A WEBLOG ON PHYSICS OF EVERYDAY OBJECTS FOR PRIMARY SCHOOL TEACHERS

GIREP seminar on « Quality developments in teacher education and training » - Udine – September 2003

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Abstract

Toys and everyday objects are very useful to illustrate physics at the level of primary school pupils because, by seeing and touching a concrete and familiar object, also the related physical concepts become, in a sense, real and concrete: the association concept-object is thus the basis for a stable understanding and learning process. It is rather common that primary school teachers use everyday objects in their didactics and there are numerous and very interesting examples of applications of this kind. However rather often primary school teachers need support to understand the physics content of the objects or of the phenomena that they are proposing to their pupils; it is also very important for them to exchange experiences with other teachers in order to compare results, methods and practice, in particular if they are involved in new developments.

To address both needs, that is to provide support on the physics aspects and to give the possibility of exchanging and discussing educational materials, we have experimented the use of a “blog”, which is a new form of communicating through the Internet. The blog is a short expression for “web log”, that is a kind of diary log book published on the web, which can be read and commented by all the interested people. The positive aspects of the blog, is that its use is easy and friendly and that, being accessible on the Internet, the communication is rapid and widespread.

Our weblog started in January 2003; its address is http://pergioco.splinder.it. It is followed both by the university students of the course of “Scienze della Formazione Primaria”, who are preparing to become primary school teachers and have started their practical training in school, and by in-service teachers, who host the students in their classes. In the presentation we discuss examples of proposed activities and of dialogues on the weblog.

Introduction

The idea of using toys and everyday objects for the introduction of basic physics concepts is widely accepted, in particular at the level of infancy and primary school teaching, because, by seeing and touching a concrete and familiar object, also the related physical concepts become, in a sense, real and concrete: the association concept-object is indeed essential for a stable understanding and learning process. The teachers like this approach, because toys and everyday life objects are easy to find and to use, the pupils become very soon involved and interested in the practical activities and, finally, interdisciplinary links are possible and fruitful. However, very often, it is just the scientific side of teaching and learning through toys which is weak, mainly for two reasons: on one hand the physics of real objects is not always easy to understand and therefore to extract; on the other hand the didactical aspects are critical, since the teacher tends to oscillate between extreme attitudes, either he “explains” too much, or he disregards all the potentiality that the real object has to introduce the underlying abstract concept. The former attitude, of trying to explain every aspect of the physics of the object much beyond what the pupil can understand, is due to an excess of enthusiasm of the teacher, who is eager to communicate to the pupils all the nice physics contained in the real object, thus forgetting that the main purpose of the activity is not to “transmit” to the pupil a difficult concept but to help the pupil to “construct” his personal understanding of the underlying physics. On the contrary, the latter attitude is due to the fact that often the teacher does not understand completely the underlying physics concepts and therefore he prefers to limit the attention the other didactical potentialities of the real object, such as those discussed above, which are more familiar to him.

Training teachers to approach physics concepts through toys and everyday life objects requires therefore to address three points:

- to select toys or familiar objects which have a physics content that is interesting and accessible at the primary school level,
- to understand what is the “hidden physics concept”,
- to use the most convenient didactical approach.

To obtain these results, it is not sufficient to give a detailed description of how the toy works and recommendations on how to present it, but it is important to have critical discussions, possibly of real
experiences, because, in order to understand and appreciate an activity, one has to analyze the context in which it develops. Also, there are numerous activities based on toys which the teacher uses continually and it is essential to encourage him to develop his own approach and to discover by himself the potentiality of a given toy. A last, important aspect is represented by the timing: a teacher needs time to understand how to introduce new ideas in his own didactics and in the curriculum he has foreseen for his class.

