Babes-Bolyai University Cluj-Napoca

Facultatea de Studii Europene

Globalization Influencing the Assimilation of ICT in Education

Long Abstract

CONDUCĂTOR DE DOCTORAT

DOCTORAL COORDINATOR

Prof. Dr. Nicolae Paun

PhD Student:

Dana Daniel Horowitz

CLUJ-NAPOCA

September 2021

Table of Contents

Abstract

Globalization's influence on education leads to rapid developments in technology and communication and leads to changed ideas, values, and knowledge in education systems around the world. Globalization produces an increased number of people with scientific and technological training. A developing economy relies on knowledge as a central factor. Organizations and industry demand workers who have qualifications and skills in science and technology. Many countries have come to realize that their future depends on their ability to compete in a world market, where the focus is on knowledge-based industries. Hence the importance of knowledge, skills, and intellectual ability to respond to the challenges of rapid changes and uncertainty in a fast-advancing world.

The global society is based on technological and communication developments and shapes the younger generation as 'global citizens' with a wide range of tools and knowledge, as well as skills adapted to a competitive society founded on information. These developments change the role of students and teachers, producing a paradigm transition from a traditional industrial society to knowledge and information-oriented society. Thus, this research sought to develop a strategic approach to ICT assimilation in schools with an emphasis on primary schools in peripheral settlements in the northern region of Israel.

Accordingly, the mixed-methods research combining quantitative and qualitative research methods and tools was chosen. A closed questionnaire and semi-structured interviews were used to collect data from two key points of view (primary school principals and teachers in the northern periphery of Israel).

Generally, research findings showed that information and computer technologies (ICT) are reflected in communication as an important tool to achieve improved performance, cooperation, and ability to provide pupils with a variety of learning styles, experiences and outcomes.

Nevertheless, the research found that the lack of clearly defined educational program that delineates achievable goals and objectives, inadequate technological infrastructure, maintenance, alongside insufficient or no training pf principals and teachers in the ICT field constitute significant obstacles, hindering active assimilation of ICT in education.

Conceptually, the Glocal-PA-ICT in Education Model arising from this study outlined a strategy for ICT assimilation policy in educational systems. The model is integrative, evidence-based, and combines knowledge areas in international relations and education. Additionally, being modular, it can be adapted to any other context of attempting to promote an ICT assimilation process in educational systems.

Key words: Globalization, Assimilation of ICT in Education, challenges/key factors likely to hinder or promote ICT integration into education.

INTRODUCTION

Globalization's influence on education leads to rapid developments in technology and communication and leads to changed ideas, values and knowledge in education systems around the world. Globalization produces an increased number of people with scientific and technological training. A developing economy relies on knowledge as a central factor. Organizations and industry demand workers who have qualifications and skills in science and technology. Many countries have come to realize that their future depends on their ability to compete in a world market, where the focus is on knowledge-based industries. Hence the importance of knowledge, skills, and intellectual ability to respond to the challenges of rapid changes and uncertainty in a fast-advancing world. The global society is based on technological and communication developments and shapes the younger generation as 'global citizens' with a wide range of tools, knowledge, and skills adapted to a competitive information-based society. These developments change the role of students and teachers, producing a paradigm transition from a traditional industrial society to knowledge and information-oriented society (Chabbott, 2013; Munshi, 2006)

Accelerated progress in information and communication technology (ICT) in the last decades has resulted in many countries' investments in assimilating ICT in education. The Internet, computers, interactive boards, and many other technological tools are accepted as valuable teaching and learning resources. Similar to other developed countries, Israel has invested much in ICT. Nevertheless, progress in that area has been quite disappointing. There is a great discrepancy between availability of ICT and ways of assimilating it. As a result, , several serious questions are asked of both decision makers and educators (Kremer at al.2013 ; Chinn & Fairlie, 2010).

The COVID-19 pandemic, which resulted, among other things, in closed schools and other educational facilities, which compelled education systems around the world to find alternatives for frontal face-to-face teaching. Many education systems have conducted online activities to enable continued teaching despite closing the schools.

One of the key questions is: what factors influence successful assimilation of ICT in schools? Hence, the importance of this study is in finding an answer to this question and other related questions, as perceived by participants. Accordingly, the paradigm that serves this study is mixed methods research combining quantitative and qualitative methods and tools within one study. Mixed methods research presents a broader picture

with comprehensive answers to research questions from various points of view, allows for drawing meaningful insights with regard to various phenomena with valid and powerful explanations about phenomena that cannot be grasped in full by using only a quantitative or qualitative method. The mixed method research employed a closed-ended questionnaire and semi-structured interviews to gather data from two different key points of view (principals and teachers at primary schools in the northern periphery of Israel.

Research findings showed ICT reflected in the media as an important tool to reaching improved performance, cooperation, and the ability to provide students with diverse learning styles, learning experiences and learning outcomes.

However, overcoming these challenges can turn them from 'challenges' to 'positive factors' to help successfully assimilate ICT. The principal aim of this study was to analyze factors hindering or promoting the integration of ICT into teaching and learning. Hence, the importance of this study, which seeks to propose a strategic approach to guide decision makers, educators, and further future studies towards promoting successful assimilation of ICT in education in general and Israeli primary schools in particular.

The development of the Internet and its rapid spread has made it the main means of communication in our times, and its implications are remarkable in every area of society, starting with the fields of politics, medicine, education, the media and entertainment and culminating with working, economics, daily home life, human relationships and personal matters. The accumulation of a large body of knowledge, improved global communication, and easy access to technological advancement, have influenced public institutions and organizations, schools in particular (Melamed & Salant, 2010).

Knowledge society is a term coined by various researchers who discussed technological developments that affected many aspects of cultural, social, and economic life around the world (Karpov, 2015b; Vallima & Hoffman, 2008; Furedi 2004; Kellerman, 2000). Kellerman (2000) discerned three stages in the development of the knowledge society periods: (1) 1960-1970: society with an abundance of information; (2) 1980-1990: knowledge-based society; (3) 1990-2000: knowledge ruled society. Three trends characterize information-based society in the 21st century:

- ☒ **Globalization**: information mobility in economics, society, and culture across the globe, without international borders.

- ☒ **Expertise** mainly in developing means of passing information, including hardware and software.
- ☒ **Connectivity**: the expeditious development of Internet technology has enabled connectivity between private individuals and service providers and producers.

These three trends influenced the face of information-ruled society. Firstly, in an economic sense, information became the key product and main commodity in the world trade market. Secondly, in a technological sense, there have been expeditious developments in intelligent information technology (IT) meant to produce, register, transmit and store diverse types of information through all-embracing connectivity that establishes information means and types that become more and more interdependent. Thirdly, in a social sense, the knowledge society is turning into a society with a worldwide digital culture that has accumulated an enormous reservoir of human knowledge by which it is unnecessary for people with common interests to sit in the same room, building or country. Castells (2007) called this culture Internet "informational capitalism".

Another important aspect characterizing the information era is the way the meaning of time and space have changed. The sources of humanity have changed from traditional national territories to all-embracing virtual ones. This digital culture increases the socio-political role of the media, contracts the constraints of time and space, and sprouts virtual worldwide symbolism of reality.

In his book, *The Medium Is the Message*, McLuhan (1967) best described the nature of ICT. He developed the theory of the global village, according to which new ICT would unite the human race once again. McLuhan expressed the technological effects on our lives and their design, stating that what influences society more than the content of communication is the means of communication.

The technology of knowledge's contribution to fast economic growth in the 1990s raised the question about its possible contribution to improving education, particularly because some of the features of the technology of knowledge are congruent with the principles of learning and suit learning improvement.

Education throughout the world is considered a significant impetus for social, economic and personal changes. Every country's development depends largely on the quality of its education. Future schools must adapt to the needs of students regarding knowledge, skills and values that will be required for living in a technological world

that produces a new cultural, social, economic, and political global reality. Based on economic considerations and ICT's potential to improve education, many countries began to develop policies encouraging considerable investment in the use of ICTs in education.

New ICTs are seen by educational policy makers as an impetus for new and dynamic pedagogy that invites other innovative ways of improving the quality of teaching and learning outcomes. Additionally, they have the potential to accelerate, drive, enrich and deepen the range of students' technological skills, giving them opportunities for their future as the workers of tomorrow (Sang et al. 2011; Kay & Greenhill, 2011)

In a modern networking society and with the demands of a global economy, teachers have to be part of this society and involve themselves in lifelong learning. Contemporary students are required to master 21st century skills including creativity, collaborative learning, knowledge sharing and critical thought to become contributing citizens and qualified for employment (Mdlongwa, 2012; Saavedra & Opfer, 2012).

The Partnership for 21st Century Skills (P21) organization, established in 2002 in the U.S.A. to establish partnerships between education, business, community and the government and place these skills at the heart of education (http://www.p21.org)

The P21 organization was established as a partnership between business companies, educators and policy makers, and its purpose was to bring 21st century skills to the center of public discussion on the topic of education. Correct to 2016, and after 14 years of existence, the organization has earned a key role in promoting the subject in the United States. Non-profit organizations from the fields of education and society, ICTs, and educational companies as well as industrial companies have joined its ranks. The organization developed an integrative conceptual framework for 21st century skills that combine familiarity and literacy in fields of knowledge alongside general skills

ICTs provide opportunities for open learning in a technological learning environment based on coping with knowledge situations, sorting and combining them into a process of building rational and authentic solutions. This environment will provide learners with tools and skills adapted to and updated for the information era, which will enable them to improve the quality of teaching and learning products. The atmosphere in such a learning environment nurtures learners possessing self-regulation, encourages free thinking, taking responsibility, progress at a personal pace, receiving immediate feedback and teamwork. Reorganizing the process of educational

institutions towards changes in education demands assimilating ICT to an innovative learning environment that will provide learners with specific knowledge, advance meaningful learning and improve productivity (Aristovnik, 2012; Halverson & Smith, 2010).

