Local and Global Perspectives of Education—Thoughts About Including Computer Science in International Exams

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Education is linked to international standards, and even the definition of education has been given a global international aspect with an economic highlight. The present paper presents the basic global principles of education and the controversy surrounding education's definition, the need for separation in education systems with a religious divide, the place of basic education vs. higher education, the need to acquire information processing abilities vs. the need for detailed curricula, and the link between life expectancy and education. The paper describes and critiques the debate regarding international exams that present the global aspect, which undermines local, traditional, community-centered education. In order to moderate the tension between localized community-oriented education and globalized education, we present an international evaluation model that allows the education system to settle the tension and even present priorities regarding education resources and learning deployment in basic education. The suggested evaluation model is based on the "CHAMSA" model [6] while relating to computer science as a language of technology [5], and points toward the importance of including computer science topics in international exams.

Definitions of Education—Globalism vs. Localism

There are many varied educational approaches that differ primarily in regard to the central role of the global vs. local perspective. For instance, the Organization for Economic and Cooperative Development (OECD) definition, which supports the global aspect, is that "both individuals and countries benefit from education. For individuals, the potential benefits lie in general quality of life and in the economic returns of sustained, satisfying employment. For countries, the potential benefits lie in economic growth and the development of shared values that underpin social cohesion" [17]. It is obvious that this definition is in line with the economic approach, in which education is a means of economic management for the benefit of both the individual and society. The economic education declaration assumes to determine what "good education" is in general, and what "good education for the economy" is in particular. The standards are seemingly uniform and enable economic wellbeing. This approach permits countries to create reforms and improve education [2]. In the same vein, Elwood P. Cubberly urges schools to be "factories in which the new materials (children) are to be shaped and fashioned into products to meet the various demands of life" as quoted in [25].

In contrast, Burbules and Torres, who advocate a community-centered approach, claim that "nothing could be more personalized, more intimate and local, than the educational process in which children and youth come to age in the context of acquiring and learning their family, regional, and national culture" [1]. In support of the community-oriented attitude, John Dewey promotes a more social approach, claiming that schools are a tool to develop, enrich and empower the child by means of "social power and insight" [7]. Critics might also add that the OECD approach is contaminated by a Western-dominated viewpoint, namely that "some may see it as a vehicle for promotion of globalization, which might itself be seen as the West's effort to destabilize fragile balances in world economic and political systems" [11].

Osler and Starkey propose the term education for cosmopolitan citizenship. They explore the features of education for citizenship in the context of globalization, noting that citizenship education addresses local, national, regional and global issues and state that "such a perspective is critical in preparing young people to live together in increasingly diverse local communities and an interdependent world." Education for cosmopolitan citizenship is about enabling learners to make connections between their immediate contexts and the national and global contexts [19].

International Standardization

The way to examine and assimilate international standards is by means of international tests, primarily OECD tests. OECD's economic declaration, which provides the legitimization of international tests such as TIMS and PISA, brings to mind the statement "learn what we think you should, because that is the road to economic success and better quality of life." Just as the economy is not determined by a certain government, but rather by way of international processes and through open markets, education is too important to be left in the hands of governments and politicians. After the abilities of governments in general and politicians in particular to determine economic arrangements have been reduced, the time has come for the social order of education. Indeed, in some countries today, international tests are "the God of education." As was stated, "… OECD indicators enable countries to see themselves in the light of other countries' performance... The indicators show who participates in education, how much is spent on it, and how education systems operate…." [9]. That is to say, the country enters a rating system, and is classified and stored in global consciousness as an educated or uneducated country, much like the country's credit rating. Criticism of the education system is often accompanied by the incessant discussion—"What place are we in the international arena?" This attitude is aimed at a slippery slope that negates the legitimization of intrinsic community-oriented education.

The chair of Israel's Pedagogical Secretariat (the council that determines learning content) has declared that the challenges of this era are to a great extent expressed in the international tests (PISA and TIMS) that Israel participates in. Thus, fundamental work to nurture the pupils' thinking abilities is necessary in order to improve Israel's achievements in these tests and meet appropriate international standards [28].

