***COGITO ERGO SUM HOMO*MACHINE?**

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When European Union (EU) heads of state and government met at a summit in Lisbon in 2000 (Lisbon declaration, 2000), they set the goal of making Europe 'the most competitive and dynamic knowledge-based economy in the world'. In a knowledge economy, the 'most effective modern economies will be those that produce the most information and knowledge, and make that information and knowledge easily accessible to the greatest number of individuals and enterprises'. This policy brief suggests that individuals and companies can easily collaborate and compete globally, and that the solution for Europe in meeting the Lisbon goals is to *invest heavily in education and skills*. Statistical evidence briefly demonstrates the high return on investment in education. It makes recommendations for ensuring that Europe' school systems become more flexible and effective in improving learning outcomes, and argues that Europeans capacity to compete in the global knowledge economy will depend on whether its higher education institutions can meet the rapidly growing demand for high-level skills. International comparisons demonstrate the challenges confronting Europe but also illustrate the success of efforts to meet such challenges. Education and skills will be most important in this process. Those statements are approx. 13 years old. Let's look at this problem from today's perspective. What influences a student's experience is briefly shown at the Figure 1.

Figure 1: 4 pillars of the education system.

One of the basic questions facing educators today has always been "*Where do we begin in seeking to improve the teaching/learning process*?" Fortunately we do not have to begin from scratch in searching for answers to this complicated question. The experts recommend that one place to begin is in defining the nature of thinking. Before we can make a better process, we need to know more of how people process information, how people think. New discoveries in the field of developmental cognitive science and neuroscience hold great promise for improving current teaching methods (Anderson, 2007). Yet there remains a significant gap between the scientific discoveries that could improve our education system and the application of this knowledge. If we want to introduce innovation in schools we must primarily take into account the whole complexity of this system, which is symbolically represented in Figure 2: the appropriate infrastructure and with it connected teaching practices, connectedness (social interaction) and learning practices, assessment, leadership and values and, last but not least, contents, curricula and organization must be taken into account (Flogie, 2013).

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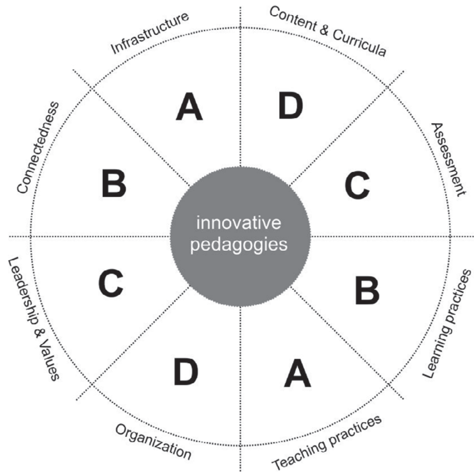

Figure 2: School system and innovative pedagogies.

From Figure 1 it is obvious that the students' experience and the quality of their knowledge is most important. From this point of view, in recent years we have talked a lot about efficiency of teaching and the learning process. We all know that two diametrical possibilities exist in these processes, namely "classical" class teaching in large groups (with low efficiency) and individual teaching, 1:1 teaching or one teacher for one student (for example: Socrates and Plato, Plato and Aristotle, Aristotle and Alexander the great etc.) So the average efficiency, if normal (Gaussian) distribution is assumed, according to figure 3 oscillates between 50% for teaching in the class and 98% for individual teaching. These are our limits.

