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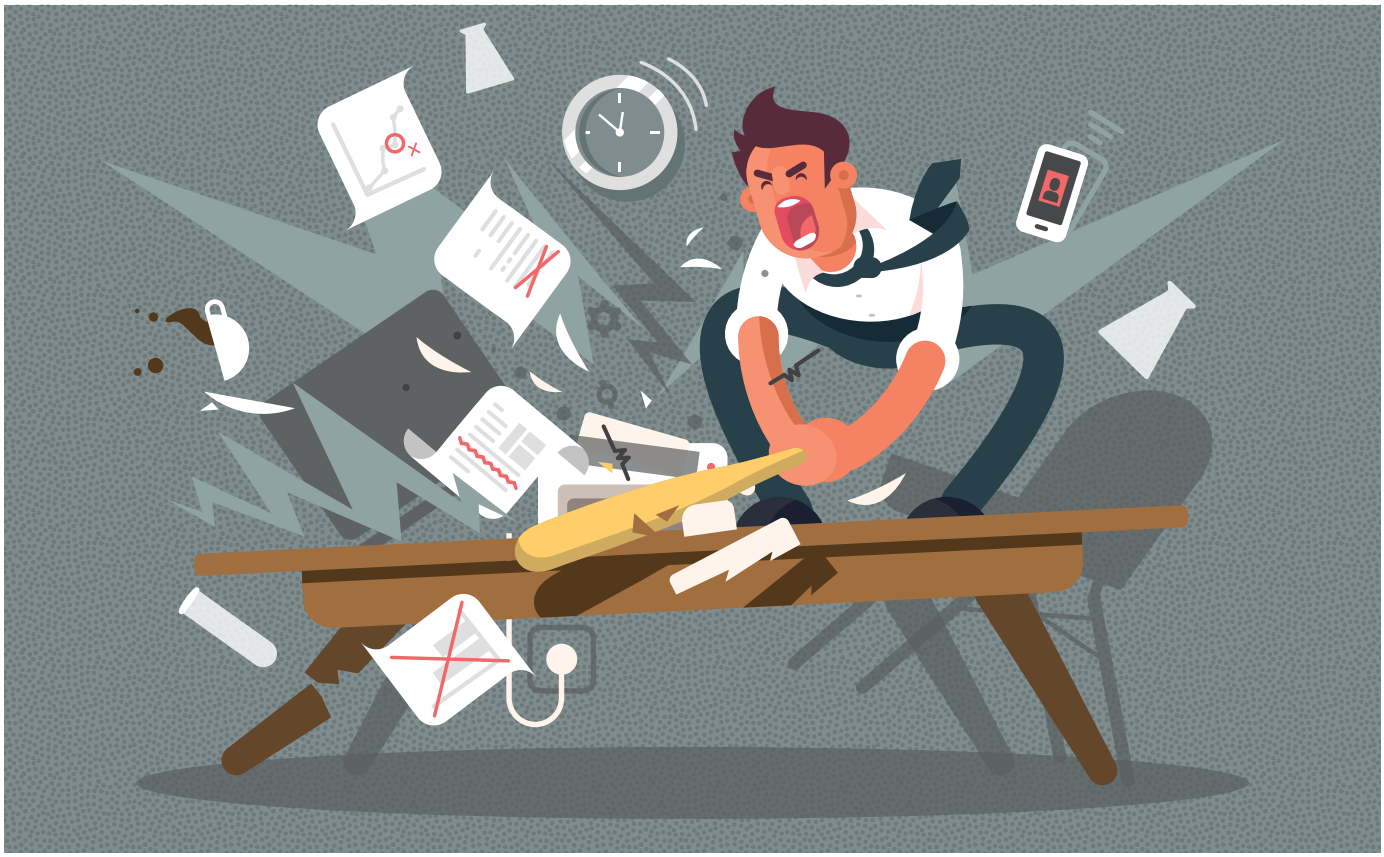

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ORGANIZATIONAL SKILLS

Avoid PhD deadline rage

Tips to skip the last-minute panic and take the stress out of submitting your thesis.