In order to moderate the tension between localized community-oriented education and globalized education, we present an international evaluation model that allows the education system to settle the tension and even present priorities regarding education resources and learning deployment in basic education. The suggested evaluation model is based on the "CHAMSA" model [6] while relating to computer science as a language of technology [5], and points toward the importance of including computer science topics in international exams.

EDUCATION AS A REFLECTION OF OURSELVES – LET OUR CHILDREN BE LIKE US

We shall define education in a way that assumes to include almost everyone, not just the educated and not just the uneducated. A simple definition that has eternally guided humanity is:

Education = "We want our children to be like us;"

like us, meaning, our aspirations and our ideology. It might not be detached from reality to quote the elusive statement that "education is hereditary," which can be explained by the phenomenon that educated people want their children to be as educated as they are (and make an effort to that end). We usually send our children to schools that are religious or secular like us, where they learn our language and basic beliefs.

The obvious example of "like us" or "who we are" is the secular-religious divide that exists in almost every country in which there are religious and secular citizens or a mix of religions and cultures. The struggle is typically summarized by secular people telling religious people: "We want your children to be like ours," and the religious people's reply: "We want your children to be like ours."

When there is no consensus, in most cases there is separation. Juergensmeyer [16:185] writes that "separation is the solution that is increasingly accepted throughout the world, as large unwieldy nations have fragmented into federations of smaller, more ethnically homogeneous ones…."

The controversies surrounding biology and religious studies are well documented. On one hand, there are communities that believe that evolution is the process that created man, whereas other communities see that as blasphemy and heresy. The Scopes Trial, commonly referred to as the Monkey Trial, was a famous American legal case in 1925, in which a high school teacher, John Scopes, was accused of teaching human evolution (Darwinism) in a Tennessee school. That is to say, the divide did not allow biology lessons to take place properly—each side would have to find different biology lessons; specifically "you study in your schools and we'll study in our schools". This separation still exists although some claim that biology and chemistry, including evolution theory, are probably the most researched fields in the 21st century, and that their discoveries will affect the welfare and economic success of countries everywhere. "Physics gave two things to the 20th century. The most obvious gift was power over nature… If the 20th century was distinguished by anything from its predecessors, that distinctive feature was physical technology, from motor cars and airplanes to computers and the internet…It is too early to be sure if the distinguishing feature of the 21st century will be biological technology, but there is a good chance that it will be" [8].

Testimony to the power of the education system to assimilate our first and foremost goal of education "We want or children to be like us" is a study conducted for the Israeli Ministry of Education and includes the following evasive statement: "In the state-religious education system, there was naturally preference for Jewish studies… It seems that the mother tongue (Hebrew for Jews and Arabic for Arabs)—excluding Jewish studies in state-religious education—is the subject that receives the most support" [14].

Often, not only conferring knowledge and culture is different, but even evaluation methods are not comparable. Globalization and international tests offer uniform standards in accordance with predetermined criteria. But in Jewish-orthodox batei-midrash, Muslim madrasah or Catholic parochial schools, the teacher diagnoses the most able student and promotes him personally. There is no specific test, and the process of teaching, promotion and transfer to special training in that society is a matter of "finding favor."

Many Europeans are puzzled and complain to African immigrants (chiefly Muslims) about their reluctance to assimilate among Europeans and accept a new identity. It turns out that the immigrants came from a different culture, and want their children to be like them. They say: "We came to earn a living, not to be like you."

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One example that OECD is an organization that represents Western culture is evident in the following text: "PISA is unique because it develops tests which are not directly linked to the school curriculum. The tests are designed to assess to what extent students at the end of compulsory education, can apply their knowledge to real-life situations and be equipped for full participation in society" [18]. Actually, the tests aim to see if students have acquired some of the knowledge and skills needed for the adult world. The results offer insights into how well students are doing, their attitudes to learning, and the success of education systems in overcoming factors such as gender and social background. Or in other words, "we check to which extent your children are like our children" while neutralizing cultural background and gender differences.

HIGHER EDUCATION VS. BASIC EDUCATION – SOCIALIZATION VS. LEGITIMIZATION

First a definition: Higher education means tertiary education (after high school), when the minor has become an adult. Basic education is the minor's education, namely the boy, girl, child or baby. For the purpose of clarity of this discussion, basic education includes elementary school, middle school and high school (i.e. K-8, K-12).