A learning environment in which there is a rational integration of computers in the teaching and learning process, allows teachers to vary their ways of working, change patterns of interaction among themselves and with their students and pay more attention to their diversity. Hence it is anticipated that a computerized learning environment would improve students' perceptions of various subjects, promote their learning, increase motivation and result in circumstances where they are not only capable of improving their achievements, but also increasing their confidence to take risks and learn from their mistakes (Tomei, 2005; Zhang & Aikman, 2007)

The European Union's national strategy for education in a digital world (Bildung in der digitalen Welt, 2016) enabled the development systemic digital abilities in countries' education systems, including primary and high school education, as well as higher education. This strategy includes digitalization actions in the areas of educational programs and learning development, continuing professional development (CPD) for teachers and educators, infrastructures, educational media, and content, managing education at all levels, as well as essential legal and functional actions The strategy also places a strong emphasis on nurturing ICT skills for studying in all subjects.

CPD supports teachers from their induction to teaching to the peak of their careers. Many CPD programs are offered to teachers, covering most subjects and aspects of school life. These programs seek to enhance and improve teachers' professional skills so as to maximize their potential[1].

Like other education systems around the world, the Israeli education system, identified the need to adapt curricula and teaching strategies to 21st century needs with an emphasis on meaningful learning, pedagogical innovation and technological literacy among learners and teachers. Therefore, the Israeli Ministry of Education's (MOEI) ICT program called 'Adapting the Education System to the 21st Century" was launched in 2011 (http://cms.education.gov.il/educationcms/units/madatech///ictineducation).

[1]https://eacea.ec.europa.eu/national-policies/eurydice/content/continuing-professional-development-teachers-working-early-childhood-and-school-education-89_en

The program's aim was to assimilate digital teaching and learning in all schools in Israel by imbuing 21st century skills, digital literacy and establishing meaningful learning combined with ICT to empower teachers and students in a digital teaching and learning environment.

The program set a goal to promote 'innovative pedagogy' in schools so that students would acquire relevant skills to function best in the 21st century. Teaching would be adapted to students' diversity and lead to breaking barriers between schools and general society. Informed ICT use would lead to improving the quality of teaching, teachers' skills, school management, students' attentiveness and interest (MOEI, 2012 https://edu.gov.il/tech/madatech/Pages/hp.aspx).

An analysis of the research literature shows that despite the great potential inherent in educational technologies for improving teaching processes, learning, and training, it seems that in education systems there is a built-in opposition to the organizational and pedagogical changes deriving from assimilation of these technologies. In the face of this opposition, the assimilation process is hampered to such a degree that technologies only have limited effects on school culture. This disappointment has characterized most projects of assimilating educational technologies (Avidov & Eshet 2011; Nachmias, Mioduser, & Forkosh-Baruch, 2010; Levin & Fullan, 2008).

Notwithstanding ICT integration into education, significant gaps remain between the underlying promise of the information revolutions and school reality. Many teachers and students confirmed in studies that a start had been made in using computers in classrooms thanks to increased availability of computers, teacher training and policies encouraging computer use. However, this was expressed predominantly in fundamental actions such as: using word processing to write, constructing presentations, seeking information on the Internet, and using e-mail The situation has not changed much to this day (Ertmer & Ottenbreit-Leftwich, 2013; Karpov; 2015b).

Teachers tend to use the ICT tools primarily for the preparation of study materials rather than for working with students in the classroom (Wastiau et al., 2013). Similar findings emerged from ICILS (International Computer and Information Literacy Study) showing that teachers do not function as 'change agents'. In this context, most of them struggle to fully make use of the potential of new technologies and tend to resort to familiar teaching methods instead of experimenting with new teaching methods **(**Fraillon, et al., 2014).

It was found that most projects in the education system focused on its external characteristics and ignore the need to change the organization's culture, norms and assumptions as a condition for effective and meaningful assimilation of ICT in teaching and learning (Petko, Cantieni, & Prasse, 2017; Dahya, 2016; Machado & Chung 2015; Makgato, 2012).

Effective ICT adoption processes in educational institutions are more dynamic and complex than cultural, social, and economic changes. The former changes include converting teaching staff's practice patterns, modifying a school's identity, improving students' performance and adjustment to environmental changes.

In the sense of time, it is a complex and multi-stage process including initial exposure to learning technology, initial experiences and making decisions to adopt technology over time. People do not adopt technology at the same speed, and therefore, time is likely to pass between the exposure to technology stage and its adoption and use in teaching and learning. The users' population is made up of early adopters on the one hand, and laggards on the other (Rogers, 2003).

It seems that significant assimilation of computer technologies in educational institutions depends on various factors that hinder or promote the integration of ICTs to adapt teaching to the postmodern era. Therefore, successful assimilation of ICT requires mapping factors that contribute to successful assimilation in education and effective teaching. However, there are factors that may promote the incorporation of ICT including the educational leadership of school administrators as a key driver of technological change management in the school organization.

This raises the central research question: What factors can help educational policy makers improve the success rate of using ICT in teaching and learning at school?

Research Problem

The national ICT program "Adapting the education system to the 21st century" in Israel concentrates on applying organizational and pedagogical outputs in schools. The program leans on national and local systemic support and resources with cooperation between the MOEI, local authorities and schools according to the following components:

1. Establishing an infrastructure for a technology-rich environment.
2. Training intra-school teaching staff: principals and coordinators to lead the process within schools.

3. Training teaching staff towards informed assimilation of digital teaching and learning integrating technology in classrooms.
4. Stimulating teaching-learning structuring both personal and shared knowledge as well as independent investigative-based learning including innovative technological tools.
5. Designing appropriate digital materials, make them accessible and ensure they are used effectively.
6. Teaching and learning using online technological tools.
7. Establish a classroom-home learning continuum by dismantling classroom borders and adjusting to effective learning times.
8. Responding to learners' diversity and diverse learning styles (MOEI, 2013) http://cms.education.gov.il/EducationCMS/UNITS/MadaTech/csit (Hebrew)

In mid-2010, a budget of NIS 200 million was allocated to the first stage, and a decision was made to start with only 220 primary schools, most located in peripheral settlements in the northern and southern regions of Israel.

Over and above the declaration level, in which expression is given to a range of 21st century skills on a practical level, the program focused on promoting ICT learning and especially on issues linked to equipping schools and establishing necessary infrastructures. Accordingly, schools were equipped with technological infrastructure according to a basic operational model and receiving operational budgets such as online access for teachers in every classroom, including: computer, projector, wired and/or wireless Internet connection (according to updated standards), a sound system and approach to worlds of digital content to assimilate virtual teaching (synchronic and a-synchronic), where the ambition was to make all schools capable of competing with the best countries with significant achievements (MOEI, 2011a) http://cms.education.gov.il/EducationCMS/Units/MadaTech/hatamat_marechet_21

Although ICT infrastructures were established in various primary schools in peripheral settlements, teachers' efficient employment of ICT in curricula has not been realized. The problem arising in some schools equipped with ICT means appears to be that they are not properly exploited. Teaching methods based on ICTs are not assimilated. In practice, the program does not encourage instilling 21st century skills linked to in-depth learning, inter alia, as a result of a lack of applied definitions as to how these skills would be instilled assimilating the program at the same time as a policy to improve achievements, created pressure on pedagogical personnel and made in-depth

processes necessary to promote 21st century skills difficult (Mishra, Fahnoe, Henriksen & the Deep-Play Research Group, 2013).

The research problem is affixed to the question why, despite the costs, the Israeli MOEI's expenditure and support, progress in ICT in the education system has disappointed more than once. There is still a disparity between strategies to assimilate ICT in Israeli schools and availability of implementation tools. Investing considerable sums of money equipping schools is meaningless unless they are used effectually. Furthermore, classroom technological resources does not necessarily result in better academic achievements (Tezci, 2011a; Wozney et al., 2006). It appears that a revolution in teachers views, beliefs and mental world comprehension is a precondition for introducing a change and adopting innovation and its assimilation. Furthermore, they are the most important factor in assimilating change processes (Kim, Kim, Lee, Spector & DeMeester, 2013; Magen-Nagar & Peled, 2013).

These aspects point to a gap between the advanced communication approach in educational policy and its practical assimilation in schools because of unique school environment factors. This gap is problematic because teachers do not have the necessary qualifications or knowledge to combine their pedagogical knowledge with new technology. Hence, this study sought to examine how to support effective ICT assimilation in primary schools in Israel. Furthermore, it seeks to identify what factors hinder successful ICT assimilation, what the best ways of assimilating ICT are, and what sort of support is needed for decision and educational policy makers.

Research Aims

The main aim of the current study was to develop a strategic approach to ICT assimilation in schools with an emphasis on primary schools in peripheral settlements in the northern region of Israel. This can be achieved through the objectives listed below.

1. To characterize the influence of the formative leadership of the school principal as a pedagogic leader on the assimilation of ICT technologies in the teaching of teachers and students.
2. To characterize the factors influencing the process of disseminating the use of ICT in teaching and learning processes

3. To develop a management model that can help facilitate and improve ICT assimilation and define the areas in which to anticipate successful and practical assimilation.

Research Questions

1. How do formative leadership characteristics of school principals as pedagogical leaders influence the assimilation of ICT technologies in the teaching and learning of teachers and students?
2. What Factors Influence the Process of Disseminating the Use of ICT in Teaching and Learning Processes?
3. What Components Might Comprise a Management Model to Facilitate and Improve ICT Assimilation and Define Areas in which to Anticipate Successful and Practical Assimilation?

