

A COMPARATIVE ANALYSIS OF NEW STUDY PROGRAMS IN SCIENCE IN ISRAEL, UNITED KINGDOM AND FINLAND

Orly NISSEL

Moldova State University

The world believes today in the importance of education and aspires to supply a good education. The question is in *what way?* For achieving the purpose, a significant change is required rather than another temporary solution. This type of change might reduce the number of matriculation exams and the number of studied subjects, and on the other hand, inclusion of humanistic, scientific and artistic subjects. Such teaching emphasizes – the structuration of knowledge by the studier under supervision and control, a combination between personal and mutual learning, alternative evaluation that emphasizes the inclusion of a pupil in the various stages of the process and includes his self-evaluation and the evaluation of his peers in class.

The comparative analysis of study programs in Israel, United Kingdom and Finland offers opportunities to examine various models of studying according to the needs of the 21st century.

Following the conclusions in Israel and European countries, a new test is under consideration that would be interactive, conducted by means of a computer, would call for reasons and explanations and maintain interaction and debate with the pupils. In the Pisa test of 2012, exercises in solving problems and economic literacy will be added to the traditional tests that demonstrate dealing with routine dilemmas in the field of finances, solving problems as a team – examination of skills of the 21st century [1].

Keywords: *combination between personal and mutual learning, self-evaluation, a transition from quantity to quality, achievements, gap, and needs of the 21st century.*

ANALIZA COMPARATIVĂ A NOILOR PROGRAME DE STUDII LA ȘTIINȚELE EXACTE DIN ISRAEL, REGATUL UNIT ȘI FINLANDA

Lumea crede astăzi în importanța educației și aspiră să ofere o educație bună. Întrebarea este *în ce mod?* Pentru realizarea scopului, este necesară mai degrabă o schimbare semnificativă, decât soluții temporare. Acest tip de schimbare ar putea reduce numărul de examene de înmatriculare și numărul de subiecte studiate, iar, pe de altă parte, ar putea include de subiecte umaniste, științifice și artistice. O astfel de instruire presupune: structurarea cunoașterii de către cel educat sub supraveghere și control; o combinație între învățarea personală și mutuală; evaluarea alternativă care pune accentul pe includerea unui elev în diferite etape ale procesului, autoevaluarea acestuia și evaluarea de către colegii lui din clasă.

Analiza comparativă a programelor de studii la științele exacte aplicate în Israel, Marea Britanie și în Finlanda oferă oportunități de a examina diferite modele de instruire în funcție de nevoile secolului XXI.

În Israel și în țările europene este în curs de examinare un nou test, care, realizat cu ajutorul unui calculator, ar fi interactiv, ar oferi motive și explicații și ar menține interacțiunea și dezbaterile cu elevii. În testul Pisa din anul 2012, exercițiile de rezolvare a problemelor și de alfabetizare economică vor fi ajustate la testele tradiționale, care să facă față dilemei de rutină în domeniul finanțelor, să facă posibilă rezolvarea problemelor în echipă – examen de aptitudini solicitat în secolul XXI [1].

Cuvinte-cheie: *combinație între învățare personală și mutuală, autoevaluare, trecerea de la cantitate la calitate, realizări, decalaj, necesitățile secolului XXI.*

Introduction

In the last decade, the achievements of the Israeli pupils in national and international tests have been low in comparison to the rest of the participating countries. In 2009, upon the assumption of duty of Minister of Education, Gideon Saar, a new study program has been decided upon. In 1992, following the Harari committee – "tomorrow 98", a science study program has been formulated, that upgrades the level of science study in Israel in all age groups. In 2009, Junior High schools began teaching according to the new program. A master document has been written delineating the study program with its sub-subjects that integrates contents and skills and assigns the number of study hours for the subject. All teachers in all sectors were obligated to teach according to the subjects and to meet the schedules. Following, is the new detailed study program for science, for Junior High school.

The change initiated in Junior High schools has advanced to High schools and as of 2013 also to Primary schools [1]. There are apparent gaps in Israel between the achievements of Hebrew speaking pupils and

Arabic speaking pupils. As a result of these gaps the average of the score of Israel drops with a significant gap [12]. The comparison of Israel to the Western countries is not valid due to the great heterogeneity in the Israeli population, the short existence of the state of 65 years and the political, religious, sectorial and security complexity of the region.

Following the conclusions in Israel and European countries, a new test is under consideration that would be interactive, conducted by means of a computer, would call for reasons and explanations and maintain interaction and debate with the pupils. In the Pisa test of 2012, exercises in solving problems and economic literacy will be added to the traditional tests that demonstrate dealing with routine dilemmas in the field of finances, solving problems as a team – examination of skills of the 21st century [1].

