

Geogebra, a useful tool for achieving school progress

Adriana Bînzar

”Ion Mincu” Technical College, Timișoara, Romania

ABSTRACT: In our modern society, where computer science implication in each domain is growing very fast, it became imperative to find ways of introducing it into the teaching process. In this paper, I have shown the advantage of using Geogebra to create interactive mathematical analysis lessons. This specific approach had led to the school progress of my students

1. Introduction

The communicate way of teenagers evolves from one generation to another. Currently the computer is their top choices. The Internet is a source of conflict between them on one hand and parents and educators on the other. Young people should be advised to select what is good for their future development of the very large crowd of information they have available.

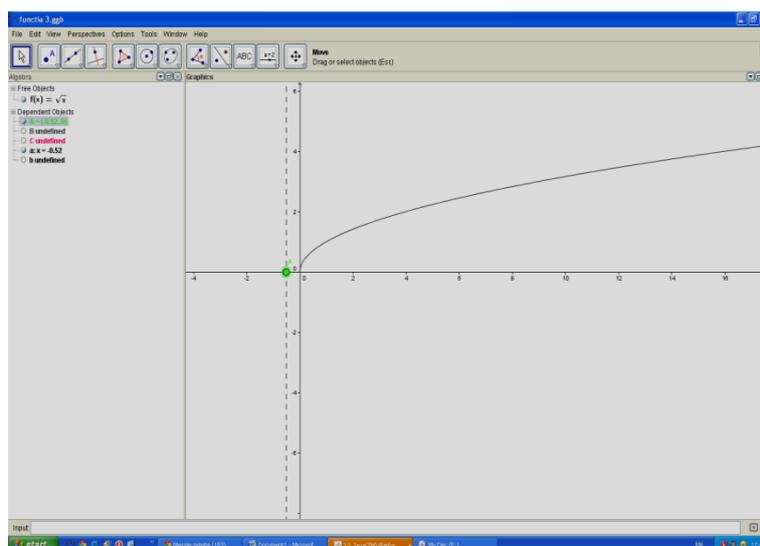
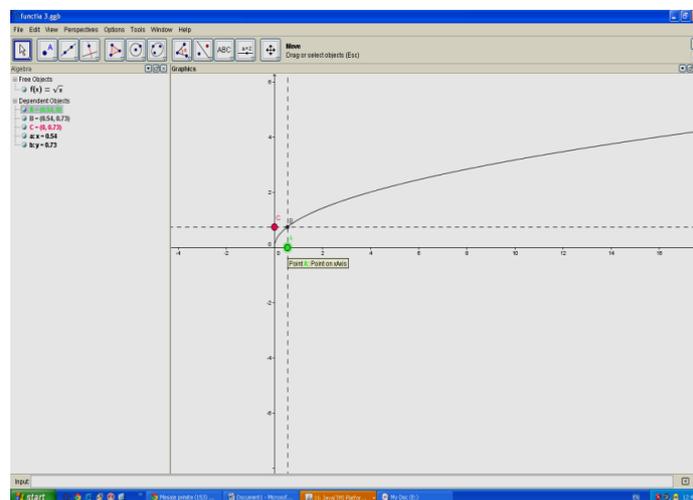
Geogebra is an alternative to spend time on the computer, on the Internet, which offers the chance of acquisition of mathematical information and not only to achieve academic progress and school performance even at intermediate or final evaluations of high school. Geogebra software may be considered a response to the recommendations of the European Parliament, concerning the development of the eight key competences, namely the one on the skills and mathematical competencies. In addition, by using Geogebra enhances students' ability to use information technologies, the ability to understand and use different representations of objects, phenomena and mathematical situations allowing a stronger anchoring of mathematics in real life.

In this context, I tried to use as much as possible this software in the lessons of the class, students having a positive reaction.

2. Applications to the study of variations of real functions

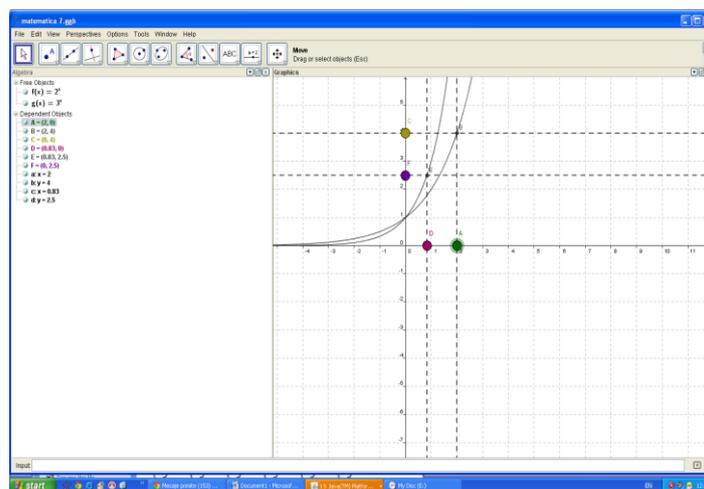
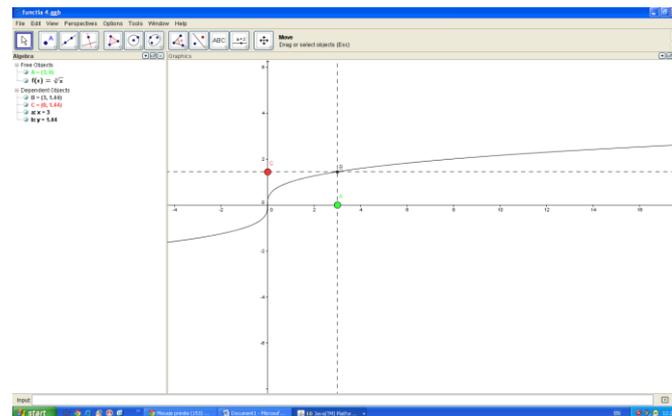
The most spectacular results I have obtained with eleventh grade students. Once students were familiar with the working tools of Geogebra, I approached teaching

