SCIENCE IS FOR EVERYONE:

Integrating Equity, Diversity, and Inclusion in Teaching

A Toolkit for Instructors

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Version 3.0

Welcome to this Toolkit!

This toolkit provides ideas to diversify science education to support recruitment, retention, and advancement of all students and bring topics of equity, diversity, and inclusion (EDI) to the curriculum. The toolkit encourages student creative expression and engagement, debunking myths and stereotypes around scientists, increasing representation of diverse role models, and more! These resources will help instructors develop equitable learning environments that support students from all backgrounds, fostering a culture of care and inclusive excellence. Through inclusive teaching, we prepare graduates for a professional environment in which EDI awareness is the cultural norm. EDI education is imperative for our students who represent the next agents of change in the fields of science, technology, engineering, mathematics, and medicine.

Carleton University

EDI Definitions

Equity

People of all identities and characteristics being treated fairly and respectfully, considering opportunities, access, treatment, power, outcomes, and resources.

Diversity

Differences within a group that may include race, ethnicity, gender identity or expression, family status, disability status, sexual orientation, age, or socioeconomic situation.

Inclusion

Ongoing process of intentionally creating welcoming and respectful environments and systems where there are opportunities for everyone to flourish, in which inequities in power and privilege are addressed.

Source: R.M. Thomson, *Advancing equity, diversity, and inclusion: a how-to guide*, Physics Today (2022)

Acknowledgments

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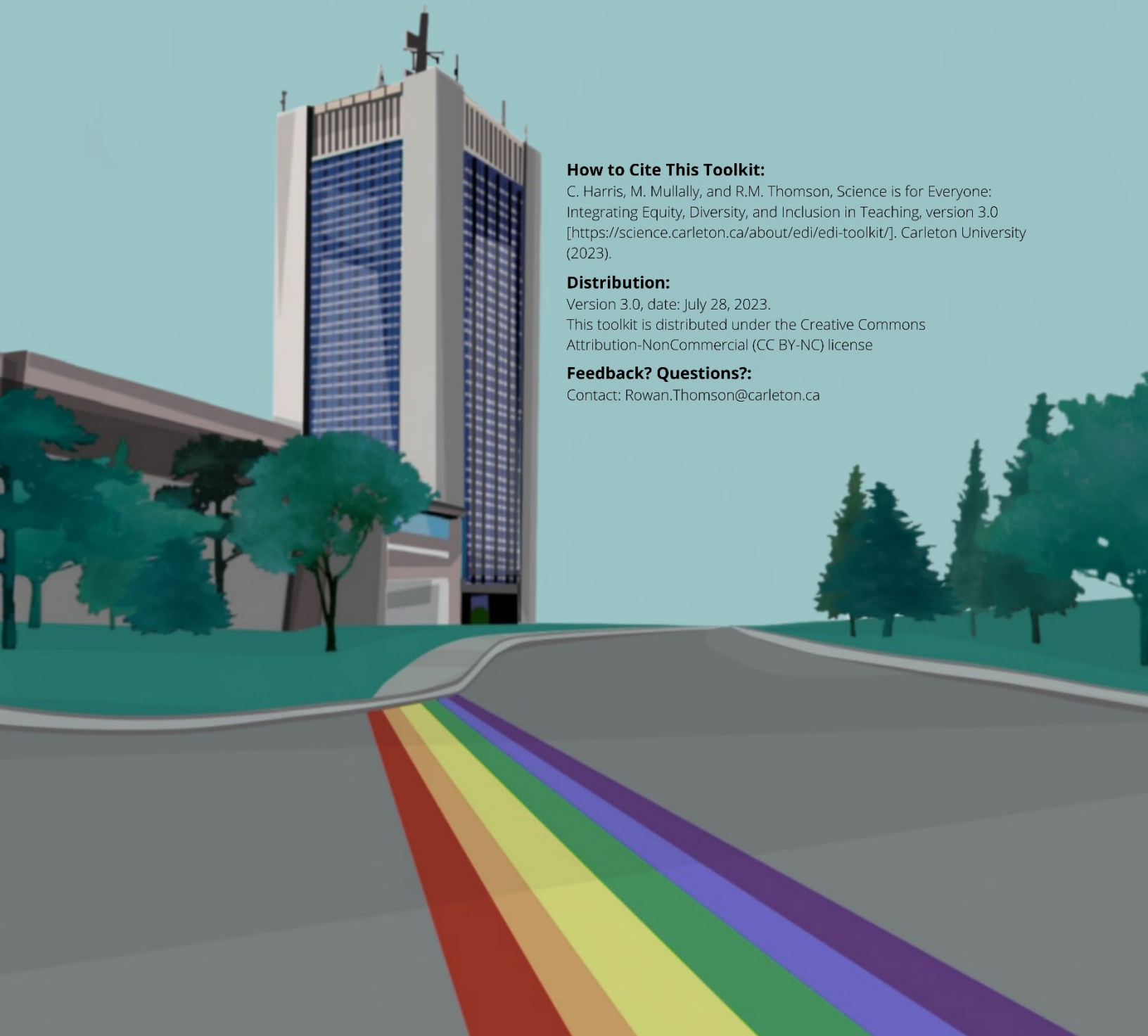
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Feedback? Questions?:
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EDI TOOLKIT ROADMAP