Significance of the Study

The importance of this study derives from its aim, which is to examine factors that are likely to make the assimilation of ICT tools more effective and successful in schools in general and in Israel specifically. Although factors hindering ICT assimilation in education and successful factors in applying ICT in general, have been topics of many studies in the past two decades, only a few studies (Aflalo, 2012; Avidav-Ungar & Shamir-Inbal, 2013; Rimon, 2012; Sujit, Basak, Govender, 2015) were conducted with the purpose of exploring and researching assimilation of ICT in Israeli primary schools.

In Israel, no focused research has been conducted reviewing the perceptions of ICT stakeholders such as school principals and teachers, with regard to ICT assimilation in primary schools in peripheral settlements in the northern region of Israel. Therefore, this study seeks to narrow a gap in the literature and proposes a framework for collecting essential data that will help emphasize barriers to ICT assimilation and suggest ways to overcome them in primary schools in Israel.

This study's findings are likely to help map schoolteachers' and principals' main uses of technological tools and services for teaching-learning purposes, as well as increasing the MOEI's awareness of the existing situation in primary schools. Additionally, the current study's findings are likely to help decision-makers make informed decisions about teacher and principal training and development to promote

teaching and learning processes with increased use and support of ICT in educational processes. Informed decision making is likely to contribute to the establishment of optimal technology-based pedagogy in school lifestyles in the 21st century, which will improve teaching and learning in the coming years.

CHAPTER I: THEORETICAL PERSPECTIVES

I.1 The Age of Globalization - the Global Village

Since this research focuses on the role of ICT in a globalized world, a discussion of globalization is necessary here. Globalization refers to a process in which social, cultural, economic, and political activism develops on the global level. These developments ignore political borders and geographical distances, and are not necessarily managed by states, but rather by national, transnational, and actors that are not necessarily governmental. These developments make the world one place or, as is commonly known, a 'global village' (McLuhan, 1967).

I.1.1 The Effects of Globalization on the Economy Aspect

The term globalization was first used in the field of economics. The world's economic reality is based on cross-border information and knowledge. Nevertheless, globalization processes have greatly influenced cultural, social, and technological aspects of societies in a new world order. Many organizations provide significant work opportunities and a work environment that enable building skills and a sense of professional identity, especially where job requirements keep changing and chances of lifelong work are not great (Werther & Chandler, 2006; Vinig & Kluijver, 2007).

I.1.2 Global Leadership

There are those who view global leadership as existing in a space where there is more geographical and/or cultural flexibility (Caligiuiri, 2006). Others see global leadership in the way a role holder fills his/her global role, including ties that are established and understanding of the role. Hence, such leadership requires developing separate and different skills than those required for 'regular' leadership (Mendenhall, Reiche, Bird, & Osland, 2012).

In order to create a sustainable advantage for an organization, there is a clear need for continuous global leadership, which includes the development of concepts that

adapt to effectively address emerging challenges, expose latent opportunities, and identify the capabilities of employees at all levels (Folkman, 2014).

I.1.3 The Effects of Globalization on Educational Aspect

Globalization has brought about a stronger influence in terms of the policies of the UN, the World Bank, and the OECD to name a few world-wide organizations. However, the ways these effects are mediated differ among developed and developing countries, where in the former, this mediation is more direct but less influential.

Clearly, education ranks among the nation's main concerns because it has a leading role in preparing children for their future in a changing world. In fact, because education is a top priority, many resources are invested in it. In terms of globalization, education is perceived as an international commodity (Green, 2002), presenting the global economy with the task of investing in people, skills, and knowledge. (Mundy, 2005).

I.2 The Importance and Contribution of ICT in Education

The literature offers various ways of defining the naturally varied and multi-faceted and modifiable concept of ICT, Although the term has been used widely around the world y, there is no agreement regarding a one clear definition (Apulu & Latham, 2011; Zuppo, 2012). The reason for this is that such technology changes rapidly naturally, with new technological developments. For example, in the past, the term 'technology' was used to define hardware alone. However, this term refers both to hardware and software (Burke & Weill, 2009). Generally, one can see in the abbreviation of the term ICT a product of two unconnected concepts, communication technology and information technology (Gholami, at.al 2010).

I.3 Learning Theories in the Context of Assimilating ICTs in the 21st Century

Learning theory has been defined as a logical theory providing knowledge about learning (Begg 2015). These include behaviorist and connectivist learning theories applied to achieve learning goals. Schools have adapted different strategies to adapt to a new computerized and online society (Altuna & Lareki, 2015).

Behaviorism: According to this approach teaching is frontal and teacher-centered, while learners depend on external processes, learning by rote and drilling. Tests consist of multiple-choice questions. Expected result is positive reinforcement.

Cognitivism: Teaching is predominantly frontal but also relies on visual tools such as charts and presentations to facilitate memorization. Learning is not only based on external processes but also on internal processes, meaning short and long-term memory. Tests consist of multiple- choice questions and writing tasks.

Connectivism: Teaching and learning are focused on students who engage in self-determined search of contents, share sources with peers, thus learn in spontaneously created groups and work together on creating knowledge.

Constructivism: The approach is based self-guided learning that relies on personal experience, on discovery through collaborative group work and scaffolding. Learning is thus informal, active, and social. Learners are assessed by their peers (http://onlinelearninginsights.wordpress.com/2013/05/15/how-couse-design-puts-the-focus-on-learning-not-teaching/).

I.4 ICT in Israel - A Case Study

The need to adapt the Israeli education system to changing times has been at the focus of public discourse for many years. The education system's conduct and growing gap between what is done within school walls and the outside world apparently cause ongoing dissatisfaction. Against this background, numerous reforms were introduced to the education system at the end of the 20th and start of the 21st century striving, at least according to declarations, to instill students with skills and skills relevant to the 21st century. Most reforms emphasized 'profound' pedagogical methods encouraging high order of thinking. A few sought to assimilate digital assimilations at school, others focused on improving skills measured in international comparative tests and there were those that addressed expanding schools' autonomy and flexibility (Nir et al., 2016).

I.5 The European Commission's Educational Policy for Assimilating ICT in Education

Europe encompasses some of the world's densest populations in many countries comprised of regions, political entities, unions and partnerships. The European Union (EU) is the world's largest economic trading bloc and operates in a wide range of partnerships with laws and regulations governing economic, social and political alliances between its countries and regions (http://epp.eurostat.ec.europa.eu).

Table 1: A Comparison of ICT Implementation between Some European Developed Countries and Israel

Developed Countries	Ireland	England & Wales	Singapore	Australia	Finland	Israel
ICT policy	Yes - a government action plan- to guarantee ICT efficient assimilation and integration in communication in learning, teaching and assessment school framework by 2020.	Yes - the government made ICT one of the core subjects in the national curricula	Yes - recognized ICT as a leading focus in its field of education.	Yes - a national framework for communication and ICT in education, 'Making Change Happen Framework'	Yes - Finnish information society considers a society in which expertise and knowledge are part of culture and significant expertise.	'Islands of innovation'- numerous reforms including multiple changes without consistency.
Aims of ICT in education	To substantially improve the quality of teaching and learning in Irish schools	ICT stands at the center of reform efforts in education, to break down barriers, establish links, improve public services, including education and to guarantee stable economic growth.	To guarantee effective integration of ICT tools into school curricula, together with developing a culture of lifelong learning, thinking skills and social responsibility	To apply ICT in teaching, learning and management processes.	To develop an information strategy for research and education	To provide 21st century skills

Developed Countries	Ireland	England & Wales	Singapore	Australia	Finland	Israel
ICT implementation strategy	Four main implementation topics: ICT-based teaching, learning and assessment. Teachers' professional learning. Leadership, research, and policy; ICT infrastructure	Using ICT tools universally	Six action strategies: Technical support team; ICT assistant training for students. Time for teachers to prepare for ICT. Cooperation among teachers. Support given by principals in dealing with teachers' concerns about ICT. Training for teachers to use ICT in classrooms.	Providing a guide to strategic planning	Promoting assimilation across education system	Too many hindering factors
Scope of ICT implementation (Primary- JH, HS, etc.)	All education institutes	All education institutes	All education institutes	All education institutes	All education institutes	All education institutes
Funds allocated to ICT in education	Funded by government ICT policy.	Providing ICT means required by schools	Providing resources to assimilate ICT into education.	Funded by government ICT policy	Funded by government ICT policy	No specific funds for ICT

Developed Countries	Ireland	England & Wales	Singapore	Australia	Finland	Israel
ICT Infrastructure	Funded by government ICT policy	Supported by various software and information reservoirs developed for educational needs	Build technological and physical infrastructure.	School's planning, assimilation, ongoing maintenance, and development of ICT infrastructure that meets the full range of learning, teaching and administrative needs across the school	Funded by government ICT policy	Gap between the education needs and existing infrastructure. Not enough accessibility and availability.
Teacher training for ICT	Develop teacher ICT knowledge and skills	Develop teacher ICT knowledge and skills	Manage teacher development by providing knowledge and skills	Develop teacher ICT knowledge and skills	Develop teacher ICT knowledge and skills	No ICT obligatory teacher training.

I.6 Conceptual Framework

Miles and Huberman (1994) defined a conceptual framework as a written and/or visual text that depicts the key concepts underpinning research and associations among them. This can be done in a written text, or in a graphic illustration, or both.

Figure 1 depicts the conceptual framework of this research.

