Teaching the Societal Consequences of Computer Science

New Ideas for Increasing Student Involvement

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Now Faculty
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CS Social Implications

• Computer Science: 50+ years

• Social Implications Topic: 20+ years
Many Approaches

How?
formal framework vs. applied knowledge

Where?
dedicated upper-course vs. throughout the curriculum

Guidelines—ACM Curriculum Knowledge Area: Social Issues and Professional Practice (SP)
Our Course

- Dedicated course
- Taken at the end of the curriculum
- Promoting active-learning
University of Waterloo

Public research university

30,000+ students

~3,000 CS student

80+ faculty
UW Students

The Social Implications course at Waterloo

- is required for Business Administration & Computer Science Double Degree (5 years program)
- is an elective taken by CS students
- has ~50 students/session

Many students have 4 or more internship experience
**FAANG:** Facebook, Apple, Amazon, Netflix and Google

<table>
<thead>
<tr>
<th>Companies</th>
<th>Students</th>
</tr>
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<tbody>
<tr>
<td>Canada Revenue Agency</td>
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<td>Bell Canada</td>
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<tr>
<td>NVIDIA</td>
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<td>Electronic Arts</td>
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<td>SAP</td>
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<td>IBM</td>
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<td>Microsoft</td>
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<tr>
<td>BlackBerry</td>
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</table>

[https://csclub.uwaterloo.ca/~s455wang/vlyubine/companies/](https://csclub.uwaterloo.ca/~s455wang/vlyubine/companies/)
Social Issues/Implications

To be socially responsible computer scientists students need:

1. the desire to make socially responsible choices

2. the ability to anticipate the *societal consequences* of the technical choices they make.
Challenges

• Motivate life-time of critical reading, thinking and discussing

• Bootstrap good habits

• Full engagement in an active learning experience
Observations

Students

• have good ethical intuitions

• lack enough knowledge of society and consequences of technology
2017 Topics

Growth
AI
Automation
Careers
Sexism
Trolling
Fake News
Social Media and Policy
Privacy
Hacking
Politics

Activities

Reading
Discussing
Writing

https://tinyurl.com/y8teth2g

https://tinyurl.com/y8m363jm
Goal 1 — Most upper-year CS students read technical news and current events daily. We want to widen and deepen their reading and strengthen their ability to interpret it.

Note: Unread readings are useless.
**2017 Primary Articles**

<table>
<thead>
<tr>
<th>Primary Article Link</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>Why Growth Will Fall</td>
<td>New York Review of Books</td>
</tr>
<tr>
<td>A.I. Versus M.D.</td>
<td>The New Yorker</td>
</tr>
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<td>Secret Lives of Content Raters</td>
<td>Ars Technica</td>
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<td>The Economics of Luck</td>
<td>Bloomberg</td>
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<td>Reflecting on...</td>
<td>Personal Blog</td>
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<td>Schadenfreude</td>
<td>London Review of Books</td>
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<td>B.S. on Big Data</td>
<td>The New Yorker</td>
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<tr>
<td>Uses and Gratifications</td>
<td>UbiComp paper</td>
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<tr>
<td>They Know</td>
<td>New York Review of Books</td>
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<td>Why hack?</td>
<td>n + 1 mag</td>
</tr>
<tr>
<td>War Goes Viral</td>
<td>The Atlantic</td>
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</table>
Many Types of Reading

Reading Types
- personal blog
- on-line news
- on-line general interest magazine
- on-line tech news
- newspaper
- general interest magazine
- literary magazine
- secondary research
- primary research

# of Readings
Many Sources
Discussing

**Goal 2**—*Students engage in many meetings, at work and at leisure. We want them to increase the quantity and quality of their contributions to these meetings.*

**Two forms**

1. Class discussion: 25 students
2. Role Playing Exercises, RPE
Class Discussion

• Two groups of about 25 students: each meeting once a week.

