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THE ISRAELI NATIONAL PROGRAM FOR ADAPTING THE EDUCATION SYSTEM TO THE 21ST CENTURY: THE FACTORS INVOLVED AND THE EXPECTATIONS FROM ICT

Ghalib BADARNE, Kaye College, Israel

Abstract. The following article focuses on the subject of the Israeli national program for adapting the education system to the 21st Century; the factors involved and the expectations from integrating ICT in education and Science. The program aspires to assimilate the information and communication technologies in organizational, pedagogical and social aspects of the school and to lead to the existence of an innovative pedagogy at the school and imparting 21st century skills, while assimilating ICT technologies. The ICT is considered today as a potential stimulus for changes in the education system as well as a means that will enable to equip the future citizens with the necessary tools for living in ICT society.

Key words: the Israeli national program, adapting the education system to the 21st century, ICT integration, 21st century skills, involved factors, expectations.

PROGRAMUL NAȚIONAL DIN ISRAEL PENTRU ADAPTAREA SISTEMULUI DE EDUCAȚIE LA SECOLUL XXI: FACTORII IMPLICAȚI ȘI AȘTEPTĂRILE DIN PARTEA TIC

Rezumat. Articolul dat se concentrează asupra subiectului programului național israelian de adaptare a sistemului educațional la secolul XXI; factorii implicați și așteptările legate de integrarea TIC în educație și știință. Programul aspiră să asimileze tehnologiile informației și comunicațiilor în aspectele organizatorice, pedagogice și sociale ale școlii și să conducă la existența unei pedagogii inovatoare în școală și să împărtășească aptitudinile specifice secolului XXI, asimilând tehnologiile TIC. TIC este considerat astăzi ca un potențial stimul pentru schimbările din sistemul educațional, precum și un mijloc care va permite echiparea viitorilor cetățeni cu instrumentele necesare pentru a trăi într-o societate bazată pe TIC. Factorii instituționali și sistemici afectează adoptarea inovației tehnologice, pentru ca asimilarea tehnologiilor TIC să creeze o schimbare organizațională, ar trebui să aibă loc numeroase condiții. Integrarea TIC în metodele de predare a cadrelor didactice constă în agenți externi și interni care constituie factori încurajatori și inhibitori. TIC poate contribui la procesele de predare și învățare, tehnologia TIC poate servi ca un cap de pod pentru pedagogia inovatoare în educație.

Cuvinte cheie: programul național israelian, adaptarea sistemului educațional la secolul XXI, integrarea TIC, aptitudinile specifice secolului XXI, factorii implicați, așteptări.

Preface. In view of the rapid infiltration and expansion of the information and communication technologies, the state of Israel faces with adapting the education system to the 21st century by allocating resources as a part of the ICT Reform [9]. Since 2010 a multiyear national ICT program called “Adapting the Education System to the 21st Century” is implemented, the ICT program promotes ICT processes in the school in the purpose of turning them into ICT organizations. An emphasis in the program is on assimilating innovative pedagogy and developing digital literacy in the various online fields in order to better teaching, learning and evaluation processes as well as promoting social-cooperative processes.

One of the main goals of the national ICT program is integrating the Information and Communication Technology within the teaching-learning-evaluating processes. In order to do so, the Ministry of Education embraced the conception of the international IEA project, according to which, the students should be taught Computer and Information Literacy -CIL. This literacy is the individual's ability to use computers for effective research, creation and communication at the school, at home and in the community [8].

The program strives to assimilate information and communication technologies in organizational, pedagogical and social aspects of the school and lead to the existence of an innovative pedagogy at the school and imparting 21st century skills, while assimilating ICT technology. The 21st century skills focus on three central fields to which the innovative pedagogy should provide an answer: 1. High-order thinking skills that include creative thinking and ingenuity, critical thinking and problem-solving skills. 2. Skills of collaborative work, independent learning and ethics. 3. Skills to handle digital and communicative information that includes Information Literacy, Media Literacy and ICT Technologies Literacy [17].

