Concept Cartoons as a Teaching and Learning Strategy at Primary Schools in the Czech Republic

Eva Hejnová

Faculty of Science, J. E. Purkinje University, Usti nad Labem, Czech Republic

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The contribution deals with tasks that are usually called „concept cartoons“. This type of tasks is not too known at Czech schools but their potential is large, mainly in respect to the possibility of the concrete application of constructivist theory in the classroom. A set of seventeen concept cartoons for the topic „Motion and force“ was created by the author of this contribution in the forms of slides in PDF format and it is possible to use them for interactive whiteboard too. Concept cartoons are designed for learners at the age of 13 to 15 (i. e. the pupils of lower secondary schools in the Czech Republic).

Keywords: concept cartoons, constructivist learning, lower secondary education, teaching and learning strategy, misconceptions.

Introduction

The concept cartoons consist of cartoon-style drawings showing every day or some interesting situations but they are not humorous or satiric. They have the form of a multiple-choice question, additionally concept cartoons integrate the dialogue among so-called “cartoon characters”. The cartoon characters (usually three or four children) put forward alternative viewpoints about science concepts and the format of the task invites learners to join in debate with the cartoon characters (see Figures 1 and 2).

Concept cartoons provide a appropriate stimulus for discussion, challenge and development the learners’ ideas, promote thinking and reasoning, help learners to ask their own questions and provide starting points for scientific investigation and enquiry etc. Typically a concept cartoon is used as the focus for a group discussion, which can then lead on to investigations to decide which of the viewpoints put forward is the most acceptable [1]. This approach is defended by numerous researchers as not only better representation of the character of science but also as challenging of critical thinking and developing of conceptual thinking.

The concept cartoons tasks use teaching and learning approach, which takes account of constructivist views on learning in science [2]. The potential of this type of tasks is large, mainly in respect to the possibility of the concrete application of constructivist theory in the classroom [3]. Unfortunately, no detailed guidance that sets out the implications of the research on constructivism for classroom practise is available in Czech language.

The set of concept cartoons for the topic Motion and force

The set of seventeen concept cartoons for the topic „Motion and force“ was created in the forms of slides in PDF format and it is possible to use it for interactive whiteboard too.

The tasks are designed for learners at the age of 13 to 15 (i. e. the pupils of lower secondary schools in the Czech Republic). These concept cartoons were developed according to FCI (Force Concept Inventory) test [4] and some other tasks from book...
“Concept cartoons in science education” by S. Naylor and B. Keogh [5] and they were formulated for the needs of learners at lower secondary schools.

Each of the concept cartoons contains some cartoon or more often a photo illustrating some situation, one or two introductory sentences and usually three or four statements written in the form of dialogues among cartoon characters. The statements include more frequent misconceptions and alternative conception. Only one scientifically acceptable explanation usually exists among the statements raised by cartoon characters. However, other statements are not implausible and are often based on students’ experiences (most frequent misconceptions [6], so that learners are likely to see many of the alternatives as credible). If learners are not confident in expressing cartoons characters’ ideas, they might express their own thoughts. That’s why is included also the blank speech bubble with the text “You are wrong. I thing that…” [5].

The statements are written as short as possible, minimal amounts of text are suitable for learners with limited literacy skills. Scientific ideas are often applied in everyday situations, so that learners are challenged to make connections between scientific and common situations.

In next text two concrete concept cartoons from the set are presented (Ice roller coaster and Space walk), including short comments for teachers.

Figure 1. The example of concept cartoon “Ice roller coaster”

Comment to the figure 1

Answer C is the most acceptable.

Pupils often find difficult to understand the statement that an object will keep moving with a steady speed if it has balanced forces acting on it and when a pushing force stops acting then the object will begin slowing down promptly.
Pupils often think that an object „is losing“ some force gradually if we stop acting by force. However, if the stopping of the sledge was caused by stopping of acting force, the sledge would stop promptly. The stopping of the coaster is caused only by friction and air resistance. If pupils find of friction or air resistance difficult, thinking about reducing friction as „more slippery surface“ can help.

**Figure 2. The example of concept cartoon “Space walk”**

**Comment to the figure 2**

Answer C is the most acceptable.

In space, where there is virtually no air resistance or friction, a moving object will keep on travelling almost indefinitely in the same direction, unless it comes under the gravitational influence of a star or a planet.

Gravity is an invisible force, and pupils often have difficulty in visualising how gravity can affect things that are far away as stars and planets, or the Earth and satellites.

**Utilization of Concept Cartoons in Teaching**

The concept cartoons help well in eliciting student misconceptions, provide the participation of almost all students in class discussions and motivate the students in order to advocate and support their arguments and, what is the most important, eliminate their misconceptions [7].

The concept cartoons can be used in variety ways and in a wide range of settings [5]. They are often use at the start of a lesson as a stimulus for discussion, to identify areas of misconception and questions to be answered. However, it is possible to use them during a
lesson or at the end of the topic, where the emphasis might be on reviewing or consolidating learning.

The separate tasks can be used by individual learners or in collaborative learning settings, but the social interaction involved when the concept cartoons are used collaboratively is very important. It is also valuable to the learners for clarifying what ideas they hold [5].

It is possible to use the concept cartoons for assessment purposes too. One way is to get learners to respond individually to a separate concept cartoon. In this way teacher can find out about the ideas that learner hold and the reasons that underpin his ideas. Sometimes it is useful to assess how learners respond to the same concept cartoon before and after teaching a topic (see for example the textbook [8]).

However, it is more usual that learners discuss in a small group without any systematic assessment. Learners can fill in blank speech bubbles with what they think or produce their own concept cartoons; their teacher can take their ideas into account in developing the lesson in the most appropriate way.

It is also valuable for science teaching that the concept cartoons very often integrate concepts across different areas of science, so learners are compulsion to think across various topics.

Conclusions

The set of the concept cartoons was given to approximately ten Czech teachers in 2012 and 2013, who used them during their teaching. Some of these teachers provided the feedback. They often stated the concept cartoons played a useful role in development of the teacher’s own subject knowledge and understanding and they appreciated that their pupils were more involved in and motivated towards science. Nevertheless, it has not been carried out any systematic or more extensive research into those problems in the Czech Republic.

However, many foreign studies [9] show that concept cartoons can be utilized in science education due to its compatibility to constructivist approach, its success in activating and motivating learners and in identifying and eliminating students’ misconceptions.

I think this method is very important in initial teacher education too, because the budding teachers can use concept cartoons for auditing and developing their own scientific understanding, for identifying likely pupil misconceptions and planning suitable approaches to address these.

References