BY NIC FLEMING

Horror stories about the final weeks, days and hours before a thesis submission deadline are common among people with PhDs in both the sciences and humanities.

Some are undone by losing their precious words to unresponsive hard drives. Others see their graphs and references mangled by software that can't cope. There are sleep-deprived administrative blunders, formatting problems, severe cases of writer's block and stress-induced disasters. In fact, candidates for whom thesis submission goes entirely to plan are almost certainly in the minority.

Nature spoke to individuals who have been through disasters, or have helped others to overcome them, to find tips to get you through submission day.

PLAN FAR AHEAD

Last August, Mark Bennett was waiting anxiously outside the university print shop, USB stick in hand, when it opened its doors at 9 a.m.. The previous evening, Bennett had ordered three copies of his thesis on the shop's website, and received an e-mail telling him when he could pick them up. But the site hadn't prompted him to upload the document, so he knew something had gone wrong. By that time it was too late to call the printers, and his final deadline was just days away.

Bennett had started his English literature PhD on eighteenth-century travel writing and its relationship to popular fiction at the University of Glamorgan in Pontypridd, UK, in 2008. But through a combination of funding issues, starting a family, following his supervisor's move to the University of Sheffield, UK, and beginning a full-time job, Bennett did not complete his thesis until the end of August 2018. Submitting a day late could have resulted in a fail. "I was in a panic, thinking I'd now have go to an appeal at which it was going to be a 'dog ate my homework scenario', which is really not appropriate at PhD level," says Bennett.

"I've never heard of a PhD student who hasn't had something unexpected or untoward happen, especially in the later stages," says Inger ▶

Mewburn, director of research training at the Australian National University in Canberra. "In 15 years of working with PhD candidates, I've never heard anyone say, 'It was totally fine.'"

As the print shop opened its doors for business, Bennett made his way inside, silently kicking himself at the thought that leaving this seemingly simple task to the last minute might result in him failing the PhD he had started a decade earlier.

The shop assistant who checked the file told Bennett he could not print it because it was a Microsoft Word document. Bennett's sense of dread was exacerbated as their combined efforts to convert it into a PDF using freeware failed. The problem was finally solved by another assistant, who pointed out that it could be converted into a PDF within Word. "It's natural that people want to take every last bit of time to work on their thesis, but they shouldn't assume printing and binding will be a formality," says Bennett, who works at FindAUniversity, a Sheffield-based company that operates several websites for students seeking postgraduate opportunities. "It's worth getting it done well ahead of the deadline."

BACK UP YOUR DATA IN MULTIPLE PLACES

Although few people would want to return to writing PhDs on typewriters, storing data and text in digital form is not without its own risks. Physicist Leonor Sierra knows this better than most. In 2006 she was most of the way through her PhD on quantum transport in carbon nanotubes at the University of Cambridge, UK, when a number of computers, including hers, were quarantined because of a computer virus. This led to a delay of only a fortnight or so, which might in other circumstances have just been a minor setback; however, her progress had already been slowed by the head of her laboratory moving away and the lab's fabrication facilities being shut down for several months.

Early the following year, Sierra had written almost half of her thesis when the external hard drive she was using to back up her work suddenly stopped working. She was not overly concerned, because her work was also stored on her computer and on CDs. Sierra resolved to get a new hard drive. A week later, however, she tried to turn on her computer only to find it unresponsive. She tried several times to no avail, and then burst into tears.

A computer-scientist friend removed the computer's hard drive, put it into another machine and retrieved all but about a chapter's worth of work. "At the time, it seemed like the end of the world," says Sierra. "But re-writing it didn't take long because I already knew what I wanted to say, and the second version was better, so it was a blessing in disguise."

Since Sierra submitted her PhD in 2007, the rise of cloud-based storage has meant fewer students lose work to hardware failures. That does not, however, mean that digital risks are a thing of the past. "I would advise people to use more than one back-up system, to make use of the cloud, and not to discard early data, printed drafts or other material until the very end," adds Sierra, who now lives in Athens, Georgia, and works as a freelance science writer and editor.

