Course Learning Outcomes for Unit II

Upon completion of this unit, students should be able to:

3. Formulate questions that result in critical thinking.
6. Evaluate decision-making patterns that result in problem solving.

Reading Assignment

Chapter 2:
The First Four Stages of Development: At What Level of Thinking Would You Place Yourself?

Chapter 3:
Self-Understanding

In order for the links below to function properly, you must first log into the myCSU Student Portal and access the Opposing Viewpoints in Context database within the CSU Online Library.

You may also access the resource by visiting the Opposing Viewpoints in Context database and performing a search for the title and/or author.


Unit Lesson

Critical thinking involves the analysis of arguments. However, in logic and critical thinking, an argument is not what it is considered in many other contexts. Most people think that an argument is a heated exchange between two people who are having a fight or disagreement. This is not the proper technical definition of an argument. In order to understand how you can define an argument in this course, it is important to understand what a proposition is. A proposition is a declarative sentence that is either true or false. Propositions are also called statements. In the context of this course, if you hear the word “proposition,” you should think of this as a true or false sentence. If you hear the word “statement,” you should think of the exact same thing, a true or false sentence. An argument is made of propositions. A student might be thinking, “So a proposition is anything that can be said?” However, upon further reflection you will find that not all sentences are propositions. For example, a lie is not a proposition. In order for a sentence to be a proposition, it must have the attribute that it can be true or false. However, a lie is always false. Therefore, it is not a proposition. Questions are also not propositions. If your teacher were to ask, “What is the temperature outside right now?” that question could not be considered a true or false sentence. A final example of sentences that are not propositions are expressions of desires. If you hear another say, “I am hungry,” you will take the other at his or her word as expressing a subjective preference or state of being. You would not argue with the person that he or she was not hungry or not trust the person under normal circumstances.

So now that you have a working understanding of propositions, you can move forward to a definition of an argument. In critical thinking, you should think of an argument as a list of propositions (called the premises)
that are given in support of another proposition (called the conclusion). An argument is not a shouting-match. Instead, it is the presentation of true or false sentences in the hope that these sentences will support the position that you are taking on an issue. An issue is the debated question that lies at the foundation of your argumentation. People create arguments in relation to issues, and then present them to one another.

There are two types of arguments that we will examine in this course. First, there are deductive arguments. A deductive argument is an argument that attempts to prove its conclusion. There are a couple components of good deductive arguments. First, in order for a deductive argument to prove its conclusion, it must be valid. The validity of a deductive argument is based on the form of the argument; it has nothing to do with the truth of the claims in the argument. When people are talking in everyday language, they often say things like, “that was a valid point.” When used in this sense, the term “valid” means true. However, in critical thinking, the term valid refers to the structure of a deductive argument. A deductive argument is valid if, given that the premises of the argument are true, its conclusion must be true. Another way of defining a valid argument is a deductive argument in which it is impossible for the premises to be true and the conclusion false. In valid arguments, when the premises are true, the conclusion must be true (of necessity). Let’s look at an example:

If an animal is a dog, then the animal is a mammal.
Labradors are dogs. (The line underneath this premise means “Therefore.”)
Labradors are mammals.

If one symbolizes this argument using letters, it would look like this:

\[
\text{If } p, \text{ then } q. \\
\text{p.} \\
\text{q.}
\]

This argument is valid. What that means is that if the premises are true (which they are in this case), then the conclusion must be true. Here is where things get tricky. Here is another example:

If an animal is a dog, then the animal is a reptile.
Labradors are dogs.
Labradors are reptiles.

Here we might think that this argument is “invalid.” However, logically, this argument is still valid because it has the same form as the previous argument. This argument form is always valid, and this argument form is called modus ponens. No matter the truth value of the argument, the argument form is always valid. In logic and critical thinking we use the terms “sound” and “unsound” to talk about the truth values of a deductive argument. If a deductive argument is valid and has true premises, then it is sound. If a deductive argument does not have true premises or it is invalid, then it is called an “unsound argument.” Let’s look at another example:

All dogs are mammals,  
All Labradors are mammals.  
All Labradors are dogs.

