# How teachers conceive their role when working with Generation Z pupils in a technological learning environment

by

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*The mind is not a vessel that needs filling,*

*but wood that needs igniting*

*Plutar`ch*

(from lan kidd's translation of Essays)

# Abstract

Teachers have to cope with two main changes. Firstly, they have experienced global technological change and the introduction of new technologies into the education system. Secondly, they have to cope with a new generation of pupils (Generation Z). This thesis argues that these changes necessitate a change in the role of the teacher.

This research examines how teachers react to these changes. The main research question is "How do teachers conceive their role when they teach Generation Z pupils in a technological learning environment?".

The research focuses on a case study of a school on the northern periphery of the State of Israel. The research focused on the teachers of the "computer notebook" classes. The school supplies every pupil and every teacher a standard personal laptop while the teachers have been integrating the technology and applications into their lessons for the last twenty years. The data was collected by means of questionnaires (20); personal interviews (24); observations (8); and an analysis of relevant documents.

The research compares the category of the "traditional teacher" with that of the "technological teacher". It finds that (a) teachers view the the two roles of traditional and technological teacher as distinct; (b) they recognise a wide variety of technological changes that influence the education system; and (c) they believe that the present pupil generation (Generation Z) requires a new approach to study in contrast with previous generations of pupils.

The research shows that in response to the changes described above, the teachers have changed their perspective through the use of the new technologies and define their role in three dimensions (pedagogical, interpersonal, and technological) and indicate that there are 11 skills and abilities required for the technological teacher. However, the research also found that despite the extensive experience of the teachers in using the new technologies, there is no confidence in realising the full potential inherent in these tools. In particular, the opportunity for cooperative learning which is offered by online technologies is not always exploited efficiently. Moreover, the research found that the challenges and barriers in the application of the new pedagogy in the technological learning environment.

The contribution of this research is both theoretical and practical. The theoretical contribution of the research is in the characterisation of the pedagogical, interpersonal and technological dimensions that constitute the role of the "technological teacher". The practical contribution of the research is detailed in the series of recommendations made in relation to the development of schools and the training and continuing professional development of teachers.

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# 1. Introduction

During the years in which I worked as a mathematics teacher in an Intermediate School (Middle or Junior High, Grades 7 to 9) I encountered a phenomenon that disturbed me. Most of the teachers were using technological tools in their teaching in the "computer notebook" classes where every pupil and teacher had a personal laptop. Although they created computerised study units, which required the pupils to use technological tools, very few of the teachers substantially changed the way that they taught. Most of them continued to use old information technologies and did not demonstrate the capacity or willingness to make use of newer technologies in their teaching.

My interest in the subject of personal laptops for every pupil and teacher and their integration into teaching began in 1999 when I first became aware of the "computer notebook" classes and the possibilities of the personal laptop. My insights gradually deepened, because the educational potential of technological integration was not yet exploited in the processes of teaching and learning.

The question that most concerned me with regard to the teaching in the "computer notebook" classes was that, given the policy of the Ministry of Education and the large investments made in acquiring materials and training teacher teams, it should have been possible to observe a major change in the education system. But this was not the case.

Speculations over this matter led me to question: Why were extensive changes taking place in many other spheres of life but were not occurring in the education system? The attempt to understand what was the source of the problem induced me to choose this subject for my research.

The education system needs to be able to adapt to the spirit of the times in two senses. One of them requires dynamism, a willingness to engage with accelerated technological development, the creation of new professions, the processes of globalisation, and frequent social and economic changes (Zuckerman, 2012). The other demands that we should prepare the pupils, the citizens of tomorrow, for a life in an information-age society (Ministry of Education, 2000). Some writers have argued that the current generation (Generation Z) are different from previous generations. The argument is made that they think, behave and learn in a different way (Prensky, 2001a) as a results of their

continuous and extensive exposure to modern technology (Oliver & Goerke, 2007; Mouza, 2008; Kennedy et al., 2009; Margaryan, Littlejohn & Vojt, 2011; Bennett & Maton, 2010), experience and breadth of technology use (Oblinger & Oblinger, 2005; Tapscott, 1998; Hargittai & Hinnart, 2008; Maton & Bennett, 2010). Although there are also counter-claims about these generational differences, this idea interested me and informed the approach taken in this study.

Global trends and challenges of this kind oblige the education system to redefine its aims and to develop new approaches to teaching and learning. During the past decade, there was an increased interest in technological innovations that integrate laptop computers into the teaching and learning environment (Bebell, 2007; Lei & Zhao, 2008; O'Dwyer et al., 2008; Mouza, 2008; Penuel, 2006; Shapley et al., 2009; Weston & Bain, 2010; Zucker & Light, 2009; Volansky, 2010). However, some researchers have found that many of these initiatives do not in fact promote innovative learning environments (Cuban, 2003, 2006; Salomon & Perkins, 2005; Weston & Bain, 2010).

These initiatives confront schools with new challenges that include addressing the implications of changing conceptions of teachers and teaching (Fullan, 2006; Salomon & Ben-Zvi, 2006). Teaching and learning in a technological learning environment allows for and demands changes to the traditional methods of teaching and may even necessitate the search for new methods (Bonk, 1999; Rossman, 1999; Atkins et al., 2010). However, every time a technology with new characteristics is presented to teachers, the existing balance between technology, pedagogy and study programs is upset (Koehler & Mishra, 2009), and the necessity arises to re-examine the system of interrelations between them. A re-examination of this is liable to expose various patterns of usage and a system of perceptions and positions.

One of the main challenges for the education system is to combine methods of teaching and learning and modern technologies in ways which create a learning experience that is interesting, authentic and personalised (Bransford, Brown & Cocking, 1999; Collins & Halverson, 2009; Fullan, 2007; Marzano & Kendall, 2007; U.S. Department of Education, 2010). If this potential is to be realised, it requires an approach to teaching and learning which is highly adaptable to the needs of pupils. Such an approach places the learner in the centre of the learning process and encourages active learning and the utilisation of all the information and resources that are available online. Such support for

learners to follow their interests can lead to higher motivation and attainment (National Education Technology Plan, 2010; Birenbaum, 1997). The wise use of technological tools is liable to increase the activity and involvement of the learner and to enable him or her to understand concepts and processes in-depth (Kali & Linn, 2007; Koszalka, 2001; Linn, Davis & Bell, 2004; Roschelle et al., 2000). This conception of technologically-supported learning draws on pre-existing theories of learning such as that advanced by Piaget, who claimed that all learning is a process of the active construction of knowledge in which the learner combines bits of new knowledge with previous experience and information (Piaget, 1972).

Research literature of the past three decades has shown that applying socio-constructivist approaches to teaching has considerable value in a technological learning environment (Chou, 2003; Grossman & Thompson, 2008; Johnson, McClure, 2004; Adams, DeVaney, & Sawyer, 2009). Socio-constructivism is based on the claim that knowledge is not transmitted to a person but is constructed within his or her consciousness in a unique manner with the help of concepts and patterns found in the mind. This approach goes against the image of a person as a passive learner who absorbs stimuli and reacts to them, an image which reflects the behaviourist theory of learning. The present research draws on this socio-constructivist tradition in its conceptualisation of the technological teacher. This approach lays greater stress on the socio-cultural context of learning, and concerns the interaction of the pupil with other learners (Vygotsky, 1980).

Waring and Evans (2014) have suggested the use of a Personal Learning Styles Pedagogy, in which they make explicit the integration of theory and practice and the many decisions and selections that teachers make, their implications for what is being taught and learnt, how learners are positioned in the pedagogical process, and ultimately, how learning can be improved. For them, pedagogy is a complex concept which should be understood in a holistic manner that also embraces educational theory, personal learning styles, assessment, and relationships inside and outside the classroom.

Moore (2012) examines the global move from traditional subject-and-knowledge based curricula towards skills and problem-solving and discusses how the emphasis on education for citizenship has forced us to reconsider the social functions of education. Among the topics discussed here are an assessment of the most influential theorists of learning and teaching; the ways in which public educational policy impinges on local

practice; the nature and role of language and culture in formal educational settings; an assessment of different models of 'good teaching'; and alternative models of curriculum and pedagogy.

*The Critical Pedagogical Reader* edited by Darder, Baltodano and Torres (2003) defines critical pedagogy as challenges our long-held assumptions which lead us to ask new questions that will determine the answers we get. Critical pedagogy gives voice to the voiceless; gives power to the powerless. Change is often difficult, and critical pedagogy is all about change from coercive to collaborative; from transmission to transformative; from inert to catalytic; from passive to active. Critical pedagogy leads us to advocacy and activism on behalf of those who are the most vulnerable in classrooms and in society.

Michael Fullan (2004), in discussing cultural change, draws from these new ideas and finds remarkable convergences in what is being discovered about how to lead in a culture of complex change. He identifies theoretical reasons why change occurs as it does to include moral purpose, understanding change, developing relationships, knowledge building, and coherence making; they have developed independently but are deeply compatible.

Thach and Murphy (1995) present three aspects which teachers must attend to in a technologically rich environment: a. *Roles* which are the main responsibility imposed upon the teacher; b. *Outputs* which are the products, services and information created as a result of carrying out a specific role in a technological learning environment, which includes the presentation of material, encouragement of interaction, giving feedback, and creating a positive learning environment; and c. *Abilities and Competencies*, which are required by the teacher in a technological learning environment.

Within this framework, the teacher is the most important component for ensuring successful learning in such an environment (Volery, 2001). This learning environment also offers resources which allow teachers to deliver learning by providing students with access to information and tools for interaction and co-operation (Dori, Tal & Peled, 2002; Kali, Levin-Peled & Dori, 2009; Linn, Davis & Bell, 2004; Salomon & Ben-Zvi, 2006). The student learns and derives insights through his exposure to the material and his re-organisation of it (Grossman & Thompson, 2008). Dialectical interaction between

teachers, Generation Z pupils and the computerised environment requires the development of a new pedagogy.

Despite the potential of new technologies to change approaches to teaching, research has demonstrated that only marginal changes have taken place (Bebell, 2007; Becker, 2001; Cuban, 2001; Rosen & Salomon, 2007). The increased availability of technology in schools has not necessarily led towards improvement in teaching methods (Lim & Chai, 2008; Lowther et al., 2008; Ross et al., 2004; Smeets, 2005).

In practice, despite the ever increasing usage of computerisation in teaching and learning in the schools, teachers tend to use computerisation to apply traditional pedagogy, sometimes termed "instructionist", in which study programs and the teacher stand in the centre and the emphasis is on the transmission of information to the pupil without supporting the process of active construction of knowledge (Reeves & Reeves, 1997; Mioduser & Nachmias, 2002). The result is that most of the computerisation activities in schools are based on surfing websites, collecting information, and processing it at a simple level (Fishman et al., 2004; Reeves, Herrington & Oliver, 2005; Mioduser & Nachmias, 2002; Roschelle et al., 2000). Only a few educational websites encourage the utilisation of the full potential inherent in technology (Roschelle et al., 2000; Hanan, 2009). In most cases, the technology is prepared and applied in accordance with traditional practice, and any paradigmatic change in teaching, learning and evaluation in a rich technological environment is rare.

Examination of the long-term influence of teacher training on pupil achievements is complex and difficult to prove (Furman-Shaharabani & Tal, 2008). There are some who claim that the revolution of computerised learning has failed and that the main reason for its failure is because no pedagogical revolution occurred in coordination with the technological revolution (Zemsky & Massy, 2004). Nevertheless, given this, this research explores the importance of professional development which is suited to the needs of the teacher, including professional development which helps teachers to envisioning a new kind of technological-pedagogical development (Maor, 1999; Windschitl & Sahl, 2002; Zhao et al., 2002; Zhao & Frank, 2003; Bauer & Kenton, 2005; Franklin, 2007; Wozney, Vankatesh & Abrami, 2006; Keengwe, Onchwari & Wachira, 2008; Lawless & Pellegrino, 2007). A few empirical studies exist today that indicate such an influence (Gerard, Spitulnik & Linn, 2009; EU Schoolnet, 2010; Plair, 2008).

Nevertheless, in spite of what was said above, it appears from a review of the research literature, that the discussion about the role of the teacher in a technological environment does actually hold a prominent place in the professional literature in recent years (Abuhmaih, 2011; Ajayi, 2009; Baek, Jong & Kim, 2008; Bordbar, 2010; Chen, 2010; Chigona & Chigona, 2010; Davis, Preston & Sahin, 2009). Further studies are necessary in order to map out the problems, the opportunities and possibilities that the new technologies offer to education, including all the changes that are involved with and influence the role of the teacher in a technological learning environment.

In view of this trend, the present research will provide insights into the operationalisation of a new conception of the role of the teacher in a technological learning environment. It aims to understand in depth this new conception and the new challenges that the teacher faces in addressing both the technological learning environment and the Generation Z pupil. The aim of the research is to understand in depth the conception of the role of the teacher who teachers Generation Z pupils in a technological learning environment.

The research questions are as follows:

- ✓ How do teachers perceive their roles in a technological learning environment in comparison with traditional teaching?

- ✓ What are the characteristics of the Generation Z pupils that obstruct or facilitate change in the perception of the role of the teacher?

- ✓ What roles, abilities and skills are required so that the teacher can integrate technologies with teaching? And, what are the patterns of usage of technological tools by teachers who integrate technology with teaching?

- ✓ What is the most efficient approach to teaching that facilitates the integration of technologies with teaching for Generation Z pupils?

**The rationale for the choice of research questions:**

The research questions were derived from the research aim and constitute a basis for understanding in depth how the teachers conceive of their role in a technological learning environment. The role of the teacher in this environment, the skills and abilities he or she requires in such an environment, and his patterns of usage of technological tools should be understood. Response to this will provide a picture of the role of the technology

teacher, and the perceived requirements for this role and its components. In addition, a change may exist in the role of the teacher since he or she is teaching in a technological environment, and it is important to understand how the teachers see, understand and conceive of their role in this environment in comparison with what they themselves had conceived of the teacher's role in the past. Response to this question will provide a general but detailed picture of the components in which change has occurred, whether a difference exists or has remained as it was. Thus it will be possible to understand not only what skills and abilities are required for this role but also whether the conception of the teacher's role has changed, whether teachers see themselves as having a different role when they teaches in a technological learning environment. Finally, in order to obtain a complete and in-depth understanding of the research aim it is necessary to examine the conception of the teacher in relation to the Generation Z and to understand how the teachers characterise this generation and believe that it influences the way they should teach. Response to these four questions will give a broad and in-depth picture of the role of the teacher who teaches Generation Z pupils in a technological learning environment.

**Terminology**: The "computer notebook" classes is defined here as a "technological learning environment". This is the environment in which every pupil and teacher has a personal laptop computer, is connected to the Internet, etc. A teacher in this environment is defined here as "the technological teacher".

The first chapter discusses the theoretical aspects of the research, the perception of the role of the teacher, and its influence on the teachers' patterns of usage of technological tools. It also includes a comprehensive review of the processes of change, the information age, learning theories and the relationship of every generation to the use of technology.

The second chapter deals with the methodological aspects, and includes the considerations that led to the choice of the qualitative research method, the "case study" approach, the exemplification method, and the methods of applied analysis in this research.

The third chapter presents the findings as life-story processes that describe the teachers who represent the new perception of the role of the teacher as identified in the interviews, observations, questionnaire, and documents in the present research.

The fourth chapter engages in a discussion and presents the process of perceptual change undergone by the teachers in comparison with the perception of the traditional teachers and as compared with various learning theories.

The fifth chapter sums up the research and presents its conclusion. The final conclusion of all the research data is that the new perception of the role of technology teachers is essentially different from the perception of the role of the traditional teacher, because it is influenced by the introduction of technologies into teaching and by the characteristics of the Generation Z pupils. Moreover, there are roles, outputs, skills and abilities which are required from the technology teacher in order to enable teaching and learning in a technological learning environment, and that constitute the basis for the emergence of a new pedagogy. However, the very use of technological tools does not ensure the full utilisation of the potentialities inherent in them. In view of this, it appears that the emergence of the new pedagogy involves challenges and impediments that hinder the essential perceptual change. One of them is the lack of certainty regarding the contribution of technology to learning and teaching for the pupil and for people in general, and the other is the lack of better technological and pedagogical support.