CASE STUDY

How to avoid an administrative nightmare

Margin sizes, forms and printing ink might be the last thing on your mind as deadline day approaches. But leaving administrative requirements to the last minute could be costly.

PhD coach James Hayton advises making a checklist of the following:

- Triple check your deadline from an official source.
- Find out which office you need to hand your thesis to. When does it close?
- What forms do you need to fill in? Who needs to sign them?
- Make note of the required margin size, line spacing and typefaces.
- If your thesis needs binding, what are the specifics? Where can you do it?
- How many copies do you need to submit? It's usually at least two, sometimes more.
- Do you have access to a printer with enough paper and ink, and a back-up?
- Figures can look different when printed, especially in colour. Do early test runs.
- Get someone to check the title page: misspelling your name won't impress.
- Allow time to solve problems caused by compiling separate chapters into one file and format conversion. N.F.

PROJECT MANAGE YOUR MONSTERS

Many students' struggles to complete their theses are rooted in the organizational difficulties they faced at the start of their PhD programme. Whereas undergraduates are largely expected to learn and understand existing material, there are no answers at the back of the book for PhDs. Supervisors offer directions, but candidates must draw their own maps as they go along. This means they must manage their own schedules.

Project-management skills are therefore key, says Sara Shinton, head of researcher development at the University of Edinburgh, UK. At that institution's induction events, candidates receive a wall chart with 48 empty boxes representing months, which they are encouraged to fill with important events, plans and deadlines relating to their PhDs. The idea is that students will find writing a thesis easier if they keep it in mind as they plan and complete earlier aspects of the programme, such as reviewing the literature, attending conferences, doing placements, devising experiments and collecting results. "If you're reflecting on the bigger questions through the process, then you'll be in a much better position to weave the narrative when it comes to the end," says Shinton.

Small formatting and referencing issues can grow into substantial problems in the final days before submission. Some PhD students get into trouble by leaving details such as references, fonts, text size and graph format until later on, says James Hayton, a PhD coach and author of the 2015 book *PhD: An Uncommon Guide to Research, Writing and PhD Life*. "A common trap is leaving those awkward little things to the end, and it taking longer than expected," he says. "I advise choosing any referencing software, sorting out things like formatting and graphs, and getting things as close to submittable as possible early on."

GET WRITING

Many struggle with the writing process itself. Having a clear timeline of when you will complete drafts of chapters can help to keep you from falling behind. Mewburn, who runs a blog called the The Thesis Whisperer along with three-day thesis boot camps for PhD candidates at the Australian National University, advises students to finish their first full draft six months ahead of the deadline. "People say to me 'no way', and then I go through all the practical details that can go wrong with things like getting supervisor sign-off, using the wrong template, finding a decent copy editor, and dealing with their input, as well as all the normal life problems which will become magnified and harder to deal with."

Mewburn says that all her boot-camp attendees write at least 5,000 words over the 3 days, and some hit 20,000. As well as using motivational techniques such as awarding different-coloured, giant Lego blocks as prizes for hitting various targets, she also teaches generative writing, a technique designed to get the words flowing by, for example, advising writers to suppress the desire to self-edit as they type. (To do this, Mewburn covers the delete keys on boot-camp-participants' keyboards with fuzzy stickers to prevent attendees from auto-editing.)

Rowena Murray, director of research at the University of the West of Scotland near Glasgow, UK, advises PhD candidates to write a 750-word summary of their thesis within eight months of their deadline. "It makes them focus on what will go into each chapter, the coherence of the structure and the macro arguments, as opposed to just the micro details they are enmeshed in at that time."

CONTROL THE CONTROLLABLE

Universities and their departments each have specific administrative requirements for thesis submission, and PhD candidates can reduce the risk of last-minute headaches by getting to grips with these criteria early on — and possibly committing them to paper, says Hayton (see 'How to avoid an administrative nightmare'). "When you are stressed, it's best not to rely on your short-term memory," he says. "It's better to make a checklist of the required paperwork."

