What I Want My Science Instructors to Know:

Students sharing experiences and perspectives on learning science in field settings and beyond

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THE UNIVERSITY OF BRITISH COLUMBIA

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Note: If you have feedback about how you have used this resource or other comments, please submit them to: easeil@eoas.ubc.ca

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Contents

Preamble

Who is this document for?

Science instructors and teaching assistants.*

** This document is especially relevant to those who take students into outdoor settings to learn science in relation to the Land.*

Document purpose/intention: How to use this document?

This document was designed to connect science instructors and teaching assistants with student voices, experiences, and recommendations for supporting student learning in their courses with a special focus on science learning activities that occur in field settings. It is intended to inform instructors' and teaching assistants' course design and teaching practices, namely to develop more inclusive environments for learning science. It is intended to be used as a companion with other resources that outline specific evidence-based strategies and practices for creating inclusive field-based learning experiences. See the EaSEIL website for additional resources.

Terminology

Field-based settings: We define field-based settings as sites on land or water that are outside of the classroom or laboratory facility.

Here we are eliciting experiences students may have had in field settings as part of formal science coursework (e.g., field schools where students live at a station/camp, all-day local trips, lab activities in the field lasting for a few hours, such as collecting water samples from a stream, lake or ocean).

Context

Land and Peoples Acknowledgment

The work leading to this document was done on the traditional, ancestral, and unceded territory of the xʷməθkʷəy̓əm (Musqueam) at the University of British Columbia Point Grey campus in what today is called Vancouver, Canada. The authors acknowledge the connection that Musqueam have had over time with the lands and waters throughout their territory as essential to their culture, knowledges, ways of being and practices, as well as a source for teaching and learning.

Origin Story

EaSEIL is a three-year multi-disciplinary curriculum and faculty development initiative at the University of British Columbia (Vancouver, Canada). EaSEIL creates space for instructors, students, staff, and community members to develop and transform field-based experiential learning in UBC courses. From surveys and discussions with instructors during EaSEIL instructor Community of Practice meetings (n=20), the EaSEIL authors identified four questions to partner with students on; 1) What fosters students' comfort and feelings of belonging in science and field-based learning experiences? 2) What are students' needs, experiences, and aspirations related to the intersection of science courses, specifically field courses, and Indigenous perspectives? 3) How can science courses and field experiences be more accessible? and 4) How can instructors foster more effective small-group learning activities in field settings?

Our intention in forming this partnership was to elevate and center student voices and stories about their lived experience in field trips and courses to then inform course design and delivery. Through this work we amplify student voices about their learning experience so the next generation of learners feel more welcome, included and represented in postsecondary science courses. We acknowledge that this is a limited set of perspectives and hope this can be a helpful addition to the conversation in the community.

Who are the EaSEIL authors?

Three members of the EaSEIL leadership team were involved in the production and writing of this document. They all identify as women immigrant settlers in Canada who each bring 10+ years of teaching experience in higher education. Dr. Sarah Bean Sherman has a background in geoscience and is a curriculum and educational developer embedded in a geoscience department. She facilitated focus group sessions and communications with students. Dr. Silvia Mazabel has a background in educational psychology. As the facilitator of the EaSEIL community of practice working with instructors taking students into field settings, she led the collaborative identification and development of the discussion prompts for the student focus groups and acted as a note-taker during focus group sessions with students. Dr. Laura Lukes has a background in geoscience and educational development, as well as experience teaching students geoscience in field settings. She is a geoscience education researcher leading the EaSEIL initiative, including this effort, providing vision and guiding the design, analysis, and outcomes. The three authors worked collaboratively to design the focus group protocols; organize/synthesize student responses; and develop appropriate framing content to situate the work, transforming raw student responses into accessible resources for researchers and practitioners.

Who are the student authors?

Student participants (n=17; 14 undergraduate, 3 graduate enrolled in science, forestry, land and food systems, and engineering programs at UBC) were recruited through Earth, Ocean and Atmospheric Science department listservs and direct communication with students affiliated with the EaSEIL initiative to share about their learning experiences and propose structures, teaching strategies, and resources to further support their science learning in field

settings. Students represented a range of student ranks, with 2 students in their second year, 4 in their third year, 8 in their fourth or more, and 1 and 2 students in MSc and PhD programs, respectively. All students reported having at least one field-based course experience at UBC prior to participating in any of the sessions, except the graduate students who reported having participated in field courses at other universities outside of Canada. It is important to note that at least one of the undergraduate students reported that their field-based course experience was online due to COVID.

How was the document produced?