The Israeli National Program for Adapting the Education System to the 21st Century and Imparting 21st Century Skills. The new ICT national program "Adapting the Education System to the 21st Century" is a practical program for practicing at schools which is aimed at changing the behavior of teachers in the classroom. The program is based on a computerized model of innovative pedagogy, which purpose is assimilating optimal pedagogy in the school on a systemic level, while imparting 21st century skills to students, combined with ICT technology. Such an innovative model empowers the role of the teacher in his relation to his students and to his school and it also continuously changes his role in the classroom. The aspiration is that all school teachers will practice technology-based optimal pedagogy in the school lifestyle, will use information management systems and will have regular communication with parents and the community. The plan is planned to be gradually practiced in all schools in the country over five years, while in the first couple of years elementary schools from the Northern, Southern and Jerusalem districts join to the program in order to narrow down the digital gap in these districts [4]. The national program, adapting the education system to the 21st century, provides a technological and pedagogical infrastructure for imparting 21st century skills and enabling the preparing graduates of the Israeli education system to face with the global labor market and the academy in the purpose of preparing the state of Israel to face with its future local and global economic, cultural, and security challenges. The program focuses on teachers, with the understanding that investment in this resource will ultimately yield the best return. The program presents a holistic conception that encompasses several complementary elements, and that their combination guarantees the success of the program and achieving the goals: Adapting the curriculum; Digital

content; Professional development of teaching staff; Infrastructure and maintenance; Control and Evaluation [8].

The 21st century skills according to the Master Document version 12, adapting the education system to the 21st century, Ministry of Education (2012), include: 1. Use in ICT tools- using computerized tools of different kinds for teaching and learning. The ability to locate and use various ICT tools in accordance with the need, and combine between the different tools on the base of their added value. Management and organization of information in personal files and storage on the web, working with multiple windows while integrating applications between them, building an Excel database, creating a graph and analyzing its results, working with several peers in a collaborative document with Google tools and more. 2. ICT Literacy- A derivative of the abundance of information found on the web. There is a great importance for intelligent handling of information, knowing its various representations, locating relevant information in different ways (in relation to the necessary type of information), cross-referencing and merging information, evaluating information and representing it, for instance- creating a digital text which includes context-related references (links), exposure to different strategies for searching information: Use of operators, keywords, search in databases and various search engines. 3. Critical thinking and problem-solving ability- in a dynamic world that requires innovation, high-order thinking and analysis abilities, the students should be trained to be creative initiators and original inventors who think differently; have the ability to identify new connections between concepts, identifying different strategies in a process or a mission; students with positions and opinions, ability to predict, develop intuition, skepticism, critical thinking, exploration and choice, metacognitive thinking. 4. Collaborative communication and teamwork- in the modern world of work it is important for a person to have the ability of teamworking, while understanding the skills in which he has a relative advantage as well as consuming from other team members skills in which he is weak, the ability to allow a flow of information and knowledge in a team, division of tasks and more. 5. Independent student - an independent student who is constantly updated and studying, initiative, motivated and active on the internet and acquire information intelligently. The independent learner should identify his optimal learning style and act upon it. 6. Ethics and network protection- the digital space poses new challenges regarding protection of intellectual property, privacy and ethics on the internet; developing awareness as well as personal and social responsibility among the students; training to ethical and protected conduct on the internet; knowing copyright laws and especially ethical conduct [9].

In order to lead to a state in which the technology is used for assimilating innovative pedagogy and imparting 21st century skills, we should lead to a state in which the combination of information technology improves the following aspects of teaching: improving the skills of the teachers; adapting the teaching for the variant students; real-

time feedback; a learning continuum in the classroom and at home and strengthening of the connection between home and school; administration that relies on the information technology. The program encompasses hundreds of primary schools and junior high schools, that constitute about 40% of all the educational institutions in Israel. The primary evaluation of program's efficiency rises from the recent Meitzav report, showing that the use of ICT for learning is on the rise and significantly improved compared to previous years [11].

