Teaching science in early childhood – inquiry-based, interactive path on energy

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Discussion on energy is long-lasting and diversified. Starting from Aristotle, he represented quite a big confusion in using words "energy", "power", "force". This is obvious, as Science (or rather Philosphy at that time) was an exlusively deductional knowledge, with little experimental evidence accumulated yet. A unique criterium of truth was the logical coherence. The XIXth century's definition of energy, as "the ability to perform the work" has been recently criticized by several groups of authors. Oghborn [1] and Kaiserslautern group proposed two, different generalizations of energy, based on concepts of flux and changes. Do these proposal, being internally coherent, introduce better what the energy is?

Interactive lessons, constructed on step-by-step experiments, for early childhood (6-10 years age) show that the concept of energy can be transmitted successfully, even starting from null knowledge. Further, any pre-knowledge, for example on gravity, spoils the didactical results. The lesson starts from Aristotle's question, why do objects fall. If the reason is that they tend to the natural place, the centre of Earth, they would never jump-up after falling to the floor. If stated directly in this way, the inquiring path would be destroyed, as the answer is given in the question. Kids notice themselves, in experiments constructed correctly, that not-jumping up is an unusual behaviour of objects falling down. But introducing the concept of energy, we can also explain bouncing of objects and, apparently, the spontaneous jumping up [2]. When wooden birds move, we feed them not with glass balls, re-collected at the end, but with energy [3].

In total, almost 2000 children has been trained within Universities for Children (UniKids) lessons on energy all over in Poland. Ways to construct the didactical path and results of teaching will be shown.

[1] Boohan, R., Ogborn, J. (1996) Energy and Change. Introducing a new approach. University of London, Institute of Education.

[2] Karwasz, G. et al. (2005) Dropper- popper, in Physics and Toys, EU S&S 02072 Project http://dydaktyka.fizyka.umk.pl/zabawki1/files/mech/dropper-en.html

[3] Karwasz, G. et al. (2007) Going downhill, or everything on the inclined plane of Galileo, An interactive path for children, UMK, http://dydaktyka.fizyka.umk.pl/na_pazurki/fotki_duze/DSC01545.JPG

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