We held eight sessions from October 2022 to March 2023 (1-6 students in each) to gather student perspectives on four dif-ferent topics: Inclusive learning environments (2 focus groups, 1 interview), accessibility (1 focus group, 1 interview), group work (1 focus group) and Indigenous-related content (2 focus groups). Most students attended for more than one topic. Students were compensated with $50 for each session they participated in. The structure of each session consisted of provid-ing questions about general science learning and field settings specifically in a written format first, so the students had time to think on their own and write down their thoughts. This was followed by a guided discussion about each question with all participants. During the meeting, we used slides with each of the questions to support student engagement in the conversation.

After each session, the facilitator and note-taker co-produced a summary document with key points, which we shared with students. They were given approximately 2 weeks to provide feedback (clarification, additional suggestions, edits). Once students reviewed the document, they were asked to add suggestions, comments, or approve if they felt it was an accurate representation of their voices. Students were compensated with $25 for engaging in this process. That summative document was group-generated to reduce potential power dynamics and support accurate representation of student voices. The EaSEIL authors shared key ideas emerging from the final summative document with the EaSEIL's community of practice (formed by a group of science instructors who teach on the field). These ideas were presented orally/visually (slides) with the intention of supporting reflection and deeper consideration of the many different student perspectives and experiences in our classes. Student responses were further organized for clarity and readability by the authors to produce this document. In this document, we are sharing the student voices with the broader community with the purpose of inspiring other instructors to consider student voices and experiences as they design/deliver field-based learning experiences. The information shared is not a systematic evaluation of courses, instructors, or student experiences. Student experiences and recommendations shared here are not necessarily rooted in evidence-based teaching practices, but many are.

Note: Neither the first or third authors had supervisory or instructional relationships with any of the student authors. The third author is an instructor in the department and serves as a supervisor for summer undergraduate projects, as such, she did not participate in the student sessions and only had access to de-identified student contributions.

Inclusive Learning Environments

This section summarizes student discussions about the topic of inclusion.

Terminology

Inclusive learning environments are spaces where students experience a sense of belonging and their involvement and contributions are valued. Inclusive teaching practice recognizes and proactively removes barriers and mitigates biases leading to oppression and marginalization of students (CAST, 2023; Dewsbury & Brane, 2019; Dewsbury, 2019; Johnson, 2019).

Note: When interacting with students in the focus groups and interview, we did not offer a specific definition of inclusion or inclusive. Instead, we asked a general question: "How or when have you felt included or like you belonged in..." which led to student-generated descriptions of inclusion or inclusive learning settings.

Context

Student voices were gathered in 2 focus groups (Oct. 26, 2022 - 6 students; Nov. 2, 2022 - 5 students) and one interview (Nov. 8, 2022).

Undergraduate (n= 9)

Graduates (n=3)

Group composition: Graduate and undergraduate students from the Faculties of Science (Integrated Sciences, Earth, Ocean and Atmospheric Sciences - Geology, Environmental Science, Geological Engineering), Forestry, and Land & Food Systems

Students were prompted to reflect about:

1. How or when have you felt included or you felt like you belonged in a science course? And what made you feel this way? How about in field-based courses?

2. How have instructors supported your sense of belonging in field courses?

3. What would you want to share with instructors that you want them to continue doing or would like them to start doing in order to support you feeling included?

Quotes included on the following page belong to students who participated in the focus groups/interview.

Think of a time when you felt included in a science course. What made you feel this way?

Students felt included in a science course when...

Student health and personal circumstances were a priority

"Recognizing externalities that may be happening [**life happens and can influence academics**] and offering accommodations accordingly."

"New students [first year/international] are transitioning, **there's mental and academic pressure**, they're figuring things out on their own, the requirements, finances... [when] these needs are considered."

"All my field courses took place in very remote and rural areas... Our instructors made it very sure that **our safety was their priority**...because of their concern, I never had to think about my own safety. That made me feel they cared about us."

"When instructors speak with me individually even when I do not directly ask for their help. **Checking in makes me feel included** and like they actually care about my learning."

Courses were gender inclusive

"**Applications and examples that relate with me specifically and to my interests.** For example, women examples, a mix of pronouns in examples, not heavily focused on one industry."

"**Instructors don't discriminate between men and women [or other genders]** in terms of assigning tasks."

Instructors... were approachable

"[**When TAs offer extra support,** are nice, compassionate, flexible and accommodating.] Taking 2 hours out of his day teaching me when I couldn't make it to class."

"**Informal, friendly relationships between teaching staff and students** made me feel comfortable thinking out loud, not afraid to be wrong, happy to discuss personal problems affecting my work."

Instructors... fostered interaction and effective communication

"**Effective communication** [not flooding with notifications and emails] helps you understand the course, and shows professors respect your time."

"Ethos of **'no such thing as a silly question,'** specifically when someone prefaces a question with 'this is probably dumb...I'm probably being stupid, [the instructor] reinforces their question is valid and say: there's no such thing as a silly question."