How to use this Toolkit:

Advancing EDI is a journey with concrete actions taken along the way. This toolkit is meant to provide ideas at different points on this journey, rather than act as a book to be read from end-to-end and implemented at once. All actions matter, small and large! This toolkit is not intended to make instructors EDI experts, but rather to provide ideas to support acknowledgment and engagement with EDI issues, while also providing resources to point students to. As we advance on this journey and gain more familiarity and comfort with EDI topics, it becomes possible to then push your limits further!

1. Course Outline

2. Course Website

Ideas for your course outline and website, with pre-curated resources & readily-adaptable text.

3. In the Classroom

Ideas for inside the classroom (values, actions, course materials).

4. Assignment Ideas

Consider an assignment question that broadens horizons.

5. In-Class Activities

As you get more comfortable with EDI-related content, consider in-class activities with a strong EDI focus.

6. Ongoing Learning

Start to rethink your pedagogical approach (deeper learning, self-reflection).

Remember: You are not expected to become an expert in EDI. You are a domain expert in your field, and that is why you teach science at university. There is no expectation that you become an expert in EDI or even that EDI overtly be a topic of discussion in your course. Instead, these tools are designed to help you to address EDI in your teaching design and delivery, to acknowledge the diversity of our student body and to use teaching practices that include as many people as possible.
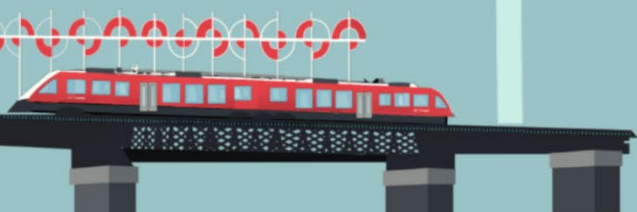
1. For Your Course Outline

- Land acknowledgment (learn the importance of this here)
- How to address instructor (e.g., Prof. X, Dr. X, first name, or other) and their pronouns
- How students can contact the instructor (e.g., email, after class, student hours, Brightspace forum)
- Marking scheme with built-in flexibility
- Technology checklist (tools required for the course and tools that may be new to students)
- Student hours (office hours renamed)
- Community guidelines (i.e., codes of conduct)
- University expectations of student behaviour online (link)
- Accommodations: students with disabilities, pregnancy, religious (Interfaith calendar)
- Academic integrity statement (link)
- Academic integrity checklist tool (instructor version, student version)
- Mental health resources (link)
- Human Rights Policy (link)
- Sexual Violence Policy (link)

Click here for a course outline template and click here for an annotated version of the course outline

Have you considered?