Some thesis-submission complications are beyond the powers of even the most organized students to do anything about. If your lab burns down, taking your experiment and results with it, no amount of planning or preparation will help. However, examiners are not looking to fail candidates, and will generally take pity on those who have genuinely had bad luck. "There are always the acts of God-type events," says Shinton. "Funders and institutions are always going to look sympathetically at such cases."

Given the hard work and sacrifice required to gain a PhD and the wide variety of things that can go wrong, some might wonder whether it is worth it. The answer will vary on a case-by-case basis, depending partly on individuals' career paths and other goals. Some who advise PhD candidates say it is important to bear in mind the scope for personal development that gaining the prized qualification can bring.

Mewburn, for example, thinks that completing her PhD on the use of hand gestures in the teaching of architecture gave her the confidence to take on a number of complex professional projects. She uses the Finnish word '*sisu*' to describe the grim determination in the face of adversity that individuals must go through to get their PhDs. "The process of doing a PhD shows you what you are capable of," she says. "If it is done well, it can give you an intense sense of achievement and power. "Plus," Mewburn adds, "it's nice when people call you 'doctor' on aeroplanes." ■

Nic Fleming *is a freelance writer based in Bristol, UK.*

COLUMN

Teaching is a privilege

Scientists should embrace teaching responsibilities, advises **Sarah A. Gagliano Taliun**.

"A postdoc is just like a faculty position minus all the hassles of teaching," a visiting professor told me and a handful of postdoctoral colleagues during an informal networking lunch earlier this year.

I disagree with this attitude towards education. Teaching at the university level is not and should not be considered a burden or chore that just needs to be done. It is a crucial part of academia, and it is essential that mentors portray it as such. We all want to do scientifically sound research, and, without question, we should all strive to be effective teachers. Through teaching, researchers are responsible for the education of the next generation of scientists ,who will use their own unique ideas and skill sets to advance their fields.

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Teaching and research are both integral parts of science.

In both my PhD programme and my postdoctoral fellowship, I have sought out teaching opportunities because I see them as an opportunity for enrichment, rather than a hindrance. I have supervised undergraduates during an intensive summer research programme, and have mentored numerous students doing research. Also, as a postdoctoral fellow, I have co-instructed several graduate-level courses. Each time I find myself in a teaching role, I try to do it better.

I work to improve the delivery of the lesson, to induce a deeper level of critical thinking through my exam questions and to incorporate new teaching strategies to meet the needs of a wider range of learners. I learn from my students. Through their fresh perspectives, I am able to rethink my research as well as the current state of the field and where it is going. For example, questions from my students helped me to reconsider the accepted threshold for 'genome-wide significance' and how it might change.

From my experiences, I have three pieces of advice to help researchers become better teachers.

Approach teaching with an open mind. The predominant attitude in the sciences needs to shift: teaching is not a waste of prized research time. Certainly, there are academics who value the responsibility of teaching, but this group needs to become the majority.

Reach out for support when planning a class. Most of us are not innate teachers, just as most of us are not innate researchers. As with developing any skill, learning to teach is a process that requires trial and error and lots of practice. To this end, many universities offer professional-development programmes designed for graduate students, postdoctoral fellows or faculty members to improve teaching practices and techniques in the classroom, the laboratory and beyond. It is never too early or too late to work on developing these skills, many of which are applicable outside the classroom, such as when mentoring students who are doing research or giving oral presentations.

Prepare thoroughly so that the content and flow of the lesson is concise and coherent, and is tailored to the audience. This preparation takes time, but by doing it you will at the same time develop new ideas on presenting your own research (through verbal, written or visual means) to non-specialists, thus broadening its reach.

I am working towards a career in academia and am aware of the ever-increasing pressures on researchers to publish in high-quality journals, secure funding and present at conferences. Teaching is often lower down on this list of priorities. I feel that science needs to rethink its positioning.

Teaching at the university level should not be seen as a hassle in academia, but rather as a skill to be developed and a responsibility to be taken seriously. Teaching does not have to decrease research productivity — it can greatly enhance research if we allow it to. ■

Sarah A. Gagliano Taliun *is a postdoctoral research fellow in biostatistics at the University of Michigan in Ann Arbor.*