A brief investigation at school in basic education clarifies the centrality of the teacher's work in the teaching process [4]. More than standing in the classroom and teaching curricular material, the teacher is an educator. The educator is a role in itself, and his/her job is to train the young ones to accept the culture of society and adapt to the society in which they live. Curricular studies, that is, exactly what they learn, seems less important, as is evident from the Education Act. In Israel, as in many other countries, the Education Act determines that a child must go to school. If parents refuse to send their child to school, they are prosecuted and fined [17]. The Education Act does not deal with content or level,

but rather with the principle that children must attend school. Although pupils love vacation time and not having to show up at school, one of the most severe punishments is suspension. That is to say, pupils want to be pupils, even if they are weak pupils and actually do not learn much. This is strongly evident in schools that support high-risk populations. The law evidently expresses the wish to prevent dropouts, and indeed most children in developed countries attend school.

School teachers often talk about "dissatisfaction with teaching," the difficulty of getting pupils to like studying, and their uphill struggle. It would be almost impossible to find a teacher who is not ready to give a remorseful pupil the chance to return to the straight and narrow and improve his/her grades. We usually observe how difficult it is for teachers to accept the fact that a pupil has dropped out of school. The official channels do not abandon the child. Level by level they try to get the pupil back onto some educational track. The concern with curricular studies is much slighter than the desire to see the child in a formal framework. The main thing is that s/he does not drop out completely, and end up on the streets, an outcome that could easily lead to crime, illiteracy and exclusion from society. Thus, *the main goal of basic education is socialization*.

Globalization ostensibly crumbles this local definition. The pupil is increasingly connected to the computer, and it seems that the teacher is becoming archaic and irrelevant. Globalization increases this process, and we already find the best alibi by which the teacher leads learning but is not really responsible for the knowledge acquired by the student. These opinions are heard incessantly, and increase the uncertainty and confusion surrounding the importance of learning content. Most educators (and probably pupils too) still do not want the abolishment of schools in their sociological format, i.e. socialization [4].

Another aspect of basic schooling is that school makes sure that children do not disturb the adults. Social chaos would ensue if children ended their schooling at a young age or did not go to school at all. These children would compete in the adult world while being exploited, not liable to care for others; they would create harsh competition for the adult world in which one must see to buying food, living arrangements, and later on a family. It is not surprising that child labor is common in many countries—a cheap workforce that can do what adults do for less money and less commitment.

The above phenomena almost do not exist in higher education. Dropouts do not have a special status. A person without formal education, seeking a job and claiming that his knowledge is equivalent to that of a university graduate, would not be accepted except in extreme cases. The claim is rejected outright for a simple reason—there is no way to ascertain this knowledge. The workplace would have to invest in filtering systems just like universities do, and that is not its function. It is possible that on a local basis, the "knower" (since he has no formal degree) would start slowly, thus revealing his skills. This process is quite common in start-ups, where formal education is not very important. That is to say, higher education is usually acquired in an academic institution, because legitimization is required. It is possible to learn at home, not necessarily at a college or university. Thus, *the main goal of higher education could be termed legitimization*.

And so, we have two systems with two separate and different roles: *socialization vs. legitimization*. Global education relates differently to each of these two systems.

WHAT TO TEACH—WHICH SKILLS?

The definition that includes many definitions of 'skills' is expressed as "the ability to do something well arising from talent, training or practice" [1]. This definition and others like it should be realized in the learning objectives of school content. Curricula should deal with the actual knowledge that students should analyze, synthesize and evaluate (the higher levels of Bloom's taxonomy), discuss and reach conclusions. It can be assumed that actions provide the skills required to cope with present and future knowledge.

Some educators agree that mathematics, a second language, and sciences meet the needs of the economic approach. But it seems that we can find citizens who achieve economic wellbeing by means of skills that were honed by disciplines other than mathematics and sciences. Consequently, one of the big questions that educators face is what to teach today and which skills to provide that fit tomorrow's economic vision.

