Trigger Teach

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Abstract

This paper describes a new teaching method, applied on high school students by two experienced teachers, one in Physics and the other in Mathematics. The method, called Trigger Teach, follows two targets:

1) *Increasing the psycho-intellectual reception permeability of the student for the information, for an efficient, new data acquisition.*
   The originality of the method consists in how the student is encouraged to ask questions in the learning process. This is done based on the observation that the student's interests are in relation to age and social environment in which on the one hand and on the other hand the student´s wish to put the teacher into trouble. The paper also shows this method results in class.
2) *The second target is based on the idea that for efficient data assimilation at least two of the following steps are needed:*

   - *The active phase, described as the primary way of learning through manipulation and action that is for the student of any age.*
   - *The image representation stage, based on the dynamic change of the perceptual visual information in an emotional charged information. The teacher's role is extremely important at this stage; he must use interdisciplinary knowledge, as well as scientific content, but also a greater ability to manipulate the information into an art form. Basically the teacher charges every notion with any suggestive image representations, no matter how abstract the notion would be.The idea is to bring the notion alive.*
   - *The symbolic step represents the final stage of learning. We are in the situation in which the student was emotionally charged and focused on the information we wanted to send him, and in this phase transition is made from personal images and emotions to symbols generalizing a process, a phenomenon and/or even abstracting them.*

Jerome Bruner´s genetic-cognitive theory[1] is influenced by Piaget´s research. Bruner introduces learning and the construction of knowledge as possible in three ways according to the different stages of a pupil’s psychical and emotional development:

- *the enactive way, achieved though the free manipulation of objects and exercise (both used in the construction of abilities and skills, as well as in the acquisition of first knowledge). This means is specific to the first years of life.*
- *the iconic way, or the acquisition of knowledge supported by visual images, without actual manipulation of objects. (specific to the 5-7 group age).*
- *the symbolic way, made through the replacement of images by symbols, which helps the construction of concepts and notions.*

The teaching method that avoids the formal rigidity and gives the information a real-life meaning, can only be made, in our opinion, taking into account the following two basic elements:

- *the pupil's permeability to the reception of information*
- *the structuring of the teaching process based on new principles.*

1 E Pupil's Permeability To The Reception Of Information

1.1 Premise

Scholastic learning is esentially a process that disregards the immediate needs of the pupil. This assumption is made starting from the common knowledge that the information that pupils acquire was once, at the moment of its production, seen as answers to essential questions of our forefathers. In other words, today's pupil is confronted with answers to questions that were not asked by his immediate needs.
Making pupils sensitive to the reception of information turns into a necessity, in the sense that the pupil should be encouraged to ask himself questions that the teacher will answer.

1.2 Solution

a) Experiment description

Since 2000 we have been conducting class experiments with a view to making students permissive and receptive to new, sometimes boring pieces of information.
While conducting such experiments we have taken into account the following elements:

- first of all the target age group, as the individual's needs differ according to the age or life stage.
- secondly the social and cultural environment that the pupils are coming from and that considerably influences and determines their needs and aspirations.

The method we have applied is described as follows:
At the beginning of a new chapter we did no longer introduce the objectives, but presented in general terms the real life significance of the basic information of the chapter in question. Then we said that the teacher was now an extraterrestrial being that knew everything about the respective theme and the pupils were encouraged to write any questions they wanted about the new chapter on a piece of paper.
The pupils that took part in the activity had ages between 14 and 19.

b) Pupils' feed-back

The pupils's interest was visibly triggered, judging from the big number of questions. Both questions within the school curriculum (70%) and extra school curriculum questions (25%) were asked. There were also questions (5%) totally unrelated to the topic, which were asked by pupils coming from a poor social/cultural environment.

c) Conclusions

Through this experiment the permeability of the pupils was raised, as pupils were no longer simply receivers of answers but they turned into question askers.
It was noticed that pupils enjoy asking questions for two reasons:

- they feel they have control over the development of the lesson through the topics they put forward,
- they are allowed a direct "confrontation" with the teacher, a process in which roles have been changed: pupils ask and the teacher answers and this happens in a context created by the pupils and not imposed by the teacher. We deliberately named this activity a "confrontation", because the pupils will instinctively try to set the teacher in a difficult situation through their questions.

The pupils' attention and interest increase significantly, as from now on they will expect new answers at every new lesson, answers that the teacher will have to formulate taking into account not only the school curriculum but also the pupils' interests. The pupils' questions cover not only every-day aspects

of life but also sociological aspects of their communication with and their approach to the people and the reality around. The teacher is thus triggered to bring real life examples that can raise pupils' interest.
This experiment conducted also to a reconfirmation of some already known psychological aspects of teaching.
The following conclusions are to be mentioned in this respect:

- the questions coming from the 9th and 10th grade pupils (age group 14-16) are mostly about the reality around; the questions asked by the 11th grade pupils (age 17) become visibly more personal, as starting from this age, irrespective of the chapter in the school curriculum, the information pupils expect should answer their questions regarding the evolution of the individual in a social context; as for the 12th grade pupils (age group 18-19), they ask highly personal questions that prove their need to shape their own personality and to assert themselves.