Mathematical Analysis classes using representation functions in Geogebra. Students drew several graphs of functions to easily identify continuous functions. Then, we reviewed the basic functions focusing on their graphic representations. We did auxiliary constructions for understanding the notion of limit. Thus, we consider a point x_0 on the axis Ox , we drew the corresponding value $f(x_0)$ on the Oy axis using the intersection of the straight line $x=x_0$ with the graph of the function and then we drew the intersection of the parallel taken through this point to Ox with the Oy axis. At this point, moving the point x_0 on the axis Ox the students could observe what happens with the function values. Here we could highlight the advantages of Geogebra, these calculations would otherwise be very cumbersome. On these graphs the students have noticed the importance of the definition domain for a function: when x_0 was no longer in the maximal definition domain, the point corresponding to the value of that function disappears.

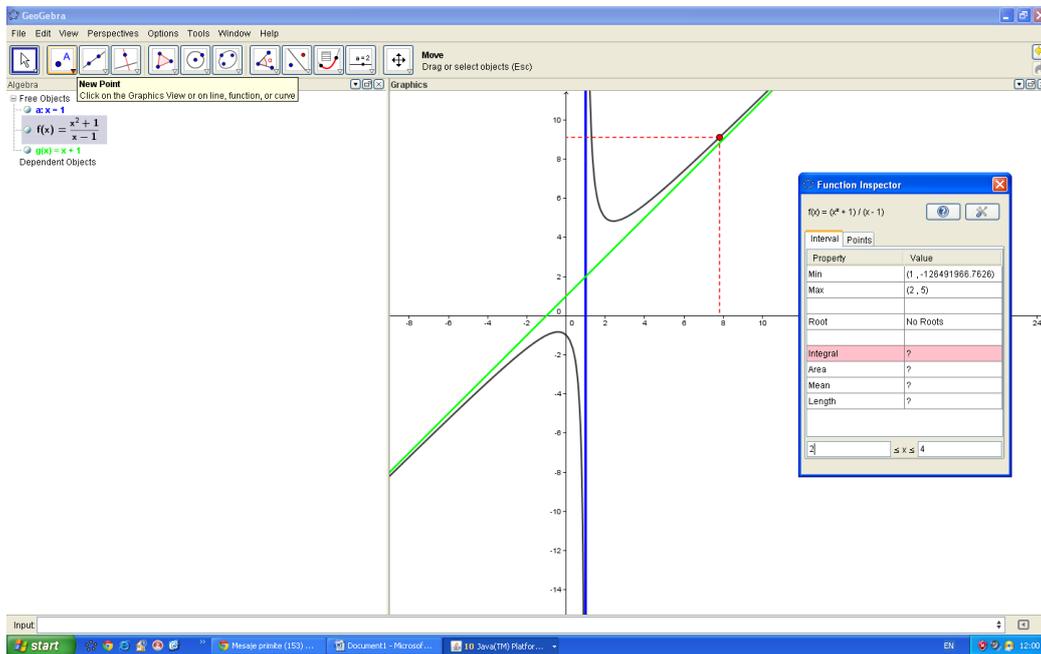
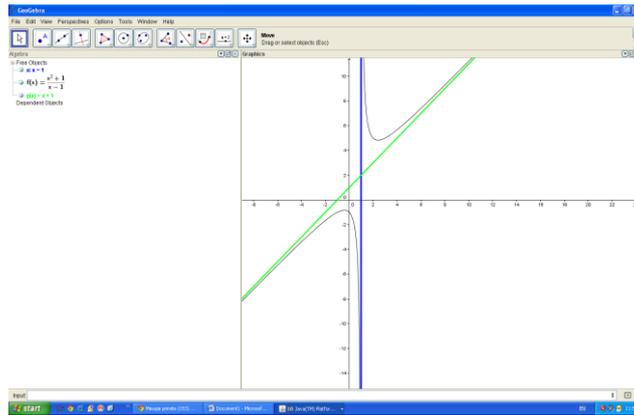


Also, understanding the notion of limit when $x \rightarrow \infty$ has become more palpable because they could move the point x_0 to very high values, or, in the case when $x \rightarrow -\infty$ for very small values noticing immediately on the drawing the displacement of the point showing the function values.

