



CRITICAL THINKING

Logical argument
formulation

Logical argument formulation



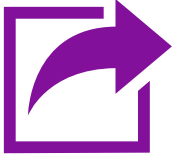
Strategies to share with students

Suggested ideas and practices educators can share with students to support awareness of the topic and development of the skill. Strategies can be adopted/adapted as needed.

- Focus arguments on the presentation of objective facts.** Think about what you truly know and can prove. Support a given argument with facts.
- Review your arguments for the presence of subjective bias, assumptions, or fallacies** that will invalidate your argument and weaken your attempts to influence.
- Have a partner peer review your work** to ensure your arguments are sound and unbiased.
- Review the following fallacies** and ensure that your arguments do not include any listed below. The list is comprehensive, which will help you learn more in depth about logical argument formulation.
 - Strawman Fallacy: You misrepresent someone else's argument to make it easier to attack.
 - False Cause Fallacy: You falsely assume that a relationship between two variables means one causes the other.
 - Appeal to Emotion Fallacy: Your argument is crafted to elicit an emotional response rather than relying on facts or compelling information.
 - Fallacy Fallacy: You presume that because an argument has been poorly made, that the conclusion or claim is wrong.
 - Slippery Slope Fallacy: Your argument relies on the premise that if one thing occurs, another thing is eventually going to happen as well, often lacking evidence and including unreasonable hypotheticals.



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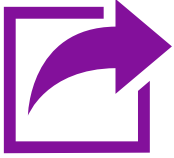


Review the following fallacies and ensure that your arguments do not include any listed below. The list is comprehensive, which will help you learn more in depth about logical argument formulation.

- Tu Quoque Fallacy: You avoid having to defend your argument or respond to criticism by attacking your opponent with a similar criticism.
- Personal Incredulity Fallacy: You avoid having to respond to an argument that you were unaware of or that is difficult to understand by claiming that it's untrue because you were unaware of it.
- Special Pleading Fallacy: You respond to evidence that your claim or argument is false by creating special circumstances or exceptions to explain the finding.
- Loaded Question Fallacy: You include a presumption in your question that makes it difficult to answer without appearing guilty of something.
- Burden of Proof Fallacy: You make a claim and reinforce the claim by declaring that it is your opponent's responsibility to prove that it isn't true.
- Ambiguity Fallacy: You use ambiguous or imprecise language for the purpose of misleading others.
- Gamblers Fallacy: You attribute a change in the likelihood of an event to recent outcomes, as opposed to focusing on the mathematical probabilities. For example, a coin flip is still a 50/50 proposition (heads vs. tails) even if heads has turned up 8 times in a row.
- Ad Hominem Fallacy: Your argument relies on attacking the qualities or character of an opponent, rather than attacking their argument.



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- Bandwagon Fallacy: You validate your claim by using popularity of the claim as evidence.
- Appeal to Authority Fallacy: You validate your claim by referencing authority figures who also believe your claim to be true.
- No True Scotsman Fallacy: You argue that no one “true” to their peer group, nationality, religion, ancestry, discipline, etc. could believe other than your claim.
- Genetic Fallacy: Your claim, good or bad, is based on the origins of something as opposed to its actual merits.
- Black-or-White Fallacy: Your claim or argument presents only two possibilities when multiple possibilities exist.
- Begging-the-question Fallacy: You present a circular argument in which the conclusion was presented in the premise.
- Anecdotal Fallacy: You leverage an isolated example to validate your claim as opposed to stronger more empirical evidence
- Middle Ground Fallacy: You claim that a compromise position, between two extremes, must be true.



Logical argument formulation



Tips for course design and delivery

Ways educators can bring awareness of the topic and incorporate development of the skill into post-secondary course design and delivery.

- ✓ **Take the time to point out and explain logical fallacies** when you notice students making weak or untrue arguments in discussions and forums.
- ✓ **When assigning controversial topics in forums, explain the link between logical argumentation and ethical argumentation**, and require students to check their comments for logical fallacies before sharing them. Provide a checklist.
- ✓ **Formalize fallacy-checking as a step within the essay writing process.**
- ✓ **Embed logical argumentation into your assessment rubrics.**
- ✓ **Point students to logic exercises, brain teasers, puzzles and apps to improve their logical thinking.**
- ✓ **Reassure students that logical mistakes are common.** When brought to our attention, they represent invaluable opportunities for intellectual and emotional growth. Remind them that logical argumentation can improve dramatically with practice.



Logical argument formulation



Activities to do with students

Downloadable activities with suggested guidelines that educators can do with students. Activities can be adopted/adapted as needed.

Activity: Brain Teasers and Applications

Overview

In this activity, students try to solve brain teasers and identify logical fallacies that contributed to 'wrong' answers. Students also identify how they arrived at the right answer. Students analyze their thought processes and reflect on how they may be extending these thinking patterns in real-world situations.

Review the [Educator Activity Guide](#) before getting started with this activity.

