Promoting systems thinking and challenging students to tackle “wicked problems” through an interdisciplinary student case competition

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Who we are

Katelyn Godin,
oncasional tree hugger.

Amanda Raffoul,
Beyoncé superfan.
What makes a problem “wicked”?
Characteristics of wicked problems

• Problems have many causes

• No one solution

• “Fuzziness”

Naaldenber et al. (2009); Murgatroyd (2010)
Obesity systems map

Vandenbroeck, Goossens, & Clemens (2007)
Take-away points

• Systems-thinking is key for examining today’s wicked problems – and solutions

• Systems-thinking can be embedded in education at numerous levels

• Specific classroom assessments and activities can be used to promote students’ use of systems-thinking

• There are numerous challenges and learning benefits of using these classroom strategies
What is “systems-thinking”?

• A lens used to look at the world and the complex challenges within it

• A recognition of the complexity underlying the whole of a system and the interrelationships between each factor

• Rooted in interdisciplinarity

• An effective approach for tackling “wicked problems”

Naaldenberg et al. (2009); Brown et al. (2010)
A shift to systems-thinking

- Need to equip students with 21st century skills
  - Creativity
  - Critical thinking
  - Teamwork
  - Ability to work in interdisciplinary groups
  - Leadership
  - Translate knowledge in a meaningful way
  - Presentation skills

Shlafer et al. (2016); Mobley et al. (2014); Neuhauser et al. (2007)
Systems-thinking in education

• Departmental-level
• Program-level
• Course-level
• Individual assignments & activities
Opportunities P.1

- Inquiry/problem-based learning
  - Real world problem
  - Tangible products that will be used by others
  - Process of offering a solution, testing, revising

Murgatroyd (2010); Mobley et al. (2014); Sharp (2015)
Opportunities P.2

• Guest lecturers

• Creating a system maps/ conceptual framework

• Interdisciplinary journal clubs and book discussions

Murgatroyd (2010); Mobley et al. (2014); Sharp (2015)
Benefits P.1

- Development of high-level cognitive learning outcomes
- Students more apt to make mistakes
- Better comprehension of problems
- Greater student engagement
- Learning the culture and language of other disciplines

Murgatroyd (2010); Hmelo-Silver, Duncan, & Chin (2007); Mobley et al. (2014); Naaldenburgh et al., 2009; Thomas, 2012
Benefits P.2

• Reinforce and connect earlier knowledge
• Students learn from each other
• Challenge pre-conceived notions
• Building tolerance and respect for other disciplines
• Disadvantaged students benefit most

Murgatroyd, 2010; Hmelo-Silver, Duncan, & Chin, 2007; Mobley et al., 2014; Ng et al., 2010; Sharp, 2015; Chanan et al. 2012
Challenges P.1

• Course curricula that examine wicked problems from one disciplinary lens

• Risk aversion

• Limited resources

Murgatroyd (2010); Thurman, Volet, & Bolton (2009); Mobley et al. (2014); Neuhauser et al. (2007)
Challenges P.2

• Communicating across disciplines

• Lack of inter-departmental collaboration

• Individualistic learners

• + it’s tough!

Murgatroyd (2010); Thurman, Volet, & Bolton (2009); Mobley et al. (2014); Neuhauser et al. (2007)
The Perfect Pitch
## Event Timeline

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
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</thead>
<tbody>
<tr>
<td>9:15 – 9:30</td>
<td>Presentation of the case wicked problem</td>
</tr>
<tr>
<td>9:30 – 11:00</td>
<td>Groups prepare their pitch</td>
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</table>
| 11:00 – 12:00| Introduction of panelists  

3 min. pitch, 5 min. questions |

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>12:00 – 12:30</td>
<td>Lunch, tallying of votes</td>
</tr>
<tr>
<td>12:30</td>
<td>Announcement of winners!</td>
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The challenge

Problem
- The Region of Waterloo is concerned that current LRT construction is having an adverse impact on the use of active transportation (AT) in the community, and has allocated $1M to support efforts to improve AT in this year.

Objective
- Develop a creative and effective initiative to promote AT among individuals living in the Region of Waterloo

Pitch
- Create a PowerPoint presentation detailing your pitch. You should outline the following:
  - Description of your initiative, Expected impact, Stakeholders and partners, Timeline, Resources/costs, Limitations and challenges
Participants

20

Teams

6

Disciplines

5
Judges

• (Clockwise) Michelle Pinto, Theron Kramer, Dr. Rhona Hanning, Robin Mazumder

• Judges scored pitches according to:
  – creativity, use of evidence, demonstration of interdisciplinarity, presentation, and viability
Outcomes

• Facilitation and logistics of activity very smooth

• High degree of engagement from students

• Diversity in judging panel allowed for constructive feedback to groups
Challenges

• Recruitment of students outside of health-related fields

• Many groups focused on single, innovative interventions, rather than multi-component approaches

• Preparation of event planning timeline, case study, and promotion materials was time-intensive
  – Materials can be re-used for future events
In Closing


