EDI: What Faculty Need To Know

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Proper language

Equity – Providing people what they need to succeed

Diversity – People who are different

Inclusion – Making sure everyone has the opportunity to participate

Sex – Biological attributes: chromosomes, hormones, reproductive organs. Mostly binary (male/female)

Gender – Socially constructed roles and identities. Fluid and non-binary

Racialization/racialized person – "the process by which societies construct races as real, different and unequal in ways that matter to economic, political and social life" Ontario Human Rights Commission (http://www.ohrc.on.ca)



Unconscious bias: Behavior that is shaped by implicit or unintended biases, stemming from repeated exposure to pervasive cultural stereotypes

People who value their objectivity and fairness are paradoxically particularly likely to fall prey to biases, in part because they are not on guard against subtle bias

YOU are biased.



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Why is gender parity/diversity important?



8 of 10 drugs withdrawn from the US market between 1997 and 2000 posed greater health risks for women than for men.

U.S. General Accounting Office (GAO) (2001) *Drug Safety: Most Drugs Withdrawn in Recent Years Had Greater Health Risks for Women* (Government Publishing Office, Washington, DC).

Companies perform better with increased diversity

McKinsey is one of the world's largest management consulting groups Data from 2015



How diversity correlates with better financial performance

Diverse teams:

- Focus More on Facts
- Process Those Facts More Carefully
- Are More Innovative

SOURCE: McKinsey Diversity Database

Gender diversity is important for team science

699 people in teams of various sizes solve tasks (e.g., visual puzzles, brainstorming, making collective moral judgments, and negotiating over limited resources)

A collective intelligence factor predicts group performance better than the IQ of individual group members.

Key components of this factor include the group members' **social perceptiveness and parity in conversational turn-taking and proportion of females** in the group



Ethnic diversity is important for team science

- 2.5 million research papers published between 1985 and 2008
 - Authors in US only
 - 11 scientific fields, including biomedicine, physics and geosciences
- Authors with English surnames were more likely have co-authors with English surnames than would occur by chance; those with Chinese names were more likely to have co-authors with Chinese names, and so on. The trend held for seven other groups, including Russian and Korean populations.
- Papers with 4 or 5 authors of different ethnicities had 5–10% more citations on average than papers from authors of all the same ethnicity

Freeman, R.B. & Huang, W. *Nature* **513**, 305 (2014)

Ethnic diversity is important for team science

Bubbles emerge when traders err <u>collectively</u> in pricing, causing a persistent misfit between the market price and the true value (also known as "intrinsic" or "fundamental" value) of an asset, such as a stock

"We find that price bubbles are fueled by the ethnic homogeneity of traders. Homogeneity, we suggest, imbues people with false confidence in the judgment of coethnics, discouraging them from scrutinizing behavior."





What are the numbers in Canada?

Program	Year	Location	Grade/Age	Males Average Score	Females Average Score	Statistically Different Yes (Y) No (N)
	2013			499	501	N
PCAP	2010	Canada	Grade 8	496	507	Y
	2007			500	502	N
-		Alberta		545	537	Y
		Ontario	Grade 4	530	525	Ν
TIMES	2011	Quebec		520	512	Y
11M55	2011	Alberta		549	542	Y
		Ontario	Grade 8	522	521	Ν
		Quebec		522	518	Ν
		B.C.		536	538	Ν
		Alberta	6 1 1	545	540	Ν
	2007	Ontario	Grade 4	539	532	Ν
TIMSS	2007	Quebec		518	516	Ν
		Ontario	Grade 8	531	521	Y
		Quebec	Grade 6	511	503	N
	2015			528	527	Ν
	2012			527	524	N
DICA	2009	Canada	15 manualda	531	526	Y
PISA	2006	Canada	15-year-olds	536	532	Ν
	2003			527	516	Y
	2000			529	531	Y

Breakdown of students by STEM field





Attrition rate is higher for women than men in STEM

Figure 2.1 The Canadian Science and Engineering Supply Chain



	% Female													
Level	1992	1999	2007	2014										
Enrolment														
Bachelor's	32.1	37.5	38.6	38.0										
Master's	29.4	38.7	37.5	36.5										
Doctoral	20.9	29.5	30.9 31.8											
Degrees														
Bachelor's	31.6	38.3	40.6	38.7										
Master's	27.4	36.3	36.2	35.9										
Doctoral	20.2	22.9	31.3	31.3										

