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Fall 8-29-2024

### Application of the Method Cell Biology

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# Application of the Method

## Cell Biology

In the Fall 2023 semester Mechanisms of Disease Course, the first round of this assignment was implemented and the assignment is below. The syllabus for this course is attached and allows for the Science Policy module in the last 3 weeks of the course for both in class presentations and group work done outside of class. We had a practice assignment that served as a practice for gathering the type of data needed to develop a discussion around the topic and outlining the need. Following that, the student groups were allowed to pick and orphan disease of their choice from <https://rarediseases.info.nih.gov/> . They then gathered the data necessary to develop their discussion and presentation. They were required to cite their sources. Emphasis throughout the full semester allowed for instruction on what serves as a good reliable source. This allowed for discussions around **gathering data**, where to look for it and how to know what sources to trust. The students were then asked to do a presentation over their disease which allowed them to move into **understanding**. They covered the basics of what the disease is, how the disease progresses, who is affected by the disease, and what is the effect of the disease on their life. The next assignment asked them to write a science policy memo. This brings into light a **judgement** that we can address the needs they uncovered in their research such as the need for more funds to support research on rare diseases as there is a lack of treatments for these patients. The groups were then asked to prepare a presentation to debate their topic in class. Each group presented their disease, provided evidence for why their disease should be funded over any other disease presented in class. They needed to provide solid evidence for the need for funding and how many people were affected. The class voted on the winner of the debate resulting in **deciding** which of the diseases should receive funding. We had a discussion about the science policy process and how they can get involved in both small and big ways. We discussed that even if they are a medical doctor or other profession, they can contribute to these policy decisions by helping to write memos or serve in other ways. That their education in biology prepares them for such a task and we discussed whether they should use their talents to support the growth of their field. It led to a rich discussion and brought out many personal conversations as many students had family members with diseases and they had been a witness to injustices in the healthcare system.

While the assignment fit perfectly in the Mechanisms of Disease class, implementing the method in the Sophomore level Cell Biology course will allow all Biology students to be exposed to an activity that challenges them to approach learning biology with an eye towards higher level ideas including science policy. The Cell Biology course typically focuses on memorization and applying what they learn to understand biological processes. However, the course does not allow time for bigger ideas or concepts or much time for reflection. We have a variety of students that attend this class including Biology majors but also Environmental Science, Forensic Science, Exercise and Sport Science and some Engineering students. While a few students will be geared toward medical school and graduate school, a number of them will be pursuing other careers. Also, many will be making decisions during their sophomore year to change their career path. Learning about science policy may introduce them to another field they have not been exposed to previously. The plan is to implement this assignment in the Fall 2024 Cell Biology Course with some adjustments to allow for the students to have more time to work on the assignments throughout the semester, more in class time and more examples.

# Science Policy Proposal and Debate for an Orphan Disease

## Assignment Overview:

In your lab groups, you will research and develop a science policy proposal addressing an orphan disease. This assignment involves creating science policy memo and preparing a 10-minute presentation to advocate for your proposal which will occur on the day scheduled for our final exam. The proposals will be presented, followed by a debate, and the class will collectively choose one proposal for potential funding.

## Structure of the Science Policy Memo:

- Header: Include a memo header indicating the recipient, sender, date, and subject.
- Introduction: Briefly introduce the issue and its importance.
- Background/Problem Statement: Provide context, and background information, and articulate the problem or challenge.
- Policy Recommendations: Offer clear and concise policy recommendations to address the issue. (What is your ask?)
- Rationale: Justify your recommendations with evidence, scientific reasoning, or relevant data. Cite sources
- Implementation Plan: Provide a plan outlining how the proposed policy can be implemented or executed.
- Conclusion: Summarize key points and emphasize the significance of the proposed policy.
- Tailor the memo to your intended audience (policy-makers, stakeholders)
- Frame the recommendations considering the audience's perspective and interest
- Submit a 2-page memo, single-spaced, one-inch margins
- Submit a Model following your 2 page memo, Provide a model (similar to what you provided in the Asthma Assignment)