Instructors... created a welcoming and positive environment/class culture for learning

"**Encourage collaboration over competition;** you can work together, but you each produce your own project."

"**Instructors connect to students' interests** and how or where to apply the knowledge or course [content]."

"**Instructors know your name and greet you personally...** making an effort to connect with students, not just straight into content."

Instructors... built community

"**Grounding the class** [by] acknowledg[ing] and respect[ing] the land and environment**.**"

"Organizing classess [that] have **small group work**. This makes it easier to ask questions and to offer other perspectives."

Accomodations for learning were tailored and adjusted in collaboration with students—accomodations made sense given the learning context

"Accommodations were offered **without any questions.**"

"My professors **accommodated for my health condition** shifting the weight of days of missed field school."

"When **traditional holidays are recognized** and students can get an assignment extension or activities are scheduled considering traditional holidays (Ramadan, Chinese New Year)."

Course assessment and processes were flexible

"**Quizzes or polls** on what students want / **more than one way to evaluate**."

"[In a course where students' health issues could have been a barrier], the instructor offered **support and assessment was based on what I had shown** during the course."

Are there things specific to being in the field that make you feel included that are different from a lab or class setting? If so, what are they? Or what might they be?

Students felt included in a field-based learning experience when ...

There was a process in place and a safe way to talk about conflicts or report incidents on site

"...**no academic consequences** if/when conflict resolution is necessary."

"Instructors need to **make sure students have someone to talk about/report in a safe way on site** so students don't feel they're creating a toxic environment for complaining to the 'wrong person.'"

"If a student has issues with instructors during a field trip, **for resolving those issues, having that extra person can be useful.**"

The instructional team was diverse

Biases are addressed [by inviting **guest speakers**].

Multiple perspectives about the subject are shared.

Students feel **represented.**

Access to learning was considered, and alternative options for meaningful participation were offered

For example, virtual field trips, alternative location, other technologies like scans or rocks, microscopes, videos, because it shows **instructors consider accessibility, mobility, and health needs.**

...so **students can plan** (budget, housing, personal commitments)

Information about field learning experiences was clear and timely (for individual courses and across the program)

> Give people **as much information as possible** since the first meeting and communicating it via email, Canvas.

> **What's the field [experience] going to be about (physically, mentally)?**

Group activities built connections

> ... group [is] chosen by the instructor but also [we could choose] the group [we] work with, that [we] know them, that [we] feel comfortable with... **pros and cons of each.**

> Discussions [that went] **beyond basic course material** into application felt inspiring - field schools.

> Partners switched regularly when going to a new area, so **by the end of the trip, you knew everybody.**

> Projects where you interact with others, **contributing to the collective plus interacting as a group,** discussing the subject material.

What could make the field-learning experience better?

Students mentioned their field learning experience could be better if...

The teaching team is diverse and knowledgeable about inclusion and accessibility

> "It would be great for instructors and TAs to be trained on how to be inclusive and support students, **to establish an environment where students can self-advocate.**"

> "**When no female instructor is present in the field, [some] students might feel they won't be taken seriously**, or don't feel like asking for personal related matters because their instructors don't share the 'woman' experience. It can ruin your day/energy."

The information about field learning experiences is transparent (at the program and course level), provided in advance (hybrid) and shared through different channels.

> "When are **bathroom breaks** going to be? What type of bathroom is there going to be? [This is important depending on menstrual cycles.]"

> "When, what, where is **food** expected? [Important for students with diabetes, allergies or eating disorders, for example.]"

Information about **accessibility and available supports, logistics, equipment, food, walking distances/level of difficulty, budget and fees, and itinerary is provided way in advance of the field visit.** In this way students feel their needs are being considered and they have enough time to prepare mentally, physically, financially, work around other personal commitments.

> "More **transparency about fees** is necessary [students think it is included in tuition, but it isn't]."

Alternative opportunities for field learning (e.g., digital tools/different locations) so students who cannot participate can still have the experience and learn.

"[Some students] know they won't do fieldwork in their career [because of health issues]. How to make [field experiences] not as relevant in their program? **[Having] different levels of field school for different students, this is an accommodation.**"

"**Moving camps was a break in my field experience.** It's fun, moving around... that could work, worked as breaks."

"You need to be done with X project by [turn it in]... then **build in the break**. So, people can choose to really have free time."

Students have more free time to work at their own pace, and social interaction is fostered

Students are empowered to participate in/during field experiences

"[In small group discussions versus large group discussions], it is more comfortable to ask questions and to **feel included.**"

"Have a computer with **accessible technology** like text-to-speech [on site]."

"[Having] an anonymous board where people can ask [and **provide feedback** via email, in a box] if there's something that's not being addressed [during field experiences]."

