Implementation of the national ICT plan for the 21st century among arab teachers as a result of readiness to change, ICT proficiency and demographics

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Abstract: This study addresses the extent to which the National ICT plan for the 21st Century is implemented among Arab teachers while examining correlations between their readiness to change, their proficiency in ICT as well as their demographic characteristics and the implementation of the plan. Findings show significant correlations between the study variables while the perception of change efficacy to change and the value of the change to the Organization are key factors that affect positively ICT proficiency and the implementation of the plan. However, ICT proficiency is the main factor that predicts largely the degree of implementation among Arab teachers at elementary schools.

Key words: The National ICT Plan for 21st Century, ICT proficiency, Readiness to change.

1. Introduction

The use of Information Communication Technology (ICT) is increasingly gaining momentum in education. In the academic year of 2011, a comprehensive plan entitled Adapting the Educational System in Israel to the 21st Century was launched. The program is also known by its short name *The National ICT Plan for 21st Century*. Schools that implemented the program, activate e-learning environments in which teachers perform computerized pedagogical management and use ICT for their teaching in the classroom. Adapting the educational system to the 21st century is a multiple year program, in which schools are planned to integrate in several steps and configurations. Basic configuration consists of laptops for every teacher, blinds, speakers and high internet connection. The teaching staff is trained and escorted by education ICT guides. In the years 2011-2012, 850 schools joined the program in the North Sector, the South Sector, and in Jerusalem to reduce the digital divide in these provinces (Ministry of Education, 2012). In 2014, 1250 schools joined the program and benefited from funding of internet expenses, the use of digital content, technical and pedagogical support (Weissblai, 2013). In 2015, all elementary schools have joined the program. The goal was to gradually include all schools in the country in the program (Ministry of Education, 2015).The goal of the plan is to implement innovative pedagogy at schools, while providing 21st century skills and assimilation of ICT at schools. The purpose is to improve five aspects of teaching: (a) teacher's skills, (b) adaptive learning and teaching, (c) real-time feedback, (d) continuum of learning in class and at home, strengthening the connection between home and school, and (e) administration using ICT.

Innovative pedagogy is an approach to teaching and learning, in which the taught content and knowledge are relevant to a changing reality and for optimal functioning. 21st century skills include ICT literacy, information and media literacy, thinking and problem solving, communication and collaboration, self-learning, and personal and social responsibility (Vydsilvski, Peled & Pevsner, 2011).The implementation of the national ICT plan requires the incorporation of online lessons into teaching-learning processes in classroom. Therefore, teachers are required to integrate online processes into their work plan according to the subject matter they teach. The plan is also intended to promote and expand the use of high-tech advanced management system as a part of establishing an online culture and transforming the school into a high-level online organization (Ministry of Education, 2012).In comparison to previous procedures of ICT integration into the education system in Israel, the National ICT Plan of the 21st Century is broad and comprehensive in both quantity and budget (like all schools). All 2263 elementary schools including 516 Arab elementary schools had joined the program by 2015. This plan is directed from the point of view of its super goals and therefore, the process of ICT assimilation in the 21st century puts a great challenge in front of the education system. The Plan requires that teachers be familiar with the possibilities of technology, creativity and investment of time, which will ultimately lead to effective application of their work in computerized tasks.

2. Assimilation of ICT and Readiness to Change

ICT is perceived as a catalyzer of organizational changes in content and pedagogy, and the process of its assimilation in education requires establishment of policy and making national and local changes at schools. Assimilation of ICT in the education system is deemed dramatically effective on the school Organization because it creates changes that oblige the education system to react, to cope with and even to change (Solomon, 2000; Fullan, 2001). In this context, innovative and updated learning-teaching materials and methods are being developed, and an innovative teaching-learning process is being applied, which is breaking through the borders of the space and time of the classroom (Ministry of Education, 2012).

Assimilation of ICT. Assimilation of the culture of ICT as a part of essential change in the school culture takes place while a considerable number of the school teachers are ready to apply this technology in their teaching (Shamir-Inbal & Kelly, 2009). Others maintain that assimilation of technological change can be done through implementation of a comprehensive systematic change that includes all the components of the school with an emphasis on the need for constant implementation of the change in order to establish and institutionalize it in the school (Cohen & Lechner, 2011). In every process of change, there are powers that are involved in supporting the change and powers that are against the change. A change succeeds when the supporting powers are stronger than the blocking and hindering ones (Fox, 2008). A survey of plans that assimilate ICT in the world show that teachers have a decisive role in assimilating successful technological change at school (Melamed & Slant, 2010; Kozma, 2008; Halverson & Smith, 2010).

