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From Faraday's candle to today's STEM: some suggestions for teachers

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According to Faraday, there was nothing more instructive than a burning candle for the juvenile audience of his time. This topic can still be educational for our pupils if we actualize some of its phenomena. First, let us expose the flame of a candle to the rays of the sun, or put it in front of the light of a video projector: we will show that on a screen made of a white sheet of paper not only the trace of the convective motions of the air heated by the flame will appear, but also something curiously opaque at the tip of the flame itself: the black smoke that radiates the light. Moreover, let us cut the flame horizontally at different heights by means of a thin wire gauze: we shall see that the flame is hollow and that during combustion a white vapor of melted wax comes out from its interior, while higher up we would get black smoke. Of equal interest in the meantime will be noting the automatic cooling of the outer edges of the candle, the separation of the melted wax from the flame, the necessity of a plaited wick for it to feed by capillarity by drawing from the cup below, the water vapor and carbon dioxide as products of combustion, and the similarity of this to human respiration. Topics, these, that interconnect physics, chemistry, technology and biology as Faraday wanted and are suitable for those among teachers who prefer STEM teaching.

Primary author: CERRETA, Pietro (Associazione ScienzaViva, Calitri)

Presenter: CERRETA, Pietro (Associazione ScienzaViva, Calitri)

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