The ICT is a necessary condition for actualizing the innovative pedagogy. An intelligent use of ICT, that bases on knowing its relative advantages and disadvantages, can greatly assist in the implementation of the innovative pedagogy. Using ICT, among others, can assist in promoting dialogue interaction and cooperation between the teacher and the students, in which the students have a part in constructing the lesson and its content, in order to cause a deeper understanding and assimilation of concepts and processes. these interactions are characterized by lively discussions and reflective reactions on the part of the teacher. At the expense of using authoritative interaction, in which the teacher sets the structure and content of the lesson, and the students do not response actively [3]. A use of ICT can turn the innovative pedagogy to more relevant to the learners, the more it would intelligently base on the profitable usages in their everyday life (social networks, blogs, computer games and more). The teacher is the decisive factor determining what use will be made of the ICT tool.

Factors Involved in Implementing the ICT Innovative Educational Program. Assimilating the change in the education systems is different from change processes occurring in other fields of society. Differently from changes in the field of business and industry that regulated by the free market processes, educational organization are usually supported by governments, and thus, they cannot change without a planning "from above". This kind of planning is a necessary, though not sufficient condition. Usually, this kind of forced planning included vision formation, setting standards, making changes in the curriculums, setting procedures regarding contingent acceptance of grants from the government and the appointment of institutional and systemic leadership [12]. Educational processes are dynamic and complex processes, that entail changing the patterns of action of the teaching staff, changing the school's identity, improvement of student performances, and environmental change adaptation. Numerous researchers engage in researching the factors that help or inhibit the success of educational changes in general and the ICT combination in particular, some emphasize the organizational aspect and the way in which the organization is preparing to assimilate the change in its structure and actions, and others highlight that the teachers and the way they cope with the demand to change, and some stress the importance of the principal and his support in the process of assimilating innovativeness and others examine the contribution of factors external to the school to the ICT integration:

1. **The Organizational-Administrative Dimension:** this dimension refers to the school management and the supervision, as it is expressed in their support of teachers training processes, in directing the assimilation process, in cooperation with external bodies and motivating the staff toward cooperation with the process. The common thinking regarding ICT integration as a part of the school vision is critical to the assimilation process, and it should include a statement of role holders to lead the implementation and will be an educational leadership in the field [13]. The school principal is an especially important factor in implementing a change in the system, researches pointed out that projects that received the principal's support, were with higher chances for success, since his involvement increases the gravity of the project, provides psychological support and recruits the required resources. Additionally, the principal or the leader of the project provides the vision that clarifies to the teachers what are the common purposes, and causes the movement of resource toward the agreed directions [10].
2. **The Teaching Staff and the Level of Pedagogical Knowledge:** the support of the teachers is another significant factor in implementing a change in the school. Their objection can derive of reasons such as failures of previous attempts, Lack of adequate compensation, mixed signals, fear of the unfamiliar, and interests of different power groups [5]. Hence, teachers training is a prerequisite when it is about implementing innovations and improvements in the school. The study of Avidav Ungar and Arazi Cohen (2014) found that the higher the level of technological pedagogical knowledge is, the higher the level of ICT assimilation will be. We can see that there is a significant importance to the pedagogical knowledge of the teacher for ICT assimilation. Thus, a teacher is no technological knowledge, manages to implement ICT due to his pedagogical abilities.
3. **Structure and Processes within the School;** many researchers claim that without essential changes in the school's structure (division to classes, study units) and in the learning processes (methods of teaching and evaluating) essential changes in the education process would be impossible. Significant factors in this group are time, space, role division, patterns of communication among the teachers, and school policy.
4. **Factors Surrounding the School:** perceiving the school as on open organizational system, that interacts with its surrounding, gives great importance to external bodies in the influence on procedures of change, although not always in the desired efficiency. Among the most prominent factors in the school surrounding we can include the Ministry of Education, supervisory bodies, local authorities, and other intervening entities [13].
5. **Infrastructures:** an additional factor, contributing to promoting innovation in education is the availability of suitable infrastructure resources: hardware, measured

by the amount of the computers available in the schools to students and teachers for teaching and learning purposes, the quality and function of the equipment (Processor speed, operating systems, peripherals, and Internet access). Software, including open-source software and subject-focused learning. However, the equipment itself is not enough, and it should be accompanied by another valuable factor: technical and pedagogical support [7].