3. The Teachers' Readiness for Organizational Change.

Readiness for change poses a major challenge and it is an important precursor to successful implementation. It reflects cognitions that are likely to affect people's behavior regarding change, including the degree of resistance or support to change, and the efforts to make it take place. High degree of readiness contributes to supporting change and reduces resistance to its implementation. Similarly, low readiness makes it hard to fulfil the change (Armenakis, Harris & Mossholder, 1993). Naraian, Brown & Navarro (2011) found that schools where teachers' readiness for an educational reform was high got more advantages from the reform in comparison with schools where the teachers' readiness for an educational reform was low.

Teachers have a central role in the process of assimilating technological change and the way in which it is employed (Blau & Hameiri, 2010). Teachers have an important role in providing the skill of self-learning, organization of efficient learning and development of thinking skills and control of technological instruments. The teachers' challenge in this era lies in creating innovative educational identity that focuses on teaching where the pupils are active, interested, ask questions, discuss issues, argue and compromise.

All this takes place in a collaborative learning environment, in which ICT is an integral part of the learning environment that affects the essence of pedagogy and its results (Rotem & Avni, 2009). The findings of certain studies indicate the existence of positive relationship between teachers' attitudes and beliefs towards change and the degree of their readiness to perform changes in their teaching process (Avidov-Unger, 2001; Avidov-Unger & Arazi-Cohen, 2014). It was found also that demographic variables such as the teacher's role and age affect the degree of actual implementation of the National ICT plan. Teachers-educators, tend to implement the plan more completely than teachers who just teach a certain subject. Other researchers pointed out a negative relationship between the teacher's age and the degree of implementing ICT in the classroom. They found that older teachers have little ICT literacy and show low self-confidence in operating ICT in comparison to younger teachers (Tondeur, van Braak, Sang, Voogt, Fisser, & Ottenbreit-Leftwich, 2012).

4. ICT Skills and Readiness to change

Teachers' mastery of the different ICT skills is likely to affect the degree in which they adopt technology in teaching. Therefore, development of the required skills to achieve reform goals among teachers is vital in creating sustainable change and motivation for change among teachers (Levin & Fullan, 2008). A previous experience in using ICT contributes larger confidence among teachers and is related to increased integration of technology in the teaching sessions (Wood, Mueller, Willoughby, Specht & De Young, 2005).

Cohen and Omer (2012) found that teachers, who thought or believed they were skilled showed larger readiness for integrating ICT in teaching, expressed less worries regarding change and were available to deal with more advanced aspects of coping with the change. Success in implementing ICT programs is largely dependent on the degree in which new directions are well-planned, availability of support in the system, and the school teachers' staff, besides the degree of the availability of resources to assimilate and maintain that technology for a long period (Mioduser, Nachmias, Forkosh & Tobin (2003).

As mentioned above, within the plan of the National ICT Plan for the 21st Century, the teachers underwent training in ICT skills and guidance regarding the implementation of the plan. However, based on experience working with teachers and school observations, reality shows that there are teachers, mainly those who have been teaching for 25 years or more, who had many difficulties in integrating this plan. Their difficulties stem of their lack of self-confidence in ICT skills, fear in coping with this feeling of insecurity, overwork as a result of the implementation of the plan, and erosion in their spare time that resulted from the necessity to prepare computerized lessons in a frequent way. Apparently, there are negative and positive factors regarding the implementation of the plan among teachers. Some factors hinder, while others promote and enhance implementation and assimilation of the National ICT Plan.

5. Objectives

This study examines the degree to which there are correlations between demographic characteristics of teachers, their perceptions about their ICT proficiency as well as their readiness to change and between the extent to which the national ICT plan is implemented. The purpose of this research is to determine which factors promote and which ones constitute obstacles for teachers upon implementing e-learning programs in particular. The study examines the implementation of the national ICT plan among Arab elementary school teachers who experienced the first stage of the National ICT Plan for the 21st Century in their schools at the end of the second year of its implementation. The results of the study indicate how significant each of the

factors is for the implementation and assimilation of the National ICT Plan among Arab teachers.

