Chapter 26
From Theory to Life:
A Transformative Approach to Teaching High School Math

Angeliki Stamati
American Community Schools (ACS), Athens, Greece

ABSTRACT

Today, more than ever, academic institutions need to identify ways to inspire their students to acquire mathematics skills and competencies which are essential for becoming critical thinkers, innovators, and decision makers. Therefore, there is a need for a new trajectory in the teaching and learning of mathematics in particular in the k-12 environment. The Mathematics Morfosis Educational Philosophy that has been successfully applied to ACS Athens transforming the teaching of high school mathematics is an authentic, unbounded, and exciting educational model for the instruction of mathematics that is preparing students for complex and ambiguous future needs.

INTRODUCTION

Mathematics is an integral part of the human condition. This is true for the past, present, and coming future. About 60 years ago, F. Feher, a professor of mathematics teacher College, Columbia University, wrote:

Mathematics is a world of wonder – a place where, with only a few numbers and points at our command, the most amazing formulas and geometric figures appear as out of a magician's hat. Mathematics is also a tool – a servant to our needs. When we wish to know how much? How many? How large? How fast? In what direction? With what chances? – The mathematician gives us a way to find the answer. But above all mathematics is the Queen of knowledge. It has its own logic – that is, a way of thinking. By applying this way of reasoning to numbers and to space, we can come up with ideas and conclusions that only the human mind can develop. These ideas often lead us to the hidden secrets of the ways in which nature works.

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Mathematics serves as a science, a tool, a language, and a form of problem solving to name a few. Mathematics is essential for individuals, communities, nations, and societies to thrive and survive. Its concepts, ways of thinking, and applications are within and all-around living forms as well as in human and non-human made objects, regular and non-regular shapes and objects. For example, there is no science that has played and continues to play a more important role than mathematics in the design and construction of buildings and roads. By coming up with improved methods of farming and increasing food production, designing and engineering drugs and medicines, navigating the seas, traveling across the globe to the moon and beyond, we continue to witness the necessity that is ethical mathematics. After all, we live in a world of change and everything in it is constantly changing. Mathematics helps us calculate and in turn, understand the changes within and around us. It helps us view and comprehend the daily challenges we face in our lives and reveals available choices.

Yet, one of the most significant obstacles mathematics instructors face is that students have difficulty clearly identifying the real-world application of mathematics, or how math concepts and applications are relevant to their everyday lives. "When am I ever going to use this?" Or "Who cares, in the real-world I can Google anything I need." Versions of this sentiment have echoed through the walls of math classrooms for years. This is simply because students don't often appreciate or become excited and motivated by something they don't see as relevant, meaningful for their daily lives or potential careers, to name a few. Thus, it is the way we design our curriculum and how we teach students what makes a difference in a student's life. As the Dean of the College of Communication at Boston University M. DiChristina, and former Editor in Chief of Scientific American Journal, recently wrote (DiChristine, 2017) "How we teach and create the right learning environments is critical to our students' success". Unfortunately, however, the traditional teaching of mathematics, which has been the dominant form of instruction in most, if not all forms of teaching school mathematics, can hardly portray the relevance of mathematics, making students reluctant towards the subject and its application. The mathematics morfosis educational philosophy is the way to develop a meaningful approach in teaching and mathematics. This philosophy is based on the gMp, the Global Morfosis Paradigm.

1. gMp The Global Morfosis Paradigm

To address the need for providing students with an invaluable learning and insightful experience the late Dr. Stefanos Gialamas developed a new educational paradigm, which has been implemented over the past decade, at ACS Athens (Avgerinou & Gialamas, 2016). The new educational paradigm called the Global Morfosis Paradigm (gMp) is an innovative, authentic and flexible educational paradigm that can prepare students for a complex and ambiguous future. Throughout the last ten years, the gMp has been implemented, evaluated, and perfected many times to meet diverse student needs worldwide.

The gMp consists of three inseparable, interconnected, and interrelated components as shown in (see Figure 1).

1. The Morfosis educational philosophy (Morfosis)
2. i^{2}Flex Learning Methodology (i^{2}Flex)
3. Aristeia Leadership (Aristeia)