An Innovate and Proven and Proven-To-Be Effective Approach in The Educational Process in Primary Schools With Help of It Technologies

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The HR market nowadays is struggling to find school and university "leavers" for entry and mid-level jobs, due to lack of practical skills. The situation is disturbing, because the gap between "supply" and "demand" in areas like IT, engineering and medicine has expanded to alarming levels, whilst in others like the economics degree courses formally there is a 'supply', but with inadequate 'quality'.

There is a set of some essential skills – IT, foreign language, math, logical thinking, problem solving, ICI (Inspiration, Creativity, and Imagination) and information processing whose possession guarantees the success of the college and university education in general.

A vast majority of government educational institutions, however, fail to understand that the university is not the place where students are expected to gain these basic skills. An innovative and carefully selected approach in the education process at preschool and primary school could bring outstanding results. The attraction of children towards the "gadgets", games and computer graphics could be of great use. A special educational software, combined with 3D graphics/animation and "learn by play" method would give much better and quicker results compared to the traditional old-fashioned approach.

Keywords: innovative education, object-oriented education, OOP training, IT in primary school, IT in education, first steps in IT, quick gain of knowledge in IT and foreign languages, IT for children, problem-solving skills

JEL Class: C3,C6,C7,C8,I8

1. Introduction

Everyone is currently aware that the businesses, the human resources market, the humanity in general are facing a huge problem in regard to the demand of up-to-date skills (IT, engineering, medicine, marketing, information analysis). The gap between the "demand" and the "supply" grows dangerously.

Even in order to survive in this world we are obliged to process and cope with a vast amount of information around us and that amount increases with each year. The skills and knowledge someone has acquired 15 years ago are considered today quite obsolete.

The key to a successful business education is to have already built solid grounds based on these 5 areas of knowledge:

- Information technologies
- English language
- Problem solving
- Math
- Inspiration, creativity and imagination (ICI)

It is more than obvious that students who are in possession of these skills will give much better final results in their education at university level of economics related disciplines.

The majority of students who enter the university are in lack of these skills (some or even all). Therefore, no matter how good a university has structured their education programs and no matter how good lecturers are involved, they achieve limited success in providing complete and effective education, because the students have no "foundations", they miss the basic, the first level skills which would allow them to assimilate the next levels.

Obviously that is a serious concern and what has been a concern yesterday is a problem today and tomorrow is already a disaster. Simply said - if you want to eat an apple today, you have to plant a tree several years ago. Therefore , in my humble opinion, all the efforts for reforms applied at university levels have little effect, if they have been

not preceded by a similar or even stronger education process reform yet in primary schools (at age of 5-12).

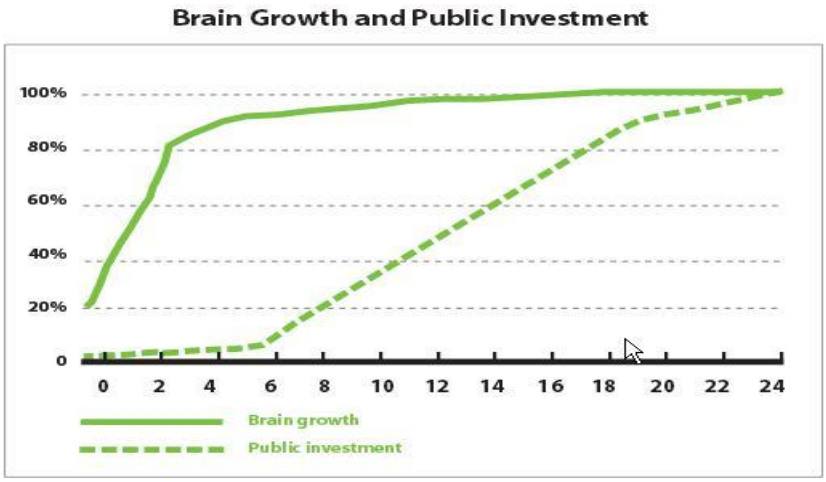
2. A Proposed Solution

Any kind of educational reform should start in the early ages. It is unchallenged that small kids learn better and quicker than a grown-up, adult person. Researches prove that children are able to "imbibe" knowledge very fast and effective in their age between 5 and 12. A research of the National Research Council and Institute of Medicine in 2002 shows that it actually takes up to 12 years for the brain to become fully organized.

According to James Heckman, University of Chicago Economist and Nobel Laureate, **investments in high-quality early education programs have the highest rate of return of any social investment**. [1]

With the neuroscience of brain development unfolding, we now know that (1) the way a brain develops hinges on the complex interplay between the genes a person is born with and the experiences a person has from birth on; (2) it actually takes up to 12 years for the brain to become fully organized, with parts of the cortex still to become organized through the later teen years.[2]

The GRAPH 1 below illustrates the trajectory of brain development compared to public investment, by age. It is striking that while 85 percent of a child's core brain structure is formed by age five, less than 4 percent of public investments on education and development have occurred by that time.[3]



Graph 1. Brain Growth and Public Investment

Therefore, the proposed here solution matters to children from preschools and primary schools.

Unfortunately, in overall the current methodology of teaching in primary schools is obsolete and uneffective. It cannot cope with the demand for modern and up-to-date skills and knowledge. *And that has to change*.

