THE UNIVERSITY OF BRITISH COLUMBIA

Faculty of Science

Skylight Annual Report 2021/2022

Skylight: The Science Centre for Learning and Teaching

sʔiːɬqəy̓ qeqən (Double-Headed Serpent Post), Brent Sparrow Jr., Musqueam, UBC Vancouver

Photo: Paul H. Joseph / UBC Brand & Marketing

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We would like to acknowledge that the UBC Vancouver campus is situated within the traditional, ancestral, and unceded territory of the **xʷməθkʷəy̓əm** (Musqueam).

Executive Summary

I am pleased to present the 2021-2022 Skylight annual report, which highlights our key accomplishments between May 2021 and August 2022. This has been an important year with a return to primarily on-campus activities - especially in teaching - with an important highlight in our events being the return of our Science Education Open House in April as an in-person event in the Earth Sciences Building. We at Skylight have continued to support, advise, and collaborate with faculty across the Science departments on all aspects of teaching and learning.

Equity, diversity, and inclusion have been a major theme again this year, and Skylight has been making intentional progress in engaging with UBC's Indigenous Strategic Plan. This was another busy year for paired teaching in our Teaching Start-Up program, with nine teaching pairs across four departments, coordinated again successfully by Sarah Bean Sherman, Science Education Specialist in EOAS; we've now had 29 pairs participate since the start of this program in 2018.

The coming year will see some important changes to our team, with several planned leaves including a planned year leave of our Director of many years, Gülnur Birol (which is why I am signing this message alone this year). We will expand our work in learning analytics now that we have added Zohreh Moradi as a Research Analyst to our team, and continue to advance our understanding of the role of learning technology and assessment strategies as our faculty in Science navigate what is possible and what is practical when it comes to modes of teaching.

Thank you for reading our report, and I wish you all the best in your teaching and educational leadership this year!

Warren Code, Interim Director

Team Updates

We welcomed the following people to our team:

- **Gaitri Yapa**, Science Education Specialist (Mathematics)
- **Zohreh Moradi**, Research Analyst
- **Jessica Garzke**, Science Education Specialist (Zoology)
- **Emma Davy**, Science Education Specialist (Chemistry)
- **Stephan Koenig**, Science Education Specialist (Computer Science)
- **Amber Schroeder**, Administrative & Communications Coordinator
- **David Loti**, Learning Technologies Support Analyst
- **Jackie Stewart**, Associate Dean, Academic

We were glad to have **Gaitri Yapa** join us from November 2021 until September 2022. We were also glad to welcome back **Jackie Stewart**, a returning member of Skylight and the new Associate Dean, Academic for the Faculty of Science.

We said farewell to **Erika Borys**, **Toren Darby**, and **Sara Harris.** We wish them all the best in their future endeavors.

Erica Jeffrey and **Jenny Wong** went on leave. **Jessica Garzke** and **David Loti** have assumed their respective roles until they return from leave.

Back Row (left to right): Jenny Wong, Nicole Wang, Gaitri Yapa, Zohreh Moradi, Emma Davy, Sarah Bean Sherman, Jackie Stewart, Kush Arora, Michael Zhang, Henry Ting, Noureddine Elouazizi, Warren Code

Front Row (left to right): Maï Yasué, Sara Harris, Gülnur Birol, Ashley Welsh, Stephan Koenig, Amber Schroeder, Adele Ruosi, Christine Goedhart, Zakir Suleman

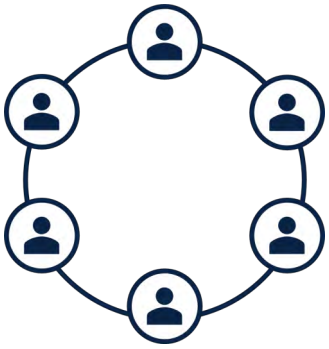
Major Initiatives

Engaging with UBC's Indigenous Strategic Plan (ISP)

In 2021, the Skylight team started a process of reflection, planning, and learning to work toward the goals of reconciliation and decolonization as outlined by UBC's Indigenous Strategic Plan (ISP). We organized a series of sessions to increase our unit's capacity to give land acknowledgements, to determine which ISP goals fit with our unit's mandate, and to identify actions that we can take as a unit to reach our ISP goals. You can learn more about our process of engaging with the ISP on our website.