As there are no unequivocal solutions, many vague answers might be offered in hope of diagnosing the essence, for instance the term "learning to think" or Resnick's definition "learning to think in a higher order" [20]. In other words, pupils should learn "something" during which teachers should act "present a significant thinking challenge, use appropriate teaching tools, and employ the language of thought" [28].

However, the education system in general and teachers who build curricula in particular remain with the question of which subjects/disciplines/fields of learning to teach. Because the question remains unresolved, or the international test dictates the curriculum, the ancient traditional education definitions remain in place.

Route 21 [21] presents the basic subjects that should be taught and imbued with the needs of the individual and society: English, reading or language arts, foreign languages, arts, mathematics, economics, science, geography, history, government and civics. Among the interdisciplinary subjects, Route21 proposes: Global Awareness; Financial, Economic, Business and Entrepreneurial Literacy; Civic Literacy. And the suggestion of subjects that challenge creativity includes: Critical Thinking and Problem Solving, Creativity and Innovation, Communication and Collaboration.

As long as we are discussing disciplines, the first category of basic subjects is clear, and there would probably be consensus about the curriculum if the key disciplines were observed. When contemplating the interdisciplinary and creative subjects, educators would shift restlessly in their seats, because any formal teaching process that involves numerous teachers and pupils in the Western education world, requires a curriculum and criteria to compare pupils, classes, communities and nations.

Regarding computer science education, the Computer Science Teachers Association (CSTA) states that "[m]aintaining

our ability to meet present and future challenges requires us to acknowledge computer science as a core element of all STEM (science, technology, engineering, and mathematics) initiatives" [23]. With respect to computer science as a means of enhancing cognitive skills, Jeannette Wing's call for teaching computational thinking [27] as a formative skill on a par with reading, writing, and arithmetic places the core of computer science as an important study subject. Recently teaching computing and information and communications technology (ICT) while developing students' e-skills has been recognized as very important for educating future citizens of the global society: "ICT's importance in the global economy is unquestionable: the continuing transition to knowledge-based economies as well as increasing levels of automation within manufacturing economies, demand the successful exploitation of ICT. Successful exploitation of ICT, in turn, demands the availability of a workforce possessing the necessary ICT knowledge and skills" [10].

The definition of education, skills, basic and higher education are not the sole players in the global education system. Health and life expectancy also play a role in the phraseology of new comparison rules between communities and nations.

LIFE EXPECTANCY AND EDUCATION

Usually, today, a person who retires continues to lead a full high-quality life for many years. Retirement is no longer the end of one's work life, but often the end of one career and the start of another. From an economic perspective, the new social order is causing the increase of retirement age, for instance: "In the United States, while the normal retirement age for Social Security, or Old Age Survivors Insurance (OASI), historically has been age 65 to receive unreduced benefits, it is gradually increasing to age 67" [22]. The goal of keeping retirement candidates in the workforce is primarily not to create actuary deficits that society cannot endure.

More workers mean that the work week can be shortened, i.e. more leisure time, which promotes the leisure industry that is becoming increasingly significant. Leisure also means more learning and knowledge expansion opportunities, and increasing the quality of work products. Extending one's work period, in conjunction with education availability, makes changing careers throughout one's long work life possible.

More than anything, it seems that longer life expectancy extends childhood. Late childhood in the Western world is expressed, among other things, by a later marriage age. Young adults typically do not start families after high school, but embark on studies and career development. Western societies encourage continuous schooling to relatively late ages. In many families it seems that young adults are dependent on their parents long after they have become adults. This social order contributes to professionalization, greater competitive abilities and higher social status in countries that support longer education periods.

CHAMSA—AN INTERNATIONAL COMPARATIVE MODEL

We claim that basic education, in its deepest sense of "Let our children be like us," starts with learning language. Language is the basic communication tool, with which we can shape character, thoughts, creativity and contemplation. We think with language. "We think in words. The more words you know, the more thoughts you can have" [13].