The conclusions of the research may shed light upon the new perception of the teacher and the way in which teachers of various pedagogical backgrounds make use of, assimilate and shape teaching and learning processes in a technological learning environment. Constructive use of the new pedagogy may prepare Generation Z pupils for efficient and active application of their knowledge in the future. The conclusions of this study could have an influence on efficiency and lead towards change in the system of training teachers as well as influencing professional development.

## 2. Review of Research

This chapter reviews the research literature in relation to the research questions. Since this research is focused on teachers who integrate technologies with teaching in one school in the State of Israel, the chapter will beging with a discussion of the education system in Israel.

## 2.1 The Education System in Israel

The education system has an important role in setting the level of income and quality of life of an individual and in determining the socio-economic development of the entire country (Yashiv, 2012). Human capital is of great importance in the global age, and therefore countries devote a lot of attention to education and to its quality and distribution across the population. The quality of education is especially important to countries such as the State of Israel where human capital is the main resource. The importance of education in the Israeli labour market is higher than the average one in developed countries (OECD, 2008). The high importance given to education requires educators in Israel to constantly re-evaluate the state of the education system in order to ascertain to what extent it reached its goals (Bar Yishai & Peer-Li, 2009; Brandes & Strauss, 2013). Therefore, the question that we must ask at the beginning of the second decade of this century is whether the existing educational system is relevant and responsive to the changing needs of an age in which information technologies impact on every aspect of our lives.

The education system in Israel was built during a period in which access to information was limited. The roots of the education system in Israel are implanted in the traditional education that had been established at the beginning of Zionist settlement in the Land of Israel. Within this framework, the Ministry of Education was founded and education laws were legislated in the state. In the year 2013, 10% of the GDP was invested in education, which comprises 87% for educational services, 72.5% of which was for teaching hours (teacher's salaries). The personal expenditure of parents for education came to 29% of the total national expenditure for education. The State of Israel and its citizens invest more in education than most other developed countries (OECD, EAG, 2014; McKinsey, 2010). Yet the Israeli pupil receives less educational resources (teaching hours, the

number of pupils in a class), as compared to pupils in most of the developed countries, and the wages of teachers in Israel are of the lowest among these countries (less than 40%, but the number of teaching hours is also low) (OECD, 2014).

**Table 1: Structure of the Education System in Israel (Central Bureau of Statistics. 2014)**

| | Number of study years | Ages | Classes | Number of pupils (in thousands) | | |
|---|---|---|---|---|---|---|
| | | | | Jewish education | Arab education | Total |
| Public Kindergartens | 3 | 3-6 | | 346 | 93 | 440 |
| Elementary Schools | 6 | 6-12 | Grades 1-6 | 699 | 249 | 1,622 |
| Intermediate Schools | 3 | 12-15 | Grades 7-9 | 192 | 84 | |
| High Schools | 3 | 15-18 | Grades 10-12 | 303 | 95 | |
| Total | 12-15 | | | 1,540 | 521 | |
| Higher Education | | 18+ | | | | 333 |

- 3.8% lessons for special education pupils
- The Jewish sector is divided into: National, National religious, Ultra-orthodox.
- The Arab sector is divided into: Arab, Bedouin, Druze, Circassian.

During the course of the school years (kindergartens excepted), the pupils study core subjects (history, language, mathematics, English, sciences, etc.) and enrichment courses (drawing, theatre, technology, physics, etc.). In high schools, the pupils prepare for the graduation examinations (bagrut). The graduation certificate at the end of 12 years of study includes the examination grades of the Ministry of Education for all the core subjects and for the additional extension subjects (each is divided into a different number of study units according to the extension). In many of the outlying settlements in Israel there are gaps in the available study subjects. Many schools in these settlements find it difficult to offer pupils advanced studies in subjects such as mathematics and science, success in which forms the basis for acceptance in the leading academic professions and in the employment world (Ministry of Education, 2011).

The average for those take the graduation examinations is 74.6% (in 2013-2014), and the average for those who received the graduation certificate is 53.4% (in 2012-2013). These graduates are candidates for academic studies in higher education institutions. Only 84% of them meet the entrance conditions of the universities, and only 50% are accepted in higher education studies. The personal expenditure for higher education stands at 51%.

Education is the springboard for the social and economic growth of the State of Israel (Katz et al., 2009; Yashiv, 2011). The state is faced with the challenge of competing successfully with other leading states in the global economy. It invests many resources in research and development, and has succeeded in becoming a leader in matters that demand creativity and innovation. However, studies show that the state will find it difficult to ensure its future prosperity without taking care that all its citizens become well integrated in society and in the business world (CET, 2012). A number of fundamental problems that confront the education system in Israel, can be defined as challenges.

**The first challenge** is the construction of the education budget in such a way that will respond to the challenges facing the education system. The reductions in the education budget in recent years have caused an increase in the number of pupils in a class, a reduction in the number of weekly study hours, increasing burdens placed on the teachers, the lost of pedagogical flexibility in the schools, a halt in the transference of educational institutions to autonomy and self-management, and a decrease in the means for advancing the weaker population (Sversky & Dagan-Buzaglo, 2013).

**The second challenge** and the most prominent one amongst them is the lack of supply of teachers (Walenski, 2011). According to the forecast of the Central Bureau of Statistics (2014), there will be an expected shortage of 7,700 teachers in the education system in the year 2018. Walenski (2011) claims that the reasons for the lack of applications for the teaching professions arises from the aging of the work force, erosion in the status of the teacher, the disincentive of low salaries, and the abandonment of the teaching profession by young teachers.

**The third challenge** is in the sphere of the ultra-orthodox and Arab sectors who are not integrated into the labour market. The constant growth of these population sectors requires new definitions in the system of relationships between the state and these communities with the aim of encouraging and supporting study in the basic subjects that are vital for their integration into the labour market.

**The fourth challenge** is connected with the clear choice of pedagogical strategy, the tradition of standardisation concerning the graduation examinations at the end of 12 years of study. Since the establishment of the State of Israel, pupils at the end of twelve years

of study are examined by the same standard examinations of the Ministry of Education. In order to become integrated into tertiary education it is necessary to allow for wide and varied choice in the structure of the study programme, the creation of a monolithic system which is academic in character and founded upon "back to basics" ideas that will ensure equal opportunity to acquire a higher education (Tamir, 2011; Razer, Warshavsky & Bar-Sade, 2011; Volansky, 2008). The very development of ICT offers a good opportunity to use it in constructing learning patterns that are challenging and relevant to the world of the pupils (Walenski, 2007; Brandes & Strauss, 2013).

The SITES test (Baruch, 2009; Carstens & Pelgrum, 2009), that evaluates the usage of information technologies and computer-assisted teaching (hereafter CAT) in schools, rates Israel in the lowest third in the level of CAT among the participating countries. Although 98% of the schools in Israel are connected to the Internet, only a third of them reach the desired pupil-computer ratio of 10:1. Moreover, it was found that teachers for sciences and mathematics in Israel and especially math teachers seldom use computers compared to their colleagues in the rest of the world (Beller, 2013). Nevertheless, the education index of the HDI (Human Development Index, 2010) places Israel in the 15th place out of 170 countries, and in the level of innovations and technological achievements in the 15th place out of 16 (in the 18th place out of 72).

In light of these global figures, Kalinov (2011) concludes and Bar Yishai and Peer-Li (2009) infer that the education system is complex since its achievements are mediocre but its grading is high; its costs are extensive, but its pupils receive very few resources; its classes are large but so is the number of its teachers; expenditure is high but the wages of its teachers are low; it holds a commitment to equality but it widens the gap between the weak and the well-established.

Studies show that the second decade of the present century has produced far-reaching changes in the local and international labour market which demand new talents that will suit the global "information economy" (Schoenfeld, 1999; Hilton, 2008). Indeed, in recent years leading countries in the world have incorporated national programs in education that focus upon the adaptation of study programs, the redesigning of the learning environment, and the instilling of updated pedagogies (Binkley et al, 2010). The State of Israel joined this trend and also constructed various virtual programmes. But the

brief history of education through the use of technology is filled with good intentions and disappointing results.

Since 1993 the implementation of the CAT programs began with the computerisation of kindergartens and schools and the setting up of sixty thousand computer stations. In 1997, "a computer for every pupil" program was initiated for economically disadvantaged children capable of learning and achieving progress through the use of a computer. These children were chosen as candidates for receiving a personal computer at home and about thirty thousand computers were distributed over a five year period. In 2001, the "Internet House" program was introduced, which combined three dimensions of activities: computers in school, computers in homes, and computers in community centres, with the aim of promoting the required skills and reducing the digital gap. In 2002, the "Lehava Program" was inaugurated with the aim of reducing socio-economic gaps in Israeli society by improving the education of hundreds of thousands of disadvantaged pupils, young and old, in the information field by activating computer rooms in community centres. In 2004, the "Apple Association" was formed, which operates as a non-profit organization with the intention of introducing the basic terms of the usage of computers and Internet to the general public in disadvantaged neighbourhood and in development towns, and 30 centres of this association were set up throughout the country (Tikva, 2006).

In 2010, the "national computerisation program" entered into operation in a renewed attempt to adjust the educational system to the 21<sup>st</sup> century (Dayan et al., 2010) Two hundred schools were integrated into the program in which a basic computerised learning environment was operated that included a laptop computer for each teacher, a screen, loudspeakers, Internet, and dark rooms with the aim of integrating information technology with teaching through a holistic approach relating to the adaptation of study programs, professional development of educational workers, digital material, infrastructure and maintenance, with the aim of enhancing the processes of teaching, learning and estimation, and to promote social and cooperative measures (Zuckerman, 2012).

This implies that the State of Israel is acting to reduce the digital gap (the gap in the exposure to the computer world between children from disadvantaged social levels and those who are socially advantaged) (DiMaggio et al., 2004; Dobson, 2001), and is trying

to respond to the changing needs of pupils in the age of information and technology. Yet it appears that the education system in Israel is responding with relative slowness to the required changes, both in regard to the depth of the change it offers and in regard to its range of its absorption (the number of schools in which the program is introduced and the scope of its budget). Although the program has equipped teachers with a computer and a film projector in the classroom, yet it is necessary to continue the process and to upgrade the learning environment by equipping the pupils with personal computers, to train the teachers accordingly, and to create a natural continuity between the school and the home (Tamir, 2011; Yashiv, 2012). In order to assist the processes suited to the education system and the new demands, and to accelerate these processes, creative ways must be sought to break out of the limitations of time and place in the traditional school that will answer to the unique needs of Israel both in the social and in the economic sphere.

The first research question deals with the comparison between the conception of the role of the technology teacher and the conception of the role of the traditional teacher. The next part deals with the relationship between traditional teaching and technology teacher. This review provides information on how teachers conceive of their role today as compared with the past and places the role of the technology teacher in the context of the historical development of the teacher's role.

## 2.2 How have teachers' roles changed following the introduction of new technologies?

The research literature describes a series of educational methods in schools that range between traditional teaching methods such as the lecture and modern teaching methods and more recently developed approaches such as virtual teaching or distance teaching (Birenbaum, 1997; Cohen & Grant-Porat, 1995; Shapira, 1999; Rimor, & Kozminsky, 2003). This series includes teaching styles, beginning from the Command Style in which the teacher controls all the stages of teaching, makes decisions, the pupil immediately responds to stimulations, and the emphasis is on the repetition of knowledge (Kulinna & Cothran, 2003), and ending with the Divergent Production Style in which the teacher presents various problems before the pupils who required to solve them, and the emphasis is on the creation of knowledge (Byra, 2000). This research correlates with the claim of Conti (1989) that there are two basic teaching styles, the style that is focused on the pupil and the style focused on the teacher, in which the teacher stands on the

continuum between these two styles and represents the widest possible conceptualisation while taking developments and changes into consideration.

From the beginning of the fifth century BCE, Plato used a traditional lecture method for teaching in Athens in which the lecturer displays figures, principles, terms and problems within the defined subject. The lecturer is active during the lecture while the pupil listens and absorbs the knowledge (Cohen & Grant-Porat, 1995). The teacher or the lecturer is conceived as someone who knows what the pupil should know in order to operate properly within society, which methods are suited for that purpose, and which skills the educational framework should provide the pupil in order to turn him into a useful citizen in the future (Birenbaum, 1997; Nicholls et al., 1990; Nichols & Utech, 1998; Seeley, 1994). This is a style of teaching that is common in many schools in the world including Israel (Lotan & Ben-Ari, 1994) and was the most accepted method in higher education.

In the traditional approach, the education process is meant to embed the individual in a historical partnership (Lamm, 2000a; Aloni, 2005). The teacher must be an intellectual with a wide range of knowledge, who serves as a legitimate and autonomous agent of culture and knowledge (Guber, 1997; Beatty, 2001). He is called the knowledgeable teacher (Zeichner, 1994) and he has to make sure that the pupils identify with him and with cultural values. She is the instrument through which the pupils are brought into efficient contact with the study materials, the agent through whom knowledge and skills are transmitted, and he imposes the rules of behaviour (Peters, 1972). She has in principle the pedagogical skills (Cochran-Smith, 2004b) and is not required to exercise his judgment regarding the kind of knowledge he will teach but only what is dictated to him by external factors (Zeichner, 1994). Weiss (2010) claims that the traditional teacher is faced with three unsolvable problems that do not allow him to teach effectively, which are the differences between the pupils, the relevance of the study contents, the didactic methods and approaches, and individual follow-up for each pupil. Therefore Perkins (1999) claims that schools focusing mainly the delivery of knowledge are no longer relevant.

The 1980s were a turning point in a transition from traditional educational approaches to innovative approaches that added new aspects to the image of the teacher without abandoning the traditional ones. Some researchers have argued that such new approaches to teaching offer learners the conditions for personal development and for self-realisation

(Lamm, 2000). The expectations from the teacher include commitment to the teaching profession, expertise in the subject field, ethical commitment, ability in practical teaching, taking into consideration the differences between pupils, ability in selecting material suitable for the pupils in relation to environment, time, place and the learners, capable of estimation, responsibility and personal commitment to professional development, able to solve problems and to make judgments (Calderhead, 1989). The teacher must understand and know the pupils, the stages of their development, their background, their study methods, the motivations of each one of them, their areas of interest and their world outlook (Sykes, 1999; Spitzer, 1996). The teacher must show flexibility, relate and respond to the difference among the pupils. He or she must activate a variety of teaching strategies while improving and broadening the knowledge in the subject field, and must have the ability for constant interpretation of events and reflection. All this is in order to assist the pupils to relate to the study subject in their own individual way and suited to the stages of their development (Darling-Hammond, 1997; Darling-Hammond & Snyder, 2000).

During the 1990s and in the early years of the 21$^{st}$ century, stress was laid on the image of the teacher as a humanist who adapts himself to the differences among pupils and changes in the classroom, school, society and the economy. The teacher was required to give simultaneous consideration in real time for alternative judgments (Kennedy et al., 2008), to adapt himself to the pupils already during the preparations for the lesson, and especially during its course, and to cope with "pedagogies of uncertainty" (Shulman, 2005). This lack of certainty increases with changes from a learning environment to an environment that integrates technology based on the perception that that a technologically rich environment is characterised by a variety of digital information sources that are of value to the learner (Levin, 1995; Brooks, 1995).

Givon (1999) indicates that **computerised orientation** is a term that indicates optimal education which is essential to all those who wish to deal with learning and life within an information-intensive environment. Yogev (1999), Idan (1999) and Calachko (2000) add that one of the motives to enter into the computerised world is the will to deal with the evolving world of information that surrounds us in all fields of life. Therefore the introduction of virtual teaching into the schools raises questions regarding its assimilation, scope of innovation, the degree of its influence on the schools, and whether

and to what extent any change occurs in the teaching paradigm, in the structures that surround it and in the educational activities undertaken (Mioduser et al., 2003; Nachmias, 2002; Watson, 2001).

Since change has occurred in the role of the teacher from the period of Plato, the research literature explains and describes the change process in general and the change processes within the teacher population and the schools in particular. The second research question deals with the causes that influence the change in the role of the teacher and in its conception. The following part describes the processes of change with the aim of explaining the causes that influence change in the role, positions and conceptions of the teacher.