Furthermore, institutional and systematic factors affect the embracement of technological ingenuity, in order for the assimilation of information technology will create an organizational change, numerous conditions should take place. A review of trends in educational change shows, that the future changes become more comprehensive and complexed, so that their application would require governmental involvement. An involvement that carries with it a promise and a commitment of leaders, a power of new ideas and great resources. However, they come with unrealistic time schedules, incompatible demands, simplistic solutions, resources directed to incorrect destinations, and inconsistent performance. Surry, Ensminger & Jones (2002), explored the factors that influence the ICT integration in teaching in institutions for high-education. They created a model called RIPPLES: Resources, Infrastructure, Policy, People, Learning, Evaluation, Support, which identifies seven major factors: a) resources and budget allocation; b) Developing hardware, software, networking infrastructures and so on; c) Policy - vision, a declared plan and supportive leadership of the institution's management; d) the faculty's motivation, beliefs, attitudes and values; e) seeing the change as a means to achieving educational targets; f) forming an evaluation that examines the impact of the change on teaching and developing a program to locate the factors that progress or inhibit the process, examining the relation between the investment and the outputs; g) support and encouragement- training the faculty, providing technical, pedagogical and administrative support (grades, promotion, rewards). The ability of the institutions' leaders to lead the change constitutes a substantial factor in the success of its assimilation.

Variables that Support or Inhibit ICT Integrated Pedagogic Innovation. The requirement of the Ministry of Education to adapt the schools to the 21st century positions new challenges to those practicing teaching. Consequentially, the need and the necessity to examine the factors that promote and inhibit ICT integration in the schools arise, as well as observing the process of change at different points of time [1]. Today students live in a world going through rapid changes in the areas of occupation, study and personal life, including extensive use of technologies, in accordance, the education system puts an emphasis on developing and implementing appropriate pedagogies of preparing students to the challenges of the future [15].

The ICT creates changes that obligate the education system to response, cope and change. The most relevant information and communication technologies for processes of

learning and teaching, and constitute a huge challenge for the education system. The ICT perceived today as a potential catalyst of changes in the education system and as a means that will enable to equip the citizens of tomorrow with the necessary tools for life in the society of information. Identification and definition of the factors involved in ICT integrated educational innovation, measuring the power of their involvement and locating the connections between the levels of innovations and the causers of innovation – all of these may contribute to the conceptual frame of ICT integration in the education system in general and in the school in particular [10].

The findings of the research of Mioduser, Nachmias, Porcush and Tovin (2003) present involvement and contribution of groups of factors in innovative initiatives that integrate ICT, which are divided into several levels: 1. System level, there is a broad growth of ICT integrated educational initiatives, most of them are ranked in the transition phase, so that innovation can be combined in various ways; 2. School level, the ICT brings about institutional change, especially in pedagogic applications. The chances of success of innovation depend on human-organizational and technical infrastructure, such as a leading figure or a supportive manager. An external interventionist was sometimes instrumental in implementing the innovative initiative; 3. Pedagogical aspects, pedagogy is what has led the ICT integrated innovation as a major factor. Innovative initiatives have enabled a learning through authentic tasks, when the extent of the change gradually expands, and may contain areas of knowledge and other areas of function in the school, both in technology and in the curriculum. Moreover, the development of digital products and their usage has expanded to learning and alternative assessment needs; 4. The level of teachers, many teachers still need support in the ICT field, and their training process requires differentiation according to the areas of integration of ICT and the needs of the teacher. However, the operation of innovation and the training of the teaching staff does not have to be on a large-scale nor necessarily include the entire staff of the school; 5. The level of students, they are the main beneficiaries of ICT integration, both academically and in terms of their roles as learners: They experience significant authentic tasks, and changes in their roles as learners can be identified. The innovative initiatives can be implemented among different learning populations in order to meet unique needs. According to Hatiba (2016), the factors promoting the successful integration of technology into the curriculum, are: 1. Positive attitudes of the teacher toward the integration of technology in the classroom instruction: positive attitudes increase the motivation to integrate and overcome obstacles. 2. A background of successful experience in technology integration in teaching. It has been found that teachers who have already successfully used certain technology in their teaching have positive attitudes toward integrating that same technology as well as other technology in the teaching, whereas teachers who have not experimented such use tended to have less positive attitudes. The explanation presented here is that a cumulative experience of integrating a