A pupil in basic education should learn five basic languages ("CHAMSA") as "tools for communication, each of which is used to express themes and ideas or feelings associated with specific domains and contexts" as described in [6]. The five languages relate to students' basic skills in the present and in the future. These basic skills relate to, on one hand, our place in our community, and on the other hand, globalism and the economic approach. The five languages are: our language, their language, mathematics (a language of science), body and soul language, and computer science (a language of technology.) These languages, learned at an early age, are the patterns that form our cognition as human beings. Therefore, we can assume that if the cognitive basis is wide, future adults who assimilated these five languages can develop a wider vocational inclination for their own benefit, and the benefit of their local and global society. The adults will probably have the skills to broaden their interest in any subject close to their hearts, whether economics or science, athletics or manual labor, art or religion.

The five languages and their principles

Our language defines us. It is the language that is part of the first and basic objective of education. Language belongs to our ancestors and to us, and most parents want their children to know their language, because then they are like their parents. The first language is the most invested in the community. Support of the proposition that each community and society decides on the appropriate content of "our language" modifies the religious divide, which is currently the deepest and most prominent divide between schools and cultures. "Our language" allows this approach. Whoever wants to focus on other content for their children can do so, as long as the right of the adjacent community to teach its language is not denied.

Their language is aimed at knowing and learning from the other. The consequence of knowing the other is usually acceptance, which creates cooperation and respect between cultures. One of the measures of one culture accepting the other's culture is the second language. Typically, in the very prominent religious divide, each side tries to prove its point and decides that its path is the right one. The first language and second language (even if it is spoken but the culture is different) can "compromise" on the second language. "We get to know you and you get to know us." It is conceivable that these social arrangements could connect an immigrant culture, and create a fabric of common life in a global multicultural world.

Mathematics (the language of science) is the way to formally describe the world, commerce, assets and sciences. It is clear that mathematics enjoys worldwide consensus, to a large extent because mathematics is considered culturally neutral (that is to say, it does not overshadow our goals that our children be like us). It is known that teaching sciences, especially physics, is limited to the student's level of mathematics. Any extension of mathematics could promote the cognitive abilities to describe scientific phenomena, and to contemplate and study sciences on a higher level.

The acquisition of *body and soul language* (physical education, dance, poetry, painting and music) has too often and in many places been relegated to informal education, because it is not meaningful to "factories" and to economic global and local interests.

Computer science (the language of technology), as the basics of computing, has increasingly become a core knowledge requirement for educated citizens. Besides being a science in its own right, computer science serves as a platform for applying scientific and other knowledge to practical tasks, and is constantly contributing to other fields by demonstrating how their processes can be modeled as information processes [24].

One of our favorite definitions, relevant to the present discussion, is that "technology is everything that man created." Technology is the need to solve the practical problems of the intelligent man [3], but we must make the distinction between technological products and technology. Technology is not a product, specifically a glass or a machine, which are the products of technology. Technology is writing, economics, transportation, etc. Computer science is a language of technology that describes processes, structures and links between technologies [5]. It is extremely important to legitimize computer science as a basic compulsory language due to its inherent representation and analysis tools, which allow the student to understand knowledge and represent it, to understand technologies, and to become a partner to technological and scientific developments in various disciplines [5].

An optimal combination of these languages could improve the student's abilities and skills, especially in the multi- and interdisciplinary aspect of problem solving and global communication. These five languages create a whole person in his or her community and family, and for the furthermost community. Education has never been an orderly doctrine, and teaching these five languages is not a pre- or post-condition of any education system. *"CHAMSA" declares that an education system, in which these five languages serve as a compass and hover above the needs and planning of teaching, could focus on high-level teaching programs, with clear criteria, detailed lesson plans, academic education benefits and promotion, and a comparison system between worldwide education systems*.

The economic perspective of the education system is a budgeting process. In order, "our language" should get the most attention and the largest budget (of teaching hours, testing and international comparison processes). Technology language, which should no doubt be recognized as an obligatory language, should probably receive the least attention among the five basic languages, which create a whole person from a cognitive aspect.

QUESTIONS, CRITERIA, AND MEASURES OF COMPARATIVE INTERNATIONAL TESTING

"CHAMSA" [6] proposes comparison, the principles of which are a balance between localism and globalism, emphasizing epistemological principles, without stating which subject causes the individual or the society to become successful in the economic arena. Comparative tests should be performed in graded stages during basic education.