Source: Statistics Canada

Degrees granted to female students in NSE



Degrees granted to female students in NSE as a percentage of total granted in NSE



Careers for NSE Bachelor Degree Holders (25 – 34 yo)

% Female										
1995	2000	2005	2010	2015						
19.2	20.9	20.7	21.8	23.1						
11.5	12.5	15.9	18.3	n/a						
10.7	13.9	17.2	20.1	23.7						
n/a	n/a	21.1*	n/a	n/a						
	1995 19.2 11.5 10.7 n/a	1995 2000 1995 2000 19.2 20.9 11.5 12.5 10.7 13.9 n/a n/a	% Fema 1995 2000 2005 19.2 20.9 20.7 11.5 12.5 15.9 10.7 13.9 17.2 n/a n/a 21.1*	% Female 1995 2000 2005 2010 19.2 20.9 20.7 21.8 11.5 12.5 15.9 18.3 10.7 13.9 17.2 20.1 n/a n/a 21.1* n/a						

Source: Statistics Canada

n/a: not applicable

*: Industry research percentage is for 2003.

Remember: 40% of Bachelor Degree Holders are female



Women are less likely to be hired as professors

■ Full Professor ■ Associate Professor ■ Assistant Professor ■ Other Rank 60 54.9 50 46.2 40.0 40 38.5 37.7 % Female Faculty 37.1 35.0 34.2 32.1 31.1 30 29.3 28.1 28.3 27.6 26.5 26.9 22.4 20.9 20.2 19.6 19.6 20 18.8 18.9 18.4 17.8 14.6 14.3 13.6 12.5 11.0 10 9.2 7.1 0 Biological & Agriculture & Natural Mathematics & Physical Engineering NSE Total Computer & Biomedical Related Statistics Sciences Resources & Information Science Sciences Sciences Conservation Source: Statistics Canada-University and College Academic Staff Systems (UCASS)

Figure 3.10 Full-time Female Faculty in the NSE as a Percentage of Total NSE Faculty by Discipline and Rank, 2010–2011

Remember: ~40% of PhD Holders in Life and Physical Sciences are female

USask: Chemistry is 11% Biology is 16% Physics and Eng Phys 17%

Women are less likely to publish



Holman *et al.* Plos Biol 2018 https://lukeholman.github.io/genderGap/ Data for all countries – all authors

Women are less likely to publish



Holman *et al.* Plos Biol 2018 https://lukeholman.github.io/genderGap/ Data for Canada – all authors

Racialized students and faculty are underrepresented

Percent of students intending to major in natural sciences who do not graduate with a natural sciences degree (National Science Board 2016):

1.5 % White	
7.0 % Asian	Retention for Indigenous students 1 st to 2 nd year
20 % Latino	at USask is 75% compared to 85% total
40 % Black	http://www.usask.ca/isa/university-reports/

Henry *et al.* (2017) The Equity Myth: Racialization and Indigeneity at Canadian Universities. UBC Press.

5 – 17% of faculty at Canadian Universities are racialized

In 2016, 22.3% of Canadians self-identified as visible minorities

What are the barriers to gender parity/diversity?

Hidden Brain Drain—a private sector task force comprising 43 global companies launched a research project targeting women with degrees in science, engineering, and technology (SET) who have embarked on careers in corporations. Sponsored by Alcoa, Cisco, Johnson & Johnson, Microsoft, and Pfizer. First report in 2008, second in 2014

Over 50% of junior SET employees are female but 32% say they are likely to quit within a year

Reasons were:

- Hostile macho cultures
- Isolation
- Scarcity of effective sponsors
- Difficulty with executive presence

Hewlett, S. A., Buck Luce, C., Servon, L. J., Sherbin, L., Shiller, P., Sosnovich, E., & Sumber, K. (2008). The Athena factor: Reversing the brain drain in science, engineering, and technology. Harvard Business Review.

Bias in STEM exists

127 biology, chemistry, physics profs in USA were given the resume of an undergrad who intends to go to grad school and has recently applied for a laboratory manager position

Asked to rank (i) perceived student competence; (ii) salary offers, which reflect the extent to which a student is valued for these competitive positions; and (iii) the extent to which the student was viewed as deserving of faculty mentoring on a scale of 1-7

1/2 given John, 1/2 given Jennifer (double blind)

Offered \$26508 to Jennifer and \$30238 to John

Faculty members' bias was **independent of their gender**, scientific discipline, age, and tenure status Brendan, Greg, Emily and Anne are more employable than Tamika, Aisha, Rasheed and Tyrone

(Bertrand and Mullainathan, American Economic Review 2004)



Moss-Racusin, et al. PNAS 2012

Bias in STEM – what does it look like?