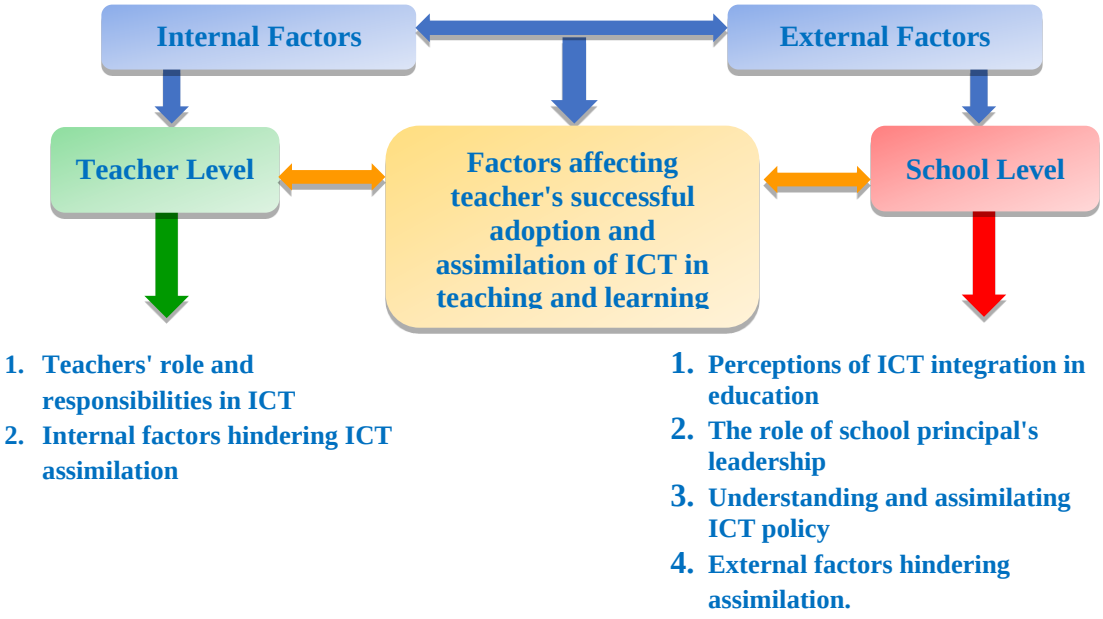

Figure 1: Conceptual framework

The conceptual framework in this study consists of a set of concepts, expectations, assumptions, and theoretical beliefs that support and contribute to this research. The assumptions underlying the research influenced the formulation of research questions, the choice of strategies used to collect data to answer the research questions and ultimately the interpretation of findings (Mertens, 2005).

The literature review described educational policies assimilated by developed countries to promote and realize the potential of assimilating ICT. These are vital and interrelated factors to ensure that governments can meet the various needs for teaching ICT in school environments, by providing all types of ICT resources, support and encouragement for relevant teacher training, as well as definitions for assimilating clear ICT policies that can be translated into action in education systems. Although some of the basic issues in ICT assimilation may differ in each country, the main assimilation criteria do not change significantly (Touray et al., 2013).

Furthermore, the various theories and models for adopting ICT were reviewed, focusing on technological, personal, and organizational factors, concentrating on cognitive beliefs that influence the level of individual user adoption. Finally, the study

presented barriers to ICT assimilation at teacher and school-levels that are intertwined and expected to have reciprocal effects.

In accordance with the broad research literature review, the present study has enabled the development of a conceptual framework underpinning the research, which aimed to identify factors that may influence ICT assimilation at teacher and school levels in general and in elementary schools in Israel in particular.

CHAPTER II:
RESEARCH DESIGN AND METHODOLOGY

II.1 Research Hypotheses

H1: It will be found that teachers with higher skills in using ICT will have higher motivation to continue with the assimilation process, and that includes principals as well.

Dependent: Motivation to practice ICT; Motivation to assimilate ICT

Independent: Operating basic tools; Operating advanced tools

H2: It will be found that teachers who experienced ICT assimilation more intensively will have higher motivation to continue the assimilation process.

Dependent: Motivation to practice ICT; Motivation to assimilate ICT

Independent: ICT assimilation in teachers' functions

H3: It will be found that teachers who faced more barriers in the assimilation process of ICT will show lower motivation to continue with the assimilation process.

Dependent: Motivation to practice ICT; Motivation to assimilate ICT

Independent: ICT assimilation in teachers' functions

H4: Perceptions on ICT policies will mediate the skill, experience and obstacle effects on motivation, or the presence of varying perceptions will help to express the motivation response to experience (indirect 1,2,3).

Dependent: Motivation to practice ICT; Motivation to assimilate ICT

Mediators: Positive Perceptions of ICT Policies; Teacher's Negative Perceptions of ICT Policies; Teachers' ICT perceptions in education.

Independent: Operating basic tools; Operating advanced tools; ICT assimilation in teachers' functions; Experiencing ICT-assimilation barriers

H5: Similar to H4, ICT perceptions in education will mediate the assimilation experience effect on motivation (indirect 4,5,6). It will be found that teachers with higher skills in using ICT will have higher motivation to continue with the assimilation process, and that includes principals as well (+).

Dependent: Motivation to practice ICT; Motivation to assimilate ICT

II.2 Mixed-Methods Research Approach

This study employed sequential research analysis procedure of mixed method research. Creswell (2003) proposed that the qualitative method should precede the quantitative method, so it is possible to collect more detailed information, and accordingly, to develop specific quantitative procedures linked to research aims. Using this type of design fits acquiring in-depth information about anomalies, unexpected or meaningful results, as well as creating focus groups for the qualitative research section. All these provide further insights about various components of a phenomenon that are likely to help create fundamental theories, which enrich and reflect understanding of the phenomenon and also open new ways for future studies. The time needed to collect quantitative and qualitative data sequentially is the research's limitation (Creswell & Plano-Clark, 2007).

II.2.1 Qualitative Research

Qualitative Research was chosen as the first data collection stage in this study. In qualitative research, information is collected from phenomena occurring in the field, the meaning of which researchers seek to establish. by relying on participants' experiences and perceptions. Qualitative research allows researchers to get close to participants' world and understand described phenomena by collecting data produced by participants in their own language. Therefore, a qualitative approach focuses on multiple meanings of individual experiences, and employs research strategies such as narratives and cases, for example, to collect data (Creswell, 2003). The main disadvantages of qualitative research derive from the fact that data analysis is mostly given to almost total researcher interpretation. Common data collection methods in qualitative research are in-depth interviews, observations, and focus groups (Hancock et al., 2007).

II.2.2 Quantitative Research

Quantitative research was chosen as the second stage of this study because it is anchored in the positivist paradigm, which contends that there is a constancy in the world emphasizing objectivity in measuring or describing a phenomenon. Focus is on numerical data rather than on research participants' views and statements. Therefore, it is possible to prove the existence of correlations between variables, hypothesize, confirm, or refute them, find/prove links between cause and effect, perform empirical measurements and objective comparisons between data. In other words, this is research founded on a deductive model. From this constancy, given parameters, to which one must adhere when conducting research, it is possible to generalize from research findings. Advantages of quantitative research stem mainly from researchers' ability to produce data relatively easily, process it and reach comparable results. The questions of validity and reliability of research tools and findings can be controlled with greater ease than other methods. Its main disadvantages stem from its use in structured research design that prevents researchers from having the flexibility to change the course of research given unexpected situations. A closed-ended questionnaire was chosen for this stage as it is considered a common data collection method in quantitative research (Gill et al., 2008).

II.3 Research Design: Mixed-methods research

Stage	Aim	Research tools	Research population	Data analysis methods
1 Qualitative research	To characterize the factors influencing the process of disseminating the use of ICT in teaching and learning processes	Document analysis: Director General documents	----------	Content analysis
2 Qualitative research	To characterize the influence of the formative leadership of the school principal as a pedagogic leader on the assimilation of ICT technologies in the teaching of teachers and students	Semi-structured interviews	9 elementary school teachers 6 elementary school principals	Content analysis
3 Quantitative research	To develop a management model that can help facilitate and improve ICT assimilation and define the areas in which to anticipate successful and practical assimilation.	Closed ended questionnaire on the basis of the qualitative stage	284 elementary school teachers 40 elementary school principals and vice principals	Statistics

CHAPTER III: FINDINGS

III.1 Findings Emerging from Research Question 1 : Qualitative Findings

The content analysis conducted on the data collected through the interviews yielded **five main themes and 16 related categories** described below.

- ☒ **Theme 1**: **School culture** includes two categories: (1) Teachers and principals' views towards assimilating ICT in Education. (2) Teachers and principals' views towards traditional teaching at school.
- ☒ **Theme 2**: **The role of school principals' leadership and Responsibility for ICT assimilation** includes four categories**:** (1) Level of Principals' assimilation of ICT skills at school. (2) Creation of an attractive school environment for ICT use. (3) Principals' control, monitoring and assessment of ICT use. (4) Principals' role and responsibility in ICT assimilation in school.
- ☒ **Theme 3: Teachers' role and responsibility for ICT assimilation in school** includes two categories: (1) Teachers' level of ICT use in their teaching. (2) Teachers' role in ICT assimilation in teaching and learning.
- ☒ **Theme 4: ICT policy and education strategy** includes two categories: (1) Teachers and principals' perceptions of the Ministry of Education's ICT policy. (2) Teachers and principals' perceptions of school ICT policy 9translating policy into action).
- ☒ **Theme 5:** Internal and external factors that hinder ICT assimilation in teaching and learning is divided into two sub-themes and their categories: **Sub Theme 1**: External hindering factors include four categories: (1) Lack of ICT infrastructure and learning software. (2) Computer faults and connection problems; (3) Lack of technical support, budgets, monitoring and Ministry of education supervision. (4) Lack of guidance and training in ICT uses.

  Sub-Theme 2: Internal hindering factors include three categories: (1) Workload and lack of time. (2) Lack of confidence and resistance to change. (3) Lack of experience and motivation.

All themes and categories were analyzed accordingly. The following section presents the five themes with the statements of teachers and principals as they emerged from the interviews.