## 2.3  What are the challenges that confront teachers in the use of technologies?

Today the educational system must meet the challenges of the 21st century (Bawden, & Szabados, 2001; Schoenfeld, 1999). The changes demand new talents and skills such as creativity, the ability to solve problems, interpersonal communication, and team work, together with the capability for self-management, flexibility, and the aptitude for rapid adaptation, self-development and systematic thinking (Zuckerman, 2012). This challenge has in recent years engaged the attention of many countries in the world including the United States, Britain, Singapore, Australia, Finland, and others (Sacks & Ruzzi, 2006; Helsper, 2008; BECTA, 2008; NBES, 2003; Wideen & Grimmett, 1995; Salomon, 1996; Adler 2010).

The dictionary definition of 'change' is turning into a different state or different conditions, a switch and a conversion (Fuchs, 1995). According to Sharan (1990), 'change' in the educational framework means replacing the standard patterns of behaviour involved in the work done by those in the system with new and different patterns of behaviour. Significant change involves learning which is not characterised by collecting facts and the study of content but by investigation deriving from dissatisfaction with the current situation and from a feeling that change is essential (Posner et al., 1982).

In the 16th century Francis Bacon (an English philosopher and statesman) claimed that people tend to hold strong to their false beliefs (political, social and even scientific), even after they discover their error in view of factual realities. Chinn and Brewer (1993) also

found that scientists, adults and pupils of science tend to resist and reject changes in their position and in their ways of thinking when they are faced with a contradiction to their knowledge and position. Instead of dealing with processes of constructing new knowledge they cling to their previous knowledge or falsify the new in order to adjust it to their conceptions. Kurt Lewin (1989) explains this tendency by stating that theories are placed in memory in an easy to use way; theories construct knowledge into coherent wholes, and thus make it easier to add new data and to retrieve data from memory. Langer (1989b) based on Freud, believes that we cling to those rules and categories that we constructed in a mindless manner due to numerous repetitions, to trust, and to cognitively immature commitments that constrain us to do so but that lead us later to a misguided view.

Nisbett and Ross (1980:168), who call this phenomenon "The Belief Perseverance", found three phenomena that show the survival ability of basic theories: a) When believers are exposed to experiences that put their faith to the test they return with stronger faith, whether the experience supported or contradicted their theories. b) Those without theories who form their beliefs for the first time, cling to them even after finding proof that contradicts these early beliefs. c) A theory that passed the test in the beginning and later on was found to be false will continue to exist. From these three it is understood that theories are long-living even when new data has led to questioning and abandoning them.

A psychological explanation for this is the Primacy Effects, those primary impressions that overwhelm and suppress any later and more reasonable impressions. Solomon Asch (Nisbett & Ross, 1980) strengthens this by stating that the information presented in the beginning is of greater influence than information displayed later on. Even Max Wertheimer (1912), one of the founders of the Gestalt approach, who defined the Phi Phenomenon, claimed that initial information is processed in a holistic manner, while later information is coloured by the former one. Therefore any later information, that does not accord with the emotional impressions of the previous information as it was first perceived, is dismissed or is given less importance. In the opinion of Nisbett and Ross (1980), the factors that will influence the change are those that influenced the initial belief formation: a) Personal significant experience, exposure to live, substantial, and relevant information during an experience will influence the creation of new beliefs and the eradication of others; b) Cognitive explanation supporting and following an

experience that raises the awareness and strengthens the reasons to continue believing can destabilise earlier beliefs.

Researchers found that the traditional image of the teacher and conception of what learning is are deeply rooted for those working in education and it is very hard to change them even when they state their intention to change (Levin & Nevo, 1998). Certain studies (Clandinin & Connelly, 1996; Strauss & Shilony, 1994; Weber & Mitchell, 1996) point out that teachers who hold pedagogical beliefs in a cognitive and behavioural way tend to teach the same way in which they were taught (Soter, 1995). Weber and Mitchell (1996) found that the image of the teacher and the essence of teaching are influenced by childhood memory and social stereotypes and affects their operation as teachers.

But in the world, which is characterised by many rapid changes, regards innovation as the key word for survival. We are required to adapt to a changing reality and to work for continuous innovation (Shimoni & Avidav-Unger, 2013). It seems that integrating computers with the education system is much more complex and comprehensive than integration within any other organisation. While in other organisations the major change is technological, in education the change is technological but also conceptual and pedagogical. The application of computerised teaching is not only the transference of traditional classroom activities on to the Internet web, but a new form of learning (Rotin, 2000; Passig, 2005; Blau, 2011), in which changes occur in the role of the teacher (Pickering, 1996; Berge, 1996; Salomon, 1997), in the strategies and models of teaching and learning (Ruberg, Moor & Taylor, 1996; Tait, 1997), in the way teaching content is displayed, in the organisation of the class and the learning groups, and more (Or, 2001).

The change requires that teachers review their own pedagogical approaches (Strike, & Posner, 1992), and develop new methods of teaching and new skills in technological tools. Many researchers emphasise the necessity of significant change being made between the role of the teacher in traditional learning and the role of the teacher in a technological environment. Teachers must make a change in their teaching strategies and in their pedagogical approach, moving from being a teacher that "relays" knowledge to a teacher that coaches and navigates, takes part of the processes of constructing knowledge with pupils and conducts a dialogue with them. This is a shift from teaching conducted physically in a defined time in a classroom, to teaching which makes use of distance and occurs beyond the accepted school hours (Fischer, 1996; Solomon, 1996; Rutin, 1997;

Salomon, 1998; Woollard, 2012; Brown, 2000). In the technological aspect, the teachers must be computer and internet oriented with the ability to cope with technical difficulties. They must be familiar with the layout of educational websites and to know where to find relevant content on the Internet (Peled, 2000).

The required change in the role of the teacher raises problems. The internal difficulties in which the teacher finds it difficult to accept the change in his role and way of work in teaching, raises doubts about himself. He no longer serves as the agent of knowledge but merely as its transmitter; he is not the only expert in the material being studied; and he is required to recognise the hidden talents (due to technology) in every pupil. Yahalom (1997) notes the difficulties in an environment that demands basic skills; in the need to be familiar with the operating system; difficulties controlling various software and difficulties in the field of resources. Hawkins (1996) refers to technological frameworks and to the limitations of hardware together with organisational problems without which no pedagogical process can start.

Change is an unclear and painful process – it contains a lot of unknowns, anxiety and ambivalence stemming from a feeling of loss of control, difficulty adapting and lack of belief in personal abilities (Hecht, 2002). Professional uncertainty is expressed in situations in which the professional has lack of information when he has to give answers or make decisions (Guijski, 2003). According to the definition of Lange & Burroughs-Lange (1994:622), "professional uncertainty" is "the feeling teachers have concerning their own professional knowledge, a feeling that emerges when teachers learn something new that rocks the basic content knowledge or pedagogical knowledge or content and pedagogical knowledge". In their research they found that the feeling of professional uncertainty, which is accompanied by a sense of discomfort, subsides with seniority and experience acquired by the teacher. In contrast to this, the research of Singer Gabeia (1995) shows that uncertainty does not lead to a sense of discomfort, but contributes to teaching and advances it. This conclusion is supported by several theoreticians, such as Jackson (1986); Eisner (1982) and the research of Labaree (2000) who claim that teaching in itself is an occupation in which uncertainty is an integral part.

It seems that the most important link in inserting changes in the education system in the field of teaching is the teacher, and the reaction of the teacher to the new media must be taken into account (Petraglia, 1998; Solomon, Almog, & Ben Zaken, 1993). In the opinion

of Samuel (1996) every change raises resistance that requires applying various methods and tools to overcome it. Sharan and Shahar (1990) claim that the demand to acquire new skills, terminologies and positions with the lack of reimbursement of incentive cause a resistance to change. In addition to this, there may be insufficient or unsuitable teacher training, insufficient budget, the lack of technical equipment or breakdowns in technical equipment, and no correlation between what is taught in the classroom and what is taught on the computer within the same subject (Hativa, 1988). Barrios (2004) writes that the greatest barrier to successful integration of technologies in the classroom (1:1) is the lack of direct support for the teachers in integrating technology with the study program.

From the research of Ben-Amar Branja (2004) an optimistic picture is revealed concerning the possibility of creating a significant change in the education system which focuses on a unique development of school culture in the education-value-pedagogical. The findings in the research suggest the existence of a "double loop learning" process in the school level, with emphasis on a continuous learning and adaptation process including managerial and pedagogical principles that always undergo re-evaluation on the set of priorities as the process advances. Fullan (2014) identifies theoretical reasons why change occurs as it does: moral purpose, understanding change, developing relationships, knowledge building, and coherence making. All these are developing independently yet are deeply compatible in leading a culture of complex change. Rhodes (1996) claims that a general, conceptual, system-wide change must occur before activating changes in education. A general array of changes in schools such as structural organizational changes, technological organisational changes, and personal pedagogical changes would be possible if accompanied by external and internal consultation (Lamm, 2002).

According to Gadja, and Koliba (2008) and Cheng (2001), the success of the change process depends greatly on the involvement of the teaching staff in fundamental decisions. Cooperation among the teachers and the team work are the central and essential foundations in the change process. The higher the consensus reached among the teachers regarding the steps taken by the entity responsible for the change processes, the stronger the feeling of partnership in generating the change that leads to success. Many educators regard the children of today as the digital generation of tomorrow which is

confident in its use of technology. Yet before radical change can begin to be carried out in education it is necessary to examine the changing needs in the world of knowledge.

The research literature that deals with the introduction of changes in education, indicates the complexities of the process and the obstacles that stand before those involved in it. Although the source of the change under discussion is the external technological change (Globerzon & Carmi, 1988), yet it creates the need for pedagogical, physical, professional and human changes that combine cognitive and affective and practical aspects (Kula & Galberson, 1994). In the view of Abd El-Gawad and Woollard (2013), success in integrating technologies with teaching is based on the content nature of study programmes, both in theory and practice. Findings illustrate the importance of curriculum content nature (theoretical, pragmatic); tutor characteristics (attitude towards e-learning, proficiency of the technology, and support); learners' characteristics (computer competency, English language proficiency, and learning style); and technology (usability, affordances and infrastructure) (Abd El-Gawad&Woollard, 2013).

## 2.4 Is Generation Z different in relation to technology and in connection with education?

The next research question deals with the teachers' conception of the characteristics of the pupil generation. In order to place this question within the relevant research framework, it is necessary to examine those studies that dealt with this issue. The following part presents the description of the generations in relation to education and the use of technology. This part will reflect the critical aspects in the definition of the generation according to their characteristics and their influence on change in the educational system and on the conception of the teacher's role.

Researchers who study generational differences are not in agreement about the division of continuous history into generations, nor do they agree on the precise characteristics that distinguish one generation from another (Almog & Almog, 2013). The average period for every generation is generally considered to be about thirty years, in which children grow up, become adults, and have children of their own. In the research literature one may find a variety of definitions for the word "generation": A general term for people or animals existing at a certain period of time; The average lapse in time between the birth of parents and the birth of their offspring (Oxford, 2015); All human

beings who belong to a certain age level that represents a common culture of a historical period or a certain period of time; A group of people of similar age involved in a particular activity. And Picher (1994) defines it as people in a certain population who experience the same significant events with a given period of time.

McCrindle (2006) offers a more complex definition: Generation refers to a group of people who were born during a range of time in which changing trends, technologies and events have significantly shaped them. The social and technological changes that happen between one generation and the next are the influences that characterise the members of each generation. That is to say, belonging to a certain generation is not only in accordance with age group (which changes a little among the various studies) but also to evidence particular characteristics of perception, awareness, behaviour, attitude towards technology and the extent of its usage, the way in which it is integrated by the individual within the course of daily life, in both social and professional contexts (Helsper & Eynon, 2010; Parry & Urwin, 2011; Cogin, 2012; Howe, & Strauss, 1992).

The term Generation X (those who were born in the years 1964-1976) was coined by Douglas Coupland in the book which he wrote in 1991: *Generation X: Tales for an Accelerated Culture* (Coupland, 1991). The X generation constitutes most of the teacher population in the education system of today. This is a generation which is known in literature and in the media of the 1980s and 1990s by very negative terms, the most prominent being the "Slackers Generation" (Ulrich & Harris, 2003; Henseler, 2012). Ortner (1998) characterised this generation as those who had lost their way, as frustrated people filled with anger and resentment, not involved in what was happening, and indifferent to society and the environment. Kotler (2009) also claims that this generation is characterised by cynicism, individualism, and is filled with a sense of alienation. In 2001, Prensky defined them as "the digital immigrants", a generation that speaks in an outdated language (of the pre-digital age), and asserted that the gap existing between the pupil generation and the teacher generation was the source of the problem in education (Prensky, 2001a). According to him, they are less computerised teachers, their main use of the computer is for variety in their work, and they use the Internet is to search for material and for connection to websites. But they still do not feel comfortable with computers, they need many hours of instruction, and they do not create any innovative pedagogy (Rotem & Avni, 2008).

Contrary to the claim of Prensky, some argue that age is not the only prognostic factor for the use of technology but rather experience, access to technology, the range of usage, gender and level of education which are sometimes even more important (Helsper & Eynon, 2010; Czerniewicz & Brown, 2010; Jones, Ramanau, Cross & Healing, 2010). In addition, researchers claimed that the duality of the "digital immigrants" and the "digital natives" is a complex phenomenon that cannot always be described in extreme terms (Salajan, Schonwetter & Cleyhorn, 2010). And there is a possibility of turning adults into "digital natives" especially in the learning sphere by acquiring the skills and experience in interaction with information technology.

The Y generation (born during the years 1976-1995) has many epithets: Millennials (Merritt & Neville, 2002); Echo Boomers (Kroft, 2005); Computer Generation (Hofferth & Sanberg, 2001); Digital Generation or Internet Generation (Strauss & Howe, 1992); Net Generation (Tapscott, 1998); You Tube Generation; the I Generation (Pew Internet & Amercan Life Project, 2007); Dot Com Generation (Stein & Craig, 2000). These epithets are based on the "I", and on its products such as I-Pod and I-Phone. Generation that grew up during the technological boom associated with personal computer systems, synchronic communication and various gadgets that constitute an inseparable part of their lives and were used for shared experiences. This generation is independent and has initiative, acting to advance their interests in cooperation with a supportive community to which they contribute the information it has, and both supports and is supported emotionally this community (Palfrey & Gasser, 2008). Rotem and Avni (2008) claim that the teachers of Generation Y, the education cadets of today, will be users of an innovative and updated pedagogy and their management of the Internet will be more regular, continuous and cooperative.

The children born from 1995 onwards belong to the Z generation, "children of the screen" (Katz, 2011), "digital natives" (Prensky, 2001a). Generation Z represents the first generation to have grown up in the world in which the Internet has always been available in abundance. They use, breathe and live technology ever since they were born (Aubrey & Dahl, 2008; Ross, 2010; Roberts & Foehr, 2008; Judd & Kennedy, 2011; Jez, 2011; Jones, et al., 2010). Moreover, Prensky (2001b) claimed that the brains of Gen-Z children are structurally different from those of their predecessors. It has nothing to do with genetics and everything to do with how we use our brains in response to the environment

(Tapscott, 2008), with lots of web browsing and information overloading (Cross-Bergstrom, 2010). As a result, the part of the brain responsible for visual ability is far more developed in this group, making visual forms of learning more effective and enjoyable (Prensky, 2001b). For example, treating learning as a game is not only more fun for Gen-Z children, it is also more effective (Hill, 2004; Huang & Cappell, 2005) in that it motivates pupils to keep pushing towards a greater mastery of the subject matter being learnt. Interactive textbooks, social interaction, collaborative projects, and making technology an integral part of all classroom study can get the digital generation better involved in learning (Hargittai, 2002; Zevenbergen & Logan, 2008; Tapscott, 2008; Prensky, 2001b; Jandrić, 2012).

