

PART III: Theatre & Mathematics

AGE RANGE: 16-18



TOOL 31: APPROACHING MATH LOGIC THROUGH “THE LESSON” OF E. IONESCO

C.I.P. Citizens In Power



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Educator's Guide

Title: Approaching The Mathematical Logic through 'The lesson' of Eugene Ionesco (school play)

Age Range: 16-18 years old

Duration: 1.5-2 hours

Mathematical Concepts: The mathematical logic: mathematical truth, mathematical implication, mathematical equivalence

Artistic Concepts: Drama/play.

General Objectives: Students will familiarize with the mathematical concepts mentioned above through an important play by one of the most known intellectuals of the 20th century in Romania and worldwide.

Instructions and Methodologies: After discussing these mathematical concepts through the school syllabus, this activity can enhance the establishment of basic terminologies through two suggested tasks, a simple fragment of a play with mathematical content as well as through a mathematical exercise.

Resources: This tool provides pictures and videos of the whole theatrical play 'The lesson' played by students of their age range in Bulgaria. It also includes lively examples of the terminologies, references and some extra material.

Tips for the educator: Learning by acting has proven to be very efficient, especially with young learners with lower attention span and learning difficulties. It is also a desirable way to construct a positive attitude towards mathematics. When used correctly it can enhance the receptive ability of students, the development of the collectivity in learning and increase the participation of the whole class. It is accepted as an experiential communication approach

Desirable Outcomes and Competences: Students will learn to unlock, improve their memorization during rehearsal and learn basic mathematical terms (related with the field of mathematical logic).

Debriefing and Evaluation Questions:

As part of reflection and/or formative assessment (=in order to improve the tool for the next time according to the students' background, interest, exact age, country's culture, students' prior knowledge etc) the educator can use these cards sometimes

called EXIT CARDS either by a hard copy he/she has made from before or simply by posing these statements on board and the students write the answers on a paper which they will leave preferably anonymously while exiting the room. The specific formative strategy is called 3,2,1. For more strategies you can visit:

<https://www.bhamcityschools.org/cms/lib/AL01001646/Centricity/Domain/131/70%20Formative%20Assessments.pdf>

3-2-1	
Write 3 things you liked about this activity	1. 2. 3.
Write 2 things you have learned	1. 2.
Write 1 aspect for improvement	1.

Introduction

Mathematics can be found in several arts e.g. literature, cinematography, drama. Rarely the students can see the connection to the arts. This is a good opportunity to familiarize with a well-known play with mathematical content and act on it whilst there is also the mathematical task 2 which involves several mathematical exercises.

By the age of 15-16 students will start familiarizing with the concepts of Mathematical Sentence wither it is True or False, the meaning of Mathematical Implication and Mathematical Equivalence. In this tool two tasks are given. The first one comes from one of Ionesco's earliest theatrical works, considered to be his most innovative, one-act plays named "*The Lesson*" (1950). Though the script is simple to read and learn and may even seem as naive; there are many hidden meanings both literature wise and mathematical wise. As far as the literature behind, this is one of the works of Ionesco's expressing the feeling of alienation and the weakness and futility of communication in a surreal and comical manner.

Literary Approach

Over the past forty years, Ionesco has been named, among other things, to “tragic clown,” the “Shakespeare of the Absurd,” the “Enfant Terrible of the Avant-Garde,” and the “Inventor of the Metaphysical Farce”— he started as a young playwright evolved as a tiny Left Bank theater and finally became an esteemed member of the Académie Française (Guppy, 1984).

His works falls under the category of so-called "Theater of the Absurd". It is said that "With their structures and dialogues, the plays of the theatre of the absurd play with their formal incoherence which eventually lead to nonsense; they seem to refuse to render intelligibly any message and prefer to confront the readers directly to the anarchy of the world and the emptiness of the existence " (Lazar, 2015, p. 367). Ionesco's plays are widely taught in upper and higher education and are said to have helped shape the surreal / modern television comedy series.

"The Lesson" is a description of a megalomaniacal teacher, representing the dark satire of the powerful. The script here is a small fragment of the play where after a polite dialogue the teacher tells the student that he has lived in the same city for thirty years but would have preferred to live in Paris or at least in Bordeaux; but then admits that he has never seen in real life Paris nor Bordeaux. When the student immediately presumes that Paris is the capital of France, the professor jumps to the conclusion that she is an expert in French geography. The schoolgirl, (although needing help in naming the four seasons), says she already has a diploma in science and arts. Then, she says she's at the Professor's disposal. Here we have the part where when the student is able to add one and one correctly, the Professor concludes that in just three weeks she should easily achieve a completed PhD diploma. After that, the student gives answers that are reasonable in her own mind but often do not make sense according to the professor. Then, the student solves a problem of multiplication through memorization, but without any foundations on reasonable thinking. Therefore, the Professor decides to prepare her for a partial doctoral thesis.