In July 2022, we held a **full-day retreat** to finish working through the ISP Implementation Toolkit. During the retreat, we reviewed our responses to the ISP Self-Assessment Survey, discussed potential actions we could take to achieve our ISP goals, and considered how to measure our progress and keep ourselves accountable.

At the end of July, we released a **new resource for STEM instructors** seeking to incorporate Indigenous ways of knowing into their curriculum and teaching practices as a means to create safer classroom environments for Indigenous students. You can find this resource, and many more, on our Inclusive Teaching Resources page.



Inclusive Teaching

In the past year, we have continued our efforts to ensure that all undergraduate students feel included in the UBC Science community and equitably supported in their success.

In March 2022, Skylight launched a new invited speaker series: **Teaching & Learning in Science through the Lens of Indigeneity, Equity, Diversity and Inclusion**. In this series, we feature guest speakers who address topics relating to their expertise in inclusive STEM education that are of interest to the UBC Science teaching and learning community.

We have invited numerous speakers representing various disciplines (biology, chemistry, physics, geology, etc.), identities (IBPOC, 2SLGBTQIA+, etc.), and specialties (curriculum, pedagogy, research) to participate in the series. We are grateful to UBC Science for sponsoring this series through the UBC Science Strategic Innovation Fund (SIF).

We are also pleased to have helped co-facilitate the **Equity and Inclusion in Action: JEDII STEM Series**. The goal of this series is to establish a cross-campus network of ideas, resources and expertise to support faculty, staff, postdoctoral fellows, and graduate students engaged in Justice, Equity, Decolonization, Indigenization and Inclusion (JEDII) initiatives in Science, Technology, Engineering, and Math (STEM).

22 sessions have been hosted since the JEDII STEM Series was launched in 2021, engaging over engaged over 680 participants across 18 faculties, as well as administrative units across UBC Vancouver and UBC Okanagan. You can learn more about the JEDII STEM Series in a recent article published by the EIO.

Learning Analytics

Learning analytics is the process of collecting, analyzing, and reporting data about learners and learning environments in order to understand and optimize learning.

In the summer of 2022, Skylight conducted a **needs analysis** around the use of teaching and learning data and analytics tools in the Faculty of Science, meeting with representatives from all nine Science departments as well as six Program Directors to discuss each department and program's needs and interests in this area. Following these consultations, Skylight prepared a report summarizing the emergent themes, suggestions of potential projects to undertake, and a list of next steps. Skylight is currently working on a number of learning analytics projects identified as part of this analysis, including demographic profiles of students at the course and program levels, as well as analysis of how long students take to graduate.

In August 2022, Skylight released the **Academic Data Access Primer for UBC Science**. This document summarizes the existing academic data sources at UBC and the types of information available, with the goal of facilitating Science data access and governance for teaching and learning projects, including research and quality assurance.

For more information about our work with learning analytics, please visit: https://skylight.science.ubc.ca/learning-analytics-and-teaching-and-learning-data-access.

Paired Teaching

Teaching Startup is a paired teaching initiative in which a new faculty member is paired with another faculty member who is experienced in implementing evidence-informed teaching practices. Together, they collaboratively teach an existing course that has already aligned learning goals, assessments, and evidence-based pedagogy, and they both receive full teaching credit. The pairs are supported by a Science Education Specialist (SES) or someone else in their department, who meets regularly with the pairs to discuss various aspects of the course, including pedagogy. They also conduct classroom observations during the term and provide pairs with feedback. For more information on Teaching Startup, please visit skylight.science.ubc.ca/projects/paired-teaching.

We would like to congratulate the 18 faculty members who successfully completed the program in the 2021/2022 academic year, with support from our SESs.

Fall 2021

- Laura Lukes & Stuart Sutherland (EOSC 326)
- Shandin Pete & Scott McDougall (EOSC 330)
- Anaïs Orsi & Stephanie Waterman (EOSC 112)
- Ingrid Stairs & Allison Man (ASTR 200)

Spring 2022

- Rachel White & Susan Allen (ATSC 409)
- Michael Lipsen & Kendra Chritz (EOSC 200)
- Lindsey Heagy & Melissa Lee (DSCI 100)

STEM Education Research Exchange (SERE)

Launched in December 2021, the **STEM Education Research Exchange (SERE)** committee organizes regular cross-disciplinary meetings with a focus on discipline-based education research (DBER), Scholarship of Teaching and Learning (SoTL) research, and pedagogical practices in STEM at UBC's two main campuses.