6. Hypotheses

1. Positive correlations will be found between the components of readiness to change: change efficacy, appropriateness, management support, value to the organization; and proficiency in ICT.

2. Positive correlations will be found between the components of readiness to change and proficiency in ICT and between the implementation of the National ICT Plan.

3. Negative correlations will be found between seniority in teaching and age and between readiness to change, proficiency in ICT and implementation of the National ICT Plan.

4. Significant differences will be found between teachers-educators and their professional counterparts. Teachers-educators will demonstrate higher levels of readiness to change, proficiency in ICT, and implementation of the National ICT Plan compared with professional counterparts.

5. The teachers' readiness for change, their ICT proficiency and seniority predict the degree of the implementation of the National ICT plan among teachers.

Methodology

The present study was carried out using a quantitative research approach. The quantitative data included a survey of teachers' readiness for change, their proficiency in ICT skills and actual implementation of the National ICT Plan.

Sample. The sample included 150 teachers from three Arab elementary schools: 50 teachers from each school: 70% women and 30% men; 52% are teachers-educators and 48% teachers who teach a subject. The teachers' age ranges between 23-58 (m=39.5; SD=7.3) and their seniority in teaching between 3-39 (m=16; SD=8.3) years.

Instrument. The instrument is a questionnaire that consisted of four parts:

(1) Demographic data such as: age, gender, seniority in teaching, role,

(2) Proficiency in ICT questionnaire contains eight statements about computer skills such as operation of interactive whiteboard, e-mail. Responses were measured using a five-point Likert scale (1 to 5), with 1=not at all, and 5=great (α 0.72);

(3) Teachers' readiness for change was assessed using a questionnaire designed by Holt, Armenakis, Field & Harris (2007). The questionnaire contains 38 statements, which were translated and modified for the study population and topic. Responses were measured using a five-point Likert scale (1 to 5), with 1=not true at all and 5=very true. Four different dimensions tested this variable: (a) change efficacy-expresses self-assessment of the ability and skill to implement the change and to perform the tasks that are required during the implementation. The questionnaire contains nine statements (e.g., *I feel like I can handle easily the plan implementation*), (α 0.87); (b) appropriateness-expresses estimation for the proposed adjustment to the organization. The questionnaire contains seven statements (e.g., *there is no doubt that the change is needed to school*), (α 0.62); (c) administration support- represents perceptions about the commitment of organizational leaders to change. The questionnaire contains 13 statements (e.g., *the school principal served as a role model for change*), (α 0.71); (d) value to the organization- represents the organization benefits from the change. The questionnaire contains eight statements (e.g., *this change will improve the effectiveness of the school in every way*), (α 0.89). Reliability of the questionnaire on all the dimensions = α 0.89.

(4) Application questionnaire, use and integration of ICT in teaching (Peeraer & Van Petegem, 2012). It contains 15 statements (e.g., *I use power point presentations in class*). Responses were measured using four-point levels: 1= rarely, 2= sometimes, 3=often and 4=always (α 0.93).

Procedure. The research topic was selected as a result of professional meeting with teachers who were required to implement the National ICT Plan for the 21st Century at their work and referred to the difficulties they experienced during their work as a result of the implementation of the plan. *The first stage* consists of reviewing relevant theoretical material, and after formulating the concept of the study, three schools were selected to perform the study. *The second stage* consists of selecting

research tools; existing questionnaires were selected and adapted to the study population. *The third stage* constitutes the process of collecting, processing and analyzing the relevant data.

Data processing. Quantitative data were processed and analyzed by quantitative research methods using correlations, *t-tests* in two independent samples and multiple regression.

Findings and Discussion

The findings of the study are introduced with reference to the objectives and hypotheses of the study. In order to test the hypotheses 1,2,3, Pearson's correlation coefficients were used to test the relationship between the following variables: implementation of the national ICT program; components of the teachers' readiness for change; (1) self-readiness, (2) appropriateness, (3) administration's support, (4) value of plan of organization, ICT proficiency, seniority, age. The results of Pearson's tests are introduced in table 1.