(Retrieved from:

[http://www.amerlit.com/plays/PLAYS%20Ionesco,%20Eugene%20The%20Lesson%20\(1954\)%20analysis.pdf](http://www.amerlit.com/plays/PLAYS%20Ionesco,%20Eugene%20The%20Lesson%20(1954)%20analysis.pdf))



The Script

PROFESSOR: Good. Let us arithmetize a little now.

PUPIL: Yes, gladly, Professor.

PROFESSOR: It wouldn't be too tiresome for you to tell me ...

PUPIL: Not at all, Professor, go on.

PROFESSOR: How much are one and one?

PUPIL: One and one make two.

PROFESSOR [*marveling at the Pupil's knowledge*]: Oh, but that's very good. You appear to me to be well along in your studies. You should easily achieve the total doctorate, miss.

PUPIL: I'm so glad. Especially to have someone like you tell me this.

PROFESSOR: Let's push on: how much are two and one'?

PUPIL: Three.

PROFESSOR: Three and one?

PUPIL: Four.

PROFESSOR: Four and one?

PUPIL: Five.

PROFESSOR: Five and one?

PUPIL: Six.

PROFESSOR: Six and one?

PUPIL: Seven.

PROFESSOR: Seven and one?

PUPIL: Eight.

PROFESSOR: Seven and one?

PUPIL: Eight again.

PROFESSOR: Very well answered. Seven and one?

PUPIL: Eight once more.

PROFESSOR: Perfect. Excellent. Seven and one?

PUPIL: Eight again. And sometimes nine.

PROFESSOR: Magnificent. You are magnificent. You are exquisite. I congratulate you warmly, miss. There's scarcely any point in going on. At addition you are a past master. Now, let's look at subtraction. Tell me, if you are not exhausted, how many are four minus three?

PUPIL: Four minus three? . . . Four minus three?

PROFESSOR: Yes. I mean to say: subtract three from four.

PUPIL: That makes ... seven?

PROFESSOR: I am sorry but I'm obliged to contradict you. Four minus three does not make seven. You are confused: four plus three makes seven, four minus three does not make seven. This is not addition anymore, we must subtract now.

PUPIL [trying to understand]: Yes ... yes ...

PROFESSOR: Four minus three makes . . . How many? How many?

PUPIL: Four?

PROFESSOR: No, miss, that's not it.

PUPIL: Three, then.

PROFESSOR: Not that either, miss ... Pardon, I'm sorry I ought to say, that's not it ... excuse me.

PUPIL: Four minus three . . . Four minus three . . . Four minus three? . . . But now doesn't that make ten?

PROFESSOR: Oh, certainly not, miss. It's not a matter of guessing, you've got to think it out.

Let's try to deduce it together. Would you like to count?

PUPIL: Yes, Professor. One . . . two . . . uh .

PROFESSOR: You know how to count? How far can you count up to?

PUPIL: I can count to ... to infinity.

PROFESSOR: That's not possible, miss.

PUPIL: Well then, let's say to sixteen.

PROFESSOR: That is enough. One must know one's limits.

(Retrieved from: http://davidkaplanteacher.com/thelessonsript%20analysis.pdf?fbclid=IwAR1Qz-JnlElqi3FqRQcPdVVAfif_Xe_PhBWrd4tHaFqBBasFZvDID8dlMs)



Picture 1: Eugene Ionesco (Retrieved from:

https://www.google.com/search?q=eugene+ionesco&client=firefox-b-d&source=lnms&tbn=isch&sa=X&ved=0ahUKEwiBxb7R2NTiAhXDPOwKHWN1DXkQ_AUIECgB&biw=1138&bih=527#imgrc=Obw0abyNwgJyWM)



Picture2 : The lesson (Rretrieved from:

https://www.google.com/search?q=THE+LESSON+EUGENE+IONESCO&client=firefox-b-d&source=lnms&tbn=isch&sa=X&ved=0ahUKEwjB-srv7NTiAhVCDOwKHT6bA04Q_AUIECgB&biw=1138&bih=527#imgdii=k_gU8v4u9jmOHM:&imgrc=Bh9sBmQQVwJYCM)

Glossary

Eugene Ionesco: (26 November 1909 – 28 March 1994) was a Romanian-French playwright who wrote mostly in French, and one of the foremost figures of the French Avant-garde theatre. Beyond ridiculing the most banal situations, Ionesco's plays depict the solitude and insignificance of human existence in a tangible way.

The Math behind the Play

Definitions

Mathematical sentence: A mathematical sentence makes a statement about two expressions. The two expressions either use numbers, variables, or a combination of both. A mathematical sentence can also use symbols or words like equals, greater than, or less than. An open sentence in math means that it uses variables, meaning that it is not known whether the mathematical sentence is true or false. A closed sentence, on the other hand, is a mathematical sentence that is known to be either true or false.