- Incorporating flexibility into your course by allowing students to drop the lowest quiz/assignment mark
- Using multiple assignments/quizzes/exams to lower stakes and promote an inclusive learning environment
- Allowing for multiple modes of expression
  E.g., Assignments that can be completed as written work, videos, podcasts, completed individually or in groups
- Explicitly communicating with students about workload expectations
  E.g., Plan for X hours of reading/studying/problem-solving each week in addition to lecture time

2. For Your Course Website

- Your name, its pronunciation (NameCoach), your gender pronouns, and how students should address you (NameCoach can also be enabled on Brightspace – here's how)
- Discord and Online Behaviour Tool (link)
- Mental health support resources (other resources)
- Tools and websites for diverse learners (examples)
- Syllabus quiz (example)
- Midpoint course survey (example)
- Midterm exam reflection for students (example)

Click here for instructions on how to insert the Wellness Widget in your Brightspace website

Have you considered?

- Including a welcome message for students (sample message)
- Using the calendar function in Brightspace to outline when assignments in your course are due
- Posting rubric and assessment criteria for assignments so students are informed of course expectations
- Posting past tests with marking keys so that students know what to expect on high stakes assessments
- Giving an outline of the types of exam questions and their point value so students know what to expect

3. In the Classroom: Actions, Values, and Course Material

- Use non-gendered terms like "friends", "folks", "they", and "everybody" (Tip: When calling on students, identify them via a clothing item and their position in the room, e.g., "the person in the back row with the blue hat")
- When allowing time for students to discuss ideas with other students, designate pairings (or instructions for whom to speak with in larger lecture halls) to prevent exclusion (Peer Instruction)
- For first lectures:
  - Explain the importance of the land acknowledgment (sample slides)
  - Discuss the Faculty of Science EDI statement (link)
  - Mention online communities and campus groups for students to join (click here)
  - Review the 7 Student Rights & Responsibilities Policy with students (link)
- Use examples of scientists from different backgrounds in lectures, to counter stereotypes (examples: #1, #2, #3)
- Incorporate Collaborative Indigenous Learning Bundles into your course (link)

Have you considered?

- Following the Universal Design for Learning (UDL) approach when planning lectures to help increase inclusion and accessibility in lesson plans (UDL resources & activities)
- Inviting students to share their chosen name and gender pronouns (Pronoun Poster)
  (Note: Sharing pronouns can create stress for students who do not feel safe or comfortable so always let this be optional – learn more here)
- Being familiar with the different gender identities (Gender Definitions)
- Knowing what the different letters mean in the LGBTQ+ acronym (LGBTQ2SQIA+ Explained)
  (Note: "Two-Spirit" is a term unique to Indigenous persons – learn about its meaning here)
- Familiarizing oneself with common language associated with gender and sexuality (Translanguage Primer)
- Talking to TAs about EDI challenges and resources; TA training (link)
- Using examples with broad appeal that may interest diverse learners
  E.g., applications in the life sciences as examples in computer science or math
- Accessibility in the lab and in field work for students with disabilities (Accessible Science Laboratories Tools)
- EDI challenges in fieldwork (Implementing EDI in fieldwork)
- Challenging norms and barriers by incorporating multiple perspectives when teaching
  E.g., sexuality from a non-heteronormative aspect, history from a non-colonial viewpoint
- Using older versions of textbooks, an open educational resource (OER), or open source softwares to lower costs
- Assumptions that may be linked to course materials/examples that are commonly used
  E.g., Examples that are heteronormative, racially biased, etc.; can you choose different materials/examples?
- Encouraging students to approach after class if an inappropriate term has been used in class and making students feel safe and welcome in offering corrections and expressing opinions
- Recognizing that different cultures deal with conflict in different ways (written exchanges versus face-to-face)
- Utilizing resources written by authors from diverse backgrounds
- Examining class resources to check for content that is racially or culturally insensitive, or potentially distressing for students with trauma, and cautioning if the material is necessary to include (learn more here)
- Giving students permission to fail/get things wrong in class, and framing failure as an essential step to success
- Maintaining awareness of current socio-political topics and social issues that might be impacting students

4. Class Assignments

Infographic Content

Create an infographic for a scientific concept, or an EDI topic related to science, that visually communicates the key points necessary for understanding. (Click here for a sample assignment & rubric.)

