

Monge's Methods Dynamically

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Abstract

The world we live in is constantly changing with the emergence of new technologies. These changes affect how traditional subjects, such as mathematics, are learned and taught, with particular emphasis on descriptive geometry. In the 18th century, Gaspard Monge defined the basic methods for visualising three-dimensional geometric figures in a two-dimensional environment. Although these methods were a military secret for the first ten years, Monge could not have predicted that, over time, they would become the standard language of graphic communication for builders, architects, cartographers, shipbuilders, painters, designers, and street artists. However, should we teach in the same way today, in the 21st century, and how can we address the new challenges of teaching and learning? Classical teaching methods, such as blackboard and chalk, are neither dynamic nor able to keep today's generations of students engaged for long. How can we find a good balance between traditional teaching and the use of technology? How can technology be applied as a tool to acquire new skills in combination with the classical competencies of descriptive geometry, using it purposefully rather than for its own sake? To answer these questions, we must recognise that students have difficulties with visualisation in the space-plane relationship, which is a consequence of living in a virtual world – the world of games. The idea is to demonstrate how to connect classical methods (Monge's method of projecting onto three orthogonal planes) with dynamic visualisation using a dynamic geometry programme on an axonometric cube model, to approach "difficult" or classical methods in an environment familiar to students. The axonometric cube is intended to replicate the familiar environment from games, where space is closed and limited. The dynamic approach ensures simultaneous changes on the axonometric cube (three-dimensional environment) and the plane (two-dimensional environment – Monge's world), so students find themselves in a familiar situation, as in games, and can readily adopt dynamic-classical Monge's visualisation methods.

Keywords: Axonometric Cubes; Descriptive Geometry; Sketchpad; Visualization