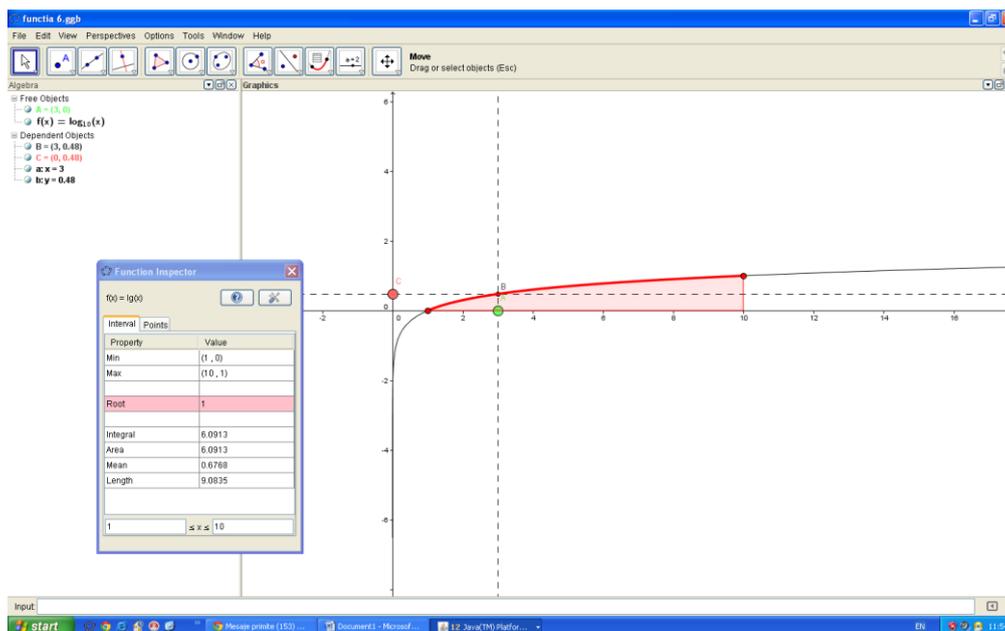
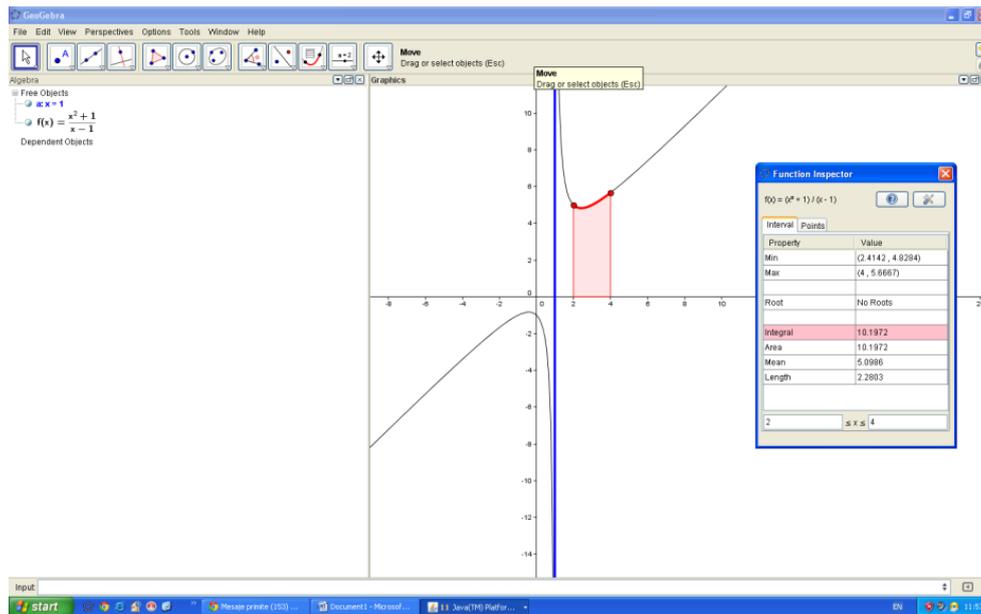
Using the properties of the drawing objects in Geogebra we made more attractive drawings, painting the important elements, which highlighted the calculations.



Next, we used Geogebra to study notions related to asymptote of functions.



Geogebra proved to be a useful tool for highlighting the extreme points and inflection points using for this the Function Inspector tool. Also, in this context we anticipated the notion of integral study defined as an area of the subgraph of a function.



These lessons in Geogebra have raised the interest of many students as evidenced by their active participation in the lessons, the highest scores obtained, their participation in a symposium in which they could present their projects in Geogebra.

References

- [Cho10] **K.-S. Choi** – *Motivating students in learning mathematics with Geogebra*, Annals. Computer Science Series, Mirton, Timiș oara, 2010
- [Gan96] **M. Ganga** – *Elemente de Analiză Matematică*, Editura Mathpress, Ploiești, 1996
- [HHL09] **J. Hohenwarter, M. Hohenwarter, Z. Lavicza** - *Introducing Dynamic Software to the Secondary School Teachers: The case of Geogebra*, Journal of Computers in Mathematics and Science Teaching, 2009