In some countries, teaching technology and a later technological language, and a second language is implemented in the higher classes, and the final grade is a weighted calculation of the comparative tests. This process has a clear advantage in building the education system and allocating the budget. Communities and countries can plan their budgets and study programs without being graded on a one-time basis, because education is a years-long process, rather than measurement at one testing point.

We propose a preliminary international comparative testing (at different ages and at the appropriate level) weighted as follows: five for our language, four for their language, three for mathematics (science language), two for body and soul language, and one for technology language. The model should be continuously developed and adapted to balance the localism-globalism tension related to various educational aspects.

The first test in the lower grades should for the most part include basic questions in "our language"—vocabulary relating to the family, holidays, the calendar, hygiene, respect for others and our country. The topics of "their language" should include the ABC, a song, location on map, and a holiday. The questions in mathematics should consist of counting, quantities, addition and subtraction. Body and soul language should be tested by means of physical education and singing. The computer science test should involve manipulating basic algorithms (e.g. a sequence of actions of moving a (mechanical or virtual) robot from one point to another).

The second test is in the middle grades (possibly middle school). The questions in "our language" ask the students about the history of their people and community (customs, dates and places) including the personal history of their family, analysis of a newspaper critique according to their system of government and constitution, a question about the cultural tradition and faith of the community (religion and tradition), a geographic analysis of the country, and literature relevant to the local community. "Their language" should include analysis and interpretation of sentences (reading or oral comprehension), dates, historic places and leaders important to their culture, and acquaintance with their system of government. In mathematics, the students should be able to solve geometry problems (such as measuring areas), geometry theorems related to a physical problem, diagnosis and description of processes by means of first- and second-order graphs , and an algebra problem with one unknown. For body and soul language, the student is graded for his/her sports activity and reading musical notes. In computer science, the student is expected to solve an algorithmic problem that includes a simple iteration that may be related to a technologi-

cal problem. Challenging computer science tasks rephrased using "cover stories" in a simple and colorful language easily understood by children (e.g. Beaver tasks [12]) may be presented to students aimed to assess their computational thinking skills.

The third test corresponds to the formal certification or end-of-school exams of basic education. Students are expected to display in-depth knowledge of the five languages that will serve them in future academic studies.

SUMMARY

We have presented what we believe to be the basic principles of globalization in education. These principles are reflected in:

- Our basic expectations of the education system (us vs. them); separation instigated by the religious and ethnic divide; the essence of education: "Let our children be like us"
- The differences between basic and higher education – socialization vs. legitimization
- The advisable subjects of study in basic education and the "CHAMSA" model.

The suggested model is first and foremost a bridge over the global-local divide, and in fact makes both approaches possible. In order to moderate the tension between localized community-oriented education and globalized education, an international evaluation model should be continuously developed, in a way that allows the education system to settle the tension and even present priorities regarding education resources and learning deployment in basic education. A preliminary evaluation model suggested in this article is based on the "CHAMSA" model [6] and on the importance of including computer science topics in international exams. In the context of computer science education, including computer science in international exams will contribute to the recognition of computer science as a scientific language for problem solving, knowledge representation, and formalization of processes, as well as a language for better understanding technology and for performing technology-related processes [5].

Countries and communities could join the international comparison system without the fear of losing their unique identity. Communities could take part in social activities within a multicultural system, and the international comparison system could provide an arena for the personal-local aspirations of education. **Ir**

