The Question of Turn of Millennium in Creative Engineering Education

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As we approach the turn of the millennium, the volume of information available in our society is growing at an increasing rate. Wide, never before seen perspectives will open in the acquiring of knowledge and the realization of life-long learning. But new forms of education hide many contradictions.

I. GENERAL CONSIDERATIONS

What are the concerns?

1. Appearance of information as images, limited fantasy

Parallel with the development of mediums we observe a reduction of the "cultural" needs of the human brain. This process has a negative effect on achieving abstraction in constructive thinking. When reading books, we are forced to translate the information on paper into an image in our brain. Rereading brightens the image as a result of the added details. The same information appearing in cartoons, on TV or in movies provides a clear visual experience and, therefore, reduces the abstraction in the human brain.

2. Passive reception, bad rate of memorization

If information is received in combination with manual activity (touching, sketching, writing, etc.), the information is better retained in the brain, and creative skills are enhanced and have a stronger base. When a medium forces us to receive information passively, the observation is complete, but the efficiency of memorization is very low. The speed of oblivion is increased, as there is no memory of the same information as a different kind of experience. Especially experiences that may turn information into knowledge or creative thought are lacking.

3. Missing skills in information selection

Furthermore, we are faced with a spectacular increase in information, which makes our reception of data more global and multiplies them daily. Oddly enough, this spectacular increase in information takes on a negative quality. Modern information transmitters, like computer networks and related databases, provide us with newer and newer information at such a high rate

that we can memorize only a fraction of it. Lack of time and skills for selection may result in a feeling of saturation.

The ability of the human brain to absorb information can not grow sufficiently to match the demands of the information society.

4. Missing the boat

The world population will be sharply devided by their access to information. There will be extreme disparities between continents, people and social classes. Differences in level of education, wealth and infrastructure could mean that hundreds of millions of people will be left behind from birth and unable to catch up. This could add to the sources of tension already present throughout the world.

5. Open to manipulation

A major concern is that the huge flow of information is open to manipulation. Most importantly, both the written and image media filter information, the so called rectifier effect, which can be used or misused. Nowadays this is common practice in our society. In many cases the information provided has an illusion of objectivity and completeness, but in reality the media transmits it through a filter. Because of this possibility - which is an increasing danger - the unprepared receiver could be saturated with manipulated information, not noticing that he was precluded from a huge amount of data. At the same time, however, he had no alternative to choose the necessary information.

What could be the solution?

Skills should be developed for filtering of information and increasing access to information.

Information can become knowledge, if the human brain can rebuild it. Knowledge is not simply remembering, but creative production.

In brief:

It is the responsibility of mankind to use and not to misuse information. If it grows beyond our control, it could cause the death of civilization, but managing it in the right way will be a source of development. Teachers have a great responsibility in this process.

II. REALIZATION IN MACHINE DESIGN TEACHING

The method of machine design teaching in reflection of multiplied information

In the information society the increasing speed of life can also be experienced in education. The possibility for personal teacher-student interaction is decreasing, so there is a need for methods of information transfer which are suitable for supplying students with the necessary information in a limited time. These methods should allow students to filter the information for important elements, and use these as a source for creative application.

In the educational process is built on three principles:

1. **Flexible structure of education**

2. **Maintain connection with students**

3. **Up-to-date method for transfer of knowledge**

Elements of the 1st principle:

- Design-projects
  - concentrate on contents and output

- Test paper
  - allows for feedback (non compulsory)

- Constant consultation and demonstration

Elements of the 2nd principle:

- Student progress database sheet
  - up-to date information
  - Easy and quick operation
  - Easy to follow individual progress

Elements of the 3rd principle:

- Standard forms
- Highlighted information
- Application of multimedia equipment
- training in information filtering
- Making information easier to absorb
- Helping in developing of creative thinking

In brief:

The independence of students and their need for personal contact with the supervisor are in a sense contradictory.

To transfer up-to-date information and knowledge through modern media allows the student more independence. All students can look through the syllabus of the study material on the Internet at any time. This syllabus gives ideas and helps in the "filtering" process, by highlighting important information.

The evaluation of design-projects is set up in such a way that students can get a many extra points if they make use of consultation, which is available on appointment basis (personal contact). Thus, they are indirectly forced to use this opportunity, which is a very important aspect of creative engineering design. Doing so, we can mix independence and the need for personal contact.