Pages 2-3: Science Policy Memo

Page 4: Model

Page 5: GEM Summary Page

## Science Policy Memo and Debate Grading Rubric

Criteria	Points
<b>Science Policy Proposal Document</b>	<b>50</b>
- Detailed proposal addressing the orphan disease (Minimum of 2 pages, Max of 3 pages, single spaced, one inch margins)	10
- Rationale for the policy, including scientific evidence and societal impact	10
- Proposed strategies for funding, research, treatment, and patient support	10
- Potential collaborations with stakeholders and governmental bodies	5
- Clarity, organization, and professional tone; Geared towards an audience of policy-makers, stakeholders	5
-Sources: Provide 6 sources in APA format from peer-reviewed journal articles, books and manuscripts, magazines and newspaper articles, websites, and interviews with experts on the topic.	10
<b>10-Minute Presentation</b>	<b>20</b>
- Clear and concise overview of the proposed policy	10
- Engaging Delivery with visual aids (slides, graphs, model)	10
- Demonstration of understanding and depth; highlighted key data and societal impacts	10
<b>Classroom Debate Participation</b>	<b>10</b>
- Active engagement and defense of proposal	10
- Thoughtful responses to counterarguments from other groups	10
<b>Quality of Debate Participation</b>	<b>10</b>
- Contribution to discussion on other proposals	5
- Critical evaluation of other proposals	5
<b>GEM Model Summary Page</b>	<b>10</b>
- Integration of scientific, economic, and moral considerations using the GEM model	10
- Analysis of the Science Policy proposal for evidence of using the GEM model – 1 page summary, single spaced, one inch margins) describing how your group used the GEM model in your proposal development. Address each level: Experiencing, Understanding, Judgement and Moral Self-Transcendence)	10
<b>Total</b>	<b>100</b>

# GEM Method



**Figure 1. Bernard Lonergan (1904-1984).**  
A Canadian philosopher, theologian and economist developed the generalized empirical method (GEM).  
<https://iep.utm.edu/lonergan/>

**Lonergan's GEM (Generalized Empirical Method)** model provides a structured approach to understanding complex problems by integrating three key dimensions: **Empirical:** This dimension focuses on gathering factual data and observations related to the problem at hand. It involves collecting scientific evidence, data analysis, and understanding the observable aspects of the issue.

**Generalized:** Moving beyond the empirical data, this dimension aims to generalize the findings. It involves extrapolating from specific observations to broader principles or theories. Here, the goal is to identify patterns, trends, or general laws that explain the observed phenomena.

**Moral:** This dimension adds an ethical and value-based perspective to problem-solving. It involves considering the ethical implications, values, and moral dimensions associated with the issue. It emphasizes making decisions that align with ethical principles and societal values.

In essence, the GEM model encourages a holistic approach to problem-solving by considering empirical data, generalizing findings to broader concepts, and incorporating moral and ethical considerations. This comprehensive method aids in addressing complex issues by integrating scientific, theoretical, and ethical aspects in the decision-making process. Please visit <https://iep.utm.edu/lonergan/> for more information.

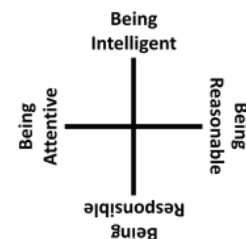
Generalized Empirical Method (GEM) had four facets, and four methodological questions:

- **Cognitional**  
*What do I do when I know?*
- **Epistemological**  
*Why is doing that knowing?*
- **Metaphysical**  
*What do I know when I do it?*
- **Methodological**  
*What therefore should we do?*

The summary of the article on Lonergan at the IEP states:

*“A generalized empirical method in ethics clarifies the subject’s operations regarding values. The effort relies on a personal appropriation of what occurs when making value judgments, on a discovery of innate moral norms, and on a grasp of the meaning of moral objectivity. These innate methods of moral consciousness are expressed in explanatory categories, to be used both for conceptualizing for oneself what occurs regarding value judgments and for expressing to others the actual grounds for one’s value positions.*”

*GEM is based on a gamble that the odds of genuine moral development are best when the players lay these intellectual, moral and affective cards on the table. Concretely, this implies a duty to acknowledge the historicity of one’s moral views as well as a readiness to admit oversights in one’s self-knowledge. Moreover, given the proliferation of moral issues that affect confronting cultures with different histories today, it also implies a duty to meet the stranger in a place where this openness can occur.”*



**Figure 2. The four transcendental imperatives of Bernard Lonergan.** Being Attentive in Experience. Being Intelligent in Understanding. Being Reasonable in Judgment. Being Responsible in Deciding.  
<https://equivalentexchange.blog/2015/12/09/the-four-transcendental-imperatives-of-bernard-lonergan/>