- Another interesting aspect to be mentioned here is the creation of groups. There are obvious tone differences between classes of pupils belonging to the same age group. We have looked at this aspect from two perspectives:

- the level of culture and education, that can differ from class to class;
- the personality of the class leader can imprint on the group's characteristics of self-expression and receptivity.

2 The structuring of the teaching process based on new principles

We believe that irrespective of the age, the process of learning and construction of knowledge confronts the pupil with all the three above mentioned ways, hereafter referred to as stages, as follows:

2.1 The enactive stage

which is the primary method of learning through physical performing of the task and motor responses, is for any age group the experimental stage. At this stage, the pupil comes into direct contact with an experiment, acknowledges the existence of new instruments and learns to manipulate them, without associating the newly acquired knowledge with its scientific significance. The pupil discovers and learns at this stage through direct contact with and handling of objects, developing thus new skills.

2.2 The iconic stage

based on the reception of information starting from visual images and triggered emotions, places the acquired information at an emotional level with the learner. The teacher plays now an extremely important role, as he has to make use of interdisciplinary knowledge with a scientific background, to have in view the cultural dimension of the environment that the pupils are coming from and to give an artistic form to the presentation of information. Any abstract piece of information has to be accompanied by a suggestive representation now, thus acquiring a life of its own. This happens because a highly suggestive image will consequently trigger related emotions.
Taking for instance Physics as a school subject, we will refer to the movement of objects in a gravitational field and explain that an expression such as `a body falls freely from a given height` will not find any resonance in the learner. A more real-life expression of the type `Radu (a classmate`s first name will be used here) wants to practise paraschutism and wonders what will happen to him when he jumps with the paraschute from an altitude of 2000 ms.' has brought the phenomenon of free falling closer to reality and has created an emotion in the classmates as the virtual question refers to one of them.
In Mathematics, in order to teach the sequence of numbers in a row as being defined by a recurrence relation that has to be determined and whose specific monotony, limit, convergence or non-convergence properties have to be set, the following starting questions could be used: Are there rules or laws to be respected in the organization of life?; Which results are significant - the ones obtained by the analysis of the convergent or of the divergent recurrent sequences?; Is the visual impact of a living structure a representation of the structure of recurrent sequences? At this point, some youtoube short films could be watched, in order to raise the pupils`interest on number sequences as being determined

by recurrence and to produce the expected effect of the pupil`s questions. This will help teaching the school curriculum interdisciplinarily through experiments.
In the same way, structures of the living world can be used, biology experiments such as determining the length of an unwrapped snail shell or the structure of a tree growing – counting the growing of tree branches makes the connection with the sequence of Fibonacci.
Another example is based on the use of music in both Mathematics and Physics in order to explain different notions. As pupils are generally interested in music, a good way to teach geometrical progression is by making the connection with a string instrument, for instance the guitar. The same classmate, Radu, will now virtually play the guitar and the pupils will have to measure the guitar fretes and find geometrical progression. Recurrence – in this case the geometrical progression- is thus, however abstract as a term, a real fact, as real as the ratio of different extremities of the human body. This proves that we perceive music as an enchanting auditive experience mainly because it is produced by instruments that respect the same ratio as the ones to be found in the construction of the human body. It has also been noticed that the frequence of the notes in the ratio 8:5, the so-called ´major sixth´, gives the music a positive sound, this ratio having been used by Mozart in the composition of ´The Magic Flute´. In this way pupils will remember the meaning of a geometrical progression, as well as the significance of sound frequences in Physics.

2.3 The symbolic stage

represents the last stage of learning. At this point the pupils have already been emotionally charged with information. What happens next is the translation of particular images and emotions into symbols generalizing a process or a phenomenon, moving further on to the construction of abstract notions.
This is the moment for the teacher to turn an easy age-specific language and some already created mental images into a scientific language that brings into focus interpretation and drawing of conclusions from previous discussions.
This is a gradual process, and in order to obtain the best results the teacher has to maintain the parallel between the plastic images and the scientific language.
In this way, the pupils have the teacher´s support and succed in giving a global meaning to the acquired information and in expressing scientifically what they have just understood of felt in relation to the presented information.
The teaching experience has proved that this is one of the most difficult processes. Most pupils tend to remain at an emotional level of understanding the information. They feel that they have basicly understood the concept but are unable to formulate it scientifically.
In order to take pupils to the next level, the teacher has to permanently make associations and give scientific significance to the images created in the previous stage.
Only through repetition and exercise can pupils assimilate the necessary language that will help them give meaning to the scientific terms and put notions into a general context. Once this level reached, then the reversed process is also possible. Confronted with a scientific problem they will be able to identify the phenomenon using emotion-heavy images from their personal experience and to understand the scientific message.
To sum up, in the second part of our work we explained how the stages of the child´s psychical and emotional development can be interpreted as general stages in the process of learning.
´We teach a subject not to produce little living libraries on that subject, but rather to get a student to think mathematically for himself, to consider matters as an historian does, to take part in the process of knowledge-getting. Knowing is a process not a product.´[1]

References

[1] Toward a Theory of Instruction, Bruner,Jerome