

Bench philosophy (15): Visualisation of experiments

Put your Paper onto Video

Nearly everybody knows YouTube and Facebook. But not every scientist knows the peer-reviewed *Journal of Visualized Experiments* (JoVE) or *Nature Network*?

No scientist could have possibly missed the societal developments which are now slowly seeping into the scientific community. Open Access (OA) describes the movement to make publicly funded research openly available. This reform has enjoyed increasing momentum and at least since Springer bought OA publisher, BioMed Central, the prospects of universal OA are rising. OA is probably the only one of three major developments which has garnered significant traction. Why?

The Science 2.0 movement reflects the implementation of Web 2.0 services in the scientific community. Historically, blogs started this era over ten years ago. Today, with ScienceBlogs, platform and german sister site of the Seed Media Group, blogs have finally arrived in the scientific community, years after they had already become mainstream publishing venues in most other aspects of our culture. Yet, even today, the practising scientist is still in the minority in the scientific blogosphere. This is surprising given the potential for fast dissemination of ideas and discussion, which would clearly benefit science, especially given the agonisingly slow publication cycle.

Leave your comments

In a bold experiment, the Public Library of Science (PLOS) has attempted to further shorten the delay between publication and discussion by allowing everyone to leave comments on the publications in their journal *PLoS One*. These comments are permanently linked to the article, a principle which has now been extended to all PLOS journals. The number of comments at *PLoS One* is comparatively high – 1,500 comments by 710 users in 1.5 years – but the overall rate of commenting is still rather low, only 25% of all papers receive comments, at all. Another attempt to tap into the vast intellectual potential of scientists using Web 2.0 technology is via community websites such as *Nature Network* of the Nature Publishing Group. This mixture of

ScienceBlogs and Facebook seems to enjoy increasing popularity. The brand name may be a contributing factor, or the possibility to interact with *Nature* editors directly. One of the few non-scientific social sites that has been populated by communities of scientists is FriendFeed with thousands of active scientists contributing. But even on these relatively successful platforms, only a minority of scientists is participating and



Filming instead of paper writing: scientists become video stars.

these are mostly off-bench scientists whose research already depends on computer usage beyond the typewriter or spreadsheet functionality.

Open Science denotes a movement, which, to many, must seem revolutionary. Using the net, every idea, every single experiment and every bit of data will be immediately accessible by everyone as it happens. This concept is based on the premise that the perfect match of ideas, methods and data are rarely combined in the same physical location. Establishing this perfect match would, of course, benefit science tremendously. Having all of science completely open would also establish precedence and eliminate theft and plagiarism: everybody could easily find out who said/found/developed what first. In this grand new scheme, there is a record for every contribution, be it an idea, method or data. OpenWetWare, for instance, is a Wiki designed especially for open data sharing among biology labs.

The *Journal of Visualized Experiments* (JoVE) is another relatively successful example of modern technology slowly being embraced by scientists. It combines OA, Science 2.0 and Open Science elements. JoVE video publications are OA from the time of publication; you can comment and discuss the aspects of the protocol directly on the page with the video, and it enhances transparency and reproducibility of biomedical research, nurturing methods into ideas. What is JoVE? JoVE is a platform for peer-reviewed, professionally produced videos of scientists explaining their method(s), together with a written protocol. Its sales pitch claims that “after about 150 years of traditional print publications in science, JoVE is building the world’s largest Life Science Resource Video Library to increase efficiency and transparency of life science research so that instead of 10 years and a billion dollars, it will only take one year and a million dollars to develop a new drug.” JoVE is the only such platform listed in PubMed (as “*J. vis. Exp.*”). During the two years approximately

that it has been in existence, JoVE has published 249 video protocols, which are being downloaded by about 2,000 unique users per day in 200,000 accesses per month. Among the authors are distinguished scientists from institutions such as Harvard, Whitehead, Stanford, Emory, Imperial College, Cornell, etc.

Scientific Screen-play

In contrast to SciVee, where the scientists produce their own videos, JoVE employs postdocs to write scripts from the protocols provided by the scientists. The advantage being a script written from the perspective of the target audience and not that of the authors’. A professional camera team then films the scientists at their bench, doing the experiment. This constant interaction between author and journal makes science publishing a more personal experience, for authors and audience. Post-production is also performed in-house by JoVE

staff. Peer-review is carried out by the review editors of JoVE and, in case the protocol involves the handling of animals, an additional special Vet Med Review by a Veterinarian is required. This kind of quality and service does not come for free and thus author-fees accrue comparable to those of a high-ranking OA journal. However, because not all authors can afford these fees, JoVE has established collaborations with corporate sponsors as well as publishers to keep the pricing scheme flexible.

