

## ‘Concepts’

### Interactive path to understanding the concept of energy

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Energy gains new social importance both with the oil crisis as well as with unexpected cosmological discoveries. Teaching the concept of energy turns out necessary already at the early stage of education, otherwise it seems to be a resource which is produced in electric plants. Interactive experiments on energy, forming an educational path<sup>2</sup> allow experiments with different forms of the mechanical energy (rotation, elasticity, potential, kinetic) and various examples of their mutual transformations. In our path entitled “Going downhill, i.e. everything on the inclined plane of Galileo or, in other words, how to change the potential energy into the kinematic one, having a lot of fun” we also indicate potential energy as the reason for objects to fall or slide along an inclined plane. If so, the introduction of the friction is also natural: we show with a heavy lead block sliding along the plane that eventually all forms of energy turn into heat.

Multimedia resources will be presented for a remote walk along the energy-concept path.

### Steps to a plan for teaching ‘energy’ that connects to students conceptions

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Students’ difficulties with energy have been described earlier, (e.g. Watts, 1983, Bliss, 1985, Solomon, 1992). On the one hand students’ alternative conceptions are diagnosed by the above authors; on the other hand students’ performance on formal examination tasks on energy are diagnosed as inflexible (Borsboom, Kaper & Ellermeijer, 2008). The research reported here is part of a project aiming at a versatile, transferable concept of energy. Building on the difference between assimilation and accommodation (Duit, 2002) we are designing a ‘bridging analogies’ (Clement, 1993, Brown, 1993) route to energy in which different levels of versatility (Dekker, 1993) are subsequently achieved. As one of the preparatory steps, we have tried out various measuring instruments for diagnosing students’ alternative conceptions (Swackhamer & Hestenes, 2005, Trumper et al., 2000). We build on Watts (1983) in distinguishing various qualitatively different frameworks in students’ talk about energy, and we will use these in interpreting our results on the concepts of energy of Dutch secondary school students and Kenyan prospective teachers. On this basis, consequences for a teaching plan will be drawn, to be tried out later.

#### References:

<sup>2</sup>(<http://dydaktyka.fizyka.umk.pl/pazurki/galileo.html>)

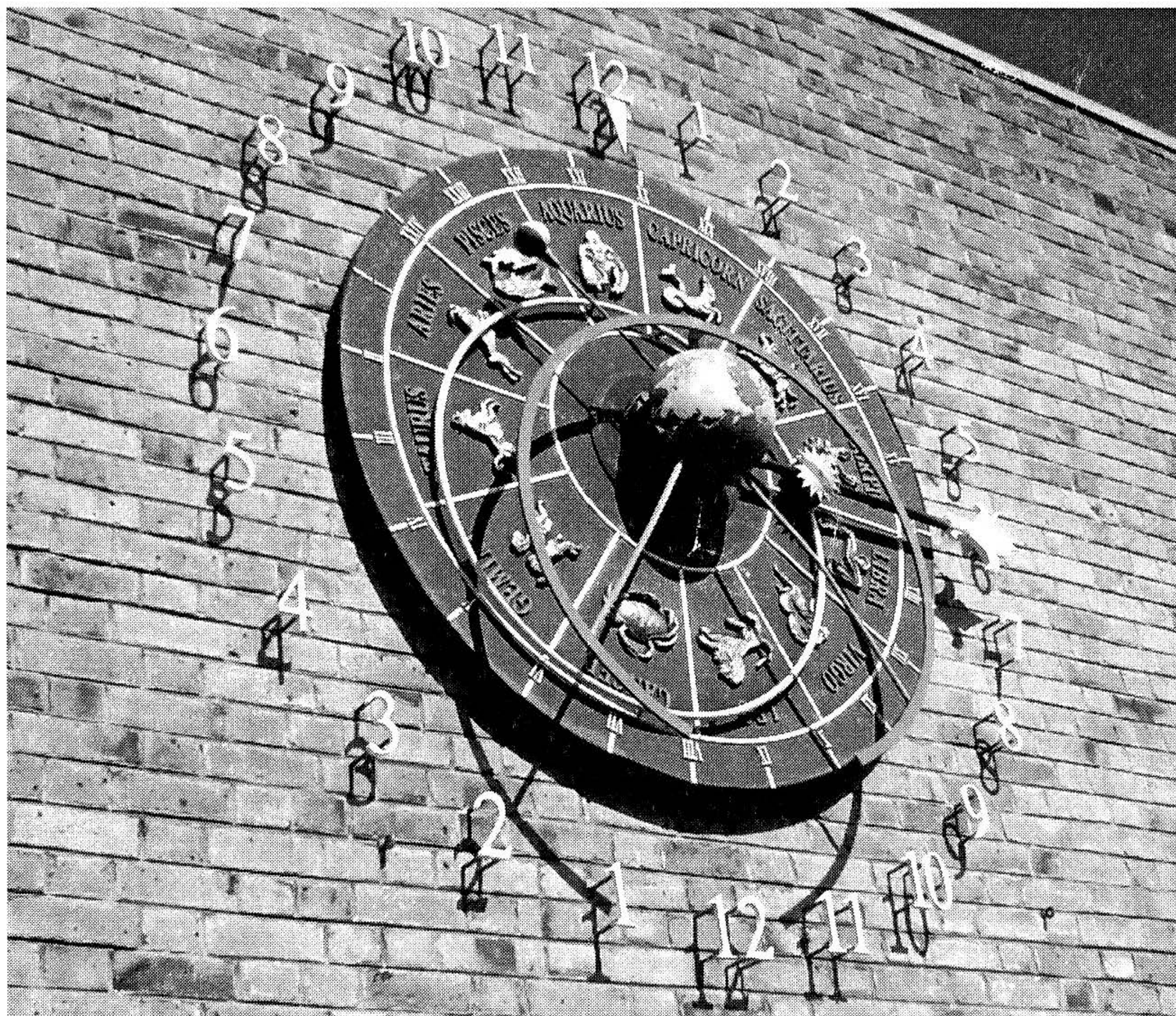


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