

## Title

Flipped polygon  
Obrnuti mnogougao

## Author(s)

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## Short description/ main idea

The aim of this work is to train students to work independently (flipped classroom), peer learning and motivation for critical thinking. Students at home watching the lesson as text and video on the Moodle platform. Share their experiences with their friends so they work together or through Skype. At a school they confirmed their knowledge and work assignments. At home, they do a test in Moodle as a preparation for a test in school that will also work in Moodle.

Cilj ovakvog rada je obuka učenika za samostalan rad (obrnuta učionica), vršnjačko učenje kao i motivacija za kritičko razmišljanje. Učenici kod kuće gledaju lekcije u tekstualnom obliku i video zapisu na platformi Moodle. Razmenjuju iskustva sa drugovima tako što rade zajedno ili putem Skype-a. U školi potvrđuju svoja znanja i rade zadatke. Kod kuće rade testove u Moodle-u kao pripremu za test u školi koji će isto raditi u Moodle-u.

## Learning objectives

Cognitive - Knowledge: Factual, Conceptual

Cognitive - Process: To understand, To apply

Affective: To respond and participate

Psychomotor: To perform confidentially following instructions, To adapt and perform creatively

## Learning activities

Phase 1: Work at home

Description of phase: Students at home first watching video lesson, which introduces them to the basic concepts of the polygon. Then read the text lesson in Moodle. Trying to solve basic assignment in that lesson. To check solutions them serve dynamic image of the polygon created with GeoGebra, as an aid . To proof what they learned communicate with a few friends to see if they have a good grasp of what they were doing.

Activities

1.1: Watching video lessons

1.2: Reading text lessons

1.3: Dynamic image of a polygon in GeoGebra

1.4: Exchange opinions with their friends learned, either directly or via Skype.

Phase 1: Rad kod kuće

Description of phase: Učenici kod kuće prvo gledaju video lekciju koja ih uvodi u osnovne pojmove mnogougla. Potom čitaju tekstualnu lekciju isto na Moodle-u. Pokušavaju da reše elementarne zadatke u toj lekciji. Kao pomoć za proveru služi im dinamička slika mnogougla napravljena u GeoGebri. Kao proveru naučenog komuniciraju sa nekoliko drugova i proveravaju da li su dobro shvatili ono što su radili.

Activities

1.1: Gledanje video lekcije

1.2: Čitanje tekstualne lekcije

1.3: Dinamička slika mnogougla u GeoGebri

1.4: Razmena mišljenja o naučenom sa drugovima, direktno ili preko Skype-a.

Phase 2: School work

Description of phase: In school pupils first exchanging experiences related to a given lesson. What there were easier, what more difficult. How was

interesting, what would they change and what left in the lesson. Through discussion and questions come to the basic concepts related to polygon. In the second part of the class on several tasks we check learned.

Activities

2.1: Repetition of learning

2.2: Checking learned

Phase 2: Rad u školi

Description of phase: U školi prvo učenici međusobno razmenjuju iskustva vezano za datu lekciju. Šta im je bilo lakše, a šta teže. Koliko je bilo interesantno, šta bi ostavili a šta promenili u lekciji. Kroz diskusiju i pitanja dolazimo do osnovnih pojmova vezanih za poligon. U drugom delu časa na nekoliko zadataka proveravamo naučeno.

Activities

2.1: Ponavljanje naučenog

2.2: Provera naučenog

Phase 3: Checking at home

Description of phase: Students at home on the platform Moodle solve the given tests. Time to deal with test and the number of attempts to solve the tests are limitless. This serves as a preparation for the test at the school which will be graded.

Activities

3.1: Solving test at home

3.2: Peer learning

Phase 3: Provera kod kuće

Description of phase: Učenici kod kuće na platformi Moodle rešavaju zadate testove. Vreme za rešavanje i broj pokušaja za rešavanje testova su neograničeni. Ovo im služi kao priprema za test koji će raditi u školi i koji će se ocenjivati.

Activities

3.1: Rešavanje testa kod kuće

3.2: Vršnjačko učenje

Phase 4: Checking at school

Description of phase: On the platform Moodle students solves a given test. They have one attempt and the time is limited to 30 minutes.

Activities

4.1: Repeat the basic concepts of the lessons learned

4.2: Solving test

Phase 4: Provera u školi

Description of phase: Na platformi Moodle učenici rešavaju zadati test. Imaju jedan pokušaj i vreme ograničeno na 30 minuta.

