Chapter 22
A Differentiated Approach to Mathematics

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ABSTRACT

How can classroom teachers maximize the learning potential of their students? How can teachers, at the same time, attend to their students' differences? Students' readiness, interests, and learning profiles are the main targets for successful and meaningful learning. This chapter discusses all the above-mentioned characteristics of learners and focuses on the different approaches and instructional models in a Mathematics classroom. Having in mind a flexible learning framework that accommodates the needs of today's learners, the authors discuss and present applicable classroom instructional techniques, techniques that offer unique opportunities to fully amalgamate pedagogy by modifying learning experiences in the three areas of content, process, and product. The reader of this chapter will also get the chance to be exposed to the i2Flex methodology, which is a type of blended learning and has been born and developed at ACS Athens, Greece.

INTRODUCTION

In this unit of work, the readers will have the opportunity to explore the different instructional models an techniques that two ACS classroom teachers have been applying in their Mathematics classrooms. The readers will also have the opportunity to find out meaningful ways of collecting student feedback and reflect on their practices.

American Community Schools (ACS) Athens is a large, private, international K12 school in Athens, Greece. The school embraces American educational philosophy, principles and values. Through excellence in teaching and diverse educational experiences, the student-centered ACS Athens challenges all

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students to realize their unique potential: academically, intellectually, socially and ethically -- to thrive as responsible global citizens.

As educators we are not expecting learners to adjust to our lessons, instead our lessons are planned to adjust to the learners at hand. Consequently, we are focused on the students' learning preferences, needs and different characteristics. We design activities for our Visual, Auditory, Tactile/Kinesthetic Learners, and most importantly for the new kind of learners; the 'Digital Natives'. The term "Digital Natives" has been introduced by Marck Prensky (2001) with the aid of Information and Communication Technologies and refers to children who were born after 1980.

After many years of teaching, we have observed that today's students have changed. Today's learners collaborate more, share and exchange ideas, physically or remotely, during the learning process. In addition to that, the students can work simultaneously on various tasks and they definitely love the multimedia interaction and usage. They enjoy multiple representations of the information given, thorough explanations of the topics studied and direct feedback on their work. Especially in Mathematics, we have observed that the students need the student to student or teacher to teacher interaction more often. That helps them verify their findings, provides a sense of security and boosts their confidence.

Part of the educators' role is to meet their learners, understanding their different needs and preparing suitable ways in which the content should be delivered. The educators should prepare activities that help students understand and eventually own the concepts and skills being taught. It is our personal view, that the educators ideally should prepare their students in order to become independent and life-long learners.

Research and evidence indicate that students are more successful and engaged in school if they are taught in ways that are responsive to their readiness levels, their interests and their learning profiles. In the following pages, we will be discussing extensively models of differentiating instruction that focuses on students learning preferences.

BACKGROUND

Instructional Models

Instructional models are ways in which instructions are presented and improved through making an analysis of learning needs and instructional material needs, for the efficient delivery of instruction and for creating better understanding between the teacher and the students. Over the years, many different instructional models have been introduced, in order to assist teachers and students in the learning process. Among the most famous ones it is the Bloom's Taxonomy named after Benjamin S. Bloom of the University of Chicago in 1956. Since then many other models have been developed. A special teaching model that has been guiding our practices is the TPACK model. The TPACK model, known as Technological Pedagogical Content Knowledge is a framework developed to help describe the kind of knowledge that educators need in order to teach effectively while integrating technology. This conceptual model developed by Koehler and Mishra (2005) was based on Shulman's Pedagogigal Content Knowledge model. The framework states that a teaching model reaches its full potential when the three major knowledge dimensions like Technology, Pedagogy and Content Knowledge intersect.