An efficient approach to train primary school teachers should therefore take all this into account. We realized the importance of all these aspects when, last year, thematic national forums were implemented in the Internet by the education ministry to train the newly employed teachers. The forum simply consisted in an opportunity to exchange ideas and compare experiences on a given theme under the coordination of an expert moderator. Having been the moderators of the forum on “Physics of everyday objects”, we experienced directly the potentiality of this kind of exchange via Internet and started to think of something similar but closer to a conventional “real” training course for teachers. We found that the use of a blog can provide a significant help in this direction; to understand how, we must first examine shortly the structure of a typical blog and the modifications needed for a didactical use.

The “blog” is an abbreviation of “web log”, because it is a kind of diary logbook published on the web. The “blog master” opens the blog in a given web platform which provides this possibility, chooses a name for his blog and publishes periodically his diary book, developing ideas, presenting documents and discussing arguments that he considers relevant for the selected theme. Once published, the text (which is called “post”) is immediately visible on the internet, carries the date and the time of the publication and is also stored in a dedicated archive, from which it can be extracted at any later time for possible changes. Since it is published on the Internet, it is visible to everybody. The interesting feature is that any reader, without the need of a previous registration, can easily introduce his comments under the selected post of the blog through a facility called “comments”, which is accessed by a simple “click” on a hot word located at the end of the post. Since the comment is attached to the blog, it is visible to everybody on the Internet; in particular it is visible to the blog master who, if he does not like it, can cancel it from the blog. Both the initial post and the comments can be written directly as plain texts in the dedicated window which opens automatically or can be copied by a normal “cut and paste” procedure from previously prepared documents. The blog master can also insert images or other types of documents in particular formats by introducing links to web sites which contain them, while this possibility is not available to the “comments”. Another important feature is the archive facility: indeed, all the blogs are stored in sequence and archived monthly, but they can be accessed at any time in the archive and comments can be included even at a later time.

The procedure for our blog based course was the following.

- First of all we opened the blog with the blog name “pergioco”\(^1\); the initial page contained the usual description of the aims and contents of the blog.
- The group of interested participants was then formed and the idea of the blog was presented in a preliminary “real” meeting, in which instructions were also given for the use of the blog and the list of activities to be developed was discussed. In the choice of the arguments the preference was given to simple, basic themes for which the participants had already some experience and could thus contribute directly to the discussion through the blog. The selected arguments were: equilibrium, walking and running, Archimedes, forces.
- Each participant had then to register in the blog and to present himself to the group using the blog “comments”. In his presentation, the participant had to describe briefly his class, pupils, school and educational experiences. This was a very interesting part of the blog and it took much longer than foreseen, because the participants had to understand and become confident in the use of communicating through the blog, but at the end we had a rather lively and exhaustive picture of the teachers, of their interests, experiences, hopes, good and bad aspects of their life in school, etc.
- The first argument, on the equilibrium, was then “opened”, by proposing on the blog the use of a simple toy, the Standing doll; comments and discussions followed very soon and some participants proposed their own activities on equilibrium. Since only text files can be posted as “blog comments”, we asked the participants to send us by e-mail any picture, image, photo which they considered to be useful and we published them later both in the blog and in our conventional web site, http://www.iapht.unito.it/giocattoli/pergioco. The contributions were very rich and interesting and the equilibrium argument was left “open” to encourage everybody to enter the discussion and experiment the proposal in his own class.
- The second argument, on “walking and running” followed after a couple of months, along a similar line; it was also the last argument for the present, we will continue in the autumn with the other themes.

\(^1\) “pergioco” in Italian means “let us play”.

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In the following section, a sample of activities and discussions on the blog will be given. They are not exhaustive, but are sufficient to understand the basic features of this method of distant training of teachers.

**Examples**

The toy we proposed on equilibrium was the “Standing doll”. The picture of the toy is shown in figure 1.