School Culture Categories

Theme 1: School Culture		
Category	**Teachers**	**Principals**
Views and perceptions towards the integration of ICT in education	*"ICT has become an urgent need in education…this could make a huge difference for both teachers and students" (Pa)*	*"…many children with high technological skills who must get a chance to develop these skills for learning important subjects …" (T1)*
Views and perceptions towards traditional teaching	*"Traditional teaching methods are …are no longer suitable for the young technology-oriented generation…they like ICT lessons and we must adapt to progress and technology" (T4)*	*"Teachers need to change when they teach digital children… use diverse ways of teaching …Our ways of teaching must change. We cannot ignore the technological changes in our world" (Pa)*

III.1.1 Theme 2: The Role of School Principals' Leadership and Responsibility for ICT Assimilation

Principals' leadership and responsibility for ICT Assimilation

Theme 2: Role of school Principals' Leadership and Responsibility for ICT Assimilations		
Category	**Teachers**	**Principals**
Level of Principals' Assimilation of ICT Skills	*"I do not completely master ICT skills. I work with the basic tools for reporting purposes, records of staff and students… a lot of emails with teachers and the Ministry of Education" (Pe)*	*"Almost 70% of my management work is done electronically. I use ICT in filling daily reports, and communicate with the Ministry, teachers and sometimes parents via e-mail." (Pa)*
Creating an attractive school environment for ICT use	*"My principal is supportive and always encourages and helps anyone who tries to use ICTs in class." (T1)*	*"I encourage teachers to use existing ICTs .. in their teaching. Some teachers are really into it, and I write letters of appreciation and gratitude to them." (Pb)*
Principals' control, monitoring and assessment of ICT use	*"I have been managing for 18 years ... I was not required to undergo ICT skills training ... I work with the basic tools I know, and they serve me in school management ... At the same time, I believe there are other tools I need to learn and use in my work." (Pf)*	*"Children are connected … most of the afternoon… not all parents control the information and the risks...so at least in school we reduce the danger." (Pb)*
Principals' role and responsibility in ICT assimilation in school	*"the principal does not really monitor what is happening with ICT…but she gets information from us….I know she is busy with many issues…" (T2)*	*"…I have not been trained at how to lead ICT in teaching among teachers…I encourage them as much as I can." (Pa)*

III.2 Findings Emerging from Research Question 2

Table 2: Factor analysis of challenges facing ICT assimilation

		Experiencing ICT assimilation barriers Factor 1	ICT limited Infrastructures Factor 2	CFA
9	Lack of training requirement	0.88	-0.20	.66***
8	Teachers' lack of awareness of the importance of using ICT in educational pedagogy	0.71	0.02	.72***
16	Lack of assimilation of school policy regarding the use of ICT in teaching and education	0.67	0.17	.65***
3	Lack of ICT skills training programs for teachers	0.61	0.00	.63***
13	Lack of supervision from the Ministry of Education	0.60	0.00	.65***
14	Lack of understanding of ICT policy	0.58	0.05	.65***
4	Lack of ICT skills training programs for school principal	0.57	-0.01	.54***
15	Lack of teachers' collaboration	0.54	0.05	.53***
10	Lack of incentives and encouragement	0.53	0.02	.47***
12	Lack of Teachers' experience in using ICT	0.52	-0.22	.46***
11	Teachers' resistance to using ICT	0.39	0.27	.52***
17	Lack of student results and achievements in ICT	0.37	0.27	.50***
6	Lack of technical support and maintenance	-0.02	0.96	.81***
5	Lack of an accessible and continuous Internet line	0.01	0.86	.75***
7	Lack of proper infrastructure / poor quality of equipment and communication tools	-0.03	0.81	.83***
1	Lack of financial resources	-0.03	0.76	.76***
2	Lack of time available to use ICT tools	-	-	
	Eigenvalue	4.81	2.61	
	Percent of Variance	30.08	16.29	
	Reliability	.859	.904	
	Means	3.32	3.95	
	Standard Deviation	0.71	1.08	

Correlation between factors=.586; CFI=.943, TLI=.904, RMSEA=.076, Chi-Square=189.03, df=72, p<.001, SRMR=.076

III.2.1 External Factors Hindering ICT Assimilation

Theme 5: External and Internal Factors Hindering ICT Assimilation in Schools		
Sub-theme 1 – External Hindering Factors		
Category	**Teachers**	**Principals**
Lack of ICT infrastructure and learning software	*"The reality is not as we hoped, lack of ICT resources causes many teachers to avoid using ICT tools" (T2)*	*"The quality of resources and the learning environment needs significant improvement and cannot be ignored ...." (Pa)*
Computer faults and connection problems	*"Many hours I invested went down the drain ... already at the beginning of the lesson a power failure or no Internet connection… until someone comes to help ..." (T8)*	*"We have a lot of problems with computer connections to the Internet ... The network does not work. Sometimes computers are disabled for a long time." (Pc)*
Lack of technical support, budgets, monitoring and Ministry of Education supervision	*"… lack of regular technical support and guidance... there are so many problems and no one will be available to help ... need to make a call for help ... an external factor comes after a few weeks…" (T9)*	*"It takes a long time to get the required technical support ... and sometimes we have to wait weeks or months" (Pf)*
Lack of guidance and training in ICT uses	*"I had training … a long time ago. It lasted an hour or two, no more ... Ministry of Education should present ICT curricula and require all teachers to take full training for at least six months or one year." (T7)*	*"Teachers received training many years ago ... which was brief and ineffective ... no continuity... there is no obligation... teachers do not really volunteer to go to training on their own ... it should come as a policy of the Ministry of Education" (Pd)*

III.3 Findings Emerging from Research Question 2

Quantitative Findings

Table 3: Factor analysis of challenges facing ICT assimilation

		Experiencing ICT assimilation barriers Factor 1	ICT limited Infrastructures Factor 2	CFA
9	Lack of training requirement	0.88	-0.20	.66***
8	Teachers' lack of awareness of the importance of using ICT in educational pedagogy	0.71	0.02	.72***
16	Lack of assimilation of school policy regarding the use of ICT in teaching and education	0.67	0.17	.65***
3	Lack of ICT skills training programs for teachers	0.61	0.00	.63***
13	Lack of supervision from the Ministry of Education	0.60	0.00	.65***

14	Lack of understanding of ICT policy	0.58	0.05	.65***
4	Lack of ICT skills training programs for school principal	0.57	-0.01	.54***
15	Lack of teachers' collaboration	0.54	0.05	.53***
10	Lack of incentives and encouragement	0.53	0.02	.47***
12	Lack of Teachers' experience in using ICT	0.52	-0.22	.46***
11	Teachers' resistance to using ICT	0.39	0.27	.52***
17	Lack of student results and achievements in ICT	0.37	0.27	.50***
6	Lack of technical support and maintenance	-0.02	0.96	.81***
5	Lack of an accessible and continuous Internet line	0.01	0.86	.75***
7	Lack of proper infrastructure / poor quality of equipment and communication tools	-0.03	0.81	.83***
1	Lack of financial resources	-0.03	0.76	.76***
2	Lack of time available to use ICT tools	-	-	
	Eigenvalue	4.81	2.61	
	Percent of Variance	30.08	16.29	
	Reliability	.859	.904	
	Means	3.32	3.95	
	Standard Deviation	0.71	1.08	

Correlation between factors=.586; CFI=.943, TLI=.904, RMSEA=.076, Chi-Square=189.03, df=72, p<.001, SRMR=.076

CHAPTER IV:
CONCLUSIONS AND RECOMMENDATIONS

IV.1 Factual Conclusions Arising from Research Question 1:
How do formative leadership characteristics of school principals as pedagogical leaders influence the assimilation of ICT technologies in the teaching and learning of teachers and students?

Research findings revealed that educational leadership in relation to assimilating ICT in educational systems in a global world were characterized by positive views about the importance of ICT assimilation in educational systems. Findings also revealed that educational leadership in relation to ICT assimilation in educational systems in a

global word necessitated formulating a vision and policy in relation to ICT assimilation in educational systems. In addition, the findings showed that educational leadership striving to lead ICT assimilation in educational systems in a global world were characterized by high computer literacy skills, serving as a role model for teachers and students in implementing ICT skills in schools.

Furthermore, findings revealed that educational leadership in relation to ICT assimilation in educational system in a global world referred to skills and skills principals needed, including technical skills alongside social skills. In other words, school principals' areas of responsibility are anchored in leading teaching, educational and learning processes, molding future school image – vision and managing changes, leading and professionally developing staff, while focusing on individual people, managing relationships between schools and communities.

This view of principals' educational leadership combines management and leadership aspects. However, practically, this refers to two different dimensions: management includes a critical aspect of school maintenance and daily activities, whereas the leadership emphasis relates to areas such as values, ethics, inspiration, consolidating goals, renewal, and motivating people to achieve agreed and shared goals.

IV.2 Factual Conclusions Arising from Research Question 2 Based on Five Research Hypotheses - *What factors influence the process of disseminating ICT use in teaching and learning processes?*

Research findings showed that motivation to assimilate ICT into teaching was associated with high ICT skills, high levels of computer knowledge and literacy, pedagogic knowledge about integrating ICT into teaching and school leadership aimed at supporting and encouraging teachers to employ ICT. Findings also revealed that motivation to assimilate ICT into teaching was linked to teachers' accumulated ICT use, which increased their sense of self-efficacy and confidence assimilating technology into teaching.

Furthermore, findings showed that motivating to assimilate ICT into teaching was characterized by mainly systemic barriers, which delayed ICT assimilation into teaching. These barrier testified to an absent component in educational policy to assimilate ICTs anchored in a need to achieve goals and how to do this qualitatively and efficiently. Global educational policy promotes exploiting the potential of

assimilating ICT in educational systems to meet changing needs for ICT teaching in school environments by providing all types of ICT resources, support, and encouragement for relevant teacher training, as well as defining a clear ICT assimilation policy that can be translated into action in educational systems.