At first glance, you might think that this argument is valid and sound. The premises are true, which means if the argument is valid, then the argument is sound. However, this argument form is not valid. Let’s use different classes with the same form in order to show that this argument is invalid:

All men are humans.  
All women are humans.  
All men are women.

In this argument, the premises are true. However, the conclusion is false. Remember that if an argument can have true premises and a false conclusion, then the argument is invalid. The definition of a valid argument is one in which true premises guarantee the truth of the conclusion. In this case we have the exact opposite. Therefore, this argument is unsound. So, when an argument has a form in which true premises guarantee a true conclusion, it is called valid. If this same argument has true premises then it is a sound argument. If a valid argument has a false premise or premises, then the argument is unsound. If an argument has an invalid structure, then it is unsound, even if its premises are true.
In addition to deductive arguments, there are also arguments called *inductive arguments*. Remember that deductive arguments attempt to prove their conclusions. Inductive arguments are arguments in which you support your conclusion. The terms *valid* and *invalid* do not apply to inductive arguments. The terms you use to talk about inductive arguments are *strong* and *weak*. An inductive argument is strong when the argument’s premises support the conclusion well. An inductive argument is weak when the premises of the argument do not support the conclusion well. Let’s look at some examples. What if someone were to present the following argument?

“In a recent poll of 100 college students, 51% of them claimed that they were satisfied with their educational experience. Therefore, a majority of these college students are satisfied with their overall educational experience.”

To make such a generalization based on this study would be hasty to say the least. First, such a small sample of students would not be representative of the thousands of college students. In addition, you do not know the randomness of the sample. If all 100 students were taken from a pool of students with GPAs above 3.0, then this sample would skew the results of the study. Finally, 51% of students are technically a majority, but you would not want to extrapolate to an entire student body based on such a statistic. This would be a pretty weak inductive argument. Notice that this argument does not prove its conclusion. Instead, it uses statistics to support its conclusion. This is what makes it an inductive argument. Now let’s look at another example.

“In a recent poll of 2,000 college students, 83% of students claimed that they were satisfied with their educational experience. The poll surveyed students from all age categories, socioeconomic backgrounds, ethnic backgrounds, GPA groupings, and familial situations. Therefore, a high majority of these college students are satisfied with their educational experiences.”

It is obvious that this argument is much stronger than the previous example. First, the survey pool is much larger than in the previous example. Second, the percentage of students responding positively is also much higher. Finally, you also find out that the survey pool is representative of various groups of students that probably have different views on their educational experiences. The argument would become stronger and stronger if any of these factors were increased. This argument might appear valid. Here is another argument that shows the invalidity of this form.

If something is a dog, then it is a mammal.
*This cat in the room is a mammal.*
*This cat is a dog.*

This argument shows more clearly the mistake in reasoning.

*Denying the Antecedent*
If p, then q. If it rains, then the picnic will be cancelled.
*Not p. It did not rain.*
*Not q. The picnic was not cancelled.*

Again this argument seems valid. However, let’s try a different example:

If something is a dog, then it is a mammal.
*This cat is not a dog.*
*This cat is not a mammal.*

You can see that in both of the invalid forms, the arguments have true premises and a false conclusion. If an argument is valid, then true premises means that the conclusion must be true. Therefore, these two forms are invalid. They mimic the valid forms of *modus ponens* and *modus tollens*. However, their slight structural differences make them invalid while those other forms are valid.
Suggested Reading

To help better hone your basic concepts in logic and argumentation, please check out the video playlist, consisting of 12 videos, by Kevin deLaplante.


Learning Activities (Non-Graded)

After reading the articles in the required reading, use some of the skills that you have learned in the class readings. What intellectual traits are demonstrated by the authors? Which article best applies Paul and Elder’s intellectual standards?

To gain further knowledge of the material, including key terms, please view this HTML presentation. This will summarize and reinforce the information from these chapters in your textbook.

Click here to access the lesson presentation for Unit II.

Non-Graded Learning Activities are provided to aid students in their course of study. You do not have to submit them. If you have questions contact your instructor for further guidance and information.