

Pass It On®...

Everyone Needs a Good Teacher. Even Einstein.

Ernst Mach, the forgotten professor who influenced Einstein and developed a method for measuring aircraft velocity

Many of us can point to a teacher who directed our talents toward a career, a fulfilling hobby, a better way to understand ourselves. A good teacher inspires students to discover their imaginations through reading, understand the universe through keen observation, and uncover the boundless potential of their minds — all while refereeing games of four-square at recess. The sentinels in our early life, teachers protect us from bad ideas and lead us to the most productive ones.

Ernst Mach was a fragile child, born in Moravia (now Czechia) in 1838. He didn't even go to school until the age of 14. Instead, his parents educated him at home. Like many genius children, his teachers berated him, calling him "unteachable, absolutely talentless."

Yet young Mach excelled at university in Vienna. He studied mathematics, physics and philosophy. He was also boundlessly curious. He conducted all kinds of experiments, believing that theories must be tried and tested, proven out in facts, but first formulated in the mind. He brought this rigorous approach to his studies, positing that true science is based on what actually happens and can be observed.

Mach was also a well-rounded student. Besides the sciences, he was interested in philosophy and was an excellent boxer and fencer. Imagine PE classes today full of kids sword fighting and boxing!

As a teacher, Mach was precise, demanding and stern. That was the model of pedagogy of the day, and Mach fit the mold: tight collar, buttoned-down tie, waistcoat and jacket, serious eyes behind wire-framed spectacles. He could be unforgiving and intimidating. And he was brilliant.

Albert Einstein credits this teacher with shepherding his ideas into the viable theory of relativity. Mach demanded exactness and pushed Einstein to experiment and prove out his ideas, to

bring clarity to his theories. He challenged the young Einstein to excellence.

Mach is credited as the grandparent of Einstein's theory of relativity because it was based on theories of his own. Yet he rejected $E = mc^2$ because he didn't feel it was complete or provable. This led Einstein to work even harder.

While Mach is credited with many theories of his own — including the aircraft velocity measurement that bears his name, "Mach 1. Mach 2, etc." — his mentorship of Einstein is perhaps his greatest achievement.

The best teachers in our lives challenge us, see us as not yet complete but brimming with potential. They shine a light on the path that gets us to a successful reality. And through us, they live on.

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