Activities

4.1: Ponavljanje osnovnih pojmova o naučenom

4.2: Rešavanje testa

## Language

English

Serbian

## Grade & Age

Age: 10-11

Age: 10-11

Grade: informal context, primary education

## Domain

### **Keywords/subject**

Mathematics, Polygon, Moodle, GeoGebra

Matematika, Mnogougao, Moodle, GeoGebra

### **Prerequisites**

What is the edge, angle, triangle, convexity

Šta je stranica, ugao, trougao, konveksnost.

### **Difficulty**

medium

### **Learning environment**

Computer-based, Video, Work-based

### **Duration**

3 Hours

### **Teaching approach**

Behaviourist: Drill and practise

Cognitivist: Collaborative learning, Inquiry learning

Constructivist: Action research

### **Assessment strategy**

Diagnostic-assessment, Summative assessment

### **Phases**

1.Work at home

1.Rad kod kuće

### **Description of phase**

Students at home first watching video lesson, which introduces them to the basic concepts of the polygon. Then read the text lesson in Moodle. Trying to solve basic assignment in that lesson. To check solutions they serve dynamic image of the polygon created with GeoGebra, as an aid . To proof what they learned communicate with a few friends to see if they have a good grasp of what they were doing.

Učenici kod kuće prvo gledaju video lekciju koja ih uvodi u osnovne pojmove mnogougla. Potom čitaju tekstualnu lekciju isto na Moodle-u.

Pokušavaju da reše elementarne zadatke u toj lekciji. Kao pomoć za proveru služi im dinamička slika mnogougla napravljena u GeoGebri. Kao proveru naučenog komuniciraju sa nekoliko drugova i proveravaju da li su dobro shvatili ono što su radili.

### **Learning activities**

1.1 Watching video lessons

1.1 Gledanje video lekcije

Description: In this activity, the student watching the video and accept the basic concepts of the polygon.

Description: U ovoj aktivnosti učenik gleda video i prihvata osnovne pojmove o mnogouglu.

Tools

Software Tools: Learning management systems (<http://moodle.svetisava.edu.rs/course/view.php?id=25>)

Hardware Tools: Computer

Resources

Educational objects (as url):

1. Moodle platform on web site of school Sveti Sava

Duration: 10 Minutes

## 1.2 Reading text lessons

### 1.2 Čitanje tekstualne lekcije

Description: After watching the video lesson students read text lesson on Moodle and trying to do basic tasks that are in the lesson.

Description: Učenici posle odgledanog videa čitaju lekciju na Moodle-u i pokušavaju da urade elementarne zadatke koji se nalaze u lekciji.

Tools

Hardware Tools: Computer

Duration: 10 Minutes

## 1.3 Dynamic image of a polygon in GeoGebra

### 1.3 Dinamička slika mnogougla u GeoGebri

Description: In GeoGebra by changing the edges number of polygon a student can see the change in the number of diagonal, the sum of the interior angles, the size of angles. This helps them to better understand the previously learned.

Description: U GeoGebri menjajući broj stranica mnogougla učenik može da vidi promene u broju dijagonala, zbiru unutrašnjih uglova, veličini uglova. Ovo mu pomaže da bolje shvati prethodno naučeno.

Tools

Hardware Tools: Computer

Duration: 10 Minutes

## 1.4 Exchange opinions with their friends learned, either directly or via Skype.

### 1.4 Razmena mišljenja o naučenom sa drugovima, direktno ili preko Skype-a.

Description: In an conversation with fellows, student better notes that it all figured out and how well he understood the lesson.

Description: U razgovoru sa drugovima učenik bolje uočava da li je sve shvatio i koliko dobro je razumeo lekciju.

Tools

Software Tools: Email Chat

Hardware Tools: Computer, Webcams

Duration: 10 Minutes

## Phases

2.School work

2.Rad u školi

### Description of phase

In school pupils first exchanging experiences related to a given lesson. What there were easier, what more difficult. How was interesting, what would they change and what left in the lesson. Through discussion and questions come to the basic concepts related to polygon. In the second part of the class on several tasks we check learned.

