

Exploring EDI: Definitions, Examples and Conjectures

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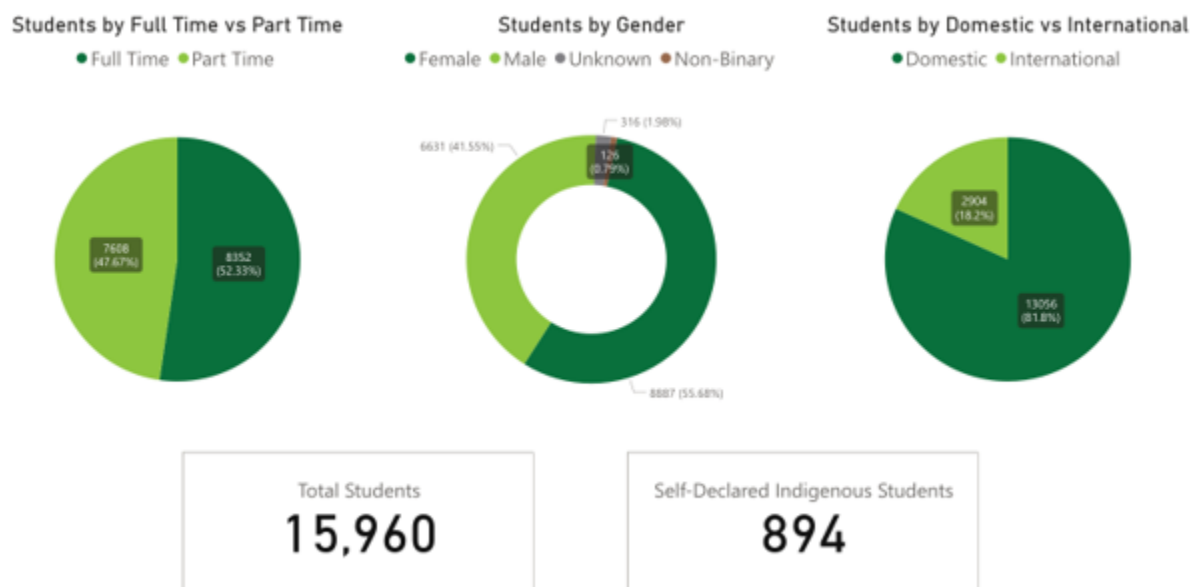
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I am sure the majority of the readers can tell me what the E, the D and the I stand for in EDI, but what are the actual definitions of those words? Do they overlap? Do they cover everything we want covered? Let's start with some definitions and exploratory work.

As mathematicians do, I would like to start with definitions and discuss the terms in the acronym. I'd like to note that while I read and listen to many books/blogs/podcasts on all things EDI, I have been particularly impressed with Michael Bach's book "Birds of all Feathers" for its clear and engaging way of laying out the terms and supporting them with implementation notes. Taking a lesson from this book, the first term I'd like to introduce is neither of the three in the acronym EDI. It is *representation*.

Representation is what we can count. There are many things we can count, ranging from one-dimensional to quite complex, but it is purely quantitative. Every institution likely has a graphic similar to the one presented below from my previous home institution, University of the Fraser Valley:



Such data can inform many decisions taken by both administration and academic faculty. For example, based on the above, one can recognize that the average student demographic includes a large proportion of part-time students that likely have some combination of part-time jobs, caretaking responsibilities and more, shifting their preferences for class format (in-person versus online) and scheduling (day classes versus night classes). Noting the proportion of international students, one can dig further into this data to find that the majority come from India; this important observation might drive decisions around scheduling examinations and other events around non-Western cultural and religious holidays. The representation shows us the snapshot of the demographic at a point in time. But it neither captures all of the complexities of the data, nor does it in itself drive action or change. It also doesn't capture the very real and tangible experiences of the humans it is counting.