![Figure 1](image1.png)

It consists of a plastic container with a round bottom, which can be opened and closed easily and can simulate a “doll”. If it is empty, it is very difficult to have it standing in equilibrium, while, if a heavy object is fixed to its bottom, the equilibrium is much more stable. The hidden physics consists in understanding that the gravity force pulls the doll downwards while there is a force that pushes it upwards and the two forces balance more easily along the same line if the center of gravity is low.

We suggested to use as a starting point any observation of real life events in which a light object (for example an empty plastic bottle) overturns easily, while a heavy object is generally more stable (for example the plastic bottle with some water at the bottom). The pupils should then make the standing doll, discovering by themselves how to fill it in order to make it stable. They should then observe how it oscillates around the equilibrium position and discuss why the equilibrium is reached. The teacher should not force any explanation, but just help the pupils to describe what they observe and discuss the results of the tests and trials they have performed.

We suggested also other toys on equilibrium, such as the Acrobat donkey, the Balance, Calder mobiles, etc., as well as simple gymn activities such as L’equilibrista, in which a pupil is asked to walk carrying a heavy object in his hand while following a narrow strip glued to the floor. Detailed descriptions can be found either on the blog or in our web site; although written in Italian, they should be easy to understand.

Interesting proposals came also from the participants, for example a teacher presented an unusual play based on pupils walking on stilts (picture in figure 2).

![Figure 2](image2.png)

The comments came gradually during about two months. Indeed, it took some time for most teachers to become familiar with the new method, but then, slowly, they started to write, either to describe their discussions with the kids, or to ask for explanations, as in these “comments”.

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Ciao a tutti, sono Angela. Ho letto il secondo intervento sull'equilibrio. Per quanto mi riguarda non ho ancora scritto nulla in quanto ho cercato in questi giorni di parlare con i bambini per capire che cosa può essere per loro l'equilibrio. Per i bambini “equilibrio” è sempre “qualcosa” che “si fa” o si “gioca” quando si svolgono attività motorie … fare il gioco di portare oggetti sulla testa, fare il gioco di portare la pallina nel cucchiaio (con il cucchiaio che girava) ecc.

Hello to everybody, my name is Angela. I read the second proposal on equilibrium. I have not yet written anything because in the last days I talked with the kids trying to understand what can be for them the equilibrium. For the kids, “equilibrium” is always something they must do or play in motion activities, for example playing to carry a small ball in a spoon.
My name is Laura. About the hidden physics of situations in which we look for equilibrium, I would need an explanation: why, when we walk on the balance board or on the edge of the footpath, it is spontaneous to open the arms? The same thing do the acrobats on the thread, who use also balance poles of different shape. I am sure that, in a discussion with the kids, this question will be raised, because it something they do spontaneously, when they do equilibrium games. Thanks. Laura Mantello

Conclusions

The examples reported and others that can be found in the blog site show that this method of training primary teachers based on the blog is neither a conventional training course, nor an experiment on distance e-learning nor a “forum” between teachers, though it shares some features of all these types of training. Using a blog for training purposes offers positive and less interesting features. One of the positive aspects is its extreme simplicity and friendliness, which makes it possible to implement and use a complex facility as an online forum with very limited resources and informatics skill. Another positive aspect is that the blog is dynamical and short lived: it is not intended to be a permanent record, but to be used on the spot, as a newspaper, to provide an immediate reaction and the possibility of a real time exchange. This encourages exchanges which have the freshness of everyday life and makes all feel to be “on the same side” so that all can contribute.

There are also negative aspects. The principal is that a minimum level of ability and familiarity with the computer and with the Internet is needed. Also, not all contributions can be easily documented and transferred electronically and, in any case, it requires a certain effort, time and resources to do it, although the number of teachers for whom this does not represent an essential drawback is slowly growing, in particular among young teachers. On the other hand, the quality of the blog itself is improving with its diffusion and more features are becoming available which should render it more powerful and its use more friendly. We will therefore continue the experiment in the coming year and extend it to other applications, as carrying out a virtual lab for the first formation of primary future teachers.