References

[1] Burbules, N. C. and Torres, C. A. *Globalization and Education: Critical Perspectives*. (New York: Routledge, 2000).
[2] Carny, M. and Rhoten, D. "What does globalization means for educational change: A comparative approach." *Comparative Educational Review*, February 2002.
[3] Chen, D. and Stroup, W. "General System Theory: Toward a conceptual framework for science and technology education for all." *Journal of Science Education and Technology*, 2, 3 (1993): 447-459.
[4] Cohen, A. "PhD Thesis, Distance Learning on the World Wide Web." (Anglia Polytechnic University, 2001).
[5] Cohen, A. and Haberman, B. "Computer Science: A Language of Technology." *Inroads - SIGCSE Bulletin*, 39, 4 (2007): 65-68.
[6] Cohen, A. and Haberman, B. "CHAMSA: Five Languages that Citizens of an Increasingly Technological World Should Acquire." *ACM Inroads magazine*, 1, 4 (2010): 54-57.
[7] Dewey, J. (1980) as referenced in *The Intellectual and Policy Foundations of the 21st Century Skills Framework*: 3, http://route21.p21.org/images/stories/epapers/skills_foundations_final.pdf. Accessed 2014 April 11.
[8] The Economist. "What physics was to the 20th century, biology will be to the 21st—and RNA will be a vital part of it." June 14, 2007. http://www.economist.com/node/9339752. Accessed 2012 January 21.
[9] Education at a Glance 2011: OECD Indicators. (OECD Publishing, 2001). http://dx.doi.org/10.1787/eag-2011-en. Accessed 2012 January 21.
[10] E-Skills. [http://www.eskills-international.com/assets/interim-report-(issued---for-comment).pdf Accessed 2014 February 5].
[11] Farleigh Dickinson University, "Global Education vs. Globalization." http://view.fdu.edu/default.aspx?id=263. Accessed 2014 April 13.
[12] Haberman, B., Averbuch, H., Cohen, A. and Dagiene V. "Initiating the Beaver contest on computer science and computer fluency in Israel." in *41st ASEE/IEEE 2011 Frontiers in Education Conf.* (Rapid City,SD, USA, 2011):T1D-1–T1D-2. http://view.fdu.edu/default.aspx?id=263 Accessed 2014 April 11.
[13] Hartshorne, J. "Does Language Shape What We Think?" *Scientific American*. August 18, 2009. http://www.scientificamerican.com/article.cfm?id=does-language-shape-what. Accessed 2014 April 11.
[14] Israel Education Act. [http://cms.education.gov.il/EducationCMS/Units/Zchuyot/ChukimVeamanot/Chukim/ChokChinuchMamlachti1953.htm. Accessed 2014 April13].
[15] Israel Ministry of Education. [http://cms.education.gov.il/educationcms/units/mazkirut_pedagogit/ofekpedagogi/hodaot/leket.htm. Accessed 2012 March 7]
[16] Juergensmeyer, M. *The new cold war? Religious nationalism confronts the secular state*. (University of California Press, 1993).
[17] OECD: Education. http://www.oecd.org/about/. Accessed 2014 April 4.
[18] OECD. http://www.oecd.org/pisa/aboutpisa/. Accessed 2014 April 11.
[19] Osler, A. and Starkey, H. "Learning for Cosmopolitan Citizenship: theoretical debates and young people's experiences." Educational Review, 55, 3 (2003): 243-254.
[20] Resnick, L. *Education and Learning to Think*. (Washington D.C.: National Academy Press, 1987).
[21] Route 21, The Partnership for 21st Century Skills, 21st century skills-related information, resources and community tools. http://route21.p21.org. Accessed 2014 April 11.
[22] Social Security. [http://en.wikipedia.org/wiki/Retirement. Accessed 2012 March 14].
[23] Stephenson, C., Gal-Ezer, J., Haberman, B. and Verno, A. "The new educational imperative: Improving high school computer science education". (Computer Science Teachers Association, Association for Computing Machinery, 2006). http://csta.acm.org/Communications/sub/DocsPresentationFiles/White_Paper07_06.pdf. Accessed 2014 April 11.
[24] *Towards Science 2020*. (Microsoft Research, 2006). http://research.microsoft.com/towards2020science/downloads/T2020S_ReportA4.pdf Accessed 2014 April 11.
[25] Tyack, D. and Cuban, L. (1995) as referenced in *The Intellectual and Policy Foundations of the 21st Century Skills Framework*: 2. http://route21.p21.org/images/stories/epapers/skills_foundations_final.pdf. Accessed 2014 April 11.
[26] Underkuffler-Freund, L. "The separation of the religious and the secular: A foundational challenge to First Amendment theory." 36 WM. & MARY L. REV. 837 (1995).
[27] Wing, J.M. "Computational thinking." *Communication of the ACM*, 49, 3 (2006): 33-35.
[28] Zohar, A. "Teaching Thinking on a National Scale: Israel's Pedagogical Horizons." *Thinking Skills and Creativity*, 3 (2008): 77-81.

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