particular technology in the teaching, gives teachers greater self-confidence and a sense of comfort in this use. Therefore, previous experience and satisfaction with the results of such integration in the past are essential for the continued use of specific technology and even of other teaching technology. 3. High personal motivation to teach well and develop as teachers and a personal commitment to promoting student learning is expressed with devotion and a dedication of considerable time and effort to prepare the lessons. 4. receiving significant support from the educational institute for the use of technology in teaching, both principle, declarative and verbal and as one that involves the financial investment of the institution as payment for an expert for support. 5. Good accessibility to technology in the classroom - help from an institute technician in the operation of technology in the classroom so that the teacher would not fail due to technicalities, and access to hardware and software equipment and applications in a suitable extent for all students in the class. 6. The existence of a support group (usually within the framework of an online network) of staff using the same technology for consultation and feedback [6].

The factors impeding the integration of ICT are Lack of resources and especially time allocation to the process lack of knowledge, skills and technology proficiencies and infrastructure gaps, technological aspects, and organizational policy. There are basic factors that their existence is essential for implementing the innovation successfully in the organization and to institutionalize the change within the system: knowledge and skills, availability of resources and time, rewards and people who lead the process. These factors continue to be essential throughout the process [1].

In view of the research results of Avidav-Ungar and Porcush Baruch (2016), ICT integration in the teaching of the teachers connects to external and internal factors that constitute encouraging and inhibitory factors. The teachers' perceptions and beliefs regarding ICT and its integration in the teaching, as well as receiving support for knowledge and pedagogical technological skills constitute common internal and external encouraging or inhibitory factors. Next to them there are external factors advocating to integrate ICT in the teaching.

In order to succeed in integrating technology to progress the learning, it is important to consider all of the factors that may impact the application – both the factors that disturb the technology application in classroom teaching and those that promote this application.

Expectations of ICT Integration in the Education System and Science Studies.

During the last century, there was one attempt after another to combine newly developed technologies in the teaching (such as film, radio, instructive machines, television, computer, online teaching). There were big expectations from each technology to bring to a revolution in the teaching and that it would dramatically progress the learning efficiency. The history and the reality comes to show that after the first years of

enthusiasm, very few of these technologies were combined to a large scale in classroom teaching. In the two recent decades an amazing revolution began in the consumption and production of global knowledge, especially due to the massive expansion of mobile technology usage (tablets and smartphones), of communication networks and their applications in the social media (such as Facebook and Twitter) and in the Cloud technologies. This revolution influenced and still is on every aspect in modern life and of course it did not pass over the teaching and learning in the academy and schools [6].

The contribution of the knowledge technology to the rapid economic growth in the 90's raised the question regarding its possible contribution to education improvement, especially in light of the fact that some of the information technology's characteristics are compatible with learning principles and are suitable for improving learning. On the base of economic considerations and the ICT potential to improve education, numerous countries began developing a policy that encourages the computerization of education. For instance, around the world, from Chile to Finland and from Singapore to the USA as well Israel, everyone set a national policy that gave ICT a central position in the curriculum and education improvement [10].