☼ *Here, students learn how to make scientific information accessible to the public while also learning skills in visual communication, topic comprehension, and concept summarization. (Tip: Try Canva and MS Word for templates.)*

Neurodiversity | Inclusion | Information Accessibility | Creativity | Communication

Screen-Right

Create a short script featuring characters from a favorite TV show, movie, or book. Develop a scene and dialogue addressing a specific scientific topic (e.g., Black Mirror episode where ENSO climate patterns disappeared, Lion King demonstrating the types of symbiosis), or an EDI-related topic in science (e.g., Lisa Simpson learning about Henrietta Lacks, Rick & Morty in a dimension where science excludes female subjects). (Click here for a screenplay template.)

☼ *This assignment prompts an in-depth exploration of a scientific concept, with students having to write from multiple perspectives to create a dialogue. When choosing science topics relating to EDI, this assignment enables students to thoroughly understand a topic and its significance as a result of the immersion and visualisation required to create scenes and storylines.*

EDI Barriers in Science | Neurodiversity | Inclusion | Immersive Learning | Communication | Perspective-Taking

Dear Gabby

Develop short letters from concerned individuals quoting misinformation related to a field of science (e.g., letters from an anti-vaxxer, a flat-earther, a parent who feels the internet is harmful), or ask students to write their own. Have students write a reply as a columnist to the question you or a peer created. (Bonus: For a low-stakes assignment, have students submit or trade assignments and write follow up responses with points that were not addressed.)

☼ *This assignment drives students to perspective-take and understand misinformed viewpoints, while building skills in communication and inclusion. Through writing responses to "concerned parties" who have been misinformed, students also practice having conversations with people from different backgrounds. Furthermore, students challenge academic gatekeeping ideals, fostering empathy and kindness in place of dismissal and exclusion.*

Inclusive Practices | Science Communication | Differing Perspectives | Discourse Skills | Humanization

ELI5

Inspired by the popular Reddit.com ELI5 ("Explain Like I'm 5") subreddit forum (see example thread here), create a shared document whereby students answer forum questions about key concepts as if explaining the concept to a child. The resulting document can be used as a class study aid for students before exams.

☼ *This assignment requires students to have a deeper working understanding of a concept to successfully convey the material to a younger individual with no educational training in the subject. The student is pushed to think more creatively about the information as they consider metaphors or images to explain an academic topic and avoid the use of jargon terms to explain scientific phenomena. Furthermore, a sense of support is created between students as they work to contribute to a project that the entire class can use for study purposes.*

Neurodiversity | Inclusion | Creativity | Communication | Peer Teaching

Fake News

Provide a choice of media articles which contain erroneous facts regarding a recent/significant journal publication (e.g., "scientists discover drug that can turn rats gay"). Have students read both the article and original study and prepare a write-up explaining how the media misinterpreted facts and what the actual findings from the study were.

☼ *By engaging students in an activity emphasizing the significance of scientific communication and knowledge sharing, this assignment discourages academia-related inclinations toward gatekeeping and individual interest.*

Scientific Communication | Knowledge Sharing | Inclusion | Equality

BYOT (Bring Your Own Tool)

Ask students to find a resource that helped them to understand a class concept—this could be an infographic, a reddit thread, a YouTube clip, or even their own explanation. Using a tool like Padlet, have students add their resources to the board. Students can also like/comment on other posts, creating a network of peer support. (Example here.)

☼ *Students from different backgrounds learn in different ways. By asking students to find and share resources that help them to understand a difficult concept, they can help and support fellow classmates (building a sense of community) while also gaining access to a variety of resources that represent different learning style preferences.*

Resource Sharing | Peer Support | Inclusion | Neurodiversity | Learning Style Preferences & Strategies

Tell a Friend

Discuss a new theory/controversial topic in class (e.g., stem cells, ADHD), explaining the opposing views and myths in addition to the facts and science. Have students approach two individuals outside of class to explain the concept to and complete a list of questions that compare old and new perspectives of those they spoke to. (Sample assignment here.)