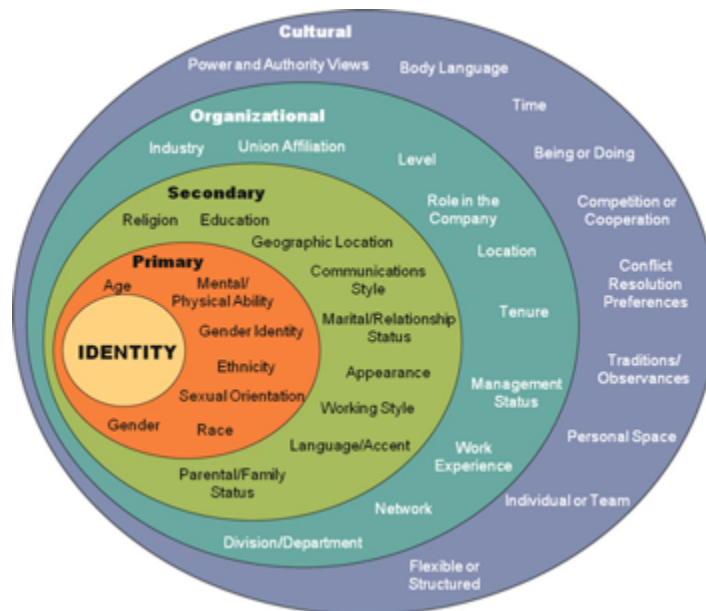
Next up, I offer you Diversity Bingo. It is what it sounds like: imagine you are in a group of 20 or more people who you don't know and you are handed out a Bingo card as below. You're to go and chat with people and you're allowed to only cross one square per person for as many squares on the card as you can in 5 minutes. This is clearly not enough time to get to know anyone holistically, so in order to cross off the squares, you will have to ask blunt questions of strangers.

Diversity Bingo

Person over 35 years of age.	Person who has changed career paths.	Person who uses they/them pronouns.	Person who speaks more than two languages.
Person who is Indigenous.	Person who is a first generation Canadian.	Person who is left-handed.	Person who is the oldest or only child.
Person who is a caregiver for a family member.	Person who has lived in another country for more than 6 months.	Person of Middle Eastern heritage.	Person who has received Employment Insurance.
Person who identifies as neurodivergent.	Person who grew up in a rural or remote area.	Person who has different religious observances from you.	Person whose daily commute is 40 minutes or more.

Which questions are easy to ask and which ones are hard? Which aspects of diversity do you think are visible? Which questions are you more likely to ask someone after a 5-second interaction based on the person's accent (or lack thereof) or their skin colour or clothing style? This simple exercise highlights the differences between what is visible, what is countable, what is assumed and finally what is meaningful. How quickly and how often do we judge our students based on their appearances, accents or handwriting?

A few details about diversity follow. They are included to ensure we all share a clear understanding of the terms, but you may skip this paragraph if you're comfortable with the terminology. Diversity has many aspects. You can find various examples of a "diversity wheel", which is helpful in understanding that there are many dimensions of diversity, here is one such example:



Here, I will give a simpler model by only discussing two broad layers of the wheel, let's call them foundational and contextual. The foundational layer encompasses core human elements that are internal to one's identity: age, ethnicity, sexual orientation, gender, gender identity and others. The contextual layer consists of external factors, such as religion, education, geographic location, parental status, traditions and observances, political and economic systems and so on. A person's foundational characteristics influence how they navigate different contexts and how they are perceived by others within those different contexts, while the contextual factors shape which aspects of the identity are valued, challenged or even visible (or allowed to be visible) in a given environment. Diversity is complex: people are not just representatives of a finite set of categories, but individuals whose lived experiences are

shaped by the overlap of the many dimensions they live(d) in. One important thing to note here is that any given individual can only control some of their diversity characteristics for themselves: the further away we move from the foundational layer, the less agency one has since the given aspects are shaped by circumstance, environment and social structures as opposed to personal agency or choice.

Representation and diversity, though often used interchangeably, are not the same. The first is a quantitative measure of who is present. The second is more of a texture, a sense of how varied those presences are.

What we can now conclude is that in a group of 2 or more people, we have diversity. And hence we have to be more precise when we talk about targeting diversity and provide actual axes along which diversity (and the progress towards it) will be tracked. For example, starting in summer 2024 CMS introduced diversity considerations into their conference session proposals and we are still working on the rubric to help organizers assess the diversity. To be clear, I'm not contradicting myself—a group of white, able-bodied, straight, tenured mathematicians from Waterloo is still a diverse group by some metric mentioned above. This is why in the guidelines developed by the EDI committee for CMS sessions, we ask organizers to consider **various** categories, such as:

- career stages,
- educational/racial/ethnic/linguistic backgrounds,
- belonging to equity-seeking and historically underrepresented groups (including women, minorities, francophones, members of the LGBTQ2S+ community, persons with disabilities, etc),
- organizational affiliations,
- types of home institutions (small teaching schools vs large research focused),
- geographic locations.

