

Welcome to

Scientific Culture Change from Above

and Below at UBCO: Implementation of a Comprehensive
Open Science Library Information Literacy Program for Undergraduates

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Where is UBC Okanagan?



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Fostering Open Science

Eric Eich

**Vice-Provost and AVP Academic Affairs, UBCV
Grandfather of UBC Open Science**

Jason Pither

Associate Professor, Biology, UBCO

Mathew Vis-Dunbar

**Librarian, Southern Medical Program, Biology, &
Human Kinetics, UBCO**





Fostering Open Science

- University-wide strategic project running 2019-2021
- Partnership between Library and Biology
 - Build infrastructure for open research and open scholarship
 - Integrate Open Science principles and practices into undergraduate and graduate programs



Undergraduate OS Vision

- Nine module program:
 - Designed to be integrated into existing courses
 - Certificate for completion
 - Capstone replication project
- Funding for undergraduate research projects contingent on Open Science practices



Undergraduate OS Vision: Lower Years

- **OS 101:** Principles of Open Science (pilot; complete)
- **OS 102:** Reproducibility through the Research Cycle (in progress); critical evaluation of scientific papers
- **OS 201:** Modularized Labs
- **OS 202:** Reproducible Data Management and Analysis (implemented)



Undergraduate OS Vision: Upper Years

- **OS 301:** Lab Books and Field Notes: Creating a Digital Record
- **OS 302:** Citizen Science
- **OS 303:** Advanced Treatment of QRPs: Reproducibility through the Research Cycle
- **OS 401:** Reframing Measures of Impact
- **OS 402:** Replication Project (Capstone)



OS 101 Outcomes/Objectives

Students should be able to explain following:

- The nature of scientific knowledge
- The science-society relationship
- The replication crisis
- Core values of Open Science
- Benefits of Open Science
- Barriers to the realization of Open Science ideals



OS 101 Planning Considerations

Relationship with Faculty

- Way paved by Mathew and Jason
- Still, some preconceptions remain → participation voluntary
- Open Science = Good Science
- Many may already practicing OS
- Show results of OS 101 and open dialogue



OS 101 Planning Considerations

Workload and Level of Students

- Heavy workload in first year Bio → optional, relatively short and easy online module on Canvas (e-learning platform)
- No statistics training at this point

Large Class Sizes (384 students participated!)

- Many TAs with diverse skillsets and knowledge
- Communication challenging

OS 101 Canvas Screenshot

The screenshot shows a Canvas LMS interface. On the left is a dark blue navigation sidebar with icons and labels for Account, Dashboard, Courses, Calendar, Inbox, Commons, and Help. The main content area has a breadcrumb trail: SNBX Open Science > Pages > Scientific Integrity. Below the breadcrumb is a 'View All Pages' button and 'Publish', 'Edit', and a menu icon button. The page title is 'Scientific Integrity'. The main text discusses the importance of scientific integrity, transparency, and equitable access. It lists several practices for scientific integrity: basing research on solid information, using fair criteria, publishing good science, fully disclosing studies, adhering to best practices, and providing equitable access. The page concludes with a 'Transparency and Grading' section, explaining that transparency in grading helps students understand their marks and improve their knowledge. At the bottom, there is a 'Let us know' link for feedback and navigation buttons for 'Previous' and 'Next'.

UBC

Account

Dashboard

Courses

Calendar

Inbox

Commons

Help

SNBX Open Science > Pages > Scientific Integrity

View All Pages

Publish Edit

Scientific Integrity

Though we haven't mentioned the phrase "scientific integrity", we have looked at the critical role it plays in replicability and Open Science. Integrity involves sticking to best practices for research that promote reproducibility through transparency and open access. At the root, this principle springs from a sense of responsibility for public welfare and from the honest pursuit of scientific truth.

In a literal sense, transparency is the property of an object that makes it so clear that you can see through it. But what about when we talk about transparency in government policy, or scientific research? In this context, transparency implies a high degree of disclosure — revealing clearly the exact reasoning and process used in coming to a decision or taking an action. As well, transparency means taking care to disclose important information in a respectful and responsible fashion.

Scientific integrity implies several practices:

- basing research conclusions and public policy on solid information and analysis that are clearly evident to everyone;
- evaluating scientific work using fair, rigorous criteria and procedures known to all involved;
- publishing good science, period (not just flashy science);
- fully disclosing studies and methods that don't yield significant results;
- adhering to best practices for creating hypotheses, collecting data, and analyzing results; and
- providing equitable access (see the following two sections on Equity) to all outputs of the research cycle.

As we saw in the last unit, these form key elements of our ideal research ecosystem, where the public trusts science and studies can be tested and repeated.

Transparency and Grading

One case where students want and need transparency is in grading. Most of you probably appreciate knowing how marks were accorded to questions on a midterm exam and what criteria the marker used to score each question. This provides you with both a *reason* for the assigned grade and a means of *comparing* your grade with those of your classmates. Ultimately, this specific information can help you to fill in gaps in your knowledge and perform better on future assessments (such as the final exam). In the same way, transparency in research allows scientists to improve future studies and add to accumulated knowledge.

Have an idea on how to improve this content, or see a mistake? [Let us know](#) etc.