☼ *This activity teaches students how to have conversations about potentially controversial science topics with others who do not study science. It allows students to fully engage with a topic and understand a variety of perspectives that can exist, combating unhelpful attitudes that academia can foster (e.g., elitism, competition).*

Scientific Communication | Inclusion | Knowledge Sharing | Different Perspectives

Science Hero

Have students select an inspirational figure in the field and write a piece on why this person is their hero. This may include the figure's background and accomplishments, as well as reasoning for the student's selection. This integrative learning activity helps students to create connections between personal, academic, and professional experiences. (See sample assignment here.)

☼ *This project promotes self-directed learning about innovation, research, and development in science. This idea acknowledges the potential for affective learning (involving emotion) in developing motivation, inspiration, and engagement alongside traditional knowledge and skills. Students are also encouraged to develop their identity as a scientist that may be key for retaining individuals in the field, particularly those from under-represented groups.*

Notable Figures | Writing Assignment | Diversity | Affective Learning | Student Identity

Academic Underdog Trivia Slides

Have students create a trivia slide for a notable figure who faced struggles because of their ethnicity, racial background, gender identity, intellectual disability, or other factor. Inform students that the best trivia slides will be added to a slide show to be shown before lectures, like the trivia slides shown in theatres before movies begin.

☼ *This short assignment allows students to learn about famous individuals who faced common struggles, while also learning more about the EDI barriers that exist in STEM. Furthermore, students gain an opportunity to share the stories or facts about notable figures that resonated with them. A pre-lecture slide show offers an easy way to integrate EDI material, creating a more supportive class environment that encourages diversity.*

Notable Figures | Trivia Slides | EDI Barriers | Diversity | Creativity & Design | Short Assignment

Take-Home (Power)Points

Ask students to read a journal article and design a single ppt slide stating the research hypothesis, method, results, and implications. Encourage students to be creative and use visual data from the paper, or other images. Best slides can be used in future course lectures, for extra incentive. (See sample assignment here).

☼ *Through extensively reducing information and using images to help visually explain an article to a potential future class, students with different learning needs and backgrounds are taught how to navigate advanced journal articles and what pieces of information to focus on.*

Inclusivity | Neurodiversity | PowerPoint | Journal Articles | Reading Comprehension | Communication

Have you considered?

- Including multiple assignment question styles whenever possible, providing students with a choice to help accommodate different learning style preferences and learning needs
  E.g., For an assignment, students can write a short argumentative essay, create an infographic, or create a slide deck
- If using short-answer questions on tests, provide options regarding answer methods students can choose from
  E.g., An exam may ask students to list steps of a process, draw a pathway, or describe what is occurring as an event takes place
- Using the tool CATME to address inequities in group formation and group work, while also providing peer feedback and identifying poorly functioning groups
- Including a "Test #0" or "Lab #0" so students can learn the process of tests and labs, respectively; this also helps students identify if they experience any difficulties related to the technology

5. In-Class Activities

Understanding Unconscious Bias

Video | 3 mins

A quick animation explaining unconscious bias and its dangers. Click here for inspiration for an in-class activity.

Unconscious Bias | Students | Awareness

What is Impostor Syndrome and How Can You Combat It?

Video | 4 mins

A short TED-Ed animation that helps students become more aware of impostor syndrome and the self-limiting beliefs that might be impacting academic performance and mental wellness. Click here for inspiration for an in-class activity.

Student Awareness | Animation | Women and Minorities in STEM | Academic Performance

Implicit Association Test

A collection of online tests to increase self-awareness of unconscious biases.

Unconscious Bias | Students & Teachers | Awareness | Race & Ethnicity | Gender | LGBTQ2SQIA+

YouTube Pre-Class EDI Playlist

An easy-to-access, curated list of trending music related to social causes and/or featuring diverse artists. Great for playing before lectures as students arrive to promote a sense of connection and belonging among students.

