Numbers In the News

Overview

This lesson introduces students to the role of mathematics and mathematical modeling in real-world contexts. By analyzing news articles, graphics, or reports with quantitative information, students explore how math is used to interpret, explain, and persuade. Working independently or in teams, they will identify key mathematical elements, assess their reliability, and present their findings.

Designed to be flexible and repeatable, this activity can be used once or throughout the semester as a formative assessment to gauge student interests and their connection between mathematics and the real world. Over time, it builds critical thinking, data literacy, and quantitative reasoning, preparing students for more advanced modeling tasks.

Lesson Timeline(s)

This activity can be designed to take as little as 15 minutes or as long as 3 days. Five timelines are listed below and can be adapted to fit your class needs.

- 15 minutes
    - Launch the activity at the end of a class period. Focus on engaging students in the activity (see below)
    - Student deliverable: independent written report.
- 1 day
    - Introduce the activity at the beginning of a class period, engage the students in the activity and provide class time to explore (see below).
    - Student deliverable: independent written report.
- 2 days
    - Introduce the activity at the beginning of a class period, engage the students in the activity and provide class time to explore (see below).
    - Student deliverable: Group written report or individual written report with peer review.
- 2.25 days
    - Introduce the activity at the end of a class period and ask the students to bring a news article to class that highlights quantitative information or modeling, engage the students in the activity as and provide class time to explore (see below).
    - Student deliverable: Group project on second full day or group written report with peer review.
- 3 days
    - Introduce the activity at the beginning of a class period, engage the students in the activity and provide class time to explore.
    - Student deliverable: Group presentations.

Teacher Note on Timing and Modeling Level
The following description of the lesson activity is written with a longer session and students who have had some experience with modeling in mind.
Teacher Note on Timing and Modeling Level will be included within appropriate subsections to highlight which portions may be skipped or adjusted for students new to modeling and/or different time constraints.

Common Core State Standards Addressed

- N-Q.1
- N-Q.2
- S-ID.B
- S-IC.B

Mathematical Practice Standard(s) Emphasized

- MP1
- MP3

Resources/Instructional Materials Needed

- Internet connection to search for articles*
- Student assignment sheet (3 examples provided)
  - [Independent activity for novice modelers](#)
  - [Independent activity for students familiar with math modeling](#)
  - [Group activity for students familiar with math modeling](#)

*If introduced to the activity in an earlier class period, students could be asked to locate and bring to class an appropriate article.

Launch (15 minutes)

Teacher Note on Timing and Modeling Level:

If students are new to modeling, remove question 2 and consider highlighting that students can (and should!) share their opinions about the article. If, for example, students overwhelmingly dislike the topic, share that they will have the opportunity to choose an article they care about soon.

Student Facing Material:

Read this [article about music](#).

1. What math is used?
2. Where is the modeling?
3. Do you agree with the number(s)/model(s) reported (or, in some cases the conclusions the author makes as a result of the reported numbers) in the article? Why or why not?

Teacher Notes:

Students will find their own article/graphic and answer similar questions later. This Launch provides an opportunity for a full class discussion on effectively communicating quantitative findings. Consider using this opportunity to discuss the importance of how articles present their information (tone, graphics, scholarly language, etc.). An example of student work for this article that aligns with the prompts found in the Explore section is here.

The Launch also provides the (time dependent) chance to analyze and compare multiple sources that address a similar quantitative finding or result. You might consider discussing why different sources present information the way they do.

Depending on your students' interests, consider using these additional articles.

Below are links to some articles that address different topics and could be used instead of the music article, based on your students' interests.