In past sessions, we have facilitated conversations on topics such as equity and learning performance, performance differences in isomorphic test questions, student grade outcomes before and after course interventions, and student agency in instructional labs.

For more information about SERE and to see a list of previous and upcoming sessions, please visit https://skylight.science.ubc.ca/stem-education-research-exchange.

Return to Campus

Fall 2021 marked the return of the majority of activity **back to campus** after a primarily remote year in 2020/21. While many have continued to supplement their in-person class time with recordings posted online, with some instructors teaching the bulk of their course online, essentially all exams returned to being held in person on campus. This move has strong support from those teaching (and among students as well) as the best option in terms of preserving academic integrity and general management around assessment.

There have been some experiments in exams though, including:

- A self-scheduling centre in Computer Science where students can sign up for an exam slot and take a randomized version of their test within a given time period (ex: a week), invigilated by the centre staff.
- More use of online systems for exams even when exams are held in person.
- Online grading systems where paper exams are scanned and the grading process (including feedback) is all handled via an online platform have continued to become more popular. This is especially true in medium- and large-sized courses where instructional teams can save substantial time and hassle compared to traditional grading. One emerging open-source solution, "Plom" (PaperLess Online Marking), is being developed in our Mathematics Department.

Services & Support

Through our consultations, collaborations, and engagement with faculty on teaching and learning projects, the Skylight team worked with over 150 faculty and dozens of staff, impacting 74 undergraduate science courses spanning all years across UBC Science departments and accounting for 36,000 enrollments (about 35% of Science's undergraduate course enrollments).

Department	Number of Courses in 2021/2022	Student Enrollments in 2021/2022
BOTA/ZOOL	19	8844
CHEM	9	5686
CS	5	4434
EOAS	7	1873
MATH	11	9890
PHAS	11	3816
STAT	1	1169
Other	1	506

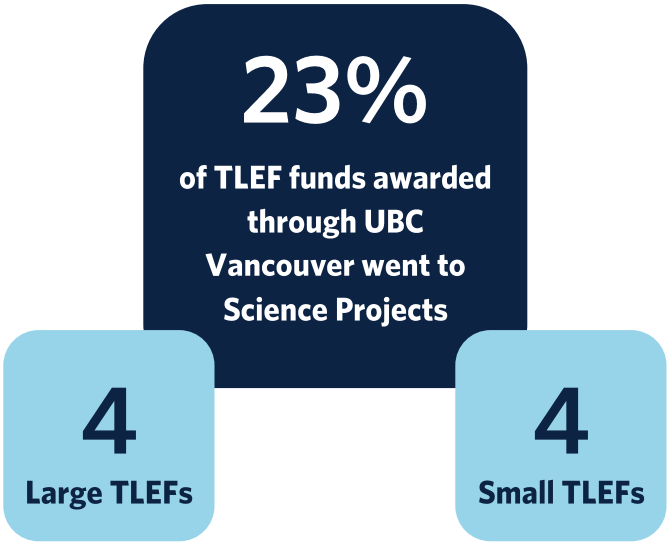
TLEF Project Support

We were pleased to provide faculty with project development and implementation support for the 2022/23 Teaching and Learning Enhancement Fund (TLEF) competition. In partnership with CTLT, we connected faculty with resources to facilitate the adoption of best practices and to build capacity for change within UBC Science.

In the 2022/23 funding competition, UBC Science faculty submitted large TLEF proposals aimed at enhancing experiential and interdisciplinary learning, incorporating Indigenous ways of knowing into the curriculum, developing innovative learning technology tools and open educational resources, and introducing more data science skills in undergraduate courses.

Small TLEF projects were focused on advancing equity and inclusion in group work, developing models for large-scale computer-based assessments, incorporating Indigenous ways of knowing into the curriculum, and enhancing students' science communication skills.

2022/23 Funding Competition



Learning Technologies Ecosystem Support and Consultations

Skylights offers learning technology (LT) support in partnership with the Centre for Teaching, Learning and Technology (CTLT), and in collaboration with department-based IT/LT groups across UBC Science.

Lecture recordings became a major topic of discussion with the return to campus this year, as well as a significant area of LT support in partnership with Classroom Services and their A/V team, expanding beyond the existing built-in systems for recording.

Online grading systems have become popular in UBC Science departments, including cloud-based options like Gradescope and Crowdmark, as well as the new open-source system under development in the Mathematics Department, "Plom" (which stands for Paper-Less Open Marking).