Besides what was said above, there is a growing body of academic research that casts doubt on these generational explanations for behaviour and the use of technologies. Some claim that the argument about the description of the digital pupils is an academic form of "moral panic" and that it is without empirical evidence (Bennett, Maton & Kervin, 2008; Czerniewicz & Brown, 2010). Helsper (2008b) adds that the use of this concept and the ideas associated with it are liable have unexpected implications. Although the percentage of youngsters using the Internet and new technologies is higher than that of the adult population (DiMaggio & Hargittai, 2001; Hargittai, 2008; Cheong, 2008), yet a significant difference still exists in "how" and "why" young people use new technologies and how they use them in an efficient manner.

A picture arises from the research literature in which the relationship of this generation with technology is much more complex than the suggested characteristics (Bennett, Maton & Kervin, 2008; Kent, & Facer, 2004). Thinyane (2010) found that among the children who were called "digital children" in accordance with their age, not all their activities were accompanied by a frequent use of technologies as Prensky (2001) has described. Those who oppose the definition of Generation Z as a homogeneous digital generation claim that despite the probability of differences that exist between a generation and the preceding one in terms of technology usage, there is a considerable variety of skills within the "digital children generation" as well as between the generations (Kennedy et al., 2006; Jones, Ramanau, Cross & Healing, 2010; Selwyn, 2008; Bennett, Maton & Kervin, 2008). A difference exists between the experiences of

pupils from developed countries and those from developing countries, and pupils from different backgrounds have different levels of access to technology (Thinyane, 2010).

Moreover, the use of technology is not found to be fully suitable for the expectations from this generation and was not found indispensable for learning among youngsters (Salajan, Schonwetter & Cleghorn, 2010; Thinyane, 2010; Waycott, Bennett, Kennedy, Dalgamo & Gray, 2010). Surveys and studies show that although a high percentage of pupils have access to mobile phones, laptops and desk computers, yet their approach to more complicated technologies such as handheld computers is more limited (Goerke & Oliver, 2007; Kennedy et al., 2009; Margaryan & Littlejohn, 2008; Volansky, 2010), and technological skills of this generation in particular with advanced activities is not as is usually supposed (Caruso & Salaway, 2008; Singh, Malan & Giardina, 2008; Kennedy et al., 2009). In fact, except for the social networks, most of the activities that belong to web 2.0 is found to be in use only by a minority (Kennedy et al., 2009; Caruso & Salaway, 2008; Lenhart, & Madden, 2007). At the higher levels of technology such as in the software field, only a small percentage venture beyond electronic mail and word processing (Lorenzo & Dziuban, 2006). Furthermore, no preference was found for the use of them in the classroom or in academic activities (Kvavik, 2005; Margaryan, Littlejohn & Vojt, 2011).

In spite of the emphasis on technology as a means for defining the digital generation, this is liable to be regarded as a metaphor for the perception of the generation in general (Jones, Ramanau, Cross & Healing, 2010). This means that those of the Z generation are sometimes viewed as being exposed and open to innovation and to different worlds, enjoying varied cultures, scanning texts with rapidity, and have a wide knowledge of various subjects (Posnick-Goodwin, 2010). Other claims that are made about Generation Z are that they need group activity and to know that support is available (Jayson, 2006), they desire to choose every process in their lives in accordance with their personal requirements (Montana & Petit, 2008; Strauss & Howe, 2000) and that, according to Dosaj & Jukes (2006), they adopt experimental thinking and learn quickly from errors, are not afraid of making mistakes, and regard the world as a large reset button.

This study does not seek to resolve the debates between those who advocate for generational explanations in education and wider culture and those who contest this. Rather, it seeks to explore how ideas and perceptions about generational differences

influence the behaviour and beliefs of teachers. This is important because the evidence suggests that educators often promote the use of technologies in the classroom because they believe that is what the pupils of today want (Carlson, 2005). They regard the children of today as the most demanding and challenging pupils in history (Tapscott, 1998). And some teachers believe that this generation does not like to read, to sit down and listen, and that rely more upon the cut-and-paste approach for assignments (Oblinger, 2003).

Questions about the evidence base for many of the assumptions about generational differences undermine the arguments for a radical change in education based on a disconnection between the needs of the young and the educational institutions. However, as this study will show many teachers operate on the basis of these generational assumptions. Furthermore, disagreements about the evidence on generational differences do not mean that education should not change at all, only that the basis for this argument should be different (Bennett & Maton, 2010; Kennedy et al., 2008; Kennedy et al., 2010). Thinyane (2010) suggest that educators and school principals who decide to use technologies in the classroom must take into account the variety in the pupil population (those that have access to technology and those that do not). Czerniewicz & Brown (2010) recommend focusing on the skills that the pupil requires and the capabilities that are needed for achievement, and not to focus on control over technology.

This means that it is more important to understand the learners in order to teach them better (Helsper & Eynon, 2010), as well as to understand the nature of activities based on technology rather than to examine a possible approach to technology (Bennett & Maton, 2010), through an ability to understand the orientation of information and to apply the skills of critical thinking (Lorenzo & Dziuban, 2006; Lynch, & Wolcott, 2001). Helsper and Eynon (2010) assert that the educational tendency to regard technology as a "correction" or "solution" to the many challenges that face education is incorrect. Information technology is merely a tool. If it is not used appropriately this can be an impediment to achieve the goal for which it was intended. And if change should occur in educational methods it will not be due to modern technology but rather to the way in which we perceive the pupils through educational theory (Oblinger, 2003).

## 2.5 What approaches to teaching have emerged which may support teachers to respond to this changing environment? - Educational theories for learning.

The next research question deals with educational theory, and the attempt to examine the characteristics of the new role of the teacher and its components. In order to describe the changing conception of the role, references are found in the research literature on this subject that provide response to existing educational theories and to theories that encourage the integration of technologies with teaching. These theories supply critical explanation for the role of the teacher in a technological learning environment in relation to the study programme, the teacher's role and the pupils themselves.

Learning in an information-rich environment is based on the technological developments in the world that demand, among other things, a process of change and rapid improvement in the education system. Learning theories are in a constant state of development, and a new pedagogy has evolved over the past decades after the integration of a few research fields such as developmental psychology, motivation theories and self-regulation, the study of fields of interest, the study of learning styles (strategies), exploration theories and identity consolidation and organisational theories.

**Learning** is defined as a change in behaviour that is relatively fixed or as a behavioural potential originating from experience (Beyth-Marom, 2001). This definition distinguishes between internal unpredictable processes (potentiality) and visible behaviour (Rubinoff, Berkowitz & Oppenheimer, 1990). **Significant learning** entails the ability to think in our world of knowledge (Perkins, 1991), and requires mental action anchored in authentic situations and occurring in significant social environments. Learning deals with the giving of significance, critical viewing, and reflection by the learner, with the teacher as the one who oversees the learning process (Perkins, 1992). Learning represents dynamic processes in which the learner plays an active and responsible role for the process. Only by investigation, examination and deliberation with the learner can the most effective processes be attained. **Teaching strategy** is derived from theory which is defined as "an intelligent complex of methods and techniques executed in a specific school for a quite a long time" (Cohen, 1990: 92). Deriving from this strategy are the principles of action,

learning conditions, learning duration and the place in which learning will be held in accordance with its goal (Bellotti, & Smith, 2000).

The research literature presents various schools for learning and for significant learning. Each of these schools is derived from characteristics of the learning process, its aims and its significance. Learning in information-intensive environments was consolidated on the basis of various schools: philosophical theory (Dewey), individual psychology (Piaget), behavioural psychology (Taylor) and social psychology (Vygotsky).

One of the basic assumptions in psychology is that for every behaviour there is a reason and that human beings do not act in a random manner. According to this all the psychological theories examine the source of the causality of human actions and what may motivate human beings to act. Research on motivation deals with action and with internal and external forces that influence the decision of taking a specific course of action (Mullins, 2002) and is defined as the will of an individual to make an effort to achieve his goals (Globerzon, 2002).

**The philosophical school**: According to Dewey (1933) <u>learning depends on activity</u>, that is to say, information and ideas are revealed only in states in which the learner extracts them from important and significant experiences concerning himself. Dewey believed in the power of active learning and in its ability to construct information. But he emphasised that this was not just the external performance of activity, but rather of acting through thought which he called an "attitude of mind" (Dewey, 1993). This kind of activity involves mental reference, not only external execution, and stimulates interest within the performer. Experience constructs meaning vis-à-vis the conditions of reality and the integration of action with thought in such a way that one supports the other and shapes it. Interactivity in a technological environment creates an explicit invitation to engage actively in learning, and challenges the utilisation of literacy skills and thinking abilities that can construct active knowledge for further learning.

**The cognitive school**: <u>Learning is acquired through understanding and the discovery of new information</u>. Piaget (1983), one of the psychologists who emerged from that school, claims that the basic principle of learning is discovery and the understanding is a reconstruction by means of a new discovery. The theory is based on the cognitive development of the child as one who is able to discover meaning of the world around him

through the intellectual abilities with which he was born (Harpaz, 1996; Fosnot, 1996; Flavell, 1979; Flavell, 1987). A technological learning environment invites connections through which it is possible to deepen learning or to broaden it, to present a concept in various aspects and to link between different sources of information (Biggs, 1988).

**The social school**: <u>Learning occurs through social interaction</u>. Vygotsky (1996), one of the leading psychologists in this school, disagreed with Piaget and stated that the development process follows the learning process. He enhanced the role in which the social element takes part in the cognitive development. In his opinion, the participation of the learner in a dialogue among grownups is what generates a higher level of learning and through which the child advances from spontaneous terms, terms that the child develops naturally, to scientific, more formal terms, originated from the school culture and teaching. Vygotsky (1996) believed that varied interactions within the social-cultural connection are a basic necessity for man. Moreover, according to his views, social interaction is the first stimulating factor that allows and encourages cognitive and intellectual development among people (Krumholtz, 1998; Huitt, 2001). Therefore, the relative influence of four factors: environment, cognition, philosophy and behaviour that differs from one person to another and is dependent upon circumstances (Rubinoff, Berkowitz & Oppenheimer, 1990; Langberg, 2000). Cooperation in the process of learning in a technological learning environment allows for team study that contributes to the construction and perfection of individual knowledge and the acquisition of agreed meanings through mutual acceptance and tolerance.

**The behaviourist school**: <u>Learning is derived from its "goal" of learning</u>. The "goal" is defined as the behavioural attitude of a learner towards the studied material. Taylor (in Blum & Mager, 1956), the father of the school, distinguishes between "long term goals", value and educational goals, and "short term goals", which includes learning conditions and methods to measure its results. The goal should be formulated in order to facilitate the guidance of the teacher and the selection of learning activities, and at the same time, to make it easier for the pupil to understand what is required of him in the learning process (Woollard, 2010). Taylor discusses nine categories in the field from the behavioural sciences: knowledge acquisition; developing skills and work habits; developing social positions; developing interest; developing evaluation; developing sensitivity; developing personal adaptation into society; preserving bodily health; and

developing a view of life. These categories constitute the basis for the formulation of detailed models in the field of goals by various researchers, as for example Blum and Mager (1962, in Passig, 2000). The ability to easily update information and to change it helps in promoting the processes of constant improvement in the output. Exposure to additional sources of information make the process of improvement an integral part of the learning process and link "long-term" aims with "short-term" ones.

**The constructivist school**: Since the end of the 18th century the epistemological approach emerged in philosophy, which deals with the essential nature of knowledge, its source and the manner of acquiring it. The constructivist approach developed from the philosophy of Giambattista Vico who believed that human beings can only understand knowledge that they themselves have constructed. Man creates knowledge from an interaction between information, existing beliefs and new ideas (Brooks & Brooks, 1997; Zellermayer & Heilweil 2000; Krumholtz, 1998; Brooks & Grennon-Brooks, 1999; Airasian & Walsh, 1997).

The constructivist theory is build from a synthesis of the theory of Dewey, Piaget, Vygotsky and Taylor. It is based on the idea that there is no absolute truth and that "human beings do not have direct access to objective reality, because we inevitably build our own version of reality and at the same time modify it and ourselves" (Harpaz, 1996: 2). It does not view the teacher as the central source of information (Glezerfeld, 1997), but sees his role as guiding and strengthening the motivation and the ability of the pupils to learn and to develop through stimulus and support. "Educators need to encourage the pupils to experience the wealth of the world and to challenge themselves to understand the complexities that compose it" (Brooks & Brooks, 1997:5). The teacher mediates within the process of learning and provides opportunities for experience in situations that may cause cognitive conflicts, with the purpose of stimulating cognitive construction (Brooks & Brooks, 1997; Shamir, 1999).

The study program is perceived as a flexible process changing according to needs, demands and changing reality, thus it will be authentic to the relevant problem of the learner. The content of the study is interdisciplinary and surrounds the solution of the problems (Brooks & Brooks, 1997). The lessons are not time bounded and the interaction is between pupil, teacher and the world of knowledge. Estimation is qualitative and takes into account the multiplicity of intelligences. It examines the learning process, the

deliberation, calculation and adaptation of the learner to new situations, and his interaction with his fellow pupils in the group (Birenbaum, 1997; Alzahrani & Woollard, 2013).

The constructivist school views the pupil as an active learner, who assesses the knowledge in his mind on the basis of his experience and in accordance with his goal, strengthens his own interpretation and thus improves the structure of his knowledge. Understanding is achieved by an effort of the learner to set up assumption, to investigate, interpret, doubt, speculate, foresee, solve, generalise, and connect the knowledge (Perkins, 1997; Salomon & Perkins, 1996; Harpaz, 1996; Fosnot, 1996). It is based on the active interaction of the learner with his physical, cultural, social and ideological environment (Shafriri & Bozo, 1998). Knowledge is formed through social dialogue that varies different viewpoints and the learner examines and challenges his understandings with the understandings of his associates in the group (Vygotsky, 1996). The learner is placed in the centre of the learning process, a process, possesses the ability for self-guidance, constructs his ideas by assimilating existing knowledge and adapting it to new realities.

**The enhancement school**: This is one of the most advanced schools in the research literature, which promotes learning through choice of a combination which is most suited for problem solving (Passig, 2006). Enhancement skills are based on the taxonomy of Bloom, and were offered as the seventh skill in a taxonomy of future cognitive skills, in order to reflect the anticipated needs of the learner which become more and more important in the development, marketing and production of future processes (Passig, 2005). The relevant taxonomy of cognitive abilities will provide the pupils with the appropriate tools for success when they grow up.

**Enhancement** skills are defined as the ability to choose a suitable combination of knowledge and to apply it in solving a problem in various situations, and at different times and place, which thus enhances the combination (Passig, 2005; Passig & Cohen, 2006). Skills enable a high order of thought which serves as a strategy for solving ill-defined problems, and thus allows one to cope intelligently with problems in the complex realities of life. Such skills help people to make complex connections between ideas that are distant in time by renewing their application. The importance of these skills stems from the need to train pupils for the world of tomorrow that demands an innovative

flexible thinking based on the increasing human knowledge that is found accessible to everyone at any time or place. Improvement in computational thinking was found by Selby and Woollard (2014) to be closer to the enhancement school since computational thinking is a brain-based activity that enables problems to be resolved, situations better understood, and values better expressed through systematic application of abstraction, decomposition, algorithmic design, generalisation, and evaluation in the production of an automation implemented by a digital or human computing device. Six stages were found in the enhancement of knowledge: original intention, sometimes retroactive intention, process, outcome, evaluation and continuity.

Passig (2013) claims that it is based on the pedagogical principle that underlies **virtual teaching**. The creation of *meaningful learning* based on the synergy of three elements: **active learning** in which the knowledge is constructed and implemented with the supervision of the teacher. The computerised environment motivates the pupils, cultivates their curiosity and their research drive, demonstrates abstract terminology, guides in executions based on understanding and practices; **cooperative learning:** The computerised environment allows for distributed learning and thinking in which teachers and pupils participate. It operates as a medium for transferring data, for public display of its content and turning it into a joint object of study and research; **custom learning:** The computerised environment adapts itself to the learning pace of every pupil and provides individualised feedback. The computer obeys the choices of the pupil and allows him to fulfil his objectives on demand and adjust the preferred learning style (Passig, 2013). The enhancement school does not receive attention in study programs of today; it is learnt slowly, if at all, in schools, and measuring tools have not yet been developed for them (Passig, 2007). But the experience of teachers in these skills will allow them to create practical insights that will lead to building evaluation processes, learning processes and study programs based on a high level of thought (Passig & Cohen, 2007).