What can video publishing do for you?

“What on earth did these guys do?” Everybody knows (and hates) the tedious study of often badly written Materials & Methods sections and that’s only to understand the main message of a paper. Especially, when you have to present it at the journal club. The next morning! The advantages of video publication of scientific protocols are clear, beyond any journal club woes. Science is becoming increasingly complex, technology is advancing at an ever faster pace, leaving less and less time and attention span for the individual researcher. Often, the first year of a graduate project is spent just reproducing somebody else’s experiment. Video instructions, combined with a written protocol and the possibility of weeding out any remaining issues right there on the video in a discussion with the authors, will, of course, cut much of this initial lag.

Not only users, also authors benefit from publishing their methods as video protocols. If a picture is worth a thousand words, a video must be worth at least a million. This would surely exceed the word limits for any print-journal. Moreover, increasing understanding leads to a rise in the success and adoption rate of a method, culminating in more citations and an increased chance of someone else improving the technique. Writing the Methods section becomes so much easier when you only have to cite your video protocols and provides the added benefit that your written publications are better understood as a consequence. The central discussion on the video reduces the number of multiple requests for information and saves everybody time. Additionally, the technical expertise developed in a lab is retained even if the person who developed the technique leaves. Thus, publishing video protocols is a win-win situation, everybody and science benefits.

Besides the rational cost/benefit considerations there may be even more sentimental reasons as to why scientists publish in JoVE. Who wouldn’t like to see his meth-

od preserved in video format for posterity? Perhaps this could become a motivating factor for scientists who submit their tips and tricks of the trade to *Lab Times* and its German sister journal *Laborjournal* for publication in the “Lab Tricks” column? With this in mind, JoVE has started a pilot project with some of the authors of this column to publish video versions of their tricks. If successful, this could also become a regular feature: *Lab Times* /*Laborjournal* tricks in JoVE.

But the future of video publication doesn’t lie in research alone. Other pilot projects at JoVE comprise basic protocols, which demonstrate fundamental lab skills, or a repository of experiments for students’ courses. The latter can either be used as material in a course or as instructions for teachers on how to establish some of these experiments in their own courses.

New reputation systems needed

These new developments all have tremendous potential for modernising research and thus scores of forward-thinking scientists should flock to adopt them. Indeed, some circles have long since been planning ahead for the time beyond the dictatorship of the Impact Factor and even for the time after the “extinction” of journals. However, so far, this has been limited to avant-garde circles; most scientists have not even begun to think along those lines. While JoVE is a success, one would naively expect the journal to be inundated with requests, given the benefits to science, listed above. The same can be said of *PLoS One*’s strict rule of not selecting for ‘impact’ or ‘relevance’ but instead applying clear criteria, which simply ask whether the science is rigorous and the paper is valid.

Another example is the tiered scheme of *Frontiers in Neuroscience*, where papers can advance to the next-higher level of journals after post-publication assessment. All the examples mentioned so far are among the most successful of similar endeavours but adoption rates are, nevertheless, not even close to what one would expect. Are scientists less networked than the general pub-

lic? Are the usually liberal scientists much more conservative on home turf? Why do scientists seem to slow down the adoption of new technologies when it comes to science publishing reform? Surely, one of the main reasons can be found in the reputation structure among scientists.

This structure currently prevents the transfer of benefits for science into benefits for scientists. Science does not feed the

family, a scientist’s salary does. Scientists are like all other people. If something new comes along, they ask “What’s in it for me?” Scientists may

be driven by intellectual curiosity but grants, positions and tenure are obtained chiefly by publishing papers in high-ranking journals.

What the particular scientist has contributed to the

paper and what effect it has had on the community is most often a secondary factor. Where a paper has been published has become more important than its content or its impact. It is so 20th century to actually read the papers of the person or grant under evaluation. Cynicism aside, in times where merely 7% of all NIH R01 first-time grant applications are awarded and tenure-track positions regularly receive 200+ applications, actually reading papers thoroughly is completely out of the question. Novel platforms such as JoVE, *PLoS One*, *Frontiers in Neuroscience* or *Nature Network* can only work as a wedge to start breaking up the old reputation structures. What is really required is a reform that brings us a new kind of reputation system in which every contribution – idea, method or data – is counted, aggregated and their value and impact assessed. Unbeknownst to most scientists, the technology for such systems is already available – but this is material for a separate article.

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