"Having a **dedicated staff** that's available to solve personal matters or logistics. If students have issues with instructors during field trips, for resolving those issues, having that extra person can be useful. Having **student rep** or a couple of student reps who could also support a diverse group of students."

Accessibility

Terminology

Accessibility/Accessible: Definition co-constructed by participants

At the beginning of our group discussions, we invited the students to describe what accessibility meant to them. In this way, we all knew what we were talking about when talking about accessibility.

Student definitions of "What do you think about when you think about accessibility?"

• "I have an invisible disability, so I speak from that experience. Accessibility means that anyone, regardless of ability they, are able to participate in courses in university. Not only participate but have the supports that are needed to thrive. Having everything but not support makes it difficult. For example, in Y1 and Y2, with so many people, it's hard to get the support. So, accessibility means low barriers, everyone being able to participate."

• "Having equal opportunities for everyone regardless of them having a disability"

• "Being able to freely know and understand how people best learn and trying to accommodate that and make sure that people are able to learn to the best of their abilities regardless of how they learn."

• "The first word that comes to mind is frustration … being a high-performing student who has a disability, [standard supports offered] have been more of a barrier."

• "Accessibility might be better to view it in terms of what it strives to be. Minimizing barriers for everyone and anyone. Equal opportunity."

Context

Student voices were gathered in 1 interview (Feb.7- 1 student) and one focus group (Feb 17 - 5 students).

Group composition: Undergraduate (n=6) students from the Department of Earth, Ocean and Atmospheric Sciences (Environmental science, Geology, Geological Engineering) within the Faculty of Science.

Students could choose one of two handouts based on whether or not they were willing to disclose a need/history for academic accommodations. Three students chose Handout 1, and three students chose Handout 2.

Students were prompted to reflect about: (cont. next page).

Handout 1

- How or what has made your science courses accessible?
- How or what made learning the field more accessible? (Field trips, field schools?)
- Is there anything you wish you had to support your learning experience in the field?

Handout 2

- How or what accommodations have you had that made your science course more accessible?
- How or what accommodations have you had that made learning in the field more accessible? (Field trips, field schools?)
- Are there any accommodations you wish you had when learning in the field?

How or what accommodations have you had that made your science course more accessible? Or what would make it more accessible?

Students mentioned things they appreciated that made or would make their science courses more accessible:

In lectures

"Having **recorded lectures.** That helped. I like the option of going over lectures again."

"**Having access to slides with notes and not only images** was also helpful, also for people whose first language is not English. Having that written [was] helpful."

"[When] we had a **remote option to attend.** Liked it and found it good for people with chronic health conditions, living far. Sometimes it is hard for me to come to campus."

"I have a **note taker** so that's the way to keep up when I can't come to class. But some classes were not recorded when it was on Zoom."

In assessments

“When profs tell us ahead of time **what to expect for midterms/finals** [i.e., time constraints, types of questions] it makes it easier to study or prepare.”

“One of my first-year courses [had quizzes at the] beginning of class, but for students registered with [accessibility services] would go to a **quieter room,** and one TA monitored the room [I started a little early and waited for everyone to be done]. I really appreciated that.”

“One thing that counts for a grade is quizzes at the end of class, but my class is too large so I can’t focus … **it’s difficult for me to process everything cause I get distracted easily [people leave when they’re done, too distracting].** Most people can write in these spaces [large classrooms] so it doesn’t come to mind. You’re being tested on what happened in class. And I don’t always process auditory information very well, that’s why I need the notes.”

“**I shared my need for accommodations but the instructor said they didn’t apply to quizzes, just for exams.** So, I had to write them, fortunately, they didn’t load the grade too much.”

“It’s hard to be entitled to say “I need ‘x’””

“Double time is a double edge sword… **exams can be 6 hours. If I have to have dinner/break I have to forfeit time.** ”

Considerations ✶

- Students appreciate **clear expectations** around assignments

- Having in-class **short quizzes at the beginning of class** can support students with challenges in auditory processing and attention.

- **Providing a separate space** for students with accommodations to write quizzes and minimize distractions.

- **Considering how the accommodations that students need play out in assessment situations.**

✶ *Note: all* **considerations** *offered in this resource are student suggestions, some of which have been rephrased for clarity.*

In group projects

> **In general I'm slower in group projects ...it's kind of frustrating for the rest of the group cause I'm not going at the same speed.** Collecting data, writing...**But in long-term projects, it's fine cause I can contribute.** When the project has been introduced, criteria and I have an established group project that's totally fine with me. It's more when you're given a paper at the beginning of class and have to be done at the end.

Considerations

- **Long-term projects with clear instructions and criteria provided in advance are helpful for students with processing difficulties** [compared to fast paced in-class/same-day group projects where they withdraw]

In office hours

> Instructors can say, "**I'm available during this period;** let me know when works."