Teaching and learning in a technological learning environment requires technological skills and abilities and the expert usage of technological tools from the teacher. The third research question tries to examine these requirements within the existing research framework. The following part will give a response to this question and a survey of the research literature on the development of technology, its advantages and disadvantages,

its contribution to learning, and the demands made upon the role of the teacher who teaches in this environment.

## 2.6   How do teachers use technologies in teaching?

In the field of mobile technology, an accelerated development has begun which is connected to three factors: their price reduction, the development of versions for Internet websites, and the degree of integration between the technologies. In parallel, a process of technological miniaturisation has occurred. These have gradually turned from utility tools to tools dealing with information (Bines, 2000; Ministry of Education, 2000). The computer, as opposed to the innovations and developments that preceded it, is not only a medium of communication, but also a technology of significance and unique potential (Salomon, 2002). He says that: "The computer is an excellent system of tools surrounded by perceptions, skills, and beliefs through which one can realise educational visions, and which in themselves are guided by a realistic view of the changes that the society in which we live has undergone ..." (Solomon, 2000: 10).

Technology integrated with teaching includes access to the services of the Internet and computerised data banks; electronic mail; word processors; electronic sheets; drawing tools; processing of pictures; display programs; smart boards; projectors; personal laptops, etc. The potential of technology in implementing advanced educational ideas is based, according to Solomon, Almog and Ben-Zaken. (1993), on four main characteristics and four planes: Computer technology is an experiential technology *activated in thinking*; a technology for cognitive design and construction, through true *interaction* between the learning individual and the tool; a technology that suggests *team work*; and the main power is in offering an opportunity for *open learning* based on coping with memory storages. Solomon (2000) and Shapira (1999) state that the integration of technologies has the potential to form a new learning environment: from one that emphasises learning as an individual process to a learning environment that emphasises interpersonal learning; from an environment where ready-made solutions rule to an environment where the process of problem solving is dominant; from emphasis on memorisation to an emphasis on thought; from choosing the studied material based on some knowledge structure to choosing the studied material based on its relevance to a chosen problem; from emphasis on learning by absorption to emphasis on learning as experience.

Technology provides the supporting structure and the tools that will allow the pupil to make the most of his intelligence and knowledge for activity (Levin, 1995; Patrikainen & Myller, 1995; Levin, & Nevo, 1997). The computer is used as a tool with the ability to organise data, to integrate videos, animation, pictures, voices and text that affects the various senses which are very significant for teaching (Dodson, 2000), and which arouse and provide immediate response (Zentall, 1993). In addition, it is perceived as having the potential for teaching that is suited to every individual pupil and this system is expected to be more efficient in terms of cost-benefit (Mevarech & Hativa, 1996; Kozma, 2010; Bonk, 2010; Magen-Nagar & Peled, 2013; Voogt, 2012; Eshet, 2012; Cuban, 2006). To that end, it is necessary that both pupil and teacher will have access to the information, to open and rapid communication channels, to free usage of computers, to available software, and to other means that will promote for the easy and immediate adoption of computerised culture by the school. We still do not know whether computers change the skills and abilities of humans, but surely it changes the way in which these skills are enacted (Solomon, 2000).

The use of laptops within a learning framework rich in technological information may generate stimulation for learning, motivation and encourage creativity and effective meaningful learning. The use of technology creates enthusiasm among pupils (Moore, 1996), causing greater interest, participation, involvement and taking bigger responsibility in the learning process which manages to generate significant learning and the construction of knowledge (Dede, 1995). The interaction between the pupil and technology is in fact a dialogue that allows him to investigate new fields that may even be those unknown to the teacher (Shapira, 1999). Although Levin (1995) and Toktali (2000) note that the information stored in the net is analogous to a gigantic library with dynamic, infinite public knowledge available to all, but the reliability of the knowledge should be evaluated and only what is important and relevant should be selected.

Yaniv (2009) claims that computers enable "modern pedagogy" to occur at its best. Through simulations in virtual-reality we can experience all space and time. And if it is possible to experience content at any time within the classroom, then it is possible to introduce experience-based teaching to levels that were not available to Rogers, Dewey, and other thinkers who understood the significance of experience as a very important component of pedagogy. At the same time it should be considered that the laptop is just a

tool. Making the computer available to a pupil does not ensure its effective utilisation. The usage should be dictated by the teaching requirements and not by the technology requirements (Salomon & Perkins, 1996; Nickerson, 1997; Salomon, 1997; Almog, 1998; Almog, 1999). And according to Weiss (2010), the computer is not a substitute for a teacher but rather an extension that grants the teacher new strengths and qualities.

**Virtual teaching** is derived from a different paradigm of teaching and learning (Berenfeld, 1996; Berge, 1995; Collins, 1995; Harasim, 1995; Rice, McBride & Davis, 1998), through which changes occur in the definition of information, learning aids, time organisation, the role of the teacher and the role of the pupil (Oren, 1997; Nachmias et al., 1998; Shamir, 1999). The style of teaching that mediates between autonomous study and teaching aims (Wengrowicz, 2014), is expressed by flexibility, cost-efficiency and its optimal usage of time, and some claim that it will become increasingly influential world education (Gunasekaran, McNeil & Shuel, 2002; Friedman & Koller, 2000). On the other hand, besides its advantages, there is a sense of physical detachment and sometimes of the lack of interaction or of immediate feedback and the potential for technical communication problems. Change of this kind includes teaching that stresses: the construction of knowledge by the learner under supervision and control; integration between individual learning and cooperative learning; encouragement of cooperation learning; and the use of student perspectives in teaching and assessment (Zuckerman, 2012). Intelligent usage of virtual teaching may support meaningful learning, to intensify the interactivity of the learner and to improve the cognitive abilities and social skills of the student (Roschelle et al., 2000; Koszalka, 2001).

Virtual teaching implies change in the role of the teacher from being a source of knowledge to becoming the guide for learners who takes advantage of the various media that may support student learning (Schneider, 1995; Shapira, 1999; Levin, & Nevo, 1996). Berge (1996) describes the role of the teacher as supervisor and claims that the teachers should be responsible for four areas: the pedagogical; social; managerial; and technical. **The pedagogical role** – The purpose of this role is to promote education, and guide with questions, to answer responses of participants, and to focus discussions on central terminologies, principles and skills. According to Waring and Evans (2014), using the Personal Learning Styles Pedagogy, the authors make explicit the integration of theory and practice and the many decisions and selections that teachers make, their

implications for what is being taught and learnt, how learners are positioned in the pedagogical process, and ultimately, how learning can be improved. **The social role** – Creating a social and friendly atmosphere in which the learners can work together and cooperative learning can take place (Nichols, Miller, & Raymond, 1994; Blair, Millard & Woollard, 2014). Levin (1995) supplements this and states that the supervisor must create conditions that will allow for building a supportive climate and a positive atmosphere. **The managerial role** – To layout the daily agenda, subjects for discussion, time tables, procedures and norms in decision making. **The technical role** – The supervisor must enable an easy access to the system in order for the learner to focus on learning. Solomon, Almog and Ben-Zaken. (1993) claim that the teacher is required to be a supervisor and guide, sensitive to the situation of all the pupils and to the teaching team, flexible in his ability to guide different teams according to their needs and personal learning goals. Shapira (1999) and Becker (1997) add that this role demands observation, management skills and a lot of initiative in finding ways to properly integrate traditional teaching content.

The Ministry of Education in the State of Israel has laid down five roles for the teacher who teaches in a technological learning environment: a) The teacher as cultivating his professionalism (initiating and utilising opportunities, using up-to-date technologies, reading and becoming familiar with study programs); b) The teacher as examiner, as follow-up and estimator (using alternative formal and informal tools in estimation, raising questions, testing the uniqueness, strong points and weaknesses pf every pupil, directing continued activity, etc.); c) The teacher as instructor (directing, encouraging, promoting awareness of work strategies, advising, giving examples, listening to ideas, encouraging development in avenues of thought, research, boldness, creativity, curiosity, conducting discussions and allow each pupil to express himself personally; d) The teacher as organiser of the learning environment (organising and allowing the pupils to participate in the organisation, responsible for variety in materials, taking advantage of the potentialities of the learning environment, giving concrete demonstrations of concepts and ideas; encouraging the creation of materials, taking advantage of opportunities and developing a supportive class atmosphere); e) The teacher as teaching programmer (planning the activities of the class according to their needs, choosing, preparing different study programs, planning challenging and interesting activities, developing programs that call for systematic cooperation, etc.) (Ministry of Education, 2010).

The teacher who integrates technologies with teaching contributes his part to the advancement of his pupils in a more efficient way (Katz & Ofir, 1996). He has the time to focus on complex problems in teaching that demand simultaneous attention to the advancement of all the pupils according to their needs. This method of teaching is more focused on the pupil and the teachers can train and direct them more (Bacher, 1997). The proper usage of technology can improve the function, to promote achievements and even to compensate for the different limitations of children with learning difficulties (Lewis, 1998). Yet teachers frequently restrain the pupils from using technology in an effort to maintain those activities at that time by all the pupils through the traditional application of interpersonal development (Ferguson, 2005).

Amiad (1991) adds and emphasises that in order for the integration to be significant and efficient, the teacher must feel comfortable with the computer, and must recognize that it is a tool that will promote his teaching work and not a tool that causes trouble for him. Studies have shown that successful technology teachers are teachers who have a greater commitment to their own personal education, are involved in leadership activities, and have their own educational goals derived from constructivist philosophy (Becker, 2001; Ravitz, Wong & Becker, 1999). At the same time, Hausfather (2001) notes that constructivist teachers are not necessarily technology teachers, yet are involved in their teaching process and focus upon "pedagogical content knowledge". They lead their students to understand content deeply and to view content and process as inseparable aspects of knowledge construction.

One can consider the level of assimilation of computer technologies in schools as part of the assimilation of new technologies in education in general. Moersch (1995; 2010) lists seven levels of technology assimilation in education: non-use; awareness; exploration; infusion; integration; expansion; and refinement. When the teacher mounts up from a level to the one above, it is possible to discern a series of changes in the teaching program. The focus of teaching gradually changes from seeing the teacher standing in the centre to the standing of the pupil in the centre. The pupil uses the computer as a tool of support to understand basic concepts, subjects, and process, and expands them through the use of data bases, multimedia communication, electronic sheets, and graphic applications. The traditional verbal activities are gradually exchanged for authentic practical investigations associated with the problem or subject.

What is demanded of the teacher is integrated professional knowledge that includes his or her ability to activate quality teaching and learning processes and the ability to plan learning activities integrated with the use of technology (Ageel & Woollard, 2012), as well as the traditional kinds of knowledge required from a teacher. These include, for example, knowledge in study planning and the ability to program study units; in computer orientation; in information studies; in the use of tools to organise data; in the practical usage of computer programs in a working environment; in the ability to integrate digital technology and to design independently new learning activities that integrate the use of programs for the needs of the teacher (Ministry of Education, 2010).

Another model for the assimilation of computer technologies in teaching was constructed in the framework of a multi-year research project ACOT (Apple Classroom of Tomorrow), which dealt with the training of teachers in the assimilation of computer technologies in a computer-rich environment in the USA. There are five levels in this model, in the following order: entry; adoption; adaptation; appropriation; and invention (Dwyer, Ringstaff & Sandholtz, 1991). These levels were also examined in teaching colleges in Israel and it was found that lecturers were generally at a level between adoption and adaptation (Shonfeld & Zelkovitz, 2010). But Givon (2004) claimed that the desire for innovation in education is not based on a desire to promote the use of technological means in education, and that educational innovation is not the result of using technology, but is rather a parallel condition or even a prerequisite for technological innovation in education.

What is further required from the education system is the transition from the modern approach that views knowledge as linear, objective and limited, to the post-modern approach that views knowledge as endlessly flowing with no structured hierarchy, and is found in a state of constant change (Idan, 1999). A combination of virtual teaching in schools is accompanied with great expectations but also with many questions, mainly when the intent is to improve the current system and to provide high quality teaching and to break the boundaries of place and time that characterise **the traditional system** (His & Tinker, 1998; Tinker & Haavid, 1997). This means that many educational institutions today vary their teaching approaches and integrate virtual teaching with face-to-face teaching. These lead to improvement in learning processes as compared to teaching with

traditional methods only or compared to e-learning based solely on a computerised environment (Dean et al., 2001; Singh, 2003; Frank & Barzilai, 2004).

The potential inherent in the integration of technologies in teaching offers opportunities to obtain many goals.including the improvement of teaching and learning. Information technology creates change in the accustomed method of teaching, strengthens educational autonomy, changes the organisational and logistical scales and enables the reorganisation of school teaching in general (Nir-Gal, & Nur, 2003; Tobin & Regev, 2008; Linn, & Eylon, 2013). Besides this, it provides the teacher with new issues in classroom management, the construction of knowledge, and the place of the pupil within computerised surroundings (Donovan, Hartley & Strudler, 2007; Livingston, 2006). In order that a change of this kind should occur in teaching methods, approaches and pedagogy, teachers are required to make an essential change in their roles. The better we understand the differences and the demands between the generations the better we can comprehend not only who is the desirable teacher but how we can direct a change in the role of the teacher towards this position and adjust him or her to the new technology and to the present generation of pupils today in the schools, universities and in work places (Boud, & Prosser, 2002). This is not merely a map of the usage of new technologies in old study programs, but the need for a new approach that provides the pupil with ideas and opportunities to explore in ways that were not possible without technologies (Yelland, 2006), as well as to develop skills in understanding and expressing ideas by various means (Hill, 2004). In which the adult provides the scaffold and support, and promotes the efficient use of information technologies in schools (Siraj-Blatchford & Siraj-Blatchford, 2006).

Global trends and challenges for change, integration of technologies in teaching, consideration for the characteristics of the pupil generation, demand that the education system re-define, encourage, support and lead forward the new perception of the role of the teacher in the 21st century.

# 3. Methodology

A paradigm is a framework of assumptions which provide a basis for understanding the phenomenon being researched and reflects the assumptions about the relationship between reality and research. This chapter discusses the basis on which the research is constructed, the paradigmatic assumptions that shape the way in which the researcher approaches the subject, the method that she uses in order to gather and analyse information, and the type of problem that she chooses to research (Shkedi, 2004; Creswell, 2002).

This research focuses on conceptualising the role of teachers who integrate technology with teaching. It aims to obtain an in-depth understanding of the challenge of teachers' roles, and of the challenges that they experience when interacting with the technological learning environment and Generation Z pupils.

In order to choose the research methodology, several distinctions were made between the various approaches to research (quantitative and qualitative) and their philosophical rationales, until finally the **applied qualitative** method was chosen as the one most suitable, and the research approach was defined as a **case study**. This chapter discusses the validity, reliability and ethics of carrying out this research, with the assumption that research writing, as an intentional activity, is "a site of moral responsibility" (Richardson, 1997:58).

## 3.1 Selection of the Research Methodology

Methodology describes the approach used in research and the way that it represents a system of interconnected assumptions of a philosophical or ideological character. Research methodology is a combination of principles, working methods, rules and presuppositions on which research is based and which is conducted in accordance with them.

Over the years, research in education and the social sciences has been strongly influenced by the quantitative positivistic tradition. The quantitative approach is a research method based on empiricist presuppositions which assumes that facts can be examined as an objective reality. This means that social realities are treated like a collection of objects.

The quantitative approach emerges from a clear and understandable theory, its research assumptions are derived deductively (Birenbaum, 1997; Beyth-Marom, 2001), and a small number of variables are examined in relation to a large number of participants.

Quantitative research reduces social reality to numerical data which can be categorised and quantified. In most cases it does not break down the existing categories in dialogue, but measures the relations between those categories. Conversely poststructuralist researchers claim that significant research in the social sciences is the study of the categories themselves. In addition, quantitative research is not reflexive – it does not usually take into account the position of the researcher in the field (Denzin & Lincoln, 2005) or his or her world view. The assumption that the researched phenomena exists unproblematically in reality can lead to researchers ignoring the interactions between the research field, the researcher, and the influence of the researcher on the field.