The claim that living with technology affected the way of thinking and the manners of learning preferable by the students these days, evoked a fear of cultural detachment between the education institutions in their traditional design and the students, there were some who even found anger and frustration among the students with a small and insignificant combination of technology in the school. From this portrayal one can expect that students will be happy and cooperative with pedagogical initiatives. On the other, others have found that the students, despite their affection to internet and their use of it are not eager to combine it in the learning at school and to change the traditional learning [15]. Among researchers and people of education there is an awareness to the educational potential and to the importance of implementing constructivist pedagogic approaches in ICT teaching. An intelligent use of ICT in teaching, may advocate significant learning and increase the interactivity of the learner and improve his thinking abilities and his social functions [14].

The ICT may contribute to teaching and learning processes, as well as enabling platforms for courses and curriculums as part of distance learning processes. Additionally, the information technology can be used as a bridge head for innovative pedagogy in education. The technologies allow opportunities for "open" learning, which bases on dealing with storages of knowledge, filtering them and adding them in a process of a true solution. This atmosphere cultivates a learner with self-orientation, by encouraging free thinking, taking responsibility, and working as a part of a team. That is to say, ICT integration enables the student's interaction with the studies material in volume and quality that are different from any other technology. The ICT allows progressing in personal pace, active learning, choice, and immediate feedback, a

possibility of training and improvement, interest, challenge and self-image improvement. A learning environment in which the computer is intelligently integrated into the teaching and learning process, allows the teacher to versify his ways of working, to change patterns of interaction between him and his students and pay further attention to their variance. Such an environment makes it possible to perform challenging tasks that were difficult to perform in the absence of the computer, and invites team work situations. For these reasons, there is an expectation that learning in ICT environment will improve the students' attitudes toward the various subjects of study, will increase their motivation, will progress their learning skills, and will bring to a situation in which many students will be able to maximize their abilities and improve their scholastic achievements [10].

The Science teachers in Israel who use ICT in teaching believe that the use in ICT intensifies their personal abilities and enriches and optimizes the instruction they are responsible for. They also believe that their students benefit from integrating ICT in the teaching. More than 70% of the teachers who used ICT to teach reported that ICT intensified their personal capabilities, enriched them with innovative teaching methods, contributed to access to high quality teaching resources and to cooperation with peers. More than half of the teachers reported that in addition, the classroom teaching processes were improved and optimized. About three quarters of the Science teachers in Israel who used ICT believe that this use increased their students' motivation to learn, to acquire knowledge and developing skills in information-processing, self-learning and communication. The ICT is considered, both by principals and Science teachers as a contributor to learning and empowering capabilities and performances of teachers as well as students, especially in the Arab sector [7], p. 7).

Summary and Conclusions. The article discusses the Israeli national program for adapting the education system to the 21st century: the factors involved and expectations from the ICT integration in education and science. A program which promotes ICT processes in the school in purpose of turning them into computerized organizations. The ambition is that all school teachers will implement an optimal technology-based pedagogy in the school's lifestyle, will use information management systems and maintain an ongoing communication with the parents and community. The program provides a technologic and pedagogic infrastructure for the imparting of 21st century skills than include: the use of ICT tools, information and communication literacy, critical thinking and the ability to solve problems - in a dynamic world that requires innovation, communication, collaboration and teamwork, independent learning, ethics and internet safety [9] as well as enabling the preparation of the graduates of the Israeli education system to face with the global labor market and academy while aiming to prepare the state of Israel to deal with future global and local, economic, cultural and security challenges it faces. Educational innovation may be expresses in all levels, starting with innovations in the educational paradigm, through the design of time, space, the

educational practice, and ending with learning and thinking processes and the field of the curriculum[10].

The information technology can be used as a bridgehead for innovative pedagogy in education. The ICT enables progress at a personal pace, active learning, choice, receiving immediate feedback, a possibility for training and improvement, interest, challenge, and improvement of self-image. But the ICT is not a necessary condition for the realization of innovative pedagogy. Intelligent use of ICT, based on recognizing its relative advantages and disadvantages, can be of great use in the realization of the innovative pedagogy. The translation of these processes into action in schools is what will determine their extent of utility in these teaching-learning processes. The main question is not about the necessity of ICT in education, but rather: under what conditions will ICT be useful? To whom? What are the unwanted side effects? And how can they be prevented?

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