- Professors ignore requests from members of underrepresented groups at a higher rate than requests from white men (Milkman et al *AmPsychAssoc* 2015; 6500 US professors)
- Women with identical publication records are less likely to be hired than men (van Dijk et al CurrBiol 2014; 25000 unique names in PubMed)
- In two person conversations, men are more likely to interrupt women (Hancock JLanSoc 2015)
- In two person teams, men are considered to be more influential than women (Heilman and Haynes JApplPsych 2015)
- Men collaborate with men (Araujo et al. *PlosOne* 2017)
- Women are invited to speak less than men (Nittrouer et al. *PNAS* 2018; Data from top 50 universities in the US)
 - Committees with female chairs: 49% of colloquium speakers were women
 - Committees with male chairs: 30% of colloquium speakers were women
- Women are perceived as less competent than men as instructors (Rivera and Tilcsik AmSocRev 2019)
- Doctors with foreign accents are perceived as less competent (Baquiran and Nicoladis *Health Commun* 2019)

Effect of small bias

In 1996, researchers ran a computer simulation of a hierarchy that began as evenly split among men and women eligible for promotion across eight levels, with a rate of 15% attrition.

The lowest level has 500 employees and the top only 10.

Men and women were assigned a random performance score, but with men on a scale of 1-101 compared to the scale of 1-100 for women.

After 20 simulations, females comprised only 35% of top positions

...only 35% of level 8 employees would be blue.



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What can we do to improve?

Step 1: Hold yourself accountable

- Take the Implicit Bias test
- Challenge your assumptions
- Justify your decisions
- Be inclusive

Step 2: Hold others accountable

- Create a culture of calling out unconscious bias
- Make others justify decisions
- Make decisions collectively
- Have these conversations

Step 3: Be involved

- Educate yourself
- Be a mentor
- Be an ally
- Listen!
- Advocate for others

EDI in grant applications

DISCOVERY GRANTS MERIT INDICATORS

	The Merit Indicators should be used in conjunction with the Peer Review Manual, which outlines how reviewers arrive at a rating.													
	EXCEPTIONAL	OUTSTANDING	VERY STRONG	STRONG	MODERATE	INSUFFICIENT								
	Past training is at the highest level in terms of the research training environment provided and HQP contributions to research.	Past training is far superior to other applicants in terms of research training environment provided and HQP contributions to research.	Past training is superior to other applicants in terms of the research training environment provided and HQP contributions to research.	Past training compares favourably with other applicants in terms of the research training environment provided and HQP contributions to research.	Past training is modest relative to other applicants in terms of the research training environment provided and HQP contributions to research.	Past training is below an acceptable level in terms of the research training environment provided and HQP contributions to research.								
ersonnel	Most HQP move on to highly impactful positions that require skills gained through the training received.	Most HQP move on to impactful positions that require skills gained through the training received.	HQP generally move on to impactful positions that require skills gained through the training received.	HQP generally move on to positions that require skills gained through the training received.	Some HQP move on to positions that require skills gained through the training received.	HQP rarely move on to positions that require skills gained through the training received.								
ified P	Training philosophy and research training plans are of the highest quality :	Training philosophy and research training plans are far superior:	Training philosophy and research training plans are superior:	Training philosophy and research training plans are:	Training philosophy and research training plans are:	Training philosophy and research training plans are:								
Iby Qual	highly appropriate, clearly defined and expected to produce top quality results in terms of the overall approach and	highly appropriate, clearly defined and expected to produce high quality results in terms of the overall approach and	highly appropriate, clearly defined and expected to produce quality results in terms of the overall	appropriate and clearly defined in terms of the overall approach and specific projects for HQP;	partially appropriate and partially defined in terms of the overall approach and specific projects for	not appropriate and not clearly defined in terms of the overall approach and specific projects for HQP;								
Training of Hig	challenges related to equity, diversity and inclusion specific to the institution and field of research are clearly described; and specific actions to support the recruitment of a diverse group of HQP and an inclusive research training environment are clearly defined .	challenges related to equity, diversity and inclusion specific to the institution and field of research are clearly described ; and specific actions to support the recruitment of a diverse group of HQP and an inclusive research training environment are clearly defined .	approach and specific projects for HQP; challenges related to equity, diversity and inclusion specific to the institution and field of research are described; and specific actions to support the recruitment of a diverse group of HQP and an inclusive research training environment are defined .	described in terms of challenges related to equity, diversity and inclusion specific to the institution and/or field of research; and defined in terms of specific actions to support the recruitment of a diverse group of HQP and/or an inclusive research training environment.	partially described in terms of challenges related to equity, diversity and inclusion specific to the institution and/or field of research; and partially defined in terms of specific actions to support the recruitment of a diverse group of HQP and/or an inclusive research training environment.	inaccurate or not described in terms of challenges related to equity, diversity and inclusion specific to the institution and/or field of research; and not appropriate or not described in terms of specific actions to support the recruitment of a diverse group of HQP and/or an inclusive research training environment.								