In the field of the social sciences in general and in the field of education in particular, quantitative research confronts difficult methodological questions regarding the definition of the researched population and the determination of the research variables (Shlasky & Alpert, 2007; Creswell, 2007). This study is examining the subjective ideas of teachers about their roles, their environment and their students. Because of this focus on subjectivity, the quantitative paradigm was therefore found to be unsuitable for the present research.

Qualitative research has developed across a wide range of disciplines and is now a well-established research paradigm (Sheinman, 2010). In a complex and multi-cultural world qualitative research is a valuable way to understanding social and cultural phenomena (Richardson, 2000; Shlasky & Alpert, 2007; Alpert, 2011). Qualitative research is based on a constructive-critical paradigm with common methodological characteristics and principles (Shulman, 1988). It is draws on an ontological approach that perceives social reality as a holistic link-dependent entity and on an epistemology that assumes no separation can be made between knowing and the known (Glaser, 1992; Janesick, 2000). Qualitative research, as the term implies, it does not involve measurements and statistics, and is not based on the "breakdown" of reality into predetermined variables, nor does it try to locate causal relations between variables. The strength of qualitative research lies in its ability to describe, reflect and interpret complex social realities according to their

unique dimensions and processes (Barone & Eisner, 2006; Stake, 2005; Shai, & Bar Shalom, 2002).

Adopting a naturalistic qualitative approach indicates the researcher's intent to understand and interpret the actions of human beings. The research begins by seeking to understand the language, conceptions, values, approach to events, demands from life, and expectations of the future of the research participants. These are the starting points of the researcher who wishes to understand a phenomenon in its essential sense (Sabar Ben-Yehoshua, 2006). The special characteristics of the research that emerges from interpretative paradigms – the focus on the individual, subjectivity, multi-dimensionality, anchored upon culture, gender and status, the striving for an understanding of the phenomena and not for dominating it, the close relationship of the researcher with the research participant, and involvement in various ethical aspects – have all been critical in this research..

## 3.2 Research Method

The research method that was found to be the most suitable for this research is the **descriptive case study**. This is a study that deals with the selective collection of information on the intentions and values of participants who are operating within a particular situation (Walker, 1993; Miles & Huberman, 1994; Yin, 1984; Guba & Lincoln, 1994). If ethnography deals with culture and its overall social meaning, in a descriptive case study, according to Stake (2000), the focus is on the particular "case", the unique and the idiosyncratic in all its complexity.

Oxford (2007) defines a case study as a detailed story about the development of a person, group or a certain situation over a period of time. Another definition is: An individual case that serves to describe a thesis or principle. Yin (1993, 2011) defined it as a research strategy, an empirical examination that studies a phenomenon within its natural context. In a similar manner, Rogers (1978) defined the term as a description of events within the framework of their natural environment. Since the education system, in which a local and unique culture is structured, includes values, role distribution, learning patterns, behaviour, etc., the case study makes it possible to describe and understand the patterns of activity and behaviour in a meaningful context (Woods, 1985).

Some writers claim that a case study is a "microscopic" methodology, since one case cannot provide the necessary evidence from which it is possible to make generalisations (Gates & Cooksy, 1998). Tellis (1997, 2001) also notes that dependence on this research method of a single case harms its ability to serve as a tool for deriving general conclusions. Burgoyne & Mumford (2001) present a substantial list of authors who critique the case study method (e.g. Romm & Manler, 1991; Heath, 1998; Ewing, 1990; Reynolds, 1998; Smith, 1987). In contrast to this, Soy Susan (1997) notes that the use of case studies is gradually increasing and that such research is characterised by process-tracing (George & Bennett, 2005) which are illuminated by an examination of the characteristics of a single case (Campbell, 1975; Eckstein, 2000). Hamel, Dufour & Fortin (1993) and Yin (1984, 1989, 1993, 1994) also justify and support the use of case study research and claim that the research aim and the necessary parameters should be determined, so that it can be applied to other cases.

In this research, a case study method was chosen because it supported researching contemporary phenomenon in a real environment even though the borderlines between the phenomenon and the context are not completely clear (Yin, 1993). That is to say, the borderlines between the conception of the teacher's role (the phenomenon under research), and the context in which this phenomenon is being researched (teaching pupils of Generation Z in a technological learning environment), are not clear.

The aim of the researcher is to examine human behaviour and the conception of teachers' roles as expressed in an individual case. The case focused on the experience of teachers with 5-20 years experience of integrating technologies with teaching within a specific place and time. The basic assumption in the present research is that an understanding of social life is gained through researching the the daily routine of people and exploring the way in which these research participants give them significance. The researcher collects information regarding the daily thoughts and actions of the teachers who teach Generation Z pupils in a technological learning environment, and uses this to explore how they understand and form their personal and social conception of their role (Yin, 1994; Stake, 2000).

This research includes within it the possibility of description, revelation and explanation relevant to the case study (Yin, 1989). This case study in accordance with Runyan (1984) offers connections that were not seen before between the conception of teachers and the

generation gap and pupil expectations. It gives a better explanation of the internal world of the teacher in relation to the way in which they perceives their lives, experiences, problems and experiments, and describes more explicitly the historical and social context of traditional teaching in which the teacher works, as well as providing clarifications for the reasons and significance of various events in the life of the teacher.

This research is based on the recommendations of Hamel, Dufour, and Fortin (1993) as well as Scapens (1990) as to how the case study method should be used. Firstly, the research field should be described and emphasis placed on the "case" under research, the sampling method defined, and the recruitment of research participants undertaken. The research tools also need to be defined and in this case were chosen to include a combination of selected techniques for gathering data in accordance with the research questions: Questionnaires (20), observations (8), interviews (24), and an analysis of documents and background material on the school were used during the course of the research.

The research process includes a detailed description of the research stages, determination of the data gathering method and documenting them, their evaluation, analysis, and the preparation of the report and its publication. By means of a **case study** it is possible to attain a deep understanding of the research phenomenon: "How the teachers conceive of their new role when they teach Generation Z pupils in a technological learning environment".

## 3.3 The Research Field

The research focused on a neighbourhood community junior high school in Northern Israel. The school has 500 pupils from varied socio-economic and cultural backgrounds. The staff includes 40 professional, academic, bachelor degrees or master's degree teachers. In addition, there are two school counsellors, an educational psychologist, a special education staff, administration staff and a principal.

At every age level (Grades 7, 8, 9) there are 4-5 study classes (MOFET- Honours class, 'computer notebook', sport/art, TLM - marginal students who are at risk of leaving school altogether without matriculating, a class for special needs students and youth with behavioural problems). Each class has about 35 pupils. In all the classes there is an

interactive board, a teacher's stand that includes a 'mother' class computer, loudspeakers and Internet access. All the school teachers have a personal laptop which they received from the school. There is a computer technician in the school who provides technical services and repairs for the computers and manages the website. One class at each grade level is the 'computer notebook' class, in which every pupil and teacher has a personal laptop, an independent website, access to electric outlets, personal compartments for textbooks, and a smart interactive board. The pupils in the 'computer notebook' classes study most of the subjects by means of their laptops, and with computerised textbooks and study units on the school website.

This research focuses on teachers of the "computer notebook" classes who integrate technologies with teaching, and it examines the conception of their roles within a broad context. Miles and Huberman (1994) note that it is necessary to decide the boundaries of the research and to define the aspects of the case under study. In this case the decision was taken to focus on teachers in "computer notebook" classes who make use of technological means in teaching, and to exclude other persons connected with the program such as pupils, parents and supervisors. This means that the "case study" in this research is of all the technology teachers (who teach "computer notebook" classes and integrate technologies with teaching) in the selected school (which has integrated technologies with teaching for 5-10 years). Teachers who do not integrate technologies with teaching, and others (pupils, supervisors, etc.) are not included in the "case study" being researched. As Pitts and Coles (1996) asserts, the description of the research borderlines presents the inclusive contexts and promotes reliability.

## 3.4 Sampling and Recruitment:

### 3.4.1 Sampling Approach

Qualitative research usually focuses on a relatively small sample which is categorised for a specific purpose. The researcher chose a "purposeful sample" which focuses on technology teachers who integrate technology with teaching. The participants were chosen because they best represent the population from which they are chosen, and they have the ability to inform us about the subject being researched (Mason, 2002). Stake (1995) stresses that the important criterion in the choice of participants is the degree to which we can learn from them and from their knowledge.

The two main considerations that guided the selection of the research participants were variety and uniformity. The **uniformity** in selecting research participants was in focusing on the teachers and educators in the school who teach in a technological learning environment and have been working in it daily for 5-20 years. The research population was based on 24 participants as follows: 21 teachers of "computer notebook" classes, with the help of laptop computers; a teacher who was the regional and school coordinator of the computerisation program; a teacher who was the director of the district Sciences Centre (a building integrated with the school); and the school principal. There was great importance in choosing people who have sufficient knowledge in the field of teaching integrated with technology.

**The variety** in selecting the research participants was in choosing people who see things from different points of view. The teachers were selected on the basis of being teachers in different fields (History, Literature, Science, Mathematics and Technology, Language skills, Bible and English), on the assumption that each subject is liable to have an influence on the character of the work done by its teacher and on the perception of his role. In addition, the variety of teachers from different backgrounds, teaching in different fields of knowledge, and with different levels of seniority allows one to examine the existence of fixed patterns, in spite of the variance. A multiplicity of voices demonstrates aspects of imagination, difference and variety (Stake, 1995) and presents a picture enriched with positions, requirements and behaviour that reduce the bias of the researcher (Van Maanen, 1983) and allows for the acquisition of greater knowledge about larger groups (Hammersly & Atkinson, 1995).

### 3.4.2   Demographic details of the participants:

**Figure 1: Age of the participants**



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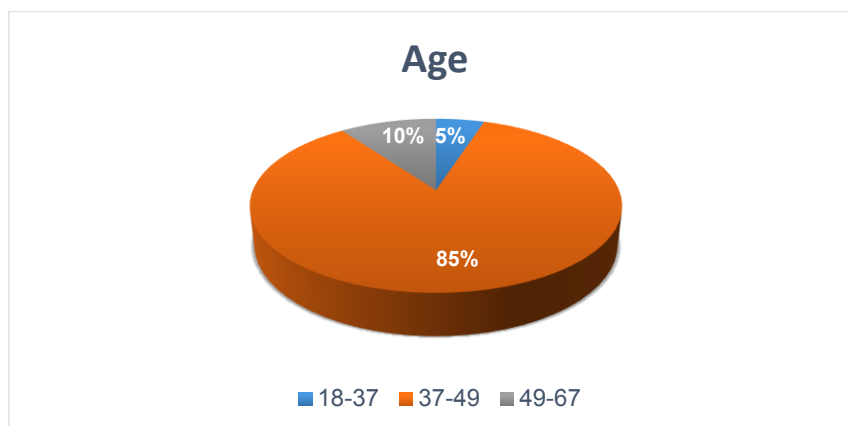
**Figure 2: Years in the Ministry of Education.**



Years in the ministry of Education

- 0-5: 5%
- 6--10: 5%
- 16-20: 65%
- +21: 25%

Legend: 0-5, 6--10, 11---15, 16-20, 21+
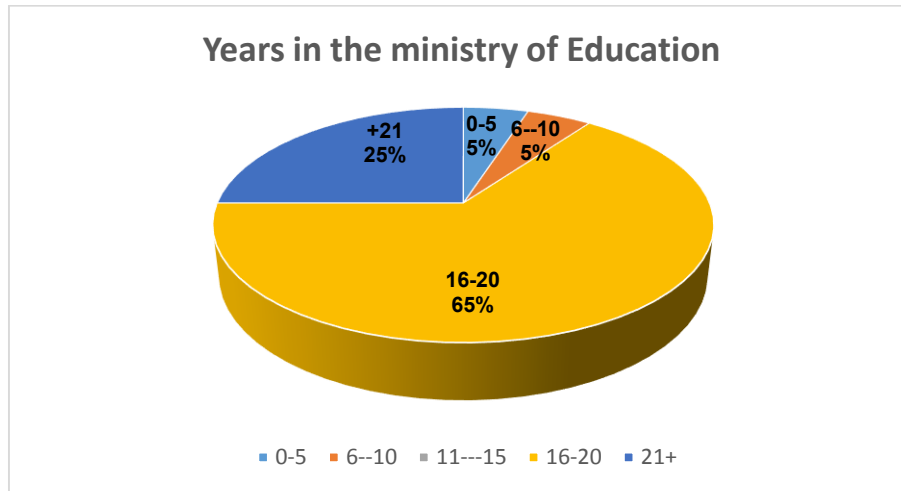
**Figure 3: Years in teaching integrated with technology.**



YEARS IN TEACHING INTEGRATED WITH TECHNOLOGY

- 16--20: 5%
- 0-5: 30%
- 11--15: 30%
- 6--10: 35%
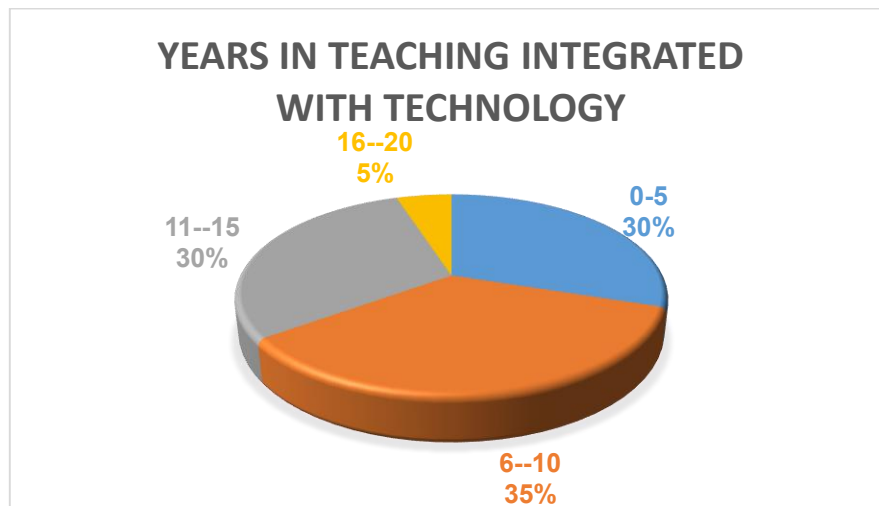
### 3.4.3    Recruitment and Readiness of the Participants

At the beginning of the 2013-2014 school year a general lecture was given to all the teachers in the school. The school principal allowed the researcher to present her research before all the teachers. The researcher, who is a mathematics teacher in the school, presented the subject of her research, and requested cooperation and participation in it. Previous familiarity of the researcher with the research field and the organisational culture provides an understanding of the school, creates a trustful relationship between the two sides (Erlandson et al., 1993; Lincoln & Guba, 1985) and improves the research findings (Kielhofner, 1982). The participants expressed that they were ready and willing to take part in the research.

The researcher looked over the list of 40 teachers in her school and marked those who were teaching the "computer notebook" classes. She then consulted the principal regarding the sample for her research. A personal email was sent out to 24 teachers out of the list, in which the researcher presented the subject of the research, its aims and a request for participation. She conversed with each participant personally and set a time for holding an interview and an observation according to the stage of the research.

## 3.5 Research Tools

The starting point was that social life can be understood only from the viewpoint of the participants themselves. The researcher, understands reality as whole that cannot be dismembered (Yosifon, 2001), and therefore all her data are gathered and documented within the research field.

### 3.5.1 Questionnaires

The questionnaire is a formal measuring tool that is used for research in the social sciences. Through a questionnaire one can gather various kinds of information and learn about the positions and opinions of research participants through their written statements and responses to pre-coded questions on the subject under research. At a preliminary stage, the advantages and disadvantages of the questionnaire in qualitative research in general and for this research in particular were examined.

The advantages of the questionnaire lie in the easy comparison of information through the use of pre-coding and post-coding of responses, the easy gathering of data and their analysis. Passing out questionnaires is inexpensive, demands little time and travel from the participants and the researcher; it enables speed and facility in reading the information. In addition, it has a high interpersonal reliability, since the personality of the researcher has no influence on the responders (Kimmerling, 2004).