☀ *Songs are effective tools for conveying messages because of their meaningful lyrics, accessible imagery, and inherent ability to evoke specific emotions. Once a song ends, instructors can also use this opportunity to point out a quick fact related to the message of the song or tie it to an EDI issue before transitioning to lecture.*

Pre-Lecture Activity | Music | Social Causes & Awareness | Inclusion

Have you considered?

- Using examples in class that represent multiple ethnicities
  E.g., In health sciences, the signs of infections such as ringworm on black skin
- Sharing a time when you or a notable figure faced failure and providing steps to take when this occurs
- Addressing the historical racial and sexist biases that have existed in the field
  E.g., The experimentation performed on African Americans and individuals with disabilities, how historical racism in healthcare fuels fear or hesitancy of vaccinations
- Reading widely and diversely to continue to educate yourself about racism, sexism, homophobia, ableism, etc., in higher education and in STEM education
- Challenging your own assumptions about students
  E.g., If a student stops participating, consider reaching out to check in and asking if they need help

6. Ongoing Learning: EDI Resources

Quick Reads (Online Articles, Blog Posts, Infographics)

The Soul of My Pedagogy

Article (Blog) | 12 min read

In this quick and enjoyable read, Bryan Dewsbury shares some motivation and insight for practicing inclusive teaching.

Inclusive Teaching | Pedagogy | Inspiration

Small Steps Instructors Can Take to Build More Inclusive Classrooms

Article (Blog) | 5 min read

This article focuses on the use of an assignment at the beginning of a course to increase inclusion in a lecture hall. The authors offer several practical pieces of advice, followed by students' perspectives on the assignment's impact.

Inclusive Teaching | Diversity | Equitable Classrooms | Activity Idea | Student Feedback

Addressing Diversity, Equity, and Inclusion in Science in an Undergraduate Course

Article (Blog) | 5 min read

A short online article that describes a course in EDI for science students and the difference it can make.

Equity, Diversity, and Inclusion | Course Design | Higher Ed | Inspiration

Longer Reads (Journal Articles, Texts, Documents)

Equity, Diversity, and Inclusion-Minded Practices in Virtual Learning Communities

Document | 17 Pages

A document containing numerous lists of practical tips for increasing equity, diversity, and inclusion.

Equity in the Classroom | Practical Tips | Educators

An Undergraduate Course That Introduces Topics of Diversity, Equity, and Inclusion into Science

Journal Article | 6 Pages

An article discussing the framework for a course on EDI topics, specifically geared towards university science students.

Equity, Diversity, and Inclusion | Inspiration | Course Design | Sciences

Universal Design for Learning in Higher Education

Document | 30 Pages

A comprehensive look at universal design, with examples for instructors to reference when designing their course.

Universal Design for Learning | Course Design | Inclusive and Equitable Classroom Practices | Teaching Guide

Structure Matters: Twenty-One Teaching Strategies to Promote Student Engagement

Journal Article | 10 Pages

This article discusses several strategies for encouraging the cultivation of equity within the classroom.

Inclusive Teaching | Equity in the Classroom | Practical Strategies | Higher Ed

Websites (Collections, Toolkits, Modules)

Uncovering The Hidden Curriculum – Universal Design for Learning (UDL) Resources

A website with definitions, explanations, activities, and suggestions to help foster inclusive and accessible lesson plans.

Universal Design for Learning | Accessibility | Inclusive Lesson Plans | Post-secondary Education

Carleton University Equity and Inclusion Resources

A list of tools and resources to help instructors learn more about inclusive teaching practices.

Carleton University | Equity | Inclusive Teaching Strategies | Resource Collection

University of Alberta WISEST Toolkit

A collection of resources including activities, articles, and examples of EDI in action.

Students & Teachers | Equity | Diversity | Inclusion | Toolkit

Request a Woman Scientist Database

A search engine that connects educators with women and gender minority experts in a variety of STEM fields.

Database | Women in STEM | LGBTQ2SQIA+

Equity Resources for STEM

A collection of unique resources including posters of STEM figures from underrepresented groups, platforms to connect students from different backgrounds with mentors, and more.