http://www.nserc-crsng.gc.ca/_doc/Professors-Professeurs/DG_Merit_Indicators_eng.pdf

Graduate student demographics

University of Alberta Faculty of Graduate Studies and Research Registration Statistics by Gender - Fall Term 2016

	- 1		Do	ctoral		Т	Mast	ters Co	ourse-l	Based	Masters Thesis-Based			Others					Degree							nder	Reg Status				
Unit		Fen	nale	N	/lale	Τ	Fen	nale	M	ale	Fen	nale	M	ale	Fen	nale	M	ale	Doc	toral	Mast	ers CB	Mast	ers TB	Fer	nale	M	ale			C = 1
	1	Full	Part	Full	Par		ll.	Part	Full	Part	Full	Part	Full	Part	ull	Part	Full	Part	Full	Part	Full	Part	Full	Part	Full	Part	Full	Part	Full	Part	Total
Biological Sciences		55	0	4	7	0	0	0	0		58	0	51	0	0	0	0	0	103	0	0	0	109	0	113	0	98	0	212	0	212
Chemistry		53	0	9	5	0	0	0	0		26	0	24	0	0	0	2	0	148	0	0	0	50	0	79	0	121	0	200	0	200
Computing Science		21	0	5	9	0	6	0	12		20	1	72	1	0	0	0	0	80	0	18	6	92	2	47	1	143	7	190	8	198
Earth & Atmospheric Science		38	0	3	8	0	10	1	14		28	0	44	0	0	1	0	0	76	0	24	1	72	0	76	2	96	0	172	2	174
Internetworking		0	0		0	0	15	1	33		0	0	0	0	0	0	0	0	0	0	48	4	0	0	15	1	33	3	48	4	52
Mathematical & Statistical Sci		20	0	5	2	0	3	2	4		12	0	19	0	0	0	0	0	72	0	7	5	32	0	35	2	75	3	111	5	116
Physics		27	0	5	7	1	0	0	0		8	0	46	0	0	0	1	0	84	1	0	0	54	0	35	0	104	1	139	1	140
Science Total		214	0	34	8	1	34	4	63	1	152	1	256	1	0	1	3	0	563	1	97	16	409	2	400	6	670	14	1072	20	1092

BioSci: 54% female Life&Physical Sci: 42% Canada Avg: 42% BioSci: 53% female Life&Physical Sci: 42% Canada avg: 54%

USask 2018-2019: Undergrads are 15% Indigenous Grads are 7.5% Indigenous

https://cloudfront.ualberta.ca/-/media/gradstudies/about/facts-and-figures/graduate-enrolmentreport/2018-2019-fgsr-graduate-annual-report.pdf

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http://www.nserc-crsng.gc.ca/_doc/Professors-Professeurs/DG_Merit_Indicators_eng.pdf

Preventing bias every day

- Use good hiring practices
- Have a code of conduct posted workshop it with your trainees
- Discuss professionalism and EDI with your group (language, music, pictures, etc)
- Once per semester, have lab meeting focused on EDI-related science
- Ensure ideas from underrepresented groups are heard and actively promote them
- Ensure underrepresented groups have the opportunity to participate in teams
- Be inclusive (food, time of activities, type of activity)
- Have flexible work hours
- Promote people from underrepresented groups (invite to speak, suggest for awards)
- Write gender neutral reference letters pay attention to emotional language
 - I will refer to the candidate as M. Saxena and they/them to be gender-neutral
- Give helpful feedback
- Be an ally

EDI in your research

- Measure and report sex differences
- Diversity in animal test groups (age, sex, weight)
- Male/Female cells/cell lines/test animals
- Gendered interpretations of behavior
- Gendered interpretation of data
- Applications of research of technology
- Gender in outreach activities

Questions?

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