These changes confront the Israeli educational system with difficult coping, as it lags behind the OECD countries.

Reforms in the world

In the last decades, in most of the developed countries such as: the UK, Japan, Finland and Canada, an awareness of international comparison has risen. As a response to changes and critique on the quality and ability of the educational system comprehensive educational reforms have begun. Most of the reforms have common principles:

- A transition from quantity to quality – transfer of knowledge, subjects and hours.
- Focusing on results – outcomes.
- Assigning schools with authorities and autonomy. Directing most of the resources to the school and decreasing bureaucracy, decentralization of authorities, improvement of training of teachers and principals.
- Being familiar with each individual pupil with various and different abilities, skills and difficulties.

The science study program in Junior High school in the UK

In the UK, the standards of assisting schools in teaching of certain contents in a clear manner have been redefined. Schools have been given the autonomy to decide upon the study program and the means to evaluate it. These have helped in the improvement of study achievements of pupils [6]. The sense of ability and change has swept teachers' teams and parent who have expressed much willingness to invest in the promotion of pupils. Parents are involved in processes that take place in a school. The situation has created a consistent study atmosphere in which teachers have seen the study program and education as a whole unit. Teachers treated pupils in person and supplied their needs. A study of the national study program in the UK has shown that there has been very little time to learn thinking skills. However, the study of high-order thinking skills has brought about a rise in the thinking standards (OFSTED) [5, 14].

The problem in the UK is the high level of involvement of government in the field of education. The country struggled with finding a balance between centralism of the government as an exclusive entity for making educational policy and between decentralization of authority and awarding autonomy to teachers and the school [3]. In the 90's the educational system has been subjected to tests in order to raise standards. In the Pisa tests the scores of the UK pupils have been near the OECD average. In 2005, there has been a change in the arrangement of tests that has included an internal evaluation of teachers as well, and the submitting of projects as an alternative evaluation. The Ministry of Education is not willing to forfeit tests. Teachers in the UK feel obligated to focusing on contents and studying for exams and there is practically no time left to deal in the studying of subjects that catch pupils' interest. This leads to superficial study, a limited and short-term assimilation of the acquired knowledge [3].

In 2010, the responsible entity for determining the national study program was the QCDA – Qualifications & Curriculum Development Agency. It was replaced in 2011, by the Standards & Testing Agency, which is responsible for developing of all the means of evaluation in the educational system in the UK [6]. It is still early to evaluate the changes from this move [4], the science study program in Junior High school in the UK [2].

Study program in Finland

In the early 90's, Finnish pupils were mediocre in their achievements. The educational system was similar to the educational system in Israel and the world. However, a change in perception which they have undergone in recent years has advanced them to having the best scores in the world – first place in all indexes: in science literacy (Israel – 13), math literacy (Israel – 9) and language (Israel – 7) (2007). The study presents a

victory of the Finnish educational system due to excellent teachers and leaders. It is evident from the study that Finland develops excellence through its teaching forces [8]. Until the 60's of the 20th century, the level of educational achievement in Finland has been relatively low: only one out of every 10 Finnish adults has completed more than 9 years of study of basic education and the achievement of a University degree was not a common thing [15].

Presently kindergarten; 99% of them complete the compulsory basic education. At the age of 16 three out of five young Finnish people enroll for post-High school education with state funding; 50% finish these institutions. Finland openly acknowledges the value of its teachers and trusts their professional judgment in schools. According to public opinion polls amongst High school graduates, teaching is considered as the most admired profession amongst young people in Finland. Becoming a teacher in a Primary school in Finland is an extremely competitive process. Only the best and the most brilliant in Finland can realize this dream. The young Finnish are attracted to teaching due to the prestige of the profession, the public and society service and the professional autonomy in schools. They consider it a profession with equal value to the subjects of law and medicine [2].

Teachers' training is based on a combination of research, practice and reflection, which must be supported by scientific knowledge and must be focused on thinking procedures and cognitive skills. The teacher is obligated with a five-year practical training in a school. There is no central management of education in Finland. The principal and the school team together with the managing committee of the school usually make the decisions regarding employment of personnel and recruitment of teachers'. In Finland, the teachers receive a feedback from the school principal and team. A good teacher helps all his pupils to progress and grow in a holistic way [9].

The work environment of a teacher in Finland is calm, autonomous, appreciated and inspiring of trust as different from other countries where there are bureaucratic systems of reporting that make teacher feel threatened and with over-supervision. The study program is approved by local educational authorities, teachers and school principals. Teachers have a key role in the evaluation of pupils [10].

