Gender Gaps in Norwegian Students: Confidence, Self-efficacy, Motivation, and Participation

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Overview

To assess the extent that gender disparities exist at the undergraduate level in biology students, we analyzed (1) students' academic motivation and confidence, and (2) in-class participation for three large introductory biology courses at the University of Bergen (UiB) in Norway, a country with one of the highest ratings of gender equality in the world[1].

Global Top 10	
The Global Gender Gap Index	Global rank*
Iceland	1
Norway	2
Finland	3
Sweden	4
Ireland	5

Metrics

Motivation: Four subscales of the Motivated Strategies for Learning Questionnaire (MSLQ):[2,3]

➤ self-efficacy ("compared with other students in this class, I expect to do well")
➤ intrinsic value ("I prefer class work that is challenging so I can learn new things")
➤ test anxiety ("I am so nervous during a test that I cannot remember facts I have learned")
➤ self-regulation ("I ask myself questions to make sure I know the material I have been studying")

Confidence: A 13-item Likert-scale instrument that includes statements such as "I am confident I can design an experiment to test an hypothesis."

Participation: Recorded classroom behaviors by perceived gender across different biology courses using a [modified[4]] protocol that characterized different types of in-class participation:

➤ Spontaneous question or comment
➤ Volunteer response

Literature Cited:

1. World Economic Forum, 2015
2. Duncan & McKeachie, 2005
3. Pintrich, Smith, Garcia, & McKeachie, 1991
4. Eddy and Brownell, 2014

Affective Metrics

There is a positive association between self-efficacy, intrinsic value, self-regulation and engagement, and a negative association between self-efficacy and test anxiety. However, the students´ average biology grade was unrelated to all of the study variables.

	1	2	3	4	5	6	7	8
1. Gender	-							
2. Biology grade	.00	-						
3. Confidence	-.246*	.023	-					
4. Self-efficacy	.157	.073	.367**	-				
5. Intrinsic value	.238*	.125	.208	.533**	-			
6. Test-anxiety	.103	-.103	-.313**	-.280*	.058	-		
7. Self-regulation	.262*	.009	-.006	.238*	.353**	.237*	-	
8. Engagement	.020	-.021	.316**	.382**	.679**	.155	.432**	-

Females (n=59) had higher intrinsic value and self-regulation, whereas males (n=23) had higher science confidence.
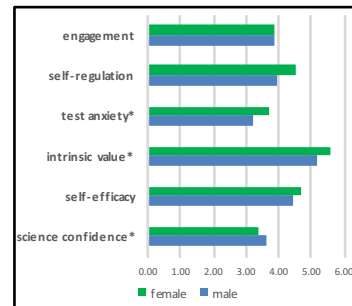

The confidence gap between males and females increases as students move through the curriculum, from 100-level through 300-level courses.
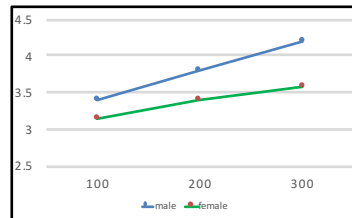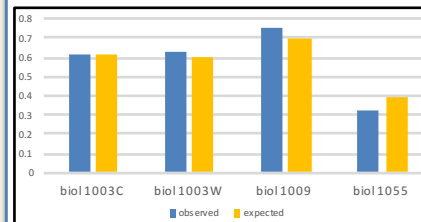

Participation

Female Participation in biology. Contrasts of observed (blue bars) and expected (orange bars) proportions of female participants in whole-classroom discussions in three introductory biology courses: **A)** Biology 100, **B)** Biology 102A, and **C)** Biology 102B. We show data on students' spontaneous comments or questions, volunteer responses, and the total proportion of interactions between a student and instructor that are female. *p<0.05
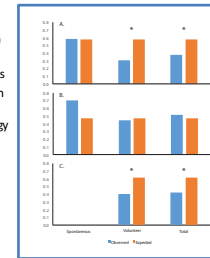
Category	Scored in-class interaction
Spontaneous question or comment	Individual spontaneous comment or question
	Spontaneous call post-Think Pair Share
Volunteer response	Individual volunteer response
	Volunteer response post-Think Pair Share
	Volunteer response post-Think Pair Share and iclicker

Women are underrepresented in class dialogue in two of the three biology classes studied at UiB. These patterns mirror those observed elsewhere,[4] and suggest that equity in this sense is not determined by regional factors, but may instead be a result of microclimatic conditions in the classroom. For example, in active-learning classes at the University of Minnesota, women participate as expected, based on course enrollment (see below).
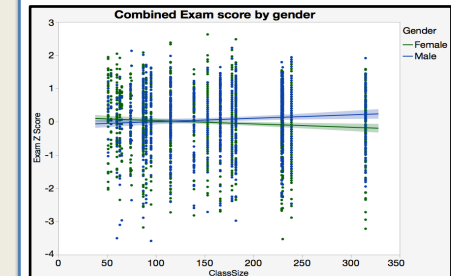

Female Participation in biology (University of Minnesota). Contrasts of observed (blue bars) and expected (orange bars) proportions of female participants in whole-classroom discussions in four introductory biology courses.

Looking Ahead

Can simple in-class techniques increase the participation of women in large, introductory courses at UiB?

➤ Spring 2017: Implement clicker discussions in Bio 101
➤ Fall 2017: Implement assigned, fixed small groups in Bio 100 to complement clicker discussions
➤ Fall 2017: Implement think-pair-share discussion format in comparative politics course

Do we see the same gender differences in performance in Norway as we do in the US (below)?

Men outperform women on exams, especially in larger classes. As class size increases, the gap in exam performance (measured by z-scores, or the individual students' performance relative to the class average) widens.
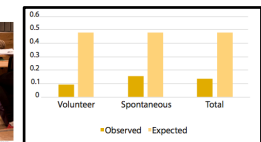
Slightly off-topic...

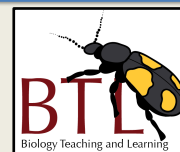≡ STUDVEST
Ja, kvinner deltar faktisk mindre enn menn

Female Participation in Political Science. Contrasts of observed and expected proportions of female participants in whole-classroom discussions in a large comparative politics course. *p<0.05

"Yes, women participate less than men."

Hvor blir det av kvinnene?

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