While it is of course not possible to have diversity along all the axes in a single session, I think we can agree that my edge example from above (a group of white, able-bodied, straight, tenured mathematicians from Waterloo) is certainly lacking.

We established that diversity is a fact. Inclusion, however, is a choice. And this is where reality comes in. You can hire a candidate from a historically underrepresented group (in math department, this is likely some version of female/person of colour/Indigenous/disabled) and then do nothing else—except perhaps congratulate yourself on the “diverse” hire and call it progress. What issues can possibly arise? Well, many. Here is a particularly poignant example that emphasizes that we aren't so far removed from the era of men-only education:

<https://numberlandadventures.blogspot.com/2017/09/are-urinals-in-womens-rooms-sign-of.html> which talks about the presence of urinals in women's washrooms in math departments of many prestigious old universities across North America, an ironic sign of slow and inconsistent progress toward gender equity. While I am here, I highly recommend Alice Silverberg's entire blog, not just the single piece linked above.

Diversity without inclusion is not progress. And inclusion is hard work—you have to explore barriers that are invisible to you but are real for others. This ranges from physical barriers to cultural to anything in between. I am an able-bodied, white woman. I am 5'4", an average height for a Canadian woman, but apparently too short for an average academic because I have been unable to reach the top 20-30% of the blackboards in the majority of the classrooms I have taught in. As a result, I have to plan out my board usage very carefully as I literally have less space to work with than most. I thought I would leave this issue in the past thanks to technology and skeleton slides—only to discover that the podium height on which I rest my tablet is a whole other issue. Details aside, let's be honest—how many of you have thought that something as mundane as furniture height or classroom layout can quietly determine who is comfortable teaching there and who is not? I will give another, even more personal example. I suffer from an episodic condition that causes my blood pressure and heart rate to plummet, rendering me physically unable to move for a couple of hours. Luckily, this only happens 3-4 times a year and I get a strong wave of vertigo first thing in the morning as a warning sign. Unluckily, my in-person teaching responsibilities and a strong sense of professional ethics leave me facing a moral dilemma every time. Do I cancel class at the last minute, inconveniencing students, or do I push through, risking a collapse mid-lecture? If I cancel the class, how will this affect my student evaluations? How will asking for a substitution last minute reflect on my reliability? How will all of this affect my career? I know that many people with chronic or episodic conditions, visible or invisible, navigate similar choices every day. Accessible building entries, moveable boards, universal washroom facilities, flexible teaching schedules and formats, a tenure clock that accounts for life, funding structures that don't penalize career interruptions, recruitment and promotion practices that do not exclude those with non-traditional career paths. inclusion is not about accommodating *one* person's needs—it is about designing systems that work for *many*.

The last letter—the E. I will let the picture do the talking for me here:



Back to data for the last concept I want to mention: *intersectionality*. According to [Statistics Canada](#) and 2022 Census data, men earn higher salaries than women across all categories—age, geographic location, level of education, immigration status, etc. Overall average income of men in 2022 constant dollars was \$17,600 higher than that of women. So men make more than women, we have certainly known that for years. However, women are not one uniform group and the data shows big discrepancies when intersectionality in education, citizenship and basically any two categories is applied. For example, Canadian-born women out-earn women who have immigrated to Canada, but that gap is much smaller for individuals without a university degree. Only recently have we as a society started analysing multi-faceted data across various characteristics to better understand compound barriers and necessary

mitigations. Various practical considerations of intersectionality can be found in the [report](#) from the Canadian Research Institute for the Advancement of Women (where the table below is taken from).

Median Earnings/year						
	Canadian-born population (men)	Canadian-born population (women)	Immigrant population (men)	Immigrant population (women)	Recent Immigrant population (men)	Recent Immigrant population (women)
With a University Degree	\$ 62,566	\$ 44,545	\$ 42,998	\$ 30,633	\$ 30,332	\$ 18,969
Without a University Degree	\$ 40,235	\$ 25,590	\$ 33,814	\$ 22,382	\$ 24,470	\$ 14,233

Source: Statistics Canada, 2006 Census data (for the year 2005)⁹

Now that we understand the terms, let's ask the big question – why EDI? Why should universities (or another organization) strive to attract and retain diverse talent? Why should we expand time and effort to adjust our existing approaches to hiring? Why challenge practices that have “worked” for decades? Why invest in structures that might slow down short-term efficiency? Why make ourselves uncomfortable by questioning habits we didn't even know we had? Why EDI?

Because it's the right thing to do.