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OS 101 Attitudinal Survey

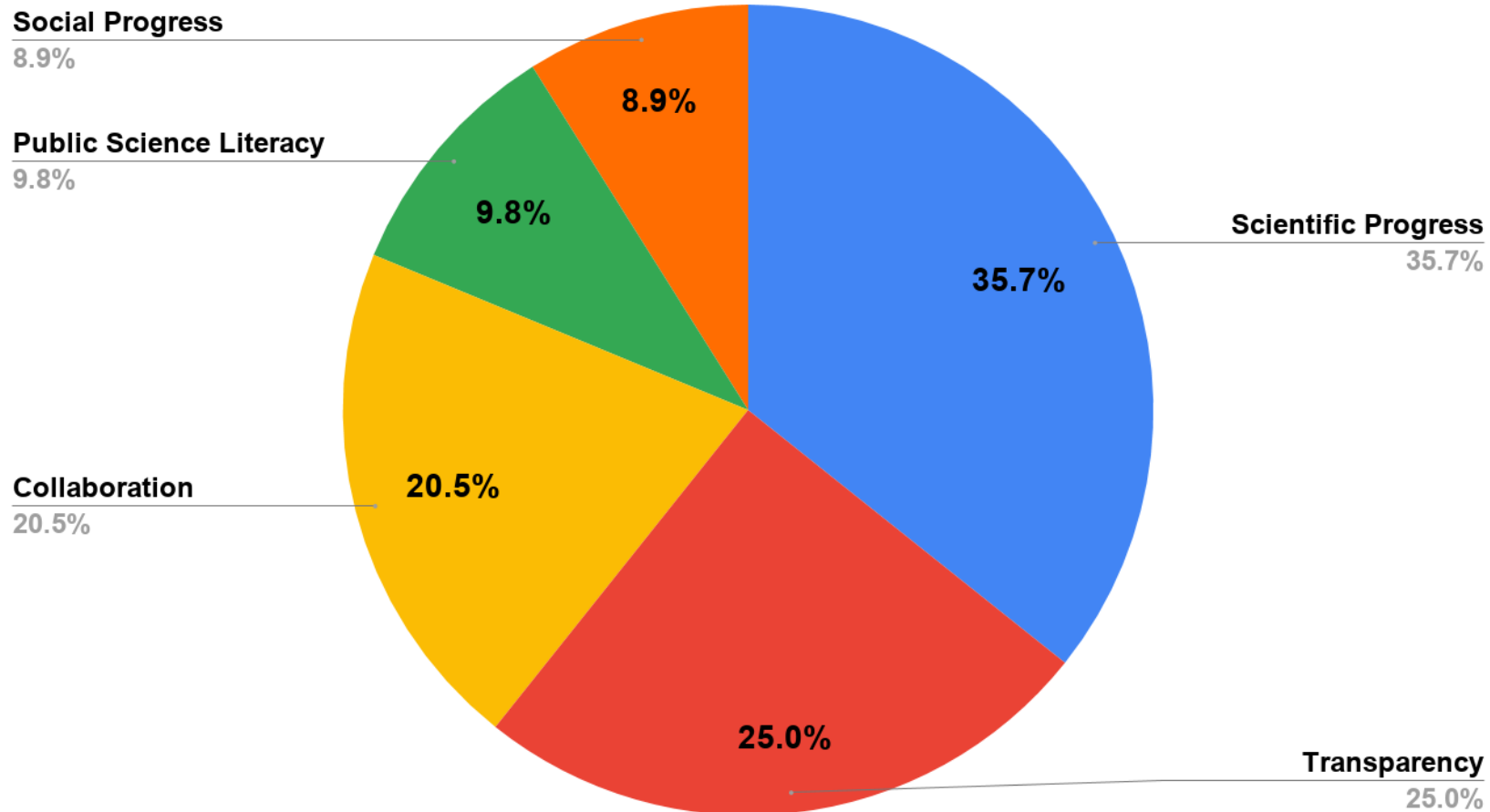


Optional, open-ended questions, online on Canvas

- If you had to sum up your view on Open Science, what would you say?
- In your opinion, what is the most important benefit that Open Science can bring? Which aspects of the Open Science movement discussed this semester resonate the most with you?
- Have a suggestion for improving OS 101? Let us know here.

OS 101 Attitudinal Survey

Open Science Benefits Cited by Students of OS 101, December 2019



OS 101 Attitudinal Survey



- Most powerful and moving for me: Statements about the importance of Open Science in the students' own words
- You can see a number of students' comments on my poster, and view the complete surveys in my project on OSF
- Open Science ideas are catching fire!
- Our hope is for the ideas and enthusiasm of the student to spread up to instructors
- Jason has already seen this happening with grad students he and Mathew have talked to



Next Steps/Lessons Learned

Spring/Summer 2020

- Have Librarian included as instructional assistant for the online course
- Reduce OS 101 content and distribute it evenly across the units
- Share results with Biology instructors and continue to engage them with OS

Fall 2020 -

- Expand role of Open Science content; integrate with lab
- Train the trainers (lab assistants) and encourage them to lead discussions
- Develop and implement other modules
- Extend Open Science to disciplines beyond Biology



Further Reading

For more information, please see my project on Open Science Framework at <https://osf.io/gpjus/> or scan my QR code.

Thank you!
Vielen Dank!