The disadvantages of the questionnaire lie in fact that no information is received that has not been asked for in advance, and that there is no possibility of clarifying vague answers. Questions that are not well formulated may receive different interpretations among the various responders, may insult or anger some of them, or make demands that will only be answered by those with a high motivation. In extreme cases, the questionnaire may make the responders face facts that they chose to dismiss. There is a

limited choice of answers offered by the researcher (it is not always possible to ensure that the responder will choose the answer that truly expresses his position). The answers are defined for the sake of a certain measurement and it is difficult to tell in advance to what degree the responder expresses his actual behaviour. The reference to the questionnaire in the present research was in relation to both its advantages and disadvantages.

The questionnaire in this research (see Appendix 1: Feedback Questionnaire) was carefully constructed. The order of the questions in it and the statements it included were planned and precisely formulated in advance. The questionnaire included a number of parts: an **introduction** in which the researcher presented the aims of the research, stressed the preservation of anonymity, and gave guiding instructions on how to fill the questionnaire. **The first part** included independent professional variables, such as seniority in teaching, age, teaching profession, seniority in technology integrated teaching. The second part included one open question and a series of closed questions in three areas as defined by the Likert scale (Burns & Burns, 2008). This is a scale which allows for the inclusion of a list of sentences and statements that express claims concerning the skills, positions and perceptions of teachers, and with five pre-coded possibilities listed alongside each claim to express the degree of agreement ("fully agree" to "disagree completely"). The responder marks the answer nearest to his position.

The aim of the questionnaire is to gather information concerning the perception of the role of the teacher who integrates technologies with teaching. The four areas in which the questionnaires were focused are:

1. the roles and productivity of the teachers who integrate technologies with teaching;

2. the abilities and skills (technological/pedagogical/interpersonal) required for a teacher who integrates technologies with teaching;

3. the perceptions and positions of the teachers regarding the integration of technologies with teaching; and

4. an open question in which the participants are asked to "describe the differences between the role of the traditional teacher and his role in teaching integrated with technologies".

The first two areas are based on a research questionnaire that was proposed by Thach and Murphy (1995), and the third area was based on the questionnaire of Sang et al., (2010) which was translated by me into Hebrew and adapted to my research and the educational system in Israel. Validation of the questionnaire was carried out with the help of the national computer program coordinator in the school. Her remarks contributed to the improvement of the questionnaire, to its formulation, and the additional emphases required, such as the additional (fifth) part that deals with the patterns of usage of technological tools by the teachers, which testified to the various modular levels among the research participants.

The quantitative findings that were derived from the questionnaire made it possible to analyse the relative frequency of the responses and statements, to derive initial categories for an analysis of the findings and to obtain a broad and comprehensive picture of four out of the five research questions (in the questionnaire there is no reference to the third research questions: "In what way do the teachers define the pupil generation?").

The findings of the questionnaire received support during the analysis which included triangulation with the additional information sources received from the observations, from the interviews, and from the background material on the school. This is on the assumption that triangulation of the methods and information sources deepens the information about the phenomenon under research, reduces the bias of the researcher, and increases the trust of the reader (Brewer & Hunter, 1989).

### 3.5.2 Interviews

The second research tool used by the researcher in her research was the personal interview. The rationale in choosing the interview as a research tool was to discover through it things that could not be known through a questionnaire in which the participants marked answers that were written for them in advance, or by means of an observation in which one could not perceive perceptions, feelings, thoughts, and behaviour that took place at some specific time in the past. The interview seeks to clarify behaviour and serve as a basis for reflective thinking by the teacher. The interview

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allowed for reflection, for the reconstruction of thought processes that have occurred during activity and their significance in logical sequence (Seidman, 2013; Copeland et al., 1993; Schön, 1983).

Interviews were used in order to obtain an in-depth understanding of the changes in the personal perceptions of the teachers (Manny-Ikan & Itzhaki, 2003) and to understand the experiences of the research participants as well as the significance that they attribute to them (Fox & Hertz-Lazarovitch, 1996; Hammel, 1992a). It is impossible to observe the ways in which the interviewees organise their inner world and imbue it with subjective significance, but it is possible to ask them about this and to clarify it with them (Patton, 1990).

We can distinguish between three types of interview (Sabar Ben-Yehoshua, 1997):

- **An open ethnographic interview** – a kind of linguistic event that resembles a friendly conversation.

- **A standard structured interview** – the formulation of the questions, the structure and order of the interview are determined in advance.

- **A guided focused interview** – written instructions, but the wording and order are not determined in advance.

Each and every one of the interviewing types has advantages and disadvantages with respect to time, analysis, reaction and validity (Beyth-Marom, 2001).

It was found that an **open ethnographic interview that is semi-structured** was the most suitable research tool for this research. It was found that through an ethnographic interview it would be easy to encourage the interviewee to develop their arguments; the interviewer could easily respond to a non-verbal feedback; the data collected was rich in information; there was flexibility during the interview.

**Figure 4: Step in interview process.**



Steps in the interview process

Preparation      Execution    Review

Interview schedule — Who you are going to interview, why, when and where?

Interview guides — What questions are you going to ask?

Interview — • Structure • Rapport • Listen • Probe • Clarify

Interview notes format — What results were obtained? • Information found • Decisions • Actions
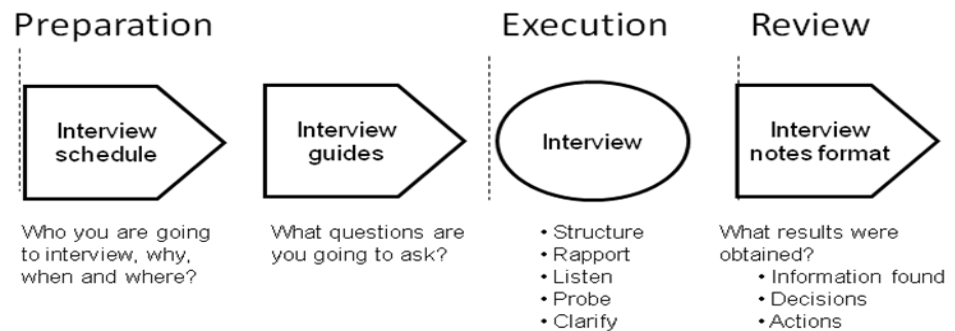
An interview guide should be created prior to all interviews to ensure the interviews are focused and efficient and enable comparison and summarisation.

The interview is not only a research tool through which information is gathered, but a process that influences the person interviewed, the researcher, and sometimes the contents of the interview. Questions have the power to create change, and the researcher must be aware of the various ways in which such a process can take place and take it into account as part of research methodology and interpretation (Barama & Hyam-Younis, 2003). The present research found that, during the course of the interview, the questions asked by the researcher were liable to arouse a reflective process that leads to new insights. Such insights may change the way the participant behaves and the choice of activities from the personal to the organisational level.

Before holding an interview, the researcher deliberated over a number of parameters according to the recommendation of Chenail (2011), such as the guidelines for holding interviews (see Appendix 2: Guidelines for Interviews). This would consist of a supplementary aid; the definition of the aim of the interview as a flow chart and in the transition from one question to another according to the answers of the interviewee; finding overlapping points between what interests her as a researcher and what interests the interviewee, and to determine the borderlines of the interview (on what should not be discussed). The questions were prepared in advance in order to help those interviewed to tell their story and present its significance according to a pre-defined detailed guideline. The interviewer expands at various points during the course of the interview in order to

obtain a full understanding of the subject. Within the framework of the interview, maximum freedom of expression is given to the interviewee.

In the interview (see Appendix 3: Personal Interview with a Teacher), the researcher focuses on a number of general subjects, such as the role of the teacher; conducting learning in the "computer notebook" classes; teaching methods; the differences between the roles of the teachers (traditional/technology integration in teaching); the pupil generation; and the support of the education system for the teacher who teaches in a technological environment. The questions in the interview according to the pre-determined series are related to all the research questions. The interviews were conducted in two sessions during two school years.

The Structure of the Interview:

- Part I: Socio-demographic details that are relevant (known beforehand); interview details – date, place, hour; explanation about preserving the anonymity of the research participant and the secrecy of what was said; signing on the "informed consent" form (see Appendix 4); "breaking the ice" (presenting the researcher, the subject, the structure of the interview, its length, and its rules of behaviour).

- Opening of the interview: All the interviewees were asked an identical question as the opening question in the interview: "Tell me about yourself". Bar-On (1994) explains "one must ask the interviewee to tell their life story as they experienced it" (p. 35).

- Part II: The interview itself which included the interview questions and further questions + the allocation of place for comments and thoughts of the researcher. This part is structured in accordance with the research questions and is meant to contribute information on the phenomenon under research: "How do the teachers conceive of their roles when they teach Generation Z pupils in technological learning environment?". Accordingly, the interview questions revolved around the role of the teacher; the conduct of the lesson; teaching methods; what the teacher focused upon during the lesson; the attitude towards the pupil generation of today; comparison between the role of the traditional teacher and the

role of the technology teacher; and the support of the education system (yes/no) for the technology teacher.

- Part III: End of the interview with the question: "Do you have any further remarks about the role of the teacher who integrates technologies with teaching?". When interviewees are asked at the end of an interview: "Is there is anything to add?" some of them have additional information that can be useful at the stage of analysis or good questions that can be adopted for later interviews.

- Part IV: Summary of the interview, thanks to the interviewee, and an explanation of what is expected to occur in the future.

- Part V: Notes at the end of the interview – theoretical, methodological, personal memos. Conclusions / criticism on the conduct of the interview, theoretical comments on the information, and personal comments.

**Figure 5: Interview review**
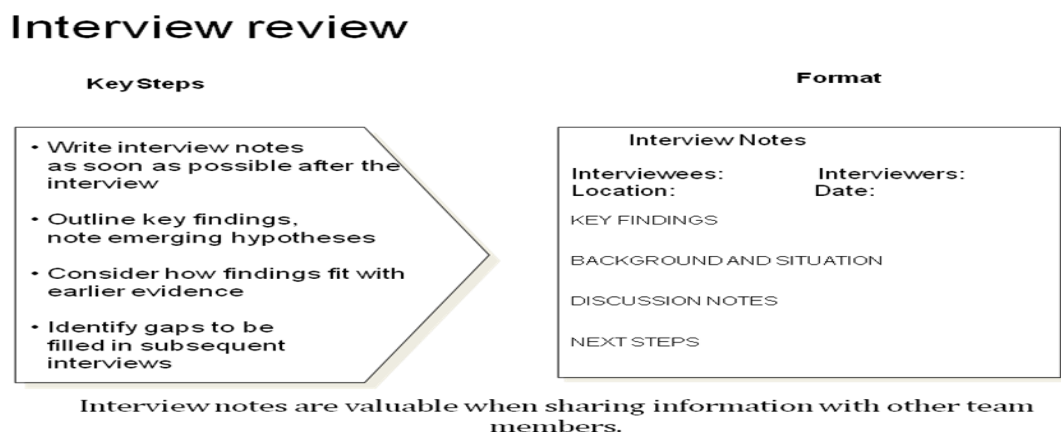


During the course of the interviews, the teachers were found to have undergone deep changes not only in relation to the specific subjects about which they were questioned. The teachers told the researcher about the process of acquiring their technological skills, about the structure of their lessons, they provided examples, told about their doubts, fears and difficulties, indicated how the conception of their role had changed, and more.

The interviews enabled the researcher to derive the individual perspective and experience of the teachers. They served as a tool for reflection and expression of the views of

teachers regarding the application of standard teaching policies. These interviews enable the researcher to understand the perceptions, experiences, and thoughts of those interviewed in relation to computerised teaching and provide in-depth information relevant to the research questions. New information was derived from these interviews that was not exposed through other research methods, since the open, flexible and dynamic character of the interview allowed the researcher and those interviewed to build mutual ties of trust. In addition to the verbal documentation during its course, other (non-verbal) aspects of the behaviour of the interviewee were also documented, and clarifications and comments of the researcher were registered, which contributed to the course their analysis.

The analysis of the interview enables a reconstruction of the teaching experience and significance that the teacher gives to it (Rosenthal, 1993). The interviews were a tool and a means allowed her to understand in depth how teachers conceived their role and the challenges that they face in teaching Generation Z pupils within a technological environment.

### 3.5.3 Observations

Observation has characterised the discipline of anthropology ever since its emergence and it has become a customary practice in market research as well as in a wide range of research fields. Some researchers claim that observation is the primary and basic tool for gathering data and for the description of the phenomenon being researched (Hammersley & Atkinson, 1995). Marshall and Rossman (1989) define observation as "the systematic description of events, behaviours and artefacts in the social setting chosen for study" (p.79). Observations enable the researcher to describe existing situations using the five senses, providing a "written photograph" of the situation under study (Erlandson, Harris, Skipper & Allen, 1993).

In the literature there is a distinction between an **open observation** where an impression of all environmental factors is gathered, and a **closed observation** where the researcher is looking for a particular thing (Sabar Ben-Yehoshua, 1988). Observations can also be classified according to the degree of researcher participation. **A participant observation**, in which the researcher is one of the research participants and takes part in the activities, recording them soon after they occur in the natural language of the participants. **A non-**

**participant observation**, in which the data is gathered within minimal and non-verbal contact (Sabar Ben-Yehoshua, 1997).

**A non-participant observation** in which the researcher observes and collects his data, enables the researcher to discover how individuals in society behave in their daily lives in their natural environment, while minimising the danger that they will change their routine behaviour as a result of the observation. The data are gathered and documented during the course of their occurrence and in the natural language of the participants, with minimal and non-verbal contact during the observation. This enables the researcher to focus on the observation, to develop sensitivity towards the significance of what was observed (Krathwohl, 1993), and to obtain an impression from all the environmental factors. However, a prior decision was made as to which aspects the observation would focus upon as Merriam and tisdell (2015) recommends in accordance with the aim of carrying out the research primarily and in relation to the research questions. Wolcott et al., (2002) suggests that fieldworkers ask themselves if they are making good use of the opportunity to learn what it is they want to know and whether they can define the purpose of using observations in this research.

**The purpose in using the observation tool:**

1. To learn about the perception of the teacher's role in a direct manner through observing it.

2. To learn about the behaviour and conduct of the teacher during his or her teaching activity.

3. To investigate the phenomenon as it occurs in its natural environment and during its natural course of development, which allows for an analysis of the behaviour background and a broader picture than can be derived from other research tools.

4. To obtain a wider picture of the components and factors that work together in the environment (the time framework of the lesson, the pupils, the conduct of the lesson, etc.).

5. To reduce the influence of the measuring tools on the behaviour of the research participant.

6. To validate the verbal reports of the research participants about their behaviour.

Studies have shown that when a series of observations are carried out, the research participant returns to normal behaviour (Beyth-Marom, 2001). The many visits and observations that take place in "computer notebook" class by various agents (principals and teachers from other schools, television reporters, business managers, wealthy persons) since this is a display school for the "laptop for every teacher and pupil" program, facilitates the holding of observations by the researcher as one of the investigating people who hold observations not merely as a transitional stage.

Observation Guidelines:

1. Planning: At the initial stage a work plan was prepared in advance of the observation. The researcher carried out the observations according to the recommendations of Kawulich (2005) including the performance of memory exercises, experimented with soundless documentation and the documentation of thoughts and feelings besides the observed data. This kind of exercise allowed the researcher to define the aims of the observation and the expected criteria – what things should be noticed (description of the physical environment, the course of the less, attention to the conduct and structure of the lesson, the subject taught, interaction, pupil involvement, teacher reactions to the pupils in the lesson, non-verbal behaviour, the movements of the teacher in the classroom, the use of the computer, the use of programs, etc.), the seat of the researcher in the classroom, her entry into the classroom (together with the teacher), writing down detailed remarks during the observation, and eye contact with the teacher and the pupils. The operative definition of the research variables in the observations was based on interviews that preceded it (the advance interviews and those conducted during the year). Its aim was to clearly define what the observation was about and to make it easier to identify the observed behaviour in the field, so as to strengthen the reliability of the tool (see Appendix 6: Observation Report).