This is not a good answer simply because it is not supported by a good solid argument. There isn't a single “right thing” that everyone agrees on; people's values and priorities differ, sometimes wildly; everyone has their own moral compass and most of us will bend or adjust it to convenience or circumstance (let's face it, we have all at some point in life considered a particular speed limit as optional). Ethics are subjective by nature – everyone thinks they're on the right side of history, even tyrants. Morality alone will not move institutions, budgets or egos.

EDI must ultimately be centered in shared human values and the creation of an inclusive community. Our foundation is a human-centered one. But the reality is that institutional decisions are often driven by incentives, finances, competition and resource considerations rather than shared moral frameworks — which are not consistent across individuals. What tools do we have to help motivate action in contexts where moral arguments, while valid, have historically been insufficient to produce change?

So why EDI?

Because it's good for business – whatever your business is. According to Statistics Canada and Census 2022:

- women account for 50.9% of Canada's total population aged 15 and older;
- Indigenous people represent 5.0% of the total Canadian population and Indigenous population is growing at a rate almost double that of the non-Indigenous population;
- the proportion of visible minorities in Canada is 26.5%;
- in 2022, 27% of Canadians aged 15 and over reported having at least one disability.

Excluding any of the above groups (intentionally or not) from opportunities is quite literally limiting yourself *away* from a significant proportion of the population and hence available talent. When half the country doesn't even see your department as a plausible destination, then you cannot claim that you are attracting the best and the brightest. If the pool you draw from remains narrow by design, then the outcomes will remain narrow as well, by design. If you're serious about attracting the best people (student and faculty alike), EDI is a competitive necessity. To be clear – you need all of the E, the D and the I, because it certainly isn't helping your case if the retention of the diverse talent is low, while the word on the street about the dysfunctional culture is spreading.

As a first side note, I do have to mention one ever-present issue. The “pipeline” problem does not start at the age when our students enter the workforce or even the university system. It is widespread through generations and across the whole society. I'm a woman and gendered statistics are easily available, so let me focus on those for a minute to illustrate the point. According to various studies, girls are more likely than boys to self-select out of advanced STEM courses in secondary school and beyond. We of course see the results of this on the other end. For example, according to the University of Waterloo CS studies website, the percentage of women awarded BSc, MSc or PhD in CS studies hovers around 25%. This is supported by the more general data from [Statistics Canada](#): while women constitute just over 60% of recent Bachelor degree holders, they represent only 29.6% of those graduating with degrees in the field of “Mathematics, computer and information sciences” with Quebec and BC showing the highest provincial levels. This of course implies that eventual workforce availability of women candidates is lower, propagating the problem into all STEM and STEM-adjacent industries, which tend to have higher wages than non-STEM fields (see [here](#)).

Most people are familiar with the program pyramid: the four layers consist of the number of students taking courses at the corresponding years/levels. The mathematical “base” is quite heavy because math departments are large service departments, with students in many, if not most, programs having to complete a math requirement. The second layer is lighter, restricted to students in math and various sciences. Third and fourth layers consist largely of math students (majors and minors) with a few adjacent disciplines. While the shape of the pyramid will inevitably be narrower at the top, we would like to strive for a more gentle slope. And let me remind you that over 60% of Bachelor graduates are female, which means we have a captive audience that chooses to explicitly not participate in our programs. You want to increase your numbers – tap into the untapped. You don't even have to go far: for example, according to the same stats, women represent over 60% of the graduates in “Physical and life sciences and technologies” where additional mathematical background could be of interest if they want to enter the fields of bioinformatics, biostatistics, medical imaging and more. The students are already here, and in fact they are already succeeding in adjacent disciplines where mathematical and computational skills are increasingly valuable. The challenge is not an absence of talent or absence of interest, but a failure of inclusion. Are our introductory courses and advising structures welcoming to students with diverse goals? Do our curricula highlight connections to applications and interdisciplinary pathways that resonate with students in adjacent fields? Do we have flexible entry points into the minor or major programs? Can we speak coherently to career-relevant skills and applications?

A second side note is in the failure of connection. What we also face is a misalignment between what we teach, how we frame our fields and how students perceive their place within

them. This, however, is a big topic that I will need motivation to write about – drop me a line if you'd like to hear my thoughts.

In conclusion to my slightly all over the place piece above: EDI is not about quotas and there is no metric that will allow you to check the box on successfully diversifying your program. EDI is a method and a way of thinking. It is a way of questioning our systems with the same curiosity we bring to our research.

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