Equity, Diversity, & Inclusion | Resource Collection | Posters | Projects & Networks

Videos, Webinars, and Podcasts

3 Tips to Boost Your Confidence

TED-Ed | 4 mins

A short animation that offers practical tips for cultivating confidence, highlighting the importance of a growth mindset.

Practical Tips | Impostor Syndrome | Growth Mindset | Inclusion | Women in STEM

Quirks and Quarks: Black in Science Special

Podcast | 54 mins

A podcast episode describing the numerous examples of racism throughout the history of scientific discovery.

Diversity | Systemic Racism | Awareness | Inclusion | Race & Ethnicity

Inclusive Teaching Strategies: How to Support the Success of All Students

Podcast | 28 mins

This episode of "Lecture Breakers" describes four key areas where inclusive teaching practices can be implemented.

Inclusive Teaching | Practical Tips l Course Design | Equity in the Classroom

The Gardener's Tale

Video | 6 mins

A short video with a clever allegory describing the three levels of racism that can threaten a student's success.

Race & Ethnicity | Systemic Racism | Equitable Teaching | Student Support

Unlocking the Potential of Diversity in Education

Video | 14 mins

An enlightening TED Talk that speaks to the challenges faced by international students.

Diversity | Students | Race & Ethnicity

Solving the Achievement Gap Through Equity, Not Equality

Video | 9 mins

An eye-opening TED Talk that underlines the role and significance of inclusive teaching practices.

Inclusive Teaching | Neurodiversity | Race & Ethnicity

Fostering Inclusion in Our Teaching

Podcast | 30 mins

Leading experts in inclusive teaching discuss practical ways to tackle unconscious bias in higher education.

Inclusive Teaching | Unconscious Bias | Race & Ethnicity

Equity in STEM

Podcast | 40 mins

Educators share advice on how to create and implement a course framework that promotes equity for students.

Equity in the Classroom | Educators | Course Framework | Inclusivity

Teaching as an Act of Social Justice and Equity

Podcast | 35 mins

Guest speaker Bryan Dewsbury discusses the various ways he fosters equity in his biology lectures of 150+ students.

Equity in the Classroom | Educators | Inclusivity | Teaching Practices | Student Relationships

The Power of Believing That You Can Improve

TED Talk | 10 mins

Psychologist Dr. Carol Dweck describes her work on growth mindset, a great introduction to this influential field.

Ted Talk | Growth Mindset | Inclusivity | Diversity

Productive Failure

TEDx Talk | 17 mins

Learning scientist Manu Kapur describes the role that failure plays in learning, and how it can support student learning.

Ted Talk | Importance of Failure | Creating Supportive Learning Environments | Inclusive Teaching

Inspiring Examples of EDI and Science in Action

Diversifying Astronomy: Introducing Indigenous Astronomy & Sky Knowledge into Astronomy

The Centre for Indigenous Studies and the Department of Astronomy & Astrophysics have come together to create a new course at the University of Toronto. This course incorporates Indigenous science and knowledge to provide a new perspective for astronomy students to explore.

Indigenous Studies | Astronomy & Astrophysics | Interdisciplinary Studies | Cultural Diversity

A Program in Feminism & Science, Technology, Engineering, and Math

At the NYU Tandon School of Engineering, students can minor in an integrative program that addresses the intersection between science and diversity. Topics include the history of women in STEM, bias in the design of technical systems, and queer studies of technoscience. The University hopes to better equip students heading into STEM fields, preparing them for the barriers they may face, and encouraging them to change the world for the better.

Women in STEM | Program Minor | Interdisciplinary Studies | LGBTQ2SQIA+ | Science & Feminism

Project Biodiversify

This online platform invites submissions for biologists from underrepresented groups that have contributed to science. The project creates slides featuring the scientist, their research, and background information including EDI obstacles the individual has faced/overcome. The project aims to promote diversity and inclusion in classrooms.

Biology | Premade Slide Presentations | Notable Figures | Underrepresented Groups | EDI Topics

Want to Learn More?

Click here to view a collection of many other helpful and interesting resources tackling topics of equity, diversity, and inclusion.

Version 3.0

https://science.carleton.ca/about/edi/edi-toolkit/