Conclusions

In this chapter, comprehensive educational reforms in developed countries in the world have been reviewed, for improvement of the achievements of pupils in science: Israel, the UK and Finland [16, 19, 20]. The study program in science has been changed while adjusting to the 21st century. In 2009, teaching according to the new program has begun. The change began in a Junior High school. For this purpose, a master paper has been written which obligated teachers, in all sectors, to teach according to it, to meet the schedules, and undergo training apprenticeships during the study year. There has been an improvement in national and international tests in the achievements of pupils.

Teachers complain about heavy pressure and burden, not meeting the requirements of the study program, teaching for exams and claim that studying is superficial. There is no time for personal and profound work as it has been in the past. In parallel, the state encourages and reinforces physics studies which in recent years have nearly gone extinct. Israel has begun adjusting itself to studying according the requirements of the 21st century. It still needs to invest greatly in the subject – computerization of classes, integrative boards and more [13].

The educational system in the UK has also changed the science study program and raised the level of pupils' achievements in national and international tests. The situation has brought about a motivation to continue with higher education. Despite the changes, the level of involvement of government is high in the field of education. It has difficulties in finding a balance between centralization of government and decentralization of authorities and awarding autonomy to teachers. Teachers feel committed to focusing on the program and to teaching for exams. This leads to superficial studying, a limited short term assimilation of the acquired knowledge. In the UK the subject of telecommunication and the use of computer technology have begun being integrated as required according to the needs of the 21st century [11, 17].

We notice similarities caused by the reforms in the educational systems in Israel and in the UK. These programs have been formulated due to the international standards in national and international tests. The study program in Israel is busier, more diverse and is studied with more weekly hours. There is an emphasis on the subjects of biology, chemistry and physics, whereas in the UK the emphasis is on Earth science and astronomy.

In Finland it is different; the reform there has brought about creative thinking. Teachers are the country's source of pride, they excel and have Master's degree in education; they are appreciated by principals, pupils and parents. They are autonomous in their work, teach without exams or homework. The teachers have a central role in the evaluation of pupils. Since the reform, the country leads in the first place worldwide in pupils' achievements in the subject of science [10].

The world believes today in the importance of education and aspires to supply a good education. The question is in what way? For achieving the purpose, a significant change is required rather than another temporary solution. This type of change might reduce the number of matriculation exams and the number of studied subjects, and on the other hand, inclusion of humanistic, scientific and artistic subjects. Such teaching emphasizes – the structuration of knowledge by the student under supervision and control, a combination between personal and mutual learning, alternative evaluation that emphasizes the inclusion of a pupil in the various stages of the process and includes his self-evaluation and the evaluation of his peers in class. This type of changes is under process around the world as well as in 110 experimental schools throughout Israel which examine various models of studying according to the needs of the 21st century [15].

International tests and setting of standards

The 20th century has been characterized by standards' policy. They have spread from Eastern Asia to the European countries the UK, the US and Israel. The purpose is to create a unified level of standards and awarding equal opportunity to all pupils. The creation of standards has led to a multiplicity of evaluation tests, internal and external, such as the Meizav (school effectiveness and growth indexes – in Hebrew acronym) and international tests such as Pisa (Program for International Student Assessment). The standards have not led the educational system to high achievements, but to mediocrity amongst pupils with high abilities. The low achievements, reflected from international tests, have reinforced the idea that there is a need for standards in the core subjects: science, language and math. The race for scores has brought studying to the traditional methods based on memorization, unification, overload of teachers; pupils not necessarily have improved their achievements [6].

On the other hand the unity in study program, the focus on study subjects, the repeating memorization and drilling have improved the achievement in scores of Israel and the UK. The tests are delivered in fixed periodicity once every three years and allows for an observation of trends over time. The tests are delivered in every country in a representative sample. The scores are reported on a national level. Israel has participated in the international tests of Pisa and TIMSS (Trends in International Mathematics & Science Study).

In March of 2013, a new government has been elected in Israel and a new Minister of Education has been appointed – Rabbi Shai Piron. The Minister presently studies the system and attempts to formulate changes: 1. limitation of the Meizav tests (school effectiveness and growth indexes), which are delivered annually, since 2007 in the core subjects of science, math, mother's tongue and English, in thousands of classes; 2. Change in matriculation exams and decreasing their number. The new Minister of Education, Shai Piron, wishes to strengthen the factor of education in schools: "the message is less testing and more learning" [8].

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