Along with partners in the Dean's Office, Skylight has been advocating for sufficient financial support for LT systems on behalf of departments when connecting with central UBC units where UBC's model for LT governance has been under review.

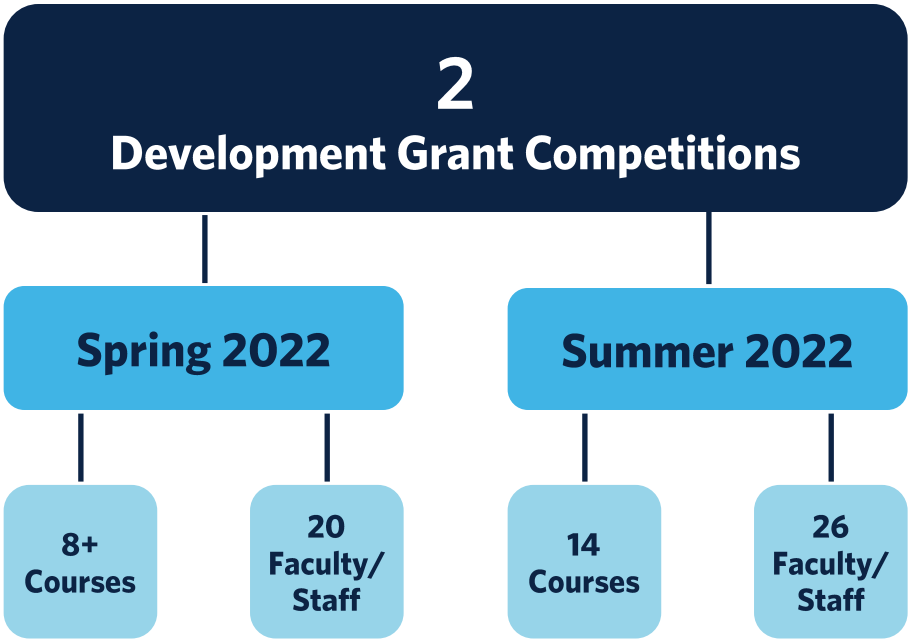
As we have shifted primarily back to in-person instruction with some new LT use (e.g., much more use of video recordings compared to a few years ago), we are also reviewing our partnership approaches with CTLT and the LT Hub for support; the **6000+ requests** from instructors this past year have been handled by a combination of our Skylight LT team – including our excellent **Learning Technology Rovers** – and the LT Hub in order to cover requests as efficiently as possible for those teaching in Faculty of Science courses. The Science-focused LT support team have provided specialized support for learning technologies popular in Science courses; for example about 40% of those requests were related to online assessment.

UBC Science Learning Technology Rovers

Thank you to the following students who joined us as Learning Technology Rovers between May 2021 and August 2022:

- **Celest Paez**, Chemical Engineering Student
- **Catherine Ng**, Biomedical Engineering Student
- **Catherine Slamka**, English Literature and Language Student
- **Tiffany Payitno**, Biomedical Engineering Student
- **Ira Sharma**, Psychology Student
- **Kush Arora**, Computer Engineering Student
- **Nicole Wang**, Cognitive Systems Student
- **Henry Ting**, Environmental Engineering Student

Skylight Development Grants



Skylight received 19 proposals requesting a total of nearly $68,000 in the 2022 Spring and 2022 Summer competitions. **We awarded nearly $44,000 in total to 17 proposals**.

Funded projects focused on a variety of themes such as increasing equity and inclusion in STEM courses, adopting mastery learning techniques, improving online course delivery and online assessments, alternative grading practices, assessing and improving first-year courses, and curriculum development.

Spring 2022

- ***Building upon pandemic induced changes to CHEM 121***—Chris Addison (CHEM)
- ***Chemistry 154: Resource development for more effective virtual delivery***—Vishakha Monga (CHEM)
- ***Introduction to practical skills in daily laboratory work***—José Rodriguez Nunez (CHEM)
- ***Developing an auto grader in CPSC 103 for rapid feedback to help with grading fairness and workload***—Jessica Wong (CS)
- ***Designing a virtual orientation for the Teck Geological Field Station to support student success***—Laura Lukes (EOAS)
- ***Development of more inclusive multiple-choice questions***—Anaïs Orsi (EOAS)
- ***Enhancing quirt across active-learning introductory science courses***—Karen Smith (MBIM/BIOL/CHEM/PHAS)
- ***First-Year Focus seminar course development***—Karen Smith (Gateway Science Programs)
- ***Jupyter and Python in first-year physics labs***—Carl Michal (PHAS)