True sentence: We know it is true e.g. $1+1=2$, $2+2=4$.

False sentence: It is not true e.g. $1-1=-1$

Mathematical Implication: The statement “p implies q” means that if p is true, then q must also be true. The statement “p implies q” is also written “if p then q” or sometimes “q if p.” Statement p is called the premise of the implication and q is called the conclusion.

Mathematical equivalence: equivalence relation is a binary relation that is reflexive, symmetric and transitive. The relation “is equal to” is the canonical example of an equivalence relation.

Examples

Mathematical Sentence:

In our daily speech we use suggestions such as

P1: Make a coffee.

P2: Everest is the highest mountain on Earth.

P3: The Earth is flat.

The above propositions P1, P2, P3, although from a syntactical and grammatical point of view, are correct, mathematically-wise are not necessarily acceptable or correct. A suggestion in mathematics is any expression that can only be characterized as true or false. So, for mathematics, P1 is not a proposition, P2 is a true proposition while P3 is a false proposition.

Mathematical Implication:

This is often the case: the truth of a P1 proposal results in the truth of another P2 proposal. This is written:

"If P1 then P2" or $P1 \Rightarrow P2$ (we read: P1 implies P2). For example, let us consider the proposals:

P1: "Alexander is a resident of Rome"

P2: "Alexander is a resident of Italy".

We notice here that if P1 is true, then P2 will necessarily be true, i.e.: $P1 \Rightarrow P2$. But if we assume that P2 is true then it does not necessarily mean that P1 will be true, stated as: $\neg (P2 \Rightarrow P1)$

Mathematical Equivalence:

However, there are cases where: $P1 \Rightarrow P2$ and $P2 \Rightarrow P1$. This is written:

"P1 if and only if P2" or $P1 \Leftrightarrow P2$ (we read P1 is equivalent to P2). For example, let us consider the proposals:

P1: "Nicos bought three 50-cent chocolates"

P2: "Nicos bought 50-cent chocolates and paid 1.5 euros." We observe here that $P1 \Rightarrow P2$ and $P2 \Rightarrow P1$, i.e. $P1 \Leftrightarrow P2$.

TASKS

TASK 1

(I)

P1: George got wet

P2: George had a shower

- (i) Can we write: $P1 \Rightarrow P2$?
- (ii) Can we write: $P2 \Rightarrow P1$?
- (iii) Can we write $P1 \Leftrightarrow P2$?

(II) Suppose that sentence Y is False, whereas sentence A is true. Complete the following Table:

P	P'
A	
Y	

(III) Complete the following table, if Y is false, whereas A is true.

P1	P2	P1 and P2
A	Y	
Y	A	
Y	Y	
A	A	

(IV) Complete the following table, if Y is false, whereas A is true.

P1	P2	P1 or P2
A	Y	

Y	A	
Y	Y	
A	A	



TASK 2

Dramatization as a project

This task is based on the script given above, a very playful and fun script which involves only two protagonists, the professor and the girl.

- Before the performance dialogues you can rehearse for ten minutes and decide the positions to take with the help of your teacher/ director.
- After all of the dyad's performances, you will vote for the best act.

LEARN MORE...

If you want to further investigate on the topics addressed in this tool, you may go through the following links:

Online resource including several sources, including videos, quizzes and courses:

<https://study.com/academy/lesson/open-sentence-in-math-definition-example.html>

Mathematical terms:

<http://www.math.niu.edu/~richard/Math101/implies.pdf>

<https://www.youtube.com/watch?v=e8S40Y3-y8s&fbclid=IwAR2sgaD9ora8qxpqoD8xHqZUnTy2qxDKXUbGLEv4PFMYBQIXxHRRWMmybjk>

'The lesson' by Ionesco, school play from Bulgaria:

<https://www.youtube.com/watch?v=vvPWLqKWcw>

References included in the Literary Analysis:

Guppy, S. (1984). The Art of Theater VI: Eugene Ionesco. *Paris Review*, (93), 52–78. Retrieved _____ from <http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,sso&db=hlh&AN=15770503&site=eds-live>

Lazăr, A. (2015). Teaching absurd literature – Ionesco's transgressive dramatic discourse in dialogue with other texts [doi://doi.org/10.1016/j.sbspro.2015.02.130](https://doi.org/10.1016/j.sbspro.2015.02.130)

[http://www.amerlit.com/plays/PLAYS%20Ionesco,%20Eugene%20The%20Lesson%20\(1954\)%20analysis.pdf](http://www.amerlit.com/plays/PLAYS%20Ionesco,%20Eugene%20The%20Lesson%20(1954)%20analysis.pdf)