> Being **easily reachable by email** helps a lot!"

> Frequent office hours (not necessarily scheduled, but as long as profs/TAs have **open availabilities**)."

> Zoom office hours are helpful but can be intimidating if you don't know what to ask with certainty. Another problem with office hours it's that **sometimes students don't know where to start, or how to address the conversation.**"

- Offering office hours (aka student hours) in-person and over zoom, **being flexible** about when to offer office hours.
- Summarizing and **sharing with the entire class what is covered in office hours** if the instructor thinks it would benefit most students.
- **Informing students the purpose of office hours** and how students can get the most out of them.

Normalizing challenges

> **Some of my best profs have been ones who share their experiences and are open about challenges they've gone through.** It makes them easier to approach and to relate to.

> When [the] prof shares their own experiences and challenges **it helps a lot to know that it's almost a universal experience** and makes it a lot more relatable."

How or what accommodations have you had that made learning in the field more accessible? (Field trips, field schools...)

Students mentioned things they appreciated that made or would make their field learning experiences more accessible:

Responsive supports meeting specific needs

"**There are many things happening at once.** (My field course) was great for having so many TAs/profs available to help direct my way of thinking or guide me on the right path."

"Field school was the only time that there was no accessibility issue for me. It was the opportunity to display my skill set with no issues .... my accessibility accommodation [twice the time] was gone in field school. **We approached it by playing it by ear**. My disability did not conflict with activities in field school."

Alternative ways to learn field-related skills can accommodate interests, financial and personal needs

"Friends who have conditions (asthma, hip pain), **people want to go into [specific discipline] but not the field component.** If we had another option, it would be great. **It was emotionally overwhelming doing field school.**"

"[Students in a specific program] had 2 options to choose from but in [another program], you only have one choice. It's also a cost barrier, you have to buy things. But for the local field school it's only one week, you're sitting around and you have that option. **Students say they should have two options: local, computer based (GIS, remote sensing type field learning).**"

Having field locations close to the university may be convenient for students with housing, medical, or other personal priorities; alternatives for making up a field trip can support some students

"[No alternatives were offered when a student could not go on a field trip], **I was supposed to go on my own. But I couldn't**, going on transit was hard, I don't live on campus, didn't have a car. "

" Last year I took a field course that took place beyond the student housing terms. **There was no accommodation done by the school, but a friend of mine hosted me and gave me a place to stay. I'm not sure where I would have gone otherwise** as I was not in a position to afford staying anywhere else during the field course."

" **Trips not too far from campus** [for courses]."

Providing a list of equipment/ supplies needed for the field work as far in advance as possible to accommodate financial needs

" I learned about it in 2nd year but I didn't realize how much equipment I needed. **many people don't have $2,000 in their pocket to spend right away...** "

" Required equipment is a **financial barrier.** "

" ...regarding financial barriers, sometimes you have to get a specific brand of pen.. **it's a lot of money and the department is not providing any of that.** Some of those things you only use once. Other programs don't require such an intensive thing to do on your own. Seems like a lot, such a barrier to taking the field school. "

Are there any accommodations you wish you had when learning in the field?

Students mentioned things they felt would make their field learning experiences more accessible:

In relation to fees for field learning

"Sometimes **cost is a large factor in being able to do field work.** It is very expensive to start up as there are many things you need to purchase beforehand to be prepared for field-based courses."

Considerations

- More ways to **reduce the cost** of field courses/trips.
- Purchase **equipment that can be loaned out** rather than purchased by students.

More transparency of what a "typical" day entails

"It would help if we didn't have an additional assignment after dinner... evening lectures. **Making us aware of what's coming up...** [include in the syllabus or course outline] something that says: evenings are occupied with activities so you can budget your time."

"**You also get very little sleep,** and that might have been a challenge."

- Provide syllabi/course outlines/field guides that give **information on how days in the field are conducted** (including day and evening activities).
- Provide information about how long a student is walking, what are they carrying, are bathrooms available...

Access to information

"**It would have helped if people knew more about this beforehand.**"

- **Have discussions about expectations/experiences with other students** without faculty/TAs

Access to information (cont.)

> In the first year, give people an idea about 2nd year, 3rd year camps and associated fields.

> We were told we were going to be walking but **we didn't understand what it meant until we were there.**

Considerations

• Create an integrated Canvas site for all field courses across the program "to make people aware of the pipeline" [different field experiences offered/required]. **This site could provide students with information about field courses' requirements and expectations** (e.g., videos, virtual tour of field stations, pictures, required equipment, links to accessibility office, information about accessibility).

Student suggestions to support students who miss a field trip

• **Connect students who have missed the field trip** so they can go together to do the field assignment.