The practical conclusion is that motivation to assimilate ICT into teaching is linked to clear Ministry of Education policy and its systemic enforcement, including immediate technological solutions, and providing pedagogical resources to teachers and principals. Such clear educational policy guarantees ICT skill development among teachers and principals and developing teachers' abilities to assimilate educational change. The more competent teachers are to apply technology in education and educational reforms, the stronger their motivation to assimilate ICT into teaching.

IV.3 Conceptual Conclusions Arising from Research Question 3: *What components might comprise a management model to facilitate and improve ICT assimilation and define areas in which to anticipate successful and practical assimilation*?

Factually, the conclusion arising from the discussion was that a model to manage educational policy in relation to ICT assimilation in educational systems was characterized by clarity and ongoing and clear government enforcement. Additionally, a model to manage educational policy in relation to ICT assimilation in educational systems included the allocation of technological, human, and economic resources contributing to progressing ICT implementation and assimilation in education and teaching, as well as teachers' professional development, constructing schoolwork plans and instilling relevant knowledge and skills.

IV.4 Glocal-PA-ICT in Education Model

The figure below presents the research model.

Research findings allow presentation of an evidence-based model describing and explaining the effect of globalization on assimilating ICT systems in educational systems. The glocal model arising in this study revealed skills and skills necessary to successfully manage these teaching and learning processes expressed by three central themes in different knowledge areas: (1) learning skills and innovation; (2) information, media, and technological skills; (3) life skills and career.

The pedagogical rationale is ICT's ability to improve teaching and learning processes in and of themselves and at the same time help students and teachers acquire and progress applied skills employing these tools.

Research findings revealed four core components able to promote ICT assimilation in schools: (1) developing and organizing standards and assessment tools; (2) developing curricula and training; (3) carrying out training to develop ICT skills; a (4) develop a management and organizational environment supporting ICT.

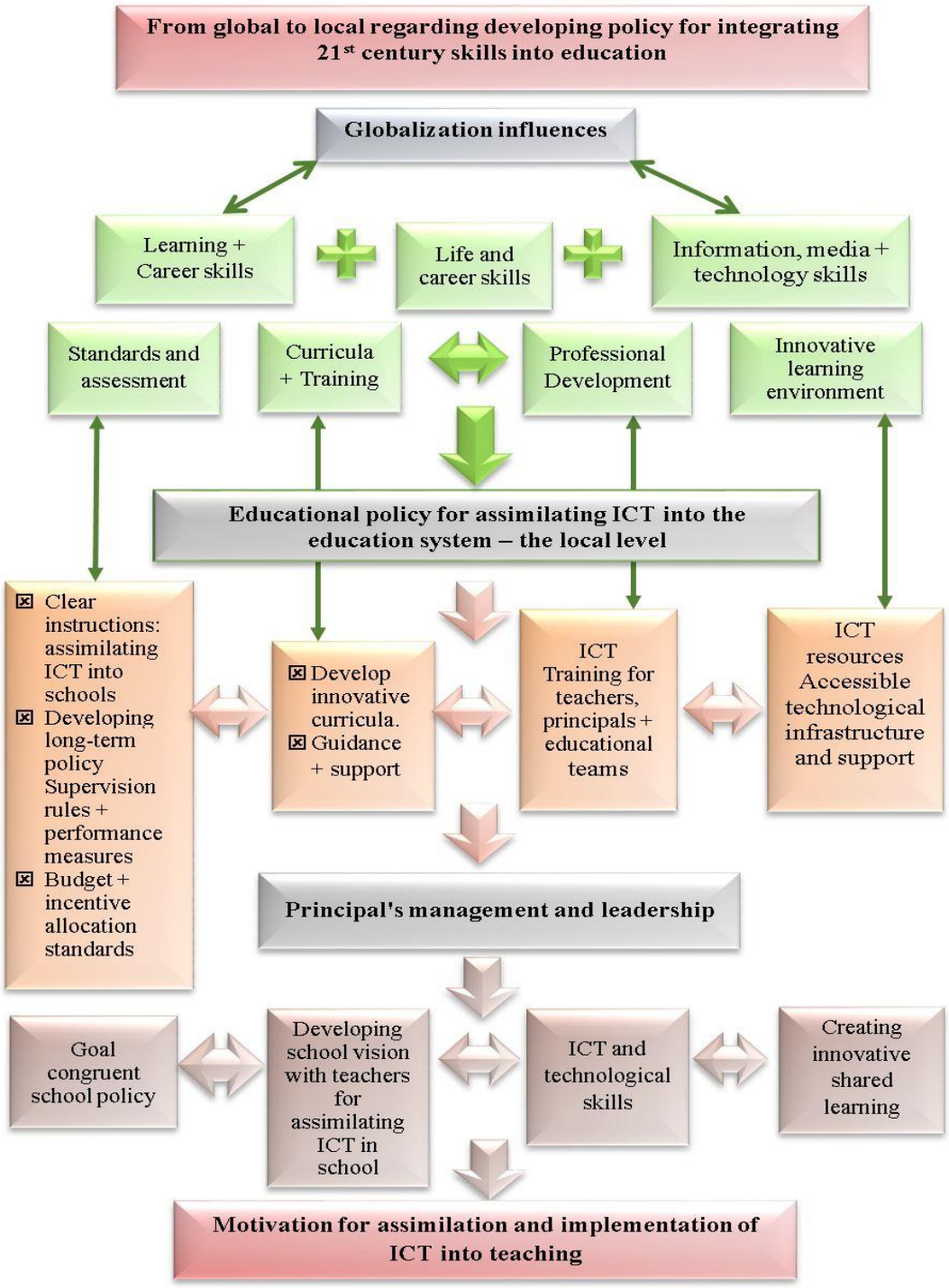

Figure 2: Model for developing policy for integrating 21st Century skills into education (Originally elaborated by author)

At the standards and assessment level – research findings indicated the need to develop a long-term educational policy including clear instructions, achievable goals and targets, supervision and control regulations, resource allocation, rewards and incentives, developing assessment measures and performance to be used as a professional language in assessing teachers and principals as well as internal school learning processes. Such policy will enable methodical and fair assessment processes and become part of educational system's way of life and culture.

At a curricula and training level – research findings showed the need to develop qualitative, innovative, and computerized curricula relying on professional training and support.

At ICT skills level – research findings showed the need for professional and qualitative training developing technological pedagogical skills for principals, teachers and educational staff.

At a supportive ICT environment level – research findings indicated the need for technological pedagogical resources, technological infrastructure, accessibility, availability, and technical support.

According to this view, educational policy would define the roles and responsibility of school principals in this context as educational leaders integrating into their work management and leadership aspect to lead a process of ICT implementation and assimilation in their schools. This would be done according to the following components:

- ☒ **Formulate school educational policy** matching government policy aims and goals.
- ☒ **Train principals** to acquire technological pedagogical knowledge and skills, including innovative management tools and strategies. Training starts from existing ICT knowledge levels and takes them to required level.
- ☒ **Formulate school vision** in cooperation with teachers related to ICT integration into teaching.
- ☒ **Personal example** – principals will become role models for teachers when they set high performance expectations by providing a personal example and inspiration, consistent advice and problem solving. Additional principals would be actively and consistently involved in teachers' and educational staff's shared learning processes as well as creating unit pride supporting an ICT learning culture in schools.

- ☒ **Supporting motivation** – ongoing support, feedback and reflection at individual and school levels. Constant involvement in all ICT teaching and learning processes. Leadership including these action components encourage teachers' motivation to realize their abilities, skills, confidence, and capabilities to assimilate ICT into their teaching methods.
- ☒ **Cooperation** – mutual cooperation between educational policy makers and school principals as well as between principals and teachers increases awareness of the importance of ICT use in education and teaching. It also removes technical, emotional, and systemic barriers and thus increases teachers' motivation to receive training in these technologies. Thus, it encourages them to apply changes confidently based on systemic backup both in terms of policy makers and school management aims.

In conclusion, it can be said that the glocal model arising from this study outlined a strategy for ICT assimilation policy in educational systems. The model is integrative, evidence-based, and combines knowledge areas in international relations and education. Additionally, being modular, it can be adapted to any other context of attempting to promote an ICT assimilation process in educational systems.

IV.5 Practical Implications and Recommendations

IV.5.1 Recommendations for Educational Policy Makers

- ☒ **Clear educational policy** – for successful ICT assimilation in education, educational policy must include clear instructions about goals and targets as well as responsibilities placed on all role-holders among policy makers and at school level, both principals and teachers.
- ☒ **Clear definitions of principals' role as pedagogical technological lead** leading and responsible for realizing the vision to assimilate ICT in schools, developing supervision, control and follow-up standards in all schools, principals' and teachers' involvement in developing ICT curricula meeting innovative teaching and learning needs as well as consolidating standards and regulation for assessing teachers' and principals' performance, incentives and reward for applying ICT programs as required.
- ☒ **Set performance measures** – including inputs and outputs in relation to ICT components, based on clear instructions and standards, where all these are

aimed at encouraging and guaranteeing internal school learning processes, methodical, fair, and evidence-based assessment processes, and attempts whose purpose is become an integral part of educational institutions' way of life and culture.

- ☒ **Allocate ICT resources and technical support** – quality and up-to-date ICT resources, infrastructure and technological resources, safety measure, accessibility, and availability as well as incentives and reward for teachers, at levels matching individual schools' needs. Regarding technical support, it is necessary to make available to school authorities maintenance teams and professional instructors to provide technical support for ICT use and allocate school budgets to fund repairs to technological equipment as well as training teachers to provide basic technical maintenance and support. Allocating necessary resources is a significant foundation and condition to encouraging teachers' and educational staff's motivation to express the potential of innovative ICTs.
- ☒ **ICT skill training** – ICT skill training must be an obligation placed on new as well as existing teachers in school systems, as a precondition of their continued professional development and employment. Research findings showed that current strategies in training pre-service teachers as well as all educational and teaching staff in schools must include ongoing and professional development to adapt professional knowledge and skills to a new age. Training must exist in internal and external school frameworks and at every career stage. Hence, it is necessary to increase the number of training and practice programs for teachers and managers, to adapt them to varied levels and needs of teacher skills, to construct timetables for continuing training, grant rewards and incentives to teaching staff participating in training and create cooperation and shared experiences and knowledge occurring as a result practical experiences.
- ☒ **Cooperation** – research findings showed that mutual cooperation between the Ministry of Education and principals as well as between the latter and educational staff were likely to prevent conflicts in reciprocal communication and resolve problems and barriers delaying ICT assimilation.