At the same time educational programs for children in preschools (kindergarten) and primary schools should be very carefully selected and planned due to the fragility of their mind and personality at this early age. Educational programs by the style of "command & demand" could have the opposite effect - "damage" their willingness to learn and could create internal "fear" and

1 Heckman, J. 2005. Lessons from the Technology of Skill Formation.

2 "Quality matters: A policy brief series on early care and education", Wisconsin Council on children & families, Winter 2007 Volume 1

3 Also there

"uncertainty" when facing new things and unprocessed information.

In addition, Rebecca Marcon, a Developmental Psychologist states that *"learning progress may actually be slowed by overly academic preschool experiences that introduce formalized learning experiences too early for a child's development status".* On the opposite – learning by playing and hands-on exploration is proven to be quick and effective, yet it does not "exhaust" kid's energy and emotions.

Psychologists say that children will develop best if they are provided with:

- Novel ways to learn
- Learn through play and hands-on exploration
- Exposure to rich, interactive language
- Opportunities to learn through hands-on interaction
- Positive, reliable and supportive relationships

Probably you all know that at an age of between 6 and 8 (could be even less) most kids (if not all) already feel the need to start playing with tablets, smartphones, laptops and other gadgets. Basically they are doing their first steps into the information technologies and the Internet world. Their first steps are usually – playing little games like Angry Birds, FarmVille, Candy Saga or whatever is now the trend, getting on Facebook/Zynga and so on.

The interest and attraction that kids have towards the information technologies is (believe me) 1) unavoidable and (believe me as well) 2)there is nothing to worry about that as long as you can wisely control it.

First steps are important (in everything). So, what if kids first steps into IT are not some waste of time – like playing senseless games, and sometimes even dangerous – like getting on the Internet through the social networks, but are something useful and constructive?

What if you make them learn and gain solid knowledge, what if you boost their ICI (Inspiration, Creativity and Imagination), what if you stimulate them to think properly and at the same time you won't take away their pleasure from doing it as they would have playing games and browsing through Facebook?

3. What "Alice" Gives?

Here I would like to introduce to you a software product called "Alice". It has been named after the popular book "Alice in Wonderland". "Alice" is an educational software product, developed at Carnegie Mellon University more than 10 years ago with the support of Oracle and Electronic Arts (EA), Inc and distributed free of charge. It is available for all major operating systems – Windows, Linux and Mac.

With Alice you can use the drag-and-drop style interaction and create 3D animations like stories, movies and games. In Alice, 3D objects (e.g., people, animals, furniture and vehicles) populate a virtual world and students drag and drop graphic tiles to create a program. Thus students learn fundamental programming concepts in the context of creating animations, videos, and simple games.

Alice has been designed to be especially suitable for courses where students are expected to transition into writing Java code, either by the end of an Alice to Java course or as preparation for a traditional Java/AP course. The 3D animation provides program visualization which aids students in understanding the execution and catching bugs.

Due to its way of interactivity, graphics/animation and "learn by play" method, teaching through Alice gives **much better and quicker results** compared to the traditional old-fashioned approach. In NSF-sponsored formal studies, Alice has been shown highly effective for introducing computer programming concepts and transitioning to Java in a high school or first year college Computer Science course.

The nice thing about Alice in regard to programming is that it does not teach **how to code software**, but instead **how to THINK in an object oriented-way** which is much more efficient.

Therefore, the design introduces students to programming in a supportive and engaging environment from which they can gradually transition to programming in commercially-used languages. More importantly, Alice functions as an entry point to all the programming concepts

typically taught in introductory computing courses.[4]

Once they start playing with Alice and getting used it, kids will start looking and perceive the world in an object-oriented way. They will easily get used to key concepts in programming like class, object, method/function, properties, variable, flow control (different loops – for/do/while, conditionals – if/else), multitasking (doing several things at once).

Besides the experience and knowledge in the object-oriented concept, the students will gain as well very good English language skills (although Alice has a multi-language interface of approximately 20 languages at the moment). Their "dictionary" will definitely extend vastly at least due to the large database of objects in Alice gallery (characters, animals, vehicles, buildings and so on) and their corresponding properties (colors, size) and actions ("move", "jump", "turn", "speak", "think").

The content-rich gallery of Alice (which is updated frequently) could assist in the education process in other disciplines other than foreign language and IT. It could help in physics, history, nature and environment sciences and so on.

When the students start to create a virtual world, they will decide where and how to place objects, what kind of actions and when these objects have and can perform, how the different objects with their properties can interact between each other. These actions with time will develop very good skills like 1) logical and out-of-the-box thinking, 2) problem solving, 3) inspiration, creativity and imagination.

A proof-of-concept study [5] found that among "at-risk" introductory computer science majors, Alice improved students' performance and retention rate within the major, and generally had a positive impact on their attitudes toward computer science.

4. Conclusion.

As we can see, Alice can be of great help in the education process. It can be used for programming courses in the middle and high-school. It could be of great use as well at preschool and primary school for teaching foreign language, basic computer literacy, nature & environment, for encouraging logical thinking, inspiration, creativity and imagination (ICI). Yet with Alice the children accept the education process more as a game, rather than as an obligation which guarantees much more interest from them and of course – better results.

For parents who are concerned that their children already spend too much time playing video games, the designers are quick to note that Alice 3.0 will not, in fact, be a video game; state-of-the-art animation is a context which exposures students to programming in a fun space so they can experience how compelling it can be.

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