• Provide **alternate ways for students to participate in a day field trip** for those students who aren't able to do the field trip (due to disability)

• **Provide data to students that can't collect it themselves** so they can still do the analyses, e.g., rock measurements, water temp, water chemistry, etc.

• **Provide data sets to students to use for making interpretations** if they can't collect their own data

• **Allow students to use Google Earth to make a geologic map** with hand samples provided

• **Create a virtual field trip of the area** - students could work together to complete virtual field trips as an assignment. Some students can collect the data, photos, samples, and other students can work with the provided data to create the virtual field trip.

Additional student suggestions

• Providing free days or **free periods of time** throughout the field experience to support mental and physical health.

• Allow **extra time** to record data during field work.

• **Find out if and what the accessibility needs of the students are ahead of time.** Have material prepared ahead of time in case accessibility needs arise while in the field.

Group work

Terminology

Belonging: "Students' sense of being accepted, valued, included and encouraged by others (teachers and peers) in the academic classroom setting and of feeling oneself to be an important part of the life and activity of the class" (Goodenow, 1993, p.80). Sense of belonging is a basic human need that is determined by the context, time and circumstances and is influenced by one's identities. Belonging leads to positive outcomes and success (Ryan & Deci, 2017; Strayhorn, 2018)

Goodenow, C. (1993). Classroom belonging among early adolescent students: relationships to motivation and achievement. *The Journal of Early Adolescence,* 13(1), 21–43. doi: 10.1177/0272431693013001002.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness.* The Guilford Press. https://doi.org/10.1521/978.14625/28806

Strayhorn, T. L. (2018). *College students' sense of belonging: A key to educational success for all students* (2nd ed.). Taylor and Francis. https://doi.org/10.4324/9781315297293

Context

Student voices were gathered in one focus group (March 1, 2023 - 2 students).

Group composition: 2 undergraduate students from the Department of Earth, Ocean and atmospheric sciences (Geological Engineering)

Students were prompted to reflect about:

1. What helps you learn when working in the field? (Here are some things to think about: working in pairs/group, individual work, worked examples, guest lecturers, low stakes assignments, options to revise an assignment, get feedback on work without being graded)

2. When makes you feel like you belong when learning /working/living in the field?

Quotes included on the following pages belong to students who participated in this focus group.

What helps you learn when working in the field?

(Here are some things to think about: working in pairs/group, individual work, worked examples, guest lecturers, low stakes assignments, options to revise an assignment, get feedback on work without being graded).

When working in groups, multiple perspectives foster learning

"Everyone would have theories, ideas to bounce off."

"I do like group work because tasks are hard and there are so many different possibilities and I don't know everything so when we can share ideas and what we think, that's how I like learning... **it's good to have other perspectives [to complement what I know].**"

Group work over individual work, depends on comfort level with people in the group and the behavior of people in the group

"**It depends on the personal comfort level with people I'm around.** Some are just intimidating and have no problem in talking... so it's hard to express thoughts and feeling when you're in a group with them. It comes down to comfort level."

"I like learning in low stakes environments. Last summer I worked with a field partner who had more experience, it can be great if you feel comfortable sharing your thinking with them. So, **if you're comfortable sharing your opinion with someone who knows more, you can get opportunities to discuss.**"

"I like working in pairs (minimum) and at most groups of 4. **After that, I notice the conversation can get dominated by 1 or 2 people.**"

In relation to group work format, students recommended having 2-4 people

Students expressed different experiences in relation to learning and working in groups

"I have mixed feelings. It's a long time to be in the field... I know a lot of people going ... but I'm not close. The one friend I have is in [my major], so we have taken the same courses. **If I'm given the choice, I'd pair up with my friend but that might not be good cause we've been taught exactly the same!**"

"**Switching partners was good** [rotating group assignment helps students in getting to know each other and setting expectations about team behaviors]."

"If it's a one off it would be good to work with someone you know, but for the most time, assigned doesn't feel left out if you don't know anyone. **If someone doesn't want to pick you it feels crappy**."

"**A lot of time with assigned partners there were people with different fitness levels [that didn't match], so hiking meant slowing down** and you couldn't cover as much [while out in the field] which meant I had to do a lot of work in the evening because we didn't cover that area... "

What makes you feel like you belong when learning/ working/living in the field?

Belonging in relation to others in class

> **We stick to groups of people we already knew** [before going into the field].

> Some **free time** would help (games).

Considerations

- **Students need opportunities to connect**/get to know/develop relationships with peers in class

Belonging in relation to working/living in the field

> ... **having a peer support system** because people have varying comfort levels... if you have a bad experience with your partner, [knowing] someone you could reach out so you get an accommodation. Is there a system like that in place?