IV.5.2 Recommendations for School Principals

- ☒ To participate in arranged and continuing ICT training workshops to include defining goals, coordinating expectations and management strategies, lead and assimilate ICT in schools.
- ☒ To be actively involved and cooperate fully and reciprocally with educational policy makers, consistently examine levels of meeting diverse needs emerging during ICT application and assimilation processes in schools.
- ☒ To build a school vision and policy matching educational policy for ICT assimilation and become role models for teachers in ICT application and use in teaching and learning processes.
- ☒ To lead school ICT by instilling required skills, expanding computerized education among teaching staff, encourage computerized teamwork, lead construction of a school website and establish organizational and technical infrastructure suitable for computerized working.
- ☒ Provide feedback, encouragement, assessment, and rewards to teachers participating in training and those proving quality and good performance in ICT application.
- ☒ Continuously update teachers about regulations and standards set by educational policy makers associated with effective assimilation of ICT application in schools.
- ☒ Set weekly agenda including time to assess inputs and outputs of ICT application.
- ☒ Arrange monthly meetings with other school principals to share ideas and discuss ICT programs and ways of realizing them in schools.

IV.5.3 Recommendations for Teacher Training in ICT Skills

Teachers must have pedagogical technological skills, knowledge and skills to feel confident and positive about the option to teach using ICTs. Hence at a strategic level of educational policy, one must emphasize and pay particular attention to promoting technology-based curricula, assimilated into teachers' curriculum prior to their entry into work. For teachers already in the system, they must reach a certain level of ICT skills through refresher courses and work-based instruction.

IV.6 Research Limitations

This research was conducted in primary schools in the northern region in the state of Israel. Only expanding it to additional regions such as the southern region, or central cities too would have enabled collection of more data to reinforce findings and determine to what degree would it be possible to generalize research results on all schools in the country. Planning such a comprehensive study would demand time and financial resources that were not available for this study.

Other limitations resulted from employing personal interviews with principals and teachers. This tool is likely to produce bias derived from the desire to meet "social desirability". However, the risk of such bias was reduced when it was made clear to research participants that their personal details would be removed and privacy maintained, and that data would be used solely for research purposes. Another limitation is associated with the researcher's professional background. The researcher is an educationalist with work contacts with some of the research participants, and hence it is possible to argue this would result in bias. On the other hand, the researcher's professional background is an advance because it improves her ability to reach correct data and even interpret it correctly. Nonetheless, to reduce bias possibilities, the research was conducted according to all research rules and qualitative data analysis underwent experts' validation.

IV.7 Contribution to Knowledge

The principal contribution of this study is that it is the preliminary study, conducted in a defined geographical region, that identified factors promoting and hindering ICT application in learning and teaching, through the points of view of teachers and principals (both women and men) in 25 primary school in the northern region of Israel. Research findings emphasize the importance of the involvement of principals, educational and teaching staff as well as the need for cooperation with the Ministry of Education to promote the issue of ICT assimilation and application. The findings also provide a broad picture of how ICT assimilation and application should be done as well as suggesting diverse obstacles facing implementers.

Although this study relied on worldwide research literature, which referred to ICT application and assimilation in various educational systems, it confirmed that in Israel like other countries there are common denominators with regard to opinions, aspects and barriers affecting successful ICT assimilation even if there are differing local

versions of conditions and barriers because of diverse conditions and cultures. This study also proposes an essential strategic approached necessary to guarantee the future development of ICT in the country.

IV.7.1 Contribution to Theoretical Knowledge

The glocal policy model for ICT assimilation in educational systems emerging from this research is original, and therefore innovative. Additionally, this model constitutes a contribution to theoretical knowledge in the area of globalization effects on educational systems (Arkorful & Abaioo, 2014; Bręčko et al., 2014), ICT assimilation in educational systems (Schwab, 2015; Sjodin, 2015) educational leadership (Machado & Chung, 2015; Richardson et al., 2012) and educational policy (Melamed & Goldstein, 2017; Nir et al., 2016).

IV.7.2 Contribution to Practical Knowledge

Although data collected for the purpose of this study exposed the current ICT picture in schools in a defined geographical region, it can be used as a guide for educational policy makers on this topic and help change and formulate strategic approaches that will contribute to better and higher quality addressing of factors likely to promote or hinder ICT application and assimilation. Data and findings may also encourage teachers and principals to apply and assimilate ICTs. They are also likely to help other researchers in the field of ICT to examine more comprehensively other barriers facing ICT application and assimilation and build even better approaches and strategies in this field.

The glocal model arising from this study helps reexamine ways of developing and assimilating educational policy to assimilate ICT in schools. It proposes an approach emphasizing the importance of joint involvement of school staff and educational policy makers in processes aimed at raising awareness and motivation of principals and teacher to assimilate and apply these technologies effectively.

This model provides educational policy makers and schools with a comprehensive knowledge base in relation to the current situation of ICT assimilation and can promote the overall goal by identifying barriers and hindering factors, which should be avoided in future applications.

IV.8 Recommendations for Future Research

Considering the rapid progress of ICT, that is likely to lead to the appearance of further factors influencing desired application, it is recommended continuing to examine the factors that influenced its application in primary schools in northern Israel to prepare for possible future changes in the same region.

It is possible and desirable to compare these research findings with ICT application in other regions in Israel such as the southern peripheral region and central cities. This comparison may contribute to developing more general insights and conclusions.

It is possible to examine ICT application through other viewpoints such as primary and high school aged students or those of educational policy makers.

References

Aflalo, E. (2012). Contradictions in teachers perceptions: the latent barrier in assimilating ICTs. *Dapim*, Vol. 54, 139 – 166 (In Hebrew)

Altuna, J. and Lareki, A. (2015). Analysis of the Use of Digital Technologies in Schools That Implement Different Learning Theories. *Journal of Educational Computing Research*, 0 (0) 1–23.

Apulu, I., & Latham, A. (2010). *Benefits of information and communication technology in small and medium sized enterprises: a case study of a Nigerian SME*. Proceedings of the 15th Annual Conference on UK Academy for Information Systems (UKAIS), March 23-24, Oriel College, University of Oxford.

Aristovnik, A. (2012) The impact of ICT on educational performance and its efficiency in selected EU and OECD countries: a non-parametric analysis, *The Turkish Online Journal of Educational Technology*, Vol. 3, No. 11, pp.144–152. file:///D:/Downloads/11314.pdf [Accessed: 24.01.2020]

Arkorful, V. and Abaidoo, N. (2014) The Role of e-Learning, the Advantages and Disadvantages of Its Adoption in Higher Education. *International Journal of Education and Research*, 2, 397-410.

Avidov-Ungar, O. & Eshet-Alkalai, Y. (2011). [Chais] Teachers in a World of Change: Teachers' Knowledge and Attitudes towards the Implementation of Innovative Technologies in Schools. Interdisciplinary *Journal of E-Learning and Learning Objects*, 7(1), 291-303. Informing Science Institute. https://www.learntechlib.org/p/44745/ [Accessed: 07.04.2020]

Avidov-Ungar, O.,& Shamir-Inbal, T. (2013). Empowerment patterns of leaders in ICT and school strengths following the implementation of national ICT reform. *Journal of Information Technology Education: Innovations in Practice*,12, 141-158. https://doi.org/10.28945/1865 [Accessed: 03.03.2020]

Begg, A. 2015. *Constructivism: an overview and some implications*. University of Auckland, Faculty of Education.

Burke, L., & Weill, B. (2009). *Information Technology for the Health Professions*.3rd ed. New Jersey: Pearson Prentice Hall.

Brečko, B. N., Kampylis, P., & Punie, Y. (2014). *Mainstreaming ICT-enabled Innovation in Education and Training in Europe*. Report EUR 26601 EN. Brussels: European Commission.

Caligiuri, P.M. (2006). Performance measurement in a cross-cultural context: Evaluating the success of global assignments. U: W. Bennett, C. Launce, I J. Woehr (Eds), *Performance Management: Current Perspectives and Future Challenges*, 227-244. Mahwah, NJ: Lawrence Erlbaum.

Castells, M. (2007). Communication, Power and Counter-Power in the Network Society. *International Journal of Communication*, 1, 238-266.

Chabbott, C. (2013). *Constructing education for development: International organizations and education for all*: New York: Routledge.

Chinn, M.D. and Fairlie, R.W. (2010). ICT Use in the Developing World: An Analysis of Differences in Computer and Internet Penetration, *Review of International Economics*, 18(1): 153-167.

Creswell, J. & Plano Clark V. (2007). *Designing and Conducting Mixed Methods Research*. Thousand Oaks CA: Sage.

Creswell, J.W., (2003) *Research Design: Qualitative, Quantitative, and Mixed Method Approaches*. Thousand Oaks, Sage Publications.

Dahya, N. (2016). *Education in Conflict and Crisis: How Can Technology Make a Difference? A Landscape Review*. INEE. [Online]. https://www.eccnetwork.net/sites/default/files/media/file/GIZ%20InDesignVorlage%20für%20Publikationen%20–%20DIN%20A4%20hoch.pdf [Accessed 30.08.2020]

Ertmer, P. A., & Ottenbreit-Leftwich, A. (2013). Removing obstacles to the pedagogical changes required by Jonassen's vision of authentic technology-enabled learning. *Computers & Education*, 64, 175-182.