- https://www.theguardian.com/world/article/2024/aug/11/global-birthrates-dropping

- Two related articles:

    - https://www.forbes.com/sites/digital-assets/2023/11/10/nfts-are-retaining-value-researchers-say/?sh=65668af52d93

    - https://markets.businessinsider.com/news/currencies/nft-market-crypto-digital-assets-investors-messari-mainnet-currency-tokens-2023-9

Potential Student Responses:

Answers will vary, some examples are:

1. statistics, data collection, linear functions, rate of change
2. in the prediction, accounting for people using the internet, etc.
3. I agree because the answers are consistent with the data presented. I agree because the mathematics seems reasonable. I disagree because I compared the projected amounts with actual numbers since we can verify all the information now because of the age of this article. I agree because I can determine that the exact numbers used are not accurate but the general trend is fairly accurate. I disagree because the information is being presented by someone who wants to demonstrate a specific outcome.
    a. Alternative (more recent) report (see page 6) https://ifpi-website-cms.s3.eu-west-2.amazonaws.com/IFPI_GMR_2024_State_of_the_Industry_db92a1c9c1.pdf

Explore (30 – 100 minutes)

Teacher Note and Modeling Level:

The Student Facing Material below is a version of the student assignment sheet listed as *Group activity for students familiar with math modeling*. As such, it is appropriate to share this material with students who have some experience with math modeling and in a class setting that can support student presentations. Two alternative student assignment sheets are shared earlier (in subsection "Resources/Instructional Materials Needed"). Notably, two of the documents are focused on students working independently to complete this assignment. In both cases, you might consider the independent version (typically with a written response to the prompts) to be a lower "cost" classroom opportunity in terms of time allocation and an opportunity for students to share their personal interests. For example, you can "Launch" the activity at the end of class, share the appropriate assignment sheet with a due date appropriate to your classroom expectations. This model can also be extended by promoting a sharing opportunity after the due date. However, in order to avoid situations in which students might be sharing sensitive information, it is strongly recommended that you announce if the assignment will be private (between the student and teacher) or may be shared more broadly with other members of the class.

Student Facing Material:

Numbers, statistics, metrics. Much of the world's decision making is based on quantitative results; many of which are the output of some (frequently not-shared) math model. As a result – and although it's not often noted – *math modeling* is regularly in the news. To complete this assignment, find an article. Then, work with your group to identify one news article from those you identified individually that you would like to share with the class and prepare a brief presentation for our next class period, no more than 3 minutes & 3 slides long, addressing the following questions:

0. **Which article?** Title of the article, where you found it (e.g., list URL and news source).
1. **What happened?**
   Summarize the article in terms of the math and/or number(s) used in the article.
2. **Where's the math?**
   Describe how math (or numbers) is important to the article. You may consider sharing (or, if not immediately apparent, hypothesizing) how the writers of the article arrived at the number(s) they reported. Ideally, you will include a graphic and summarize how the information in the graphic(s) is significant.
3. **Where's the modeling?**
   (Can be combined with #2, above) Describe the math modeling that you believe was utilized to obtain the graphic(s) and or result(s) presented in the article. Most notably (if you haven't already addressed) what is the *question* that the author(s) are addressing?

4. **What do you (plural) think?**
Provide your perspective and opinion on the article. You may consider responding to one (or more) of the following questions:
   - Do you believe the reported result? Why or why not? Did any other new services report on this same item? (If so, were their conclusions similar?)
   - Why does the article matter to *you* (i.e., your group)? More generally, why should *anyone* care about this?
   - Could the number(s) or mathematical method(s) in the article be used to examine other real-world problems or situations? If so, share a few thoughts.

Teacher Notes:

The first thing a student needs is an article (or graphic or report). Students might initially find it difficult to find resources, typing "numbers in the news" into Google or "Show me some articles that have math in them" into ChatGPT don't typically provide the desired response. Appropriate articles (or graphics or reports) can be found in many, many online locations, but some highlight "numbers" more prominently. Here are a few I share with students who are having difficulty with their search:

- www.ourworldindata.org (listed first for a reason ☺)

- www.apnews.com (notably, apnews.com/hub/one-notable-number/)

- www.natesilver.net (some items behind a paywall)

- www.gallup.com

- www.reuters.com

- www.theguardian.com

Make sure every student has an article before they begin working in groups. It may be beneficial to have a few articles already pulled for students who did not complete the preparation or provide a few moments at the start of class for students to prepare to meet with their groups.