• Students sit facing each other: seminar layout

• Instructor seeds the discussion, then facilitates

• TA records participation

• Aside time near end for students who haven’t talk
RPE: Role Playing Exercises

6-9 students in 2 or 3 teams

**Goal:** Present/prepare/act to engage 40+ peers

<table>
<thead>
<tr>
<th>RPE</th>
<th>Team A</th>
<th>Team B</th>
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<tbody>
<tr>
<td>Neophiles and Neophobes consensus</td>
<td>Neophiles</td>
<td>Neophobes</td>
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<td>q35huang, astu, j457liu</td>
<td>m2hayash, r24lin, vnly@edu</td>
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<td>Hard Head versus Soft Heart consensus</td>
<td>Hard Heads</td>
<td>Soft Hearts</td>
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<td>j336liu, wjwillem, s2vij</td>
<td>jkw2lo@edu, xj2yu, kevin.cai@edu</td>
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<td>Ambition consensus</td>
<td>Veterans</td>
<td>Challengers</td>
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<td>apbrioux, w23lam, otsylke</td>
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<tr>
<td>Evolution versus Revolution consensus</td>
<td>Evolvers</td>
<td>Revolvers</td>
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<tr>
<td></td>
<td>jonathan.smith@edu, zkchen@edu, amy.li@edu</td>
<td>jzhen@edu, gssuri, mj5murph</td>
</tr>
</tbody>
</table>

https://tinyurl.com/yc3heoxd
Sexism: Students Innovate

witholding

let’s talk

parents
AI: neophiles & neophobes
automation: hard hats & soft hearts
careers
sexism
trolling
sociality & sociability
freedom & security
hacking: war on the internet
We gave few suggestions as to how these goals might be achieved, sphere by giving bonus marks for groups that came in costume. That the teams do joint planning, and encouraged a playful atmosphere for the class and towards participation of the entire class. We suggested 50 students. We thus reframed the RPE away from presentation to the class, and others had a question and answer session with the class.

Our measure of participation (Figure 3) shows gender balance is always important when the classroom is dominated by a single sex, as ours is by men. We broke down the raw participation marks for the small group discussions. The two showings some teams debated with each other ignoring sexism in the programming workplace. The two roles were secondary school girls organized by professors and TAs: parents at a meeting called to discuss the matter. They drilled down in Table 2, for example, describe an ed role-playing exercises (RPEs). In business training, where they originated, an RPE is simple in theory, this procedure easily misinterpreted. Playing a role forces them to do so. Second, leading discussions is as important a practical skill as analyse the perspective of others. Playing a role forces them to do it out.

Thus, although females are usually underrepresented in CS classes, and was unique in doing so. For judging equality of participation, the raw participation marks are a rough proxy for the participation the top third of the class, one third from the middle third and less than one sixth from the bottom third. Participation is more uniform than in lecture-dominated courses, and less uniform than anony.

The following procedure obtains these ends. Each role is assigned to a team of two or three students who did not. On their own the role-players found a role for the topic of the week along with two or more complementary roles that might occur in the situation. (These descriptions are available on the course website, for example, describe an analyst who thought the complaint was justi.

Preparation for the 2017 o

Writing

**Goal 3**—*Students write at work and at leisure. We want them to write more easily, stylishly and persuasively.*

Writing #3: Tweets from the Time Machine

Four writing assignments available online.

https://tinyurl.com/y8b7odg4
Tweets Assignment

Given 16 tweets of a time machine

She has more goodness in her little finger than he has in his whole body.

Jonathan Swift

... 

He who fights and runs away, lives to fight another day.

Oliver Goldsmith

Part 1: Analyze 10 into the parallel structures that comprise them
And those who paint them most trust them most.

It matters not how a person dies, but how they live.
**Tweets Assignment**

**Part 2:** Write 5 tweets expressing course content and using parallel structures.

- He says that he can imagine being in her shoes, but he can’t understand why she has more than one pair.

- Finding wisdom on twitter is like finding a gem in glitter.

- Ten years ago I was told don’t use your real name, don’t share personal pictures, don’t chat with strangers. And we have Facebook, Instagram, Tinder.

- The desire to be entertained brings forth news that does not inform and social media that does not socialize.
New Ideas

• Today's news is what's on our students minds.
• Give the students the opportunity to innovate.
• Students need skills not facts.
Thank you!
Other Institutions

- Liberal Arts colleges
- Double degrees program
- Students of the future