Folkman, J. (2014). The Urgent Need To Develop Global Leaders For Company Growth) https://www.forbes.com/sites/joefolkman/2014/06/18/the-urgent-need-to-develop-global-leaders-for-company-growth/?sh=2c48f98a487f

Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Gebhardt, E. (2014). *Preparing for life in a digital age: The IEA International Computer and Information Literacy Study international report*. Cham, Switzerland: Springer. https://www.springer.com/gp/book/9783319142210. [Accessed 15.06.2019]

Furedi, F. (2004). *Therapy culture: Cultivating vulnerability in an uncertain age*. Routledge/Taylor & Francis Group.

Gholami R., Anon Higon D., Hanafizadeh P. and Emrouznejad A. (2010). Is ICT Key to Development? *Journal of Global Information Management*, 18(1): 66-83.

Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Methods of data collection in qualitative research: Interviews and focus groups. *British Dental Journal*, 204, 291-295. doi:10.1038/bdj.2008.192.

Green, A. (2002). The many faces of lifelong learning: recent education policy trends in Europe. *Journal of Education Policy*, 17(6), 611-626.

Halverson, R., & Smith, A. (2010). How new technologies have (and have not) changed teaching and learning in school. *Journal of Computing in Teacher Education*, 26(2), 49-54. https://www.learntechlib.org/p/55251 [Accessed 08.04.2020]

Hancock, B., Windridge, K. & Ockleford, E. (2007). *An Introduction to Qualitative Research*. Trent RDSU, UK.

Kay, K. & Greenhill, V. (2011). Twenty-First Century Students Need 21st Century Skills. In Wan, G. & Gut, D.M. (Eds). Bringing Schools into the 21st Century. London: Springer, 41-66.

Karpov, A.O. (2015b). Integrated and network systems of research education in the knowledge society. *Mediterranean Journal of Social Sciences*, 6, 529-540.

Kellerman, A. (2000). Phase in the rise of the information literacy. Info Vol. 2, No. 6, Center for the Study of the Information Society (InfoSoc) University of Haifa. /http://infosoc.haifa.ac.il [Acessed 21.06.2020]

Kim, C., Kim, M. K., Lee, C., Spector, J. M., & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching and Teacher Education, 29*, 76-85.

KMK, Strategie der Kultusministerkonferenz **"Bildung in der digitalen Welt", 2016**, Available: https://www.kmk.org/fileadmin/Dateien/pdf/PresseUndAktuelles/2017/Strategie_neu_2017_datum_1.pdf. [Accessed 08.05.2020]

Kremer, S., A. Bick and D. Nautz (2013), Inflation and Growth: New Evidence from a Dynamic Panel Threshold Analysis, *Empirical Economics*, 44(2), 861-878.

Levin, T., & Wadmany, R. (2008). Teachers' views on factors affecting effective integration of information technology in classroom: Developmental scenery. *Journal of Technology and Teacher Education*, vol. 16, no. 2, pp. 233-236.

Machado, L. J., & Chung, C. J. (2015). Integrating Technology: The Principals' Role and Effect. *International Education Studies*, 8(5), 43-53.

Magen- Nagar, N. & Peled, B. (2013). Characteristics of Israeli school teachers in computer-based learning environments. *Journal of Educators Online*, 10 (1), 1-34

Machado, L. J., & Chung, C. J. (2015). Integrating Technology: The Principals' Role and Effect. *International Education Studies*, 8(5), 43-53.

Makgato, M. (2012) Identifying constructive methodologies and pedagogic content knowledge in teaching and learning of technology. *Procedia-Social and Behavioral Sciences* 47: 1398-1402.

McLuhan, M. (1967). *The Medium is the Massage*. Gingko press Inc.

Mdlongwa, T. (2012). Information and communication technology (ICT) as a means of enhancing education in schools in South Africa. Policy Brief: Africa Institute of South Africa. Retrieved from http://www.ai.org.za/wp-content/uploads/downloads/2012/10/No.-80.-ICTas-a-means-of-enhancing-Education-in-Schools-in-South-Africa.pdf. [Accessed 15.05.2019 May 2019].

Melamed, U., & Salant, A. (2010). Integrating ICT into educational systems around the world [In Hebrew]. http://portal.macam.ac.il/ArticlePage.aspx?id=3194&referer=useJsHistoryBack [Accessed 01.04.2020]

Melamed, U., Goldstein, O. (2017). Teaching and Learning in the Digital Age. Tel Aviv: Mofet Institute (In Hebrew)

Mendenhall, M.E., Reiche, B.S., Bird, A., & Osland, J.S. (2012). Defining the 'global' in global leadership. Journal of World Business, 47(4): 493-503.

Mertens, D. (2005). *Research and Evaluation in Education and Psychology: Integrating diversity with quantitative, qualitative, and mixed methods* (2nd edn). Boston: Sage.

Miles, M.B, and Huberman, A.M. (1994). *Qualitative Data Analysis*, 2nd Ed., p. 10-12. Newbury Park, CA: Sage.

Mishra, P., Fahnoe, C., Henriksen, D., & The Deep-Play Research Group (2013). Creativity, Self-directed Learning, and the Architecture of Technology Rich Environments. *Tech Trends*, (57) 1. 10-13.

Munshi, Kaivan, and Mark Rosenzweig. 2006. Traditional Institutions Meet the Modern World: Caste, Gender, and Schooling Choice in a Globalizing Economy. *American Economic Review*, 96 (4): 1225-1252.

Nachmias, R., Mioduser, D., & Forkosh-Baruch, A. (2010). ICT use in education: Different uptake and practice in Hebrew speaking and Arab speaking schools in Israel. *Journal of Computer Assisted Learning*, 26(6), 492-506.

Nir, A., Ben-David, A., Bogler, R. Inbar, D. and Zohar, A. (2016). School Autonomy and 21st Century Skills in the Israeli Educational System: Discrepancies between the Declarative and Operational Levels, *International Journal of Educational Management* 30 (7): 1231-1246.

Petko, D., Cantieni, A., & Prasse, D. (2017). Perceived quality of educational technology matters A secondary analysis of students' ICT use, ICT-related attitudes, and PISA 2012 test scores. *Journal of Educational Computing Research*, 54(8), 1070-1091.

Richardson, W. (2012). Preparing students to learn without us. *Educational Leadership*, 69(5), 22–26.

Rimon, O. (2012). National Program: Adapting the Education System to the 21st century. Position Paper. *Dapim*, 54, 284-292 (In Hebrew)

Rogers, E.M. (2003). *Diffusion of Innovations.* New York: Free Press.

Sang, G., Valcke, M., Braak, J., Tondeur, J. and Zhu, C., 2011. Predicting ICT integration into classroom teaching in Chinese primary schools: Exploring the complex interplay of teacher-related variables, *Journal of Computer Assisted Learning*, vol. 27, pp.160-172.

Saavedra, A. R. and Opfer, V. D. (2012). *Teaching and learning 21st century skills: Lessons from the learning sciences*. Asia Society, Partnership for Global Learning.

Sang, G., Valcke, M., Braak, J., Tondeur, J. and Zhu, C., 2011. Predicting ICT integration into classroom teaching in Chinese primary schools: Exploring the complex interplay of teacher-related variables, *Journal of Computer Assisted Learning*, vol. 27, pp.160-172.

Schwab, K. (2015). The Global Competitiveness Report. [Online] Available at: http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2014-15.pdf [Accessed 28.11.2020]

Sjodin, S. (2015). Labour Market Outlook 2015—2019: Press Release. [Online] http://www.digcompass.ca/labour-market-outlook-2015-2019 [Accessed 18.04.2019]

Sujit Kumar Basak, D.W. Govender, Theoretical Framework Of The Factors Affecting University Academics Job Satisfaction , International Business & Economics Research Journal (IBER): Vol. 14 No. 2 (2015)

Tezci, E., (2011a). Factors that influence preservice teachers' ICT usage in education. *European Journal of Teacher Education*, vol. 34, pp.483-499.

Tomei, L. A. (2005). *Taxonomy for the technology domain.* USA: Information Science Publishing.

Touray, A., Salminen, A. and Mursu, A., (2013). ICT Barriers and Critical Success Factors in Developing Countries. *The Electronic Journal of Information Systems in Developing Countries*, Vol. 56, No: 7, pp. 1-17.

Vallima, J. & Hoffman, d. (2008). Knowledge society discourse and higher education. *Higher Education*, 56(3), 265-285.

Vinig, T., Kluijver, J. de (2007), "Does Globalization Impact Entrepreneurship? Comparative Study of Country Level Indicators", Sprouts: *Working Papers on Information Systems*, 7(8). University of Amsterdam, Netherlands.

Wastiau, P., Blamire, R., Kearney, C., Quittre, V., Van de Gaer, E., & Monseur, C. (2013). The use of ICT in education: A survey of schools in Europe. *European Journal of Education*, 48, 11-27.

Werther, W.B. Jr., Chandler, D. (2005).“Strategic corporate social responsibility as global brand insurance” *Business Horizons*, 48 (4) (2005), pp. 317-324.

Wozney, L., Venkatesh, V., & Abrami, P. (2006). Implementing computer technologies: Teachers' perceptions and practices. *Journal of Technology and Teacher Education*, 14(1), 173-207.

Zhang, P., & Aikman, S. (2007). Attitudes in ICT Acceptance and use. In J. Jacko (Ed.), *Human-Computer Interaction*, Berlin Heidelberg.

Zuppo, C. (2012). Defining ICT in A Boundary less World: The Development of a Working Hierarchy. *International Journal of Managing Information Technology (IJMIT*) Vol.4, No.3, August 2012 DOI: 10.5121/ijmit.2012.4302 13.