Summer 2022

- ***Building capacity for the inclusion of sex and gender diversity in UBC Biology courses***—Irene Ballagh (BOTA/ZOOL)
- ***Developing a local option for Biology 409 (Field Course in Ecology) for a more equitable field course***—Rachel Germain (BOTA/ZOOL)
- ***How does ungrading affect the quality of student work?***—Celeste Leander (BOTA/ZOOL)
- ***Mastery learning modules in cell biology***—Karen Smith (BOTA/ZOOL/MBIM)
- ***Using exam wrappers in second-year analytical chemistry: Enhancing engagement with summative assessment***—Emma Davy (CHEM)
- ***Moving toward a mastery learning module in CPSC 317 (Internet Computing)***—Norm Hutchinson (CS)
- ***Evaluation and improvement of Math 10X***—Peter Harrington (MATH)
- ***Neuroeducation modules to support student development***—Ryan Bouma (NSCI)

Events

Skylight hosted and facilitated a wide range of events between May 2021 and August 2022, including professional development and networking opportunities for faculty and staff. Our events were attended by more than **1,600 participants**.

In April 2022, we were excited to return to our traditional in-person **Open House** event, featuring talks by:

- Marcia Graves (MBIM) and David Oliver (MBIM), "An Extensible Portfolio-Driven Model to Enhance Student Access to Undergraduate Research Opportunities in the UBC Faculty of Science"
- Laura Lukes (EOAS) and Shandin Pete (EOAS), "Developing a Toolkit for Assessing Student Understanding of How Indigenous Issues Intersect with Their Field of Study"

During the morning session, we had a chance to thank **Ian Cavers**, Associate Dean, Academic then Students and an original founder of Skylight, for his many years of service and to wish him well on his retirement!

The Open House poster session featured **17 posters** showcasing the excellent work and activities carried out by the UBC Science teaching and learning community and provided opportunities for fruitful conversations. You can find a record of the event and digital versions of most of the posters on our website.

Research & Dissemination

Last year, we continued sharing our work with the broader science education community. We were invited to give 9 talks and we generated numerous internal reports to inform strategic decisions involving teaching and learning.

Our peer-reviewed journal contributions, often written in collaboration with UBC Science faculty and other colleagues, reflect our key areas of focus in recent years: equity and inclusion in teaching, learning analytics, and online teaching.

Peer-Reviewed Contributions

The following works were published recently, after the release of our previous annual report. Please visit skylight.science.ubc.ca/resources/publications for a full list of our scholarly publications.

Proceedings

- Couch, B.C., Schmidt, H., & Goedhart, C. (2022). Training a Biologists Mind Through an Artist's Eye. *Proceedings of the 2022 ABLE Annual Conference*, Victoria, BC. https://www.ableweb.org/conferences/able2022/schedule/major-workshops/.
- Smith, K., Chowrira, S., & Birol, G. (2022). The Show Must Go On! *Proceedings of the 2022 Improving University Teaching International Conference*, July 28, 2022.
- Code, W., & Piccolo, C. (2020). Better learning of calculus concepts through more active learning: Details of a teaching methods comparison study. *Proceedings of the 2020 SALTISE Annual Conference*, p65. https://www.saltise.ca/saltise-conference/saltise-2020-proceedings/.

Journal Articles and Book Chapters

- Code, W., & Welsh, A. (2022). Discipline-based education specialists: an embedded model for supporting the development of teaching expertise in undergraduate science education. In H. King (Ed), *Developing Expertise for Teaching in Higher Education: Practical Ideas for Professional Learning and Development*. Routledge. https://doi.org/10.4324/9781003198772.
- Garzke, J., Steinwand, B. (2022). C.R.E.A.T.E.'ing shifts in first year students' science efficacy that are independent of instructor rank and experience in a large, multi-section online introductory course [Preprint]. *BioRxiv*. https://doi.org/10.1101/2022.11.14.516496.
- Öberg, G., Campbell, A., Fox, J., Graves, M., Ivanochko, T., Matsuchi, L., Mouat, I., & Welsh, A. (2022) Teaching Science as a Process, Not a Set of Facts: A Case Study of a First-Year Science Seminar. *Science & Education*, 31, 787-817. https://doi.org/10.1007/s11191-021-00253-8.
- Stang, J.B., Altiere, E., Dubois, P.J., Egorova, Y., Goedhart, C., Ives, J., Smith, K.M., & Stewart, J. (2021). The Contributions of Self-Efficacy and Test Anxiety to Physics Exam "Gender Gaps". *Physics in Canada*, 77(1), 42-45. https://pic-pac.cap.ca/index.php/Issues/showpdf/article/v77n1.0-a4143.pdf.

