific task or duty and a "laboratory manager". There should be provisions for leadership opportunities for the more senior staff or students assisting in mentoring the junior ones. For teaching, maintain team-teaching among colleagues with similar interests and update the course materials accordingly.
3. *Topic management:* Each research or teaching topic should be classified meticulously for quick reference with proper cross-referencing. Notes should be updated as and when new ideas either for research or teaching projects emerge. For module teaching, one should volunteer to teach course with which one feels comfortable and one that should ideally provide room for new ideas. Examination topics can be set according to the nature encountered by the research.

'Teaching informing research' and 'research informing teaching' is poised to set the new landscapes to attain the best quality of education. Like the efficient Mass Rapid Transport commuter system here in Singapore, I would certainly think that the principle of MRT stipulated above will catalyse my desire to stay relevant in both my research and teaching career.

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Research/ Writing Groups

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One stubborn problem for lecturers at NUS is the balancing of teaching and research. As one might always do a bit more to prepare for a class, and as many other demands on one's time can arise during a semester, many feel it is difficult to block out time for research and writing, especially during term. One strategy that helps is to form research and/or writing groups that meet regularly during term and which create a 'counter-demand' to match the existing demands of teaching and administration. Since lecturing, grading and student supervision present constant external demands on one's time and attention, it can feel selfish or irresponsible to take time away from class preparation in order to further one's research aims. By working within the context of a writing group, a writer may create an external demand to compete with the ever-present demands of teaching and administration.

At a workshop held in English Language and Literature in August 2003, K. P. Mohanan, Lionel Wee, Valerie Wee and myself presented various models of how a writing group might work, based on past participation. Usually, members of the group set up a weekly or a bi-weekly schedule, with one member presenting on the given day. It is useful if the piece of writing under discussion (usually between ten and twenty-five pages) is emailed to the other participants at least two days in advance, though in practice we often cannot get drafts out much before the end-of-business of the previous day. Writing group members can then, after having had a chance to read the material, meet for an hour or so to discuss strengths, problems and venues for publication (if that has not already been decided). This process can be very helpful in developing a conference paper into an article-length draft.

In addition to the formation of writing groups, the workshop offered a few more ways of making writing possible during term. One suggestion, from Robert Boice's *Advice for New Faculty Members: Nihil Nimus*, is that one try to write everyday, for however short a period, in this way avoiding the frustration of 'binge writing': by reserving as little as a half-hour each day for writing or revision, one better maintains fluency. While everyone agreed that it is quite a challenge to maintain a writing habit towards the end of the semester when student work is rapidly piling up, many participants in the workshop complained about the difficulty of resuming a writing job after being away too long and felt it was worthwhile to write as often as possible.

If one has the fairly typical experience of *intending* to put more time into research, only to find at week's end that one has put all the effort into grading papers, preparing for class, answering student questions, and perhaps seeing to administrative duties, it might be useful to track one's time. Boice recommends "brief daily sessions" and one could chart exactly how the hours are spent (perhaps by dividing the time spent on the categories of 'research', 'teaching' and 'administration') in order to see how the time spent on writing tallies in comparison with time spent on other tasks. This way one can see how one week stacks up against another, and one can also get a better sense of which parts of the week are more possible for writing—and which time slots are just impossible.

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Integrating Research into Teaching

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Introduction

It is a popular belief that research enhances teaching, though such a claim is debatable. Given that research is largely a problem-solving process, and one of the aims of teaching in engineering classes is to imbue in the students the ability to solve problems, it is obvious, in this instance that there are strong links between teaching and research.

Research has traditionally been highly valued in academic careers. However, research can indirectly influence teaching negatively if faculty members focus on their research output to the detriment of their teaching activities. As time is a finite resource, faculty members need to strike a fine balance between the time spent on research and teaching. In this article, I shall highlight how I have managed to strike a balance between teaching and research by integrating research into teaching based on my personal experience at NUS.

Integration of Research into Teaching

Balancing teaching and research is a very challenging task. Optimisation of staff time can be achieved if there is explicit management strategy that promotes the interdependence between teaching and research. The effective allocation of time could stimulate a synergistic relationship between teaching and research by enabling staff to engage in a level of scholarship which enhances both activities. The supervision of research students is one such example of how teaching and research can be integrated. Whether time spent supervising students should be classified as teaching activities or research varies between departments and institutions. Here are some advantages of integrating research into teaching:

- The teacher is able to give accurate and up-to-date information to students with relevant examples rather than second-hand knowledge from textbooks. I know from my own learning experiences that I develop a particular affinity for topics when

the teacher is able to draw on their own research experience.

- The teacher's research is also beneficial because s/he is forced to articulate their ideas and open them to challenges from students. This could in turn stimulate new research directions.
- Teaching could be a recruitment platform for attracting the right students with a passion for research. This is especially important in the science and engineering fields where students form the backbone of the research conducted.

Personal Experiences at NUS

It is very easy for new faculty members to get too caught up in their teaching preparations, thus leaving too little time for research. Balancing the time spent on teaching and research is especially difficult when one is handling large classes (>100 students). This is exactly what happened to me after I joined NUS in May 2000. I struggled to balance my time between teaching and research because I was assigned a large class of 380 third-year students to teach a compulsory module, EE3002, "Engineering Mathematics IV". In wanting to excel in teaching the module, I spent a lot of time developing course materials and reflecting on how they can be presented to the students with varied levels of understanding. Although I enjoyed teaching the module, it was very difficult to strike a balance because the module was not directly related to my research work. After teaching the module for two semesters, it was moved to the mathematics department due to curriculum changes. I have since developed new modules related to my field of research and find it is much easier to strike a balance.

The first module, EE4414 "Magnetic Materials and Devices for Information Storage" I developed is an undergraduate elective course. By bringing my research experience into the classroom, a high level of interaction between the students and myself is

promoted. The students had indicated in their feedback that this interaction is highly welcomed and appreciated. The time I spent developing the course materials was reduced significantly compared with the earlier module. My research activities have also benefited as a result of introducing this course because I am now able to attract very good undergraduate students who stay on to do graduate studies at NUS through my passion. Since 2002, I have at least one very good undergraduate student from the class joining my research team every year.

The second module I developed, EE6504 “Nanoscale Engineering” which integrates my research work into teaching, is a graduate level course. Nanotechnology is a broad and interdisciplinary area of research and development that has been growing explosively worldwide in the past few years. This course introduces new concepts and novel issues that arise when describing ultra-small devices. Lectures are interactive and discussion-based, and involve a number of guest lecturers. Students read original research papers and review articles and present seminars on assigned topics of contemporary interest. Students are assessed continuously through components such as term papers, assignments and mid-term tests. Each student is also expected to give a seminar on topics in nanotechnology either proposed by the student or pre-assigned. There is also the peer review component of the assessment where all registered students must participate in grading each student seminar. My research activities have benefited from the student seminar series because some of their findings can be integrated directly into my research.

Conclusion

Teaching and research can complement each other if new ways of managing the relationship are considered. Recognition of the tensions between balancing the time spent on teaching and research can lead to more realistic expectations of staff performance. Other factors such as the stage of career development and the nature of the discipline can significantly affect teaching/research productivity and effectiveness. However, from my experience at NUS, I find that it is possible to integrate research into teaching, thus enhancing productivity. ■



The Centre for Development of Teaching and Learning (CDTL) engages in a wide range of activities to promote good teaching and learning at the National University of Singapore, including professional development, teaching and learning support, research on educational issues, and instructional design and development.

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