2. Timing of the Observation: The choice of time units for observation that will ensure the suitable representation of the observed events or expected behaviour. According to the recommendation of Kutsche (1998), a time sample was carried out in accordance with the observed variables and the considerations of variation in the teaching hours (the difference hours of the study schedule), the variety of teaching subjects and of study classes (different pupils and study groups), and other things connected with the aims of the research (see Appendix 5: Observation Schedule).

3. <u>Enactment – Recording of the Observations</u>: The researcher took care to use the exact quotations as far as possible; she used pseudonyms in order to protect anonymity; described the activities according to the order in which they occurred; provided descriptions without inferring their significance; included relevant background details in order to place the event; and distinguished between thoughts or assumptions and observation of what took place. The researcher carefully wrote down the general impressions of the observations, and the comments of the participant teachers before and after the observation. This is in order to search for the general meanings and patterns, and to avoid the loss of data through the gap in time between the observations and their analysis, with the aim of obtaining as precise a picture of the events as possible. Systematic recording during the observation in which the explicit observed categories strengthens the reliability of the tool (Guba & Lincoln, 1994).

4. <u>Summary</u>: Summing up of the observation, merging of the information from the observation with other information sources.

5. <u>Evaluation</u>: Assessment of the findings received and determination of the ensuing plan (additional interview/ observation).

The observations in the 'computer notebook' classes were carried out with the knowledge of the research participants and permission from the headmistress and the class teacher. The observations were not photographed or documented, except for verbal notations, since it involved pupils who were not included as research participants, and it was forbidden to photograph or document them without permission of the chief supervisor and their parents. But full verbal documentation, consistent and precise, turned everything that was seen and heard into a kind of photograph of the occurrences.

### 3.5.4 Documentary Analysis:

Another qualitative tool which was used in the research was analysis of the documents and background material available on the school. The researcher received the work program for the 'computer notebook' classes from the school headmistress, as well as documentary material about the classes and permission to search for additional material in the school library and archives. During the course of the research, printed material (documents) and digital material (school study websites) were collected. The digital material included the school website, the website of the 'computer notebook' classes,

computerised study units, and presentations. The printed material includes the school constitution, the school work programs, and protocols of pedagogical meetings (the meetings, which were held twice a year, dealt with every class and every pupil)

Background material and documents constitute important information source in ethnographic research (Sabar Ben-Yehoshua, 2006). The documents contributed more in-depth information for the research questions both in understanding the usage of the technological tools and in understanding the characteristics of pupils and the interaction between teachers and pupils. They provided a wider context for the research (Shenton, 2004), and also helped to complete the general picture and to deepen the understanding of the new role of the teacher in a technologically rich environment and the challenges that it implies.

The present research utilised the triangulation of research tools and their findings for pragmatic reasons that are intended to take advantage of each tool (Burke & Onwuegbuzie, 2004). The rationale that underlies the research based on four sources of input (questionnaire, interview, observation, and documents) derives from the need to augment the depth of verbal information; to lead the research participants towards more focused responses; to verify the answers that were received; and to attain a more comprehensive picture of the challenge facing the perception of the role of the new teacher from the viewpoint of the responders (Gidron, 2011). At the methodical level, a combination of research tools provides for better coping with the issues of accessibility, fidelity to the various points of view, a far richer documentation as possible of social reality. It also strengthens the validity and reliability of the findings and reduces the bias of the researcher to make the research more verifiable (Guba, 1981; Brewer & Hunter, 1989; Krefting, 1991).

## 3.6 Process of Research

### 3.6.1 Process of Data Gathering

The researcher relied on the suggestions of Silverman (1989) and Dingwall (1992) to strengthen the reliability of the research by a full and in-depth presentation of the research process, the distinctions between the data, the analytical framework, the use of interpretation and supplementary material in understanding the development of the

research. The research system comprised the conditions for gathering data and their analysis. The gathering of data is a long and significant process, since the researcher is attempting to document the background, organisation, actions, problems and outcomes in order to understand them, and to describe the changes, innovations, solutions, or processes in their emergence and development so that they can be of use to decision makers (Sabar Ben Yehoshua, 1997; 2006).

### 3.6.2 Description of the Research Stages

**Figure 6: Chart of the Research Process:**
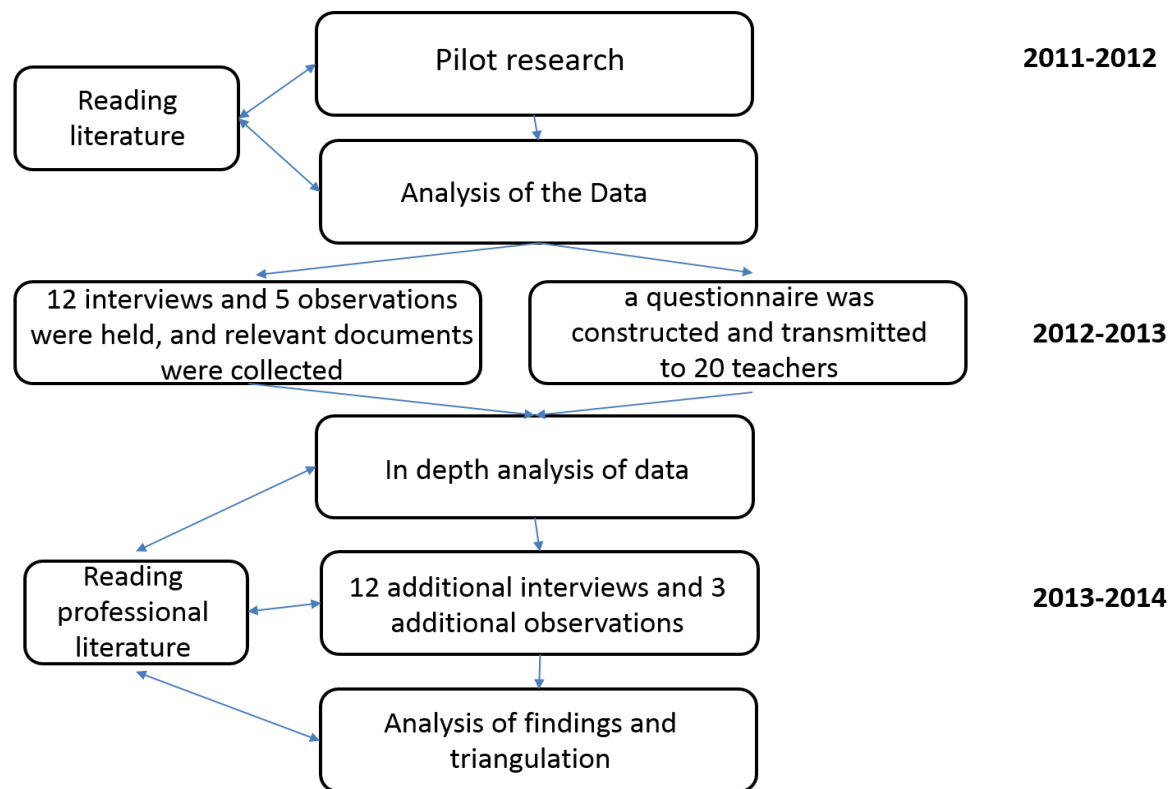


The working method required to meet the standards of good research is in building it so that each stage provides the basis on which the next stage is built. Therefore, according to the recommendation of Shenton (2004), much consideration was taken in determining the stages of the research, the presentation of consistent and reasonable explanations of the phenomenon under research, the research process, methods of activity, and analysis of the data.

**First stage – Pilot study**. According to the recommendation of Chenail (2011), during the academic year 2011/2012, a pilot study was conducted based on two observations in the "notebook-computer" classes, and three interviews with teachers who integrate

technologies with teaching in which the suggested methods were tested and the planned arrangements for conducting the research were examined. Background material on the school was scanned including the school constitution, displays, and work programs in the "computer notebook" classes which contributed to the presentation of the wider context of the research (Shenton, 2004). As a preparatory stage to the research, an initial summary of the findings and an initial analysis of the categories were carried out. This stage contributed to the construction of the questionnaire and its adaptation to the present research, to the focusing of the research subject, to the definition of the research questions, to the determination of questions for the personal interviews, and to choosing the list of the potential participants.

The second and third stages were conducted in the same location and during the same period of time.

**The second stage** of the research, which was based on the previous one, was the construction of the questionnaire with the aim of examining the perceptions, positions, abilities and technological skills of the teachers in a technological learning environment. At the beginning of the 2012-2013 school year the questionnaires were transmitted (in a white return envelope) to 20 teachers of the 'computer notebook' classes.

**The third stage** of the research dealt with the identification of perceptions, positions and the differential pedagogical considerations of the teachers in a technological learning environment. During the 2012-2013 school year a qualitative stage that included:

> 1. A round of interviews with 10 teachers of the 'computer notebook' classes, the regional computer coordinator, and the school headmistress (a total of 12 interviews).
>
> 2. Observation in five lessons: Sciences, Geography, Computers, History, and Education.
>
> 3. Collection of background material on the school, which included protocols of pedagogical meetings on grading for previous years, and the school and classroom websites were scanned to gather the maximum field data.

The stage of analysis already began at the stage of data gathering. Miles and Huberman, (1994:49) argue that "analysis during data gathering allows the researcher to move forwards and backwards between thinking about the existing data and the creation of strategies for gathering new data". It was found possible to supplement the data by listening to the voices of other teachers in the "computer notebook" classes through additional interviews and observations.

**The fourth stage**, which was based on the earlier stages, was a return to the professional literature and a preliminary analysis of the data, which was carried out as an additional qualitative stage. During the 2013-2014 school year, a second round of interviews was begun with 11 teachers and the director of the Sciences Centre (a total of 12 interviews), and 3 observations in lessons on language, Bible and literature. As in the second stage, this stage dealt with the identification of differential pedagogical considerations, with the identification of additional perceptions and positions, with attention being given to the attitude of the participants towards the contribution of technology to teaching, to the pupil, and to learning, which contributed to a deeper understanding of the research findings.

To sum up, the research included four stages over a period of three school years (2011-2014). In the first stage, pilot research was carried out 3 interviews with teachers, 2 observations, and a partial collection of documents). In the second stage, 12 interviews and 5 observations were held, and relevant documents were collected. In the third stage, a questionnaire was constructed that was validated by the municipal computerization coordinator and transmitted to 20 teachers. And in the fourth stage, 12 additional interviews and 3 additional observations were held to supplement the data and to validate the findings.

### 3.6.3   The Researcher as a Research Tool

Qualitative research by its very nature determines that the researcher is a tool for the gathering of data (Bourke, 2014), and that reflection is a basic characteristic of qualitative research (Banister et al., 1994). Without some degree of reflectivity, it may be argued that the research is blind and has no purpose (Flood, 2015). At the beginning of this research it was not clear to the researcher where it was leading in what way it would develop. The development of the research, in the course of which the researcher learnt

about herself and her abilities, learnt to recognise in depth the story of the research participants, documented and described the data, discovered surprising things (such as the influence of the characteristics of the pupil on the conception of the teacher's role), critically examined the data and the findings vis-à-vis the research literature, went on until the final report when the new information could serve the research participants by providing practical value and assistance.

The researcher felt that it was of particular importance, specifically in her familiar field, to give expression to the ideas, thoughts and reflections that arose during the research process. Prior acquaintance with the research field created a system of trust and reliability, and the researcher felt it was her duty to reflect the world outlook of the participants through their own perspective as well as to give a true report of her findings. Through emphasis on openness, empathy and identification it was possible to give equal representation to all the participants and a free platform to tell their story, to indulge in illustrations and in-depth descriptions which increased the curiosity of the researcher in the subject and pride in the cooperation of the participants in the research.

The researcher as a research tool implies the possibility that his subjectivity will accompany her research project in spite of her wish for objectivity (Hall, 1990). It is important for the researcher to feel comfortable with her own positions and interests and to place herself explicitly within the research (Hertz, 1997; Freire, 1981). This means that subjectivity turns from being a problem into an opportunity (Finlay, 2002) that can ensure understanding and lead to innovative thought and a revolutionary breakthrough (Gould, 1994). In this research, a number of rules were maintained in order to increase the objectivity of the researcher. She took care to report with clarity and in depth on the entire process of the research which would make it possible to judge the research process and to estimate it; during the course of the research, the researcher was assisted by external readers of academic standing to judge the process; the pilot research provided the opportunity to re-examine and change the shape of the research; the definition of the borderlines of the research presented the broad contexts of the research; the use of triangulation allowed for exploiting the advantages of every research tool and for retaining a variety of viewpoints; the full approval received for carrying out the research allowed for free and easy access in gathering the varied data; the selection of questions, examination of their reliability and suitability for the research prevented intentional bias;

the care for consistency, the identical research conditions, and the many voices heard which exhibited the characteristics of imagination, difference and variety; transparency, the maximum documentation of findings and the presentation of many quotations in the Findings chapter allowed for a clear distinction between data and interpretation; the knowledge of varied methods for data analysis and the extensive amount of time that was given to process them enabled in-depth comprehension of the data and the preservation of objectivity; also, the use of extensive research literature in the field and the application of critical considerations gave stability to the research and to the process of its development.

### 3.6.4   Method of Data Gathering:

The researcher was given a high degree of freedom in her research. After the research subject was presented to the school headmistress, she did not ask to see the work program or the questions that would be asked during the interviews, nor was any restrictions made for her research, and she could therefore go ahead with her research.

The questionnaires were distributed to 20 teachers of the 'computer notebook' classes on a specific day in September 2012 at the beginning of the 2012/2013 school year. All the questionnaires were distributed with a white return envelope to be deposited in the mailbox of the researcher in the school. Most of the teachers filled out the questionnaire on that same day and deposited it in the mailbox. Some of the teachers returned the questionnaire after a few days. All the questionnaires were returned.

The interviews were held in two rounds. The first one took place in the 2012-2013 school year and the second in the 2013-2014 school year. The conditions of the interviews were identical: a date was set with each participant separately, at a free hour in the teacher's schedule, and the venue for the interview was in the school library which is a quiet and comfortable place to hold a conversation. The exception was the interview with the school headmistress which took place in her office.

The documentation of the interviews was done differently. For the first round of interviews the researcher chose to use pen and paper. She wrote down the words of the participants and the clarifications she made. In the second round of interviews the researcher asked permission to record the interview on tape. She placed the tape-recorder in front of the interviewee who spoke freely, and the researcher felt that she was more

attentive to her words and could therefore request further expansion on certain subjects and be given broader examples. The interviews which were transcribed word by word. The researcher felt it was important to be extremely sensitive so that the interviewee would feel comfortable and provide the information which could not be obtained through other research tools or by any other means.

Before the observation was held, besides the permission granted by the school headmistress to hold an observation in a class, the researcher requested permission from the class teacher personally to observe the lesson in her classroom. A date was then set for the observation, a meeting place with the researcher before entry into the classroom, and the place where the researcher should sit in order to record her impressions. The researcher told the participant that she should act freely and normally.

The observations were held in the various "computer notebook" classes in which the teacher participants taught. The researcher entered the classroom together with the teacher participating in the research and documented whatever occurred in the classroom according to the guidelines for observations, which she had prepared for them. The researcher exited the classroom at the end of the lesson together with the teacher, continued with a free discussion with her about the lesson, and later on documented what was said.

## 3.7 Ethics

Ethics is a field engaged in a wealth of relationships that go beyond morality towards the unique values of every profession, position or institution (Sabar Ben-Yehoshua, Dushnik & Bialik, 2007). Ethics in social research is related to our commitment and responsibility – as researchers and writers – towards the truth, to the originality or our work, and to the benefit and welfare of the research participants. (Shlasky & Alpert, 2007:235). The exposure of the considerations that underlie the research are an indication of the ethical codes that are contained in it not as apologetic discourse but as a discourse that is ethically imperative (Hazan, 2001).

The researcher chose to adopt varied methods for the collection and analysis of data. Since the education system and the school in which the researcher is investigating the field are familiar to her, it is especially important to allow for the expression of ideas,

thoughts, and various forms of speech which arise during the process. This is because it is just at the site which is well known to the researcher, her "home" ground that she is particularly required to break out of the patterns that are familiar and known to her and to give a chance and legitimacy to think otherwise, to have new and surprising thoughts that may help her to look at the same issues from a different point of view.

Ethical significance already exists in the very choice of the