Table 1

Correlations between dependent variables and independent and themselves (N=150)

	M	SD	1	2	3	4	5	6	7	8
1. application	3.13	.912	-							
2.Change efficacy	3.20	.599	.695***	-						
3. Appropriateness	2.99	.475	.391***	.506***	-					
4.. Support	3.22	.468	.336***	.417***	.317***	-				
5. Value	3.09	.688	.570***	.608***	.292***	.494***	-			
6. Proficiency	3.66	.883	.821***	.716***	.248**	.294***	.581***	-		
7. Seniority	16.10	8.34	-.259**	-.240**	-.490	-.172*	-.247**	-.388***	-	
8. Age	39.52	7.38	-.272**	-.279***	-.190	-.182*	-.272**	-.439***	.925***	-

*P<0.05   ****P<0.01**   *****P<0.001**   Diagonal values of reliability α

The matrix of correlations indicates that there are clear relationships of different powers between the study variables. Regarding the first hypothesis, two clear and strong positive relationships appear between two components of readiness for change and ICT proficiency. The first is between change efficacy and between ICT proficiency (r=0.716, P< 0.001); the second is between the value of the plan to organization and between ICT proficiency (r=0.581, P< 0.001). These relationships indicate that teachers with high ICT proficiency feel more ready to implement the ICT plan in their work, and therefore, they express high self-readiness to implement the plan. In parallel, they give value to the importance of the use of ICT and its positive contributions to the school in this information era. Clear positive relationships, though weak, were found between appropriateness of the change to the organization and between ICT proficiency (r=0.248, P< 0.001), and between the administration support and ICT proficiency (r=0.294, P< 0.001). The findings verify hypothesis (1) and show that the higher the perception of ICT proficiency is, the teachers express higher readiness for change.

The results verify hypothesis (2) and indicate existence of clear strong and medium positive relationships between the components of change and ICT proficiency and between the implementation of the National ICT Plan. Two clear positive and strong correlations were found between self-efficacy and between the degree of implementation of the ICT (r=0.695, P< 0.001), and between attitudes towards the value of change to organization and the degree of the implementation of the ICT Plan (r=0.570, P< 0.001). Another two clear and positive relationships were found in a medium power between appropriateness of the change to the organization and between the degree of the implementation of the ICT plan (r=0.391, P< 0.001), and between attitudes towards the administration support and between the extent of the implementation of the ICT plan (r=0.336, P< 0.001). These results indicate that the more the teacher thinks that the change is worthwhile and

relevant to the system, the more he/she will assimilate it in a more extensive way.

These results are compatible with the results of previous studies that showed that the teacher's pedagogical technological knowledge and his positive attitudes regarding change and assimilation of ICT plans are relevant to a realistic higher implementation of the plan (Avidov-Unger & Arazi-Cohen, 2014; Palak & Walls, 2009). The strong positive relationship that exists between ICT proficiency and the degree of the implementation of the ICT plan (r=0.821, P< 0.001) indicate that teachers who have well-control ICT skills feel high personal capability regarding the implementation of the ICT plan (Kalemoglu Varol, 2014).

Regarding hypothesis (3), significant negative relationships were found between seniority and age and between the other study variables, but most of the relationships are at low power. Only two significant relationships were found in medium power between seniority and age and between the degree of mastery of ICT skills (r=-0.388, P< 0.001); (r=-0.439, P< 0.001) respectively. The older teachers are and their seniority is longer, the lower is the level of their ICT proficiency. No significant relationship was found between age and between attitudes regarding appropriateness of the change to the organization.

It is possible to assume that older teachers find difficulty in changing educational paradigms to which they have got accustomed until now. This difficulty together with low skills of ICT causes a feeling of low self-readiness, and consequently to less implementation of the ICT plan. These findings are compatible with the findings of a previous study that found that older teachers have less technological knowledge and low self-confidence regarding the operation of technology in comparison with younger teachers (Tondeur et. al., 2012).