U školi prvo učenici međusobno razmenjuju iskustva vezano za datu lekciju. Šta im je bilo lakše, a šta teže. Koliko je bilo interesantno, šta bi ostavili a šta promenili u lekciji. Kroz diskusiju i pitanja dolazimo do osnovnih pojmova vezanih za poligon. U drugom delu časa na nekoliko zadataka proveravamo naučeno.

### Learning activities

2.1 Repetition of learning

2.1 Ponavljanje naučenog

Description: Students exchanging experiences related to a given lesson with each other. What they were easier, what more difficult. How was interesting, what would you change and what is left in the lesson. Through discussion and questions come to the basic concepts related to polygon. The teacher explains the further course of learning.

Description: Učenici međusobno razmenjuju iskustva vezano za datu lekciju. Šta im je bilo lakše, a šta teže. Koliko je bilo interesantno, šta bi ostavili a šta promenili u lekciji. Kroz diskusiju i pitanja dolazimo do osnovnih pojmova vezanih za poligon. Nastavnik objašnjava dalji tok učenja.

Tools

Software Tools: Learning management systems

Hardware Tools: Computer, Projector, Video, Interactive whiteboard

Duration: 10 Minutes

2.2 Checking learned

2.2 Provera naučenog

Description: Trying to solve assignment, students checked learned, acquired skill and speed in solving assignment, acquiring permanent knowledge.

Description: Rešavanjem zadataka učenici proveravaju naučeno, stiču veštinu i brzinu prilikom rešavanja zadataka, stiču trajnije znanje.

Duration: 30 Minutes

## Phases

3.Checking at home

3.Provera kod kuće

## Description of phase

Students at home on the platform Moodle solve the given tests. Time to deal with test and the number of attempts to solve the tests are limitless. This serves as a preparation for the test at the school which will be graded.

Učenici kod kuće na platformi Moodle rešavaju zadate testove. Vreme za rešavanje i broj pokušaja za rešavanje testova su neograničeni. Ovo im služi kao priprema za test koji će raditi u školi i koji će se ocenjivati.

## Learning activities

### 3.1 Solving test at home

#### 3.1 Rešavanje testa kod kuće

Description: Students at home on the platform Moodle solve the given tests. Time to deal with test and the number of attempts to solve the tests are limitless. This serves as a preparation for the test at the school which will be graded.

Description: Učenici kod kuće na platformi Moodle rešavaju zadate testove. Vreme za rešavanje i broj pokušaja za rešavanje testova su neograničeni. Ovo im služi kao priprema za test koji će raditi u školi i koji će se ocenjivati.

Tools

Hardware Tools: Computer

Duration: 20 Minutes

### 3.2 Peer learning

#### 3.2 Vršnjačko učenje

Description: Through conversations with fellow students clarify the problem if you have it. They help each other and then try to do the test again. Compare the results of the tests.

Description: Kroz razgovor sa drugovima učenici razjašnjavaju problem ako ga imaju. Pomažu jedni drugima i posle toga pokušavaju da urade test ponovo. Upoređuju rezultate testova.

Duration: 20 Minutes

## Phases

4. Checking at school

4. Provera u školi

## Description of phase

On the platform Moodle students solves a given test. They have one attempt and the time is limited to 30 minutes.

Na platformi Moodle učenici rešavaju zadati test. Imaju jedan pokušaj i vreme ograničeno na 30 minuta.

## Learning activities

### 4.1 Repeat the basic concepts of the lessons learned

#### 4.1 Ponavljanje osnovnih pojmova o naučenom

Description: Short repetition of the basic things about the polygon.

Description: Kratko ponavljanje osnovnih stvari vezanih za poligon.

Duration: 5 Minutes

#### 4.2 Solving test

##### 4.2 Rešavanje testa

Description: Students are attached to the platform Moodle with their accounts and take the test. Test time is limited to 30 minutes. Immediately after completion of the test the teacher reviews the results and announce the individual results and the general attitude of what they have learned.

Description: Učenici se kače na platformu Moodle sa svojim nalogima i rade test. Vreme testa je ograničeno na 30 minuta. Odmah po završetku testa nastavnik pregleda rezultate i saopštava pojedinačne rezultate kao i generalni stav o naučenom.

Tools

Software Tools: Learning management systems (<http://moodle.svetisava.edu.rs/course/view.php?id=25>)

Hardware Tools: Computer

Resources

Educational objects (as url):

1. Moodle platform on web site of school Sveti Sava