Time

- Under 20 minutes
- 20 minutes to 1 hour
- More than 1 hour
- Over several classes

Modality

- In person
- Online synchronous
- Online asynchronous

Format

- Individual
- In pairs
- Small groups
- Large groups
- Whole class

Resources

- Module notes
- Paper
- Pen/pencil
- Laptop/tablet



Logical argument formulation

Instructions

1. Find brain teasers for your students, have students select their own, or have groups of students exchange brain teasers with each other. A quick online search will yield several examples of brain teasers.
2. Have the class form small groups.
3. Provide groups with a brain teaser. Remind them that when thinking about a brain teaser, 'wrong' answers are likely guessed before the correct answer is guessed.
4. Ask groups to analyze their thought process after answering a brain teaser successfully or after learning the correct answer. They can tap into their thoughts by identifying and writing down the fallacy behind the wrong answers as well as the logical thought formation that eventually brought them to the right answer.
5. Next, invite students to reflect on everyday examples of both the fallacies and the logical thinking in real-world situations. Here, they can transfer the fallacy and logic from the brain teaser to their lives and experiences, making logical thinking more relevant to them.
6. Engage the class in a discussion where students share their reflections.
7. *Optional:* Encourage students to think about how they will monitor their own thinking to ensure they are on logical paths and not on ones informed by a faulty process.

Variation(s)

- Extend reflection by asking students to seek instances of flawed thinking in the course content/readings or in examples from their research. Students should try to identify the names of the fallacies representing these flaws in thought.



Logical argument formulation



Activities to do with students

Downloadable activities with suggested guidelines that educators can do with students. Activities can be adopted/adapted as needed.

Activity: Logical Fallacies

Overview

In this activity, students use a reference page to identify different types of fallacies, consider the examples provided, and create their own examples of fallacies. Students can also reflect on where they've encountered various fallacies and how they can avoid fallacies.

Review the [Educator Activity Guide](#) before getting started with this activity.

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- Under 20 minutes
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Format

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Resources

- Module notes
- Paper
- Pen/pencil
- Laptop/tablet
- [Logical Argument Formulation Strategies PDF](#)



Logical argument formulation

Instructions

1. Present and discuss the examples below of logical fallacies and matching statements to the class.
2. Logical Fallacies:
 - Appeal to fear: You should stock up on groceries because more delays could happen and cause stores to miss their shipments.
 - Personal attack, ad hominem: I wouldn't be taking advice from someone younger than me.
 - False Dilemma: If I stay home to catch up on my assignments, it'll be a boring evening. If I join my friends to go see a movie, I'll just fall behind.
 - False analogy: I could be doing better in math, but my psychology mark will be really high.
 - Slippery Slope: If we allow ourselves to ban one book, we will live in a world that eventually bans all books.
 - Appeal to authority: I'll choose the same topic our professor published several papers on.
 - Hasty Generalizations: It's only the first day and I can tell I won't like this class.
3. Assess knowledge of logic/logical fallacies by asking students to explain/define them in their own words.
4. Ensure that the class understands logical fallacies as flaws in thinking. Tell them that logical fallacies can be especially problematic when they find their way into academic writing, as they then threaten the stability of the entire argument or thesis. Tell the class that they should practice identifying and eliminating logical fallacies.
5. Have students form small groups.
6. Provide them with the [Logical Argument Formulation Strategies PDF](#), which includes of several fallacies.
7. Ask students to follow the examples by creating real-world statements for 10 different fallacies from their list.
8. Return to the whole class setting and ask groups to share their examples. Emphasize the importance of being well-versed in logic by encouraging students to challenge fallacies in their thinking and writing each day.



Logical argument formulation

Variation(s)

- Students can reflect individually on times they have used or heard logical fallacies being used.



Logical argument formulation



Activities to do with students

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Activity: Logical Argument Statements

Overview

In this interactive activity, students explore fallacies in the context of their discipline or the course subject area. They can use the assessing logical and factual validity tool to formulate true and false statements to extend logical thinking and support their knowledge of logical thought formation.

Review the [Educator Activity Guide](#) before getting started with this activity.

Time

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- 20 minutes to 1 hour
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Format

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- Small groups
- Large groups
- Whole class

Modality

- In person
- Online synchronous
- Online asynchronous

Resources

- Module notes
- Paper
- Pen/pencil
- Laptop/tablet
- [Presentation](#)



Logical argument formulation

Instructions

1. Frame this activity as a look into logical thinking. Share the [presentation](#) with students and engage the class in a discussion about why it is important for people to check their thinking across all areas of their lives.
2. Form/have students form groups.
3. Inform groups that they will be formulating a statement with respect to their discipline or the course subject that is either True or False.
4. Collect the statements (with corresponding answers and reasoning) from the groups.
5. Share the statements with the class and have students answer them accordingly.
6. Encourage students to reflect on their learning after answering the statements.

Variation(s)

- Ask students to create a slide with their logical fallacy and then present them to the class and engage their peers in a discussion.