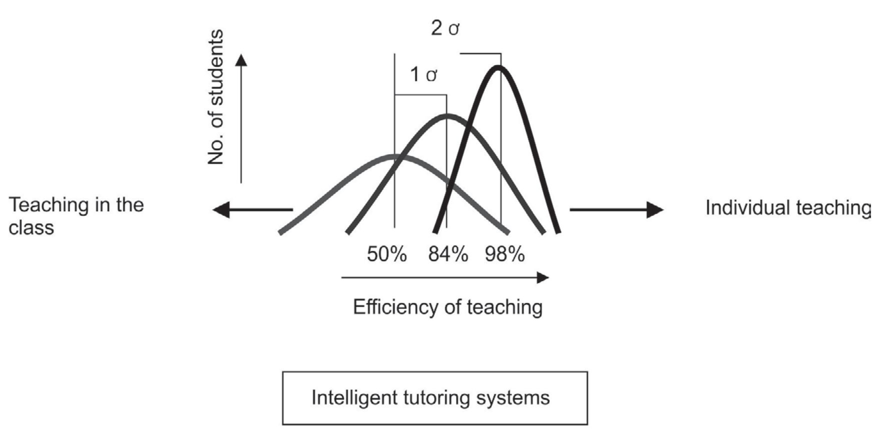

Figure 3: Efficiency of teaching process.

If we want to increase the efficiency of (todays) teaching process from 50% we must somehow incorporate a 1:1 philosophy in the regular class room process. This could is only possible through the use of technology, with innovative 1:1 pedagogy, which means every student would have their own tutor, specifically their own i_tutor (intelligent computer tutor - netbook). A lot of research in education is concerned with the development of intelligent applications such as Intelligent Computer-Aided Instruction (CAI), intelligent tutoring system (ITS) and intelligent learning environment (ILA) (Allen and Seaman, 2008, Aberšek, 2010) and also with applications that can be justified as being consistent with educational theories. Providing these forms of intelligent tutoring, poses unique challenges, because it requires an intelligent system that can model domains as well as student behaviours and mental states that are often not as structured and well-defined as those involved in traditional problem solving. Advances in AI techniques for reasoning under uncertainty, machine learning, decision-theoretic planning, as well as the

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increasing availability of sensors that can help capture the relevant user states, are promising means for the field to face these challenges (Bermudez, 2010). Success in these endeavours has the potential to have a great impact on our society, and on its ever-increasing need for high quality teaching and training. The most promising way for today is use of intelligent educational systems that promise increasing efficiency according to figure 3 of up to 84% (Conati, 2009). The most important part of such systems is the use of artificial intelligence that makes the following possible:

- representation of knowledge and teaching/learning process,
- intelligent selection (selection of most appropriate tasks, i.e. individualisation),
- learning from previous experience (experience based learning), etc.

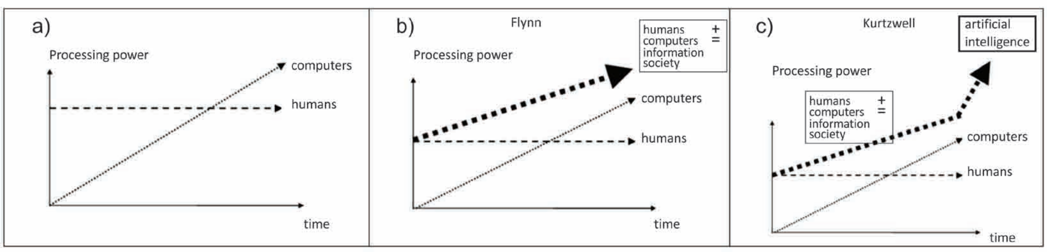

Figure 4: Do we think differently? (Kurzweil, 2005).

What happens with humans` intelligence? Try to find an answer to this question in the example of processing power. In figure 4 the short historical overview and, comparison of human-computer is presented. It is possible to conclude that human processing power was nearly constant before the computer era (figure 4a) and after computer power it slightly decreases linearly. If we combine human and computer the processing power considerably increases and results in an, the information society (figure 4b). But the problem is that human processing power decreases. And if we start talking about artificial intelligence etc., the whole processing power increases rapidly (figure 4c), but could lead to the question: *What will happen to humans as such and/or is everything that is good for society (=global economy) also good for humans as individuals and/or only as a part of this global economy?*

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