> **Undergrad support group** would be good...

> I would feel comfortable talking to a [one or more] **volunteer [support] peer[s].**

- **Knowing point person in advance of field learning experiences** should issues arise.
- **Being able to ask anonymous questions** about working/living in the field.

Student suggestions for enhancing a sense of belonging in the field

- Offering **unstructured/free time opportunities** at camp.
- Opportunities for **structured social time** (e.g., games).
- A **peer support point of contact** that is not a TA or instructor.
- Implementing an **anonymous discussion board** [or event] for students to ask questions.
- **Fostering relationship building with peers**–connecting with peers prior to field, makes it less stressful [presumably easier to develop a sense of belonging].

Indigenous-related content/context

Terminology

Following the Indigenous Language Guide, we use here the term **Indigenous** to refer to the collective of First Nations, Métis and Inuit, the Indigenous Peoples of Canada. We chose to use the term Indigenous in this document because it aligns with the United Nations Declaration on the rights of Indigenous Peoples as well as with UBC's Indigenous Strategic Plan.

Context

Student voices were gathered in 2 focus groups (Nov. 23, 2022 – 4 students; Nov. 25, 2022 – 5 students).

Undergraduate (n=7)

Graduate (n=2)

Group composition: Graduate and undergraduate students from the Faculty of Science (Earth, Ocean and Atmospheric Sciences), Land & Food Systems and Integrated Science.

Students were prompted to reflect on:

1. Are you interested in having Indigenous-related topics incorporated into your courses generally? In science courses? And why are or aren't you interested in having Indigenous-related topics incorporated into your courses?

2. Have you encountered Indigenous content in your science courses- select from checklist, how was it presented?

3. What would you change about how it was presented?

Quotes included on the following page belong to students who participated in these focus group.

Are you interested in having Indigenous-related topics incorporated into your courses generally? In science courses? And why are or aren't you interested in having Indigenous-related topics incorporated into your courses?

All students in the focus groups want and expect Indigenous content included in their science courses – provided it is relevant and done authentically.

> **Yes. It should be present in Science courses but the way it is integrated is flawed.** Other ways of knowing are usually not well integrated, just isolated.

> **Yes, it is important in general and science courses.** Even if it is not related it should be integrated.

> **It's part of the responsibility of the professor because we are in Canada, it's part of history, but in science courses we should even know more cause we're studying the earth.**

> From an engineering perspective, **whatever I do will reach/affect communities in a given region.**

Students find Indigenous content relevant in the Canadian Context and particularly in earth science courses

> I enjoy having Indigenous content incorporated. But I grew up immersed in it, I don't remember a year in my schooling (K-12) when it wasn't present. It was surprising to come and not having it come up at university. **It's still important to talk about it in Science courses particularly in any type of land-based activities. I'd like to see it expand because it is relevant, because if you work in industry/research being exposed to it is necessary.**

Have you encountered Indigenous content in your science courses? Select from the checklist, how was it presented?

- ❑ Land acknowledgement(s)
- ❑ Discipline-related case-study (or studies) in which and Indigenous Community or First Nation is identified and discussed as a stakeholder (e.g., mining, water quality).
- ❑ Tradition story (or stories) from an Indigenous Community or First Nation.
- ❑ Lecture, reading/video assignment or other about the contemporary activities of an Indigenous Community or First Nation (e.g., current practices, governance, or priorities of community).
- ❑ Field trip to a site(s) significant to an Indigenous Community or First Nation.
- ❑ Visits to Indigenous cultural centre or museum with Indigenous exhibit content (in person or virtual).
- ❑ Lecture, reading, video assignment, or other about the traditional knowledge/way of knowing about the Earth of an Indigenous Community or First Nation.
- ❑ Lecture, reading, video assignment, or other about science content tied to a place based context relevant to an Indigenous Community or First Nation.
- ❑ Guest speakers from Indigenous communities (e.g. First Nations, Inuit, Métis) to speak about Indigenous-related topics and share knowledge.
- ❑ Guest-speaker led workshop(s) or working class session on Indigenous-related topic(s).
- ❑ Images of community artwork, engineering, practices, or traditions.
- ❑ Used an Indigenous Community or First Nation's language in instructional interactions with students or in class materials.
- ❑ Other: (please describe).

Note: Checklist developed by Laura Lukes and Shandin Pete (2022) as part of a Science Innovation Fund Project.