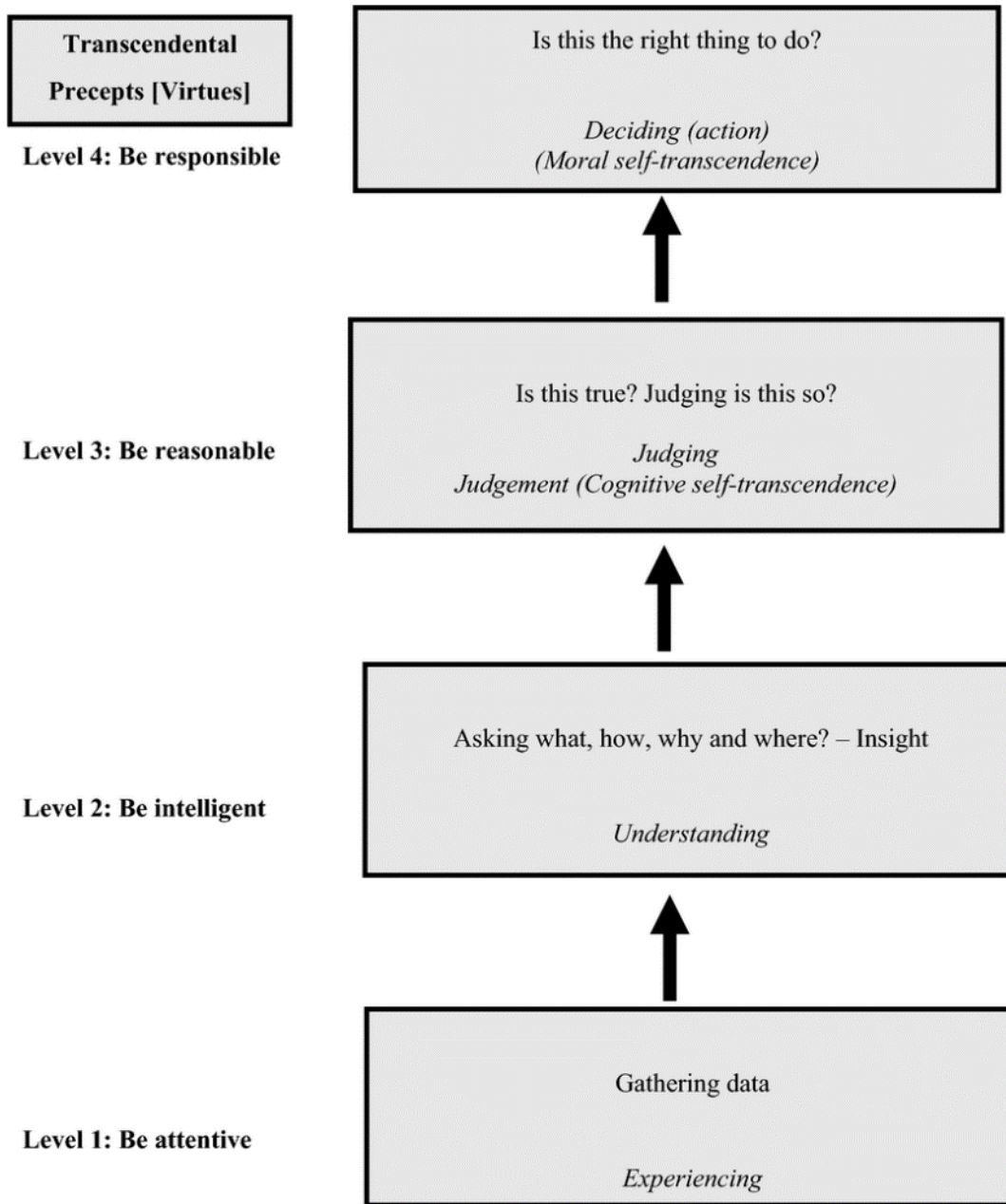


Figure 3. A Lonergan ethical decision-making framework

<i>Level of Transcendence</i>		<i>Retrieving the Past</i>		<i>Moving into the Future</i>
<i>Being Responsible</i>	↑	<b>Dialectic</b>	↓	<b>Foundations</b>
<i>Being Reasonable</i>	↑	<b>History</b>	↓	<b>Doctrines / Policies</b>
<i>Being Intelligent</i>	↑	<b>Interpretation</b>	↓	<b>Systematics / Plans</b>
<i>Being Attentive</i>	↑	<b>Research</b>	↓	<b>Communications / Implementations</b>

Figure 4. The GEM Model proposal for use in practice

## Mechanisms of Disease Fall 2023 Course Syllabus



Mechanisms of  
Disease Syllabus\_FA2:

## Example Student Submission



group4\_16549\_26178 group4\_16549\_26178 group4\_16549\_26179  
36\_Science Policy Pro35\_Science poilicy (2)-05\_Science poilicy.ppt