Chapter 6
The Transformation of a Mathematical Exercise Into an Inquiry-Based Task

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ABSTRACT

This paper presents a project—an extended exploratory activity—designed in accordance with the guidelines of the Greek Institute of Educational Policy (IEP). The project is intended for the orientation stream of the second year of Lyceum (Grade 11), specifically within the unit on hyperbolas. The aim of this paper is twofold: on the one hand, to create an exploratory learning environment for students; and on the other, to provide teachers with a project design proposal based on a typical exercise from the school textbook. Its design is informed by Kolb's theory concerning Experiential Learning and by the theoretical framework of Anderson's taxonomy. The teaching approach adopted is Problem-Based Learning (PBL).. Educational software has been a helpful assistant too, almost in all stages of the project, during its development.

1. THEORETICAL BACKGROUND - SOME THOUGHTS FOR INTRODUCTION

The design of educational activities, and the subsequent implementation of these activities, necessitates the consideration of numerous learning theories and teaching

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application theories, which are integral components of the educational process. We will subsequently present the two primary theories and the predominant teaching approach that served as the foundation for the design of this project.

In the 21st century, it is often asserted that developments are occurring at an unprecedented pace. However, there is a lack of consensus regarding the veracity of this assertion. This phenomenon can be attributed to the diminishing shelf life of novel concepts in the public eye. The vast majority of phenomena appear to lose their relevance prior to our ability to comprehend their significance.

Within this paradigm, education is defined by a perpetual endeavor to identify efficacious pedagogical methodologies that will facilitate learning and cultivate critical competencies in students. In recent decades, the field of educational research has placed significant emphasis on the role of experiential learning as a pivotal mechanism for the acquisition and retention of knowledge.

Historically, the pedagogy of mathematics education has been marked by conventional instructional approaches that prioritize rote memorization of formulae and procedural instructions, often neglecting to foster a comprehensive understanding of the fundamental principles and their practical applications. Despite the prevalence of contemporary technical facilities, traditional teaching practices persist, resulting in the utilization of conventional methods employing modern technologies. Nevertheless, this pedagogical approach has resulted in numerous students cultivating a superficial relationship with mathematics, typified by trepidation, evasion, and an absence of ambition to pursue further learning. This assertion is corroborated by numerous researchers who explicitly state that the pedagogy of mathematics has traditionally centered predominantly on the memorization of algorithms and the implementation of standardized procedures, with a concomitant absence of emphasis on cultivating higher cognitive abilities (Krathwohl, 2002).

In this context, the two theories employed in the design of the teaching proposal were David Kolb's experiential learning theory, which has emerged as one of the most significant and widely applied theories in contemporary educational practice, and the revised Bloom taxonomy by Anderson and his colleagues (Anderson et al., 2001), which is one of the fundamental pillars of modern educational science and has emerged as a particularly important tool for the design, implementation, and evaluation of teaching interventions in all cognitive subjects, including mathematics.

The pedagogical approach employed was Project-Based Learning (PBL). In the contemporary era, educational institutions are confronted with significant challenges, primarily attributable to the rapid advancements in technology. The globalization of the economy and the increasing complexity of social problems are two additional factors that have a significant impact on the teaching environment. Adhering to a conventional educational approach, which emphasizes the transmission of information from educators to students, appears to be an insufficient strategy for preparing