Students have encountered Indigenous content in some science courses [not at the 100 level] and it has taken different forms

- **Just one session on Indigenous topics** and the instructor mentioned **"you won't be tested on this."** [Students don't pay attention].
- **Resources on Indigenous related topics** (e.g., nativeland.ca, videos).
- **Indigenous related stories woven with content:** "It was really cool. I wish there was more of it."
- **Indigenous guest lecturers teaching about topics related to course,** "Prof said, it was important to understand different perspectives, and we were tested on it."
- **Case studies** exploring the negative/positive aspects of project in communities
- **Land acknowledgments** (first day, included in the syllabus, canvas site), "My research project is field based so **the idea of asking for permission to access the land is relevant.** In that part of the program (research) it happens because it's part of the process but I didn't have any of that in my undergrad."
- **Land-based course co-taught by Indigenous (elders, knowledge keepers) and non-Indigenous instructors.**
- **Specific activities** (e.g., "group project and there is a small section in instructions that says you need to address the Indigenous communities.")
- "**Hearing from locals was an incredible experience.**" [In a field course].

What would you change about how it was presented?

Students agreed Indigenous-related content should be integrated and or woven through their courses rather than in a single session...

"Have a land acknowledgement and get knowledge about Indigenous [communities local to field sites] ... **visible and tangible acknowledgment** in field stations (e.g., plaque, art piece, signs in local language. Asking local Indigenous groups would be a better way to integrate things."

"**Conversations about Indigenous rights and cultural responsibilities** that those nations ha[ve] with that land."

"**Little recurrent pieces can be more meaningful than just the one session.**"

"Ways to integrate could be: **when you refer to a location, mention the Indigenous name,** having info on how gems/rocks are/have been used by Indigenous groups ... **what's the meaning for Indigenous groups**."

"I'd like to push back on the idea of integrating two world views if it is done from the western perspective. **Two-way seeing has to do with looking at it from a different perspective, the focus is different (plants and rocks as teachers, stories that these tell, they offer us lessons for how to interact with the living world).** My experience of Indigenous topics in science courses is framing it as Indigenous trauma (all the ways that colonizers came to destroy us), or debates where the aspect that was acknowledging Indigenous peoples was thinking about them as opponents."

"**Not pushing** in Indigenous content if it doesn't relate to the subject matter."

"**Case studies** could help bridge gaps."

...they mentioned quality over quantity is a good way to think about it to keep it relevant.

"**If we were tested on things, it would be more valuable.**"

"In one course there was a multiple-choice question where they tested us on the language that goes in a land acknowledgment, it didn't add [anything]."

Students would like Indigenous content to be assessed, specifically having time to process and reflect

"Besides lecture component, **having a discussion component after the guest lecture.** So, we reflect on the content we're learning. For example, in small groups/ presenting but **giving students time to think about it and expressing what they learned/think about Indigenous Knowledges.**"

Including content in courses early on in programs and incorporating mandatory content (e.g., creating a course on Indigenous studies for Earth sciences)

"There should be a mandatory section on **how to engage/talk with Elders** but I have never seen that."

"I'd like to have basic knowledge (what should I look for, how to communicate) of projects and then we can include more of these topics throughout the program."

"There are different courses people take in the first year but **there is nothing about Indigenous peoples and I think it should be included.**"

"**My experience is that Indigenous peoples were always [seen as] a problem (pushing back because they're stakeholders) and they were usually considered an afterthought (end of the process), I didn't like it.** Communities are seen as detrimental to projects ... a lot of the course work did not include anything about how what we do affects communities, or mentioned how to address that."

"**I believe it should be in every single course, regardless of the department because your work will always affect communities as a whole**... It would be a great start of their program for people new to this context like me. It can also be created as an intro course, elective and people just sign up. Would be good for geological engineering."

"**If we have people who have an Indigenous background it would be great to learn from them** how they approach projects, engineering problems."

Students would appreciate it if Indigenous cultural training was offered

> “ **If access to cultural centres could be added to field courses**... that would be great, even as the first thing they do... ”

> “ Explain that **Indigenous peoples have rights to the knowledge** ... It's part of learning how to not continue harming, **learn why extracting knowledge is problematic and disrespectful.** ”

Considerations

- Consider incorporating **visits to cultural centres, asynchronous videos and readings, or self-paced training options.**
- Cultural training is especially needed for students, teaching assistants, and faculty who are new to Indigenous contexts

Key Takeaways for Instructors

From across student perspectives and experiences shared.

Note: This list was compiled by the non-student authors from looking across the student data.

- **Instructors and teaching assistants play an active role in student experiences in field settings.** Their actions and communication approaches (and timing) directly influence students' feelings of inclusion, belonging, and self-efficacy.
- **Field courses involve multiple types of social relationships and requires relationship building skills.** Students are looking to instructors to create opportunities that support and guide them in connecting and collaborating with other students and instructors.
- **Transparent course design and advanced communication about costs, equipment and setting conditions support student success.**
- **Most students want and expect Indigenous context and content included in their field courses,** provided that it is relevant and done authentically. They are seeking cultural training opportunities.