- Prat, A., & Code, W. (2021). WeBWorK log files as a rich source of data on student homework behaviours. *International Journal of Mathematical Education in Science and Technology*, 52(10), 1540-1556. https://doi.org/10.1080/0020739X.2020.1782492.
- Webb, A.S., & Welsh, A.J. (2021) Serendipitous conversations: the 10-year journey in becoming SoTL scholars and educators. *International Journal for Academic Development*. https://doi.org/10.1080/1360144X.2021.1964510.

Conference Talks

- Couch, B.C., Schmidt, H., & Goedhart, C. (2022, June 23). *Training a Biologists Mind Through an Artist's Eye* [Workshop]. 2022 ABLE Annual Conference, Victoria, BC.
- Davy, E., Quane, S., & Whitesell, C. (2022, June 16). *Carbon Sequestration from Air: A Multi-Day Lecture and Laboratory Unit Modelling an Industrial Process* [Symposium]. CSC CCCE 2022, Calgary, AB.
- Webb, A., & Welsh, A. (2022, June 7-10). *Theory isn't a dirty word: Elevating the role of (educational) theory in SoTL work* [Presentation]. 2022 STLHE Annual Conference, Ottawa, ON.
- Stewart, J., Ives, J., Stang, J., Smith, K., & Goedhart, C. (2022, June 2). *Enhancing equity and inclusion by attending to the affective domain: Measuring self-efficacy and sense of belonging across active-learning introductory science courses* [Symposium]. 2022 SALTISE Annual Conference.
- Chaudhary, Z., Egorova, Y., Goedhart, C., Meredith, A., Smith, K., Stang, J., Welsh, A., Wright, T., & Stewart, J. (2021, December 15-20). *Enhancing equity and inclusion by attending to the affective domain: The role of sense of belonging, self-efficacy, and perceptions of classroom climate* [Presentation]. 2021 International Chemical Congress of Pacific Basin Societies.
- Welsh, A., & Webb, A. (2021, October 26-29). *Sustaining Ourselves in SoTL* [Presentation]. ISSOTL 2021.
- Code, W., & Welsh, A. (2021, June 10). *What happened next? Reflections and career trajectories for discipline-based education specialists and next steps for embedded expertise at UBC* [Poster session]. 2021 Transforming Institutions Conference.
- Code, W. (2021, June 3). *Discipline-based Education Specialists: Big Impact, One Course at a Time* [Poster session]. 2021 SALTISE Annual Conference.
- Code, W., & Welsh, A. (2020, October 16-23). *Discipline-based education specialists: an embedded model for supporting the development of teaching expertise in undergraduate science education* [Presentation]. Exploring Expertise in Teaching in Higher Education 2020 Symposium. https://www.youtube.com/watch?v=gPr7rs4wE6s.

Message from our Associate Dean, Academic

I am thrilled to be joining the Faculty of Science as Associate Dean Academic and returning to Skylight, where I worked as an embedded chemistry education specialist from 2005 to 2010. I am proud of UBC Science's culture of teaching excellence, and grateful for the excellent work of Skylight in supporting teaching in many ways. The highlights presented in this year's annual report speak to Skylight's ongoing commitment to data-informed reflection and decision making and ongoing pursuit of applying the latest science of learning. Together with instructors and teaching assistants, we are fostering a teaching climate where continual improvement is expected, supported, and celebrated.

UBC Science students are academically strong, diverse along many dimensions, and curious. One of the greatest challenges in teaching is considering how to design curricula, instruction, and assessment to guide a diverse group of learners to success. Skylight's expertise is key to helping us rise to this challenge every day. I am very excited to see where our renewed capacity in learning analytics will take us - and I have no doubt projects in this area will allow us to make better decisions about our teaching at the course, program, department, and Faculty levels.

Thank you to everyone who engaged with Skylight and our Faculty's teaching community this year. I am looking forward to seeing our efforts toward equitable and inclusive teaching benefit our students and communities.

Jackie Stewart, Associate Dean, Academic

Annual Report Enquiries

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General Information

Please visit https://skylight.science.ubc.ca/about to download our prospectus, *Advancing the Science Behind Education.*

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