To test hypothesis (4) a *t-test* was conducted in two independent samples in order to test differences between subject teachers and teachers-educators regarding their readiness for change (self-efficacy, appropriateness, support

and value), their perceptions about their ICT proficiency and their implementation of the ICT plan. The results of the *t-test* show that there is difference between teachers-educators, and subject teachers, in the degree of the implementation of the ICT plan. The degree of implementation of the ICT plan among teachers-educators (m=3.241, SD=0.867) is clearly higher (t=2.286, p< 0.05) than the degree of implementation of the ICT plan among subject teachers: (m= 2.871, SD=0.972). This finding is compatible with the findings of the study conducted by Avidav-Unger and Arazi-Cohen (2014), which showed that teachers-educators implement the ICT plan more completely than subject teachers do. This can be attributed to the possibility that the ICT plan focuses mainly on teachers-educators and less on subject teachers. There were no significant differences between teachers-educators and subject teachers regarding their readiness for change and their ICT proficiency. In order to examine hypothesis (5) a stepwise linear regression was conducted. Table 2, depicts the criterion to enter the regression model of every variable and its significance of p<0.05.

Table 2

Stepwise linear regression

	Model	β	R	R Square	R Square change	F
1	ICT proficiency	**0.821*****	0.821	0.674	0.674	**0.821*****
2	ICT proficiency	**0.772*****	0.844	0.712	0.037	**177.870*****
	Appropriateness	**0.200*****				

Note: The independent variables are attitudes regarding readiness to change, ICT proficiency, seniority and age; the dependent variable is the extent of the implementation of the ICT Plan

* P< 0.05   ** P< 0.01   *** P< 0.001

As we see in Table 2, after two steps we received a significant regression model (F=177.870, P<0.001). Only two variables, ICT proficiency and attitudes regarding appropriateness of the ICT Plan to the organization were found to be predicting the degree of implementation of the Plan. The regression model explains 71% of the variance in the variable implementation of the ICT Plan whereas ICT proficiency constitutes the largest contribution to the explained variance of the implementation (β= 0.772, p< 0.001). Regarding the attitudes towards the appropriateness of the ICT plan to the organization, a lower degree of contribution was found regarding the explained variance of the implementation of the ICT Plan (β= 0.200, p< 0.001). It seems that teachers, who believe that the ICT Plan is appropriate to school, implement it in a larger way. The other components of readiness for change (self-efficacy, support and value), and the variables of age and seniority did not contribute to the prediction of the degree of implementation of ICT plan among teachers. The added value that is received from the regression-model points out that ICT proficiency is the most important variable and it explains best way the degree of the implementation of the plan in a practical way.

7. Conclusions

The purpose of this study was to find out if and to what degree there are relationships between teachers' readiness for a change that requires implementation of the National ICT Plan for the 21st Century, ICT proficiency, and demographic variables and the implementation of the plan among Arab teachers at elementary schools.

The study adopted the quantitative approach in order to test the research hypotheses. The sample included 150 Arab teachers from three Arab elementary schools. In the beginning, the relationships between the study variables were examined. After that, the differences between teachers-educators and subject teachers were tested with reference to the study variables. Conclusion, the model of stepwise linear regression model was conducted.

The findings show that there are positive relationships between all the components of readiness for change (self-efficacy, appropriateness to the organization, administration support and value of the change to the organization) among themselves, and between them and ICT proficiency, and between all these variables and the implementation of ICT plan.

Self-efficacy for change and the value of change for the organization are the central components of readiness that are connected in a positive and strong way with both ICT proficiency and the implementation of the National ICT Plan. Teachers with high perception of self-efficacy have high assessment to the contributions of the change that is bound with the implementation of the National ICT Plan were found to have high ICT proficiency and implemented the plan to a high degree. At the same time, older teachers with low mastery in ICT skills in comparison with younger teachers, and teachers-educators were found to implement the ICT plan in a more complete way in comparison with subject teachers.

The findings of the study point out ICT proficiency as a central variable that largely predicts the degree of the implementation of the ICT Plan among Arab teachers at elementary schools. There is no doubt that successful assimilation of the National ICT Plan for the 21st century at educational institutes is dependent on many pedagogical, administrative, and bureaucratic factors. Still, the findings indicate that teachers' readiness for change, their ICT proficiency and their perceptions regarding the ICT National plan constitute a significant and decisive cause in the process of assimilating the plan in teaching and learning. Therefore, establishing readiness for change among teachers, and increasing their understanding of the factors that affect it, along with guidance and support for the acquisition of ICT skills, will enable initiators of reforms and educational leaders to develop professional instruments and processes that are required for successful implementation and assimilation of educational and technological reforms.

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