Allow students an entire class period to work with their group to identify which article they plan to present on and to create their presentation. Walk around and ask probing and advancing questions. This is also an opportunity to confirm the context of the article is appropriate for a whole-class presentation.

Assessment criteria (essentially a rubric) is included with each student assignment sheet and based on your classroom practices; you might not have shared it with your students yet. If you haven't already done so, share the rubric that will be used to assess student's presentations. Take time in a whole class discussion to review it, if needed. You might also consider sharing the assessment criteria with students as a separate document (or a Google Form) for students to use in order to provide feedback to other teams when they present.

Things to note around grading that may be beneficial to share with students:
- Are all team members identified in the presentation?
- Did you provide the title and cite your source(s)?
- Can the summary be understood by someone not in your group?
- Have you discussed the quantitative feature(s) of your article?
- Have you highlighted (potential) modeling in the article?
- Have you shared *your unique opinion* of the article?
- (Overall) Is the presentation well organized? (e.g., clean transitions, on topic, everyone in your group participated, etc.)

Students will work in teams throughout this module. They will also present their findings in varied ways, with increasingly challenging expectations. This activity is a low stakes opportunity for students to work in a team and present their findings. As such, praise teams after each presentation, noting something specifically well done. Ask a variety of questions after each presentation to press students' thinking and encourage them to include more detailed and comprehensive analysis.

You might also spend some time asking students: Who is the intended audience for the article you chose? Or, if appropriate, how would you use these results to make a decision?

Synthesis (5 – 10 minutes)

Teacher Note on Timing and Modeling Level:

This short full class discussion is especially valuable for students who are engaging with this activity for the first time or are new to modeling. It is recommended to introduce this prompt if students have had access to multiple articles.

Student Facing Material:

For novice modelers: Numbers and data are shared with us constantly. What approach (or approaches) have you noticed are used to find the reported values?

For students familiar with modeling: Math Modeling is all around us. What are some aspects that indicate a math model?

Teacher Notes:

For novice modelers: Use this prompt as an opportunity to introduce math modeling. Encourage discussion based on the topics students shared and relate the student responses to characteristics of modeling.

For students familiar with modeling: Spend some time as a whole class discussing how students identified their articles for this activity. How did they know there was math modeling?

For any student group, following a few minutes of discussion, you might consider displaying a diagram of the math modeling process (e.g., GAIMME report, page 13) to highlight how the activity they just engaged in connects with the math modeling process.

Reflect (5 −10 minutes)

Teacher Note on Timing and Modeling Level:

This activity is valuable with all groups. If timing is an issue, you might consider introducing it a few class periods after the submission of reports / group presentations.
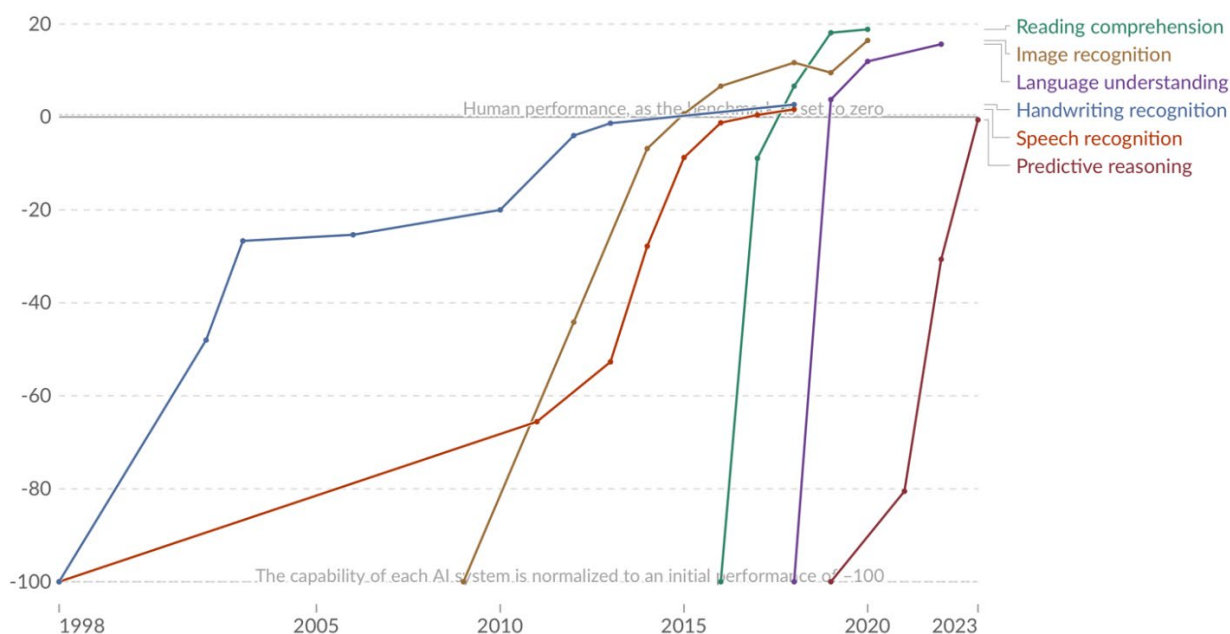
Student Facing Material:

Summarize the graphic below. What information would you like to better understand the graphic?

Test scores of AI systems on various capabilities relative to human performance

Our World in Data

Within each domain, the initial performance of the AI is set to −100. Human performance is used as a baseline, set to zero. When the AI's performance crosses the zero line, it scored more points than humans.

Data source: Kiela et al. (2023)   OurWorldinData.org/artificial-intelligence | CC BY

Note: For each capability, the first year always shows a baseline of −100, even if better performance was recorded later that year.

Teacher Notes:

Students will continue to develop their understanding of mathematical modeling throughout this module. Look for students to demonstrate some ability to analyze information and to critically think about the mathematics that was used.

Potential Student Response:

Answers will vary.

Three different examples:

- Wow! AI is smarter than all of us!
- I didn't know AI was around in the last century.
- AI performance in particular areas is increasing much faster than in others.

In all cases, ask them what aspect of the graph led to their statement (or exclamation in at least one instance ☺) I may want to know more about the statement "increasing much faster…"

Extension

Teacher Notes:

Consider running this activity multiple times throughout the semester.

Reflections on Practice

Even though I grade this activity, often using the provided assessment criteria, I view *Numbers in the News* as an essential component of a formative assessment approach in a math classroom. Given the opportunity (typically dependent on the availability of time) I strongly recommend running this activity multiple times to provide students the chance to experience math in a more personal and interactive way by writing about math, speaking about math, and evaluating how others – including peers – communicate mathematical ideas.

Key Observations from Facilitating This Lesson:

- **Developing Communication Skills:** This activity often introduces students to new ways of expressing quantitative ideas (e.g., creative visuals), helping them reconsider (or consider for the first time) how others (or they!) communicate mathematical concepts.
- **Expanding Students' Perception of Math:** For some, this activity challenges their preconceived notions of what math is—especially because, at first glance, it may not appear to involve any math at all. The accessibility of the task makes it relevant to all students, regardless of their prior experiences with math.

- **Group Work** (when applicable)**:** When completed in groups, students gain experience in collaborative decision-making, requiring them to negotiate and discuss their choices with teammates.
- **Fostering Math Identity** (especially when working independently): While I firmly believe mathematical modeling thrives in a group setting, I have also seen the value of this project for students who may not typically share their thoughts in full class discussions. A number of students have revealed personal details of their lives through their choice of article or their commentary on their selection. Several students, particularly those in classes with a more traditional math curriculum, have noted that this assignment gave them a new perspective on how math connects to their life.
- **Laying the Foundation for Mathematical Modeling:** While this activity may not engage students directly in mathematical modeling, it helps build the skills necessary for future modeling tasks. In several cases, students have used this experience as a springboard to investigate mathematical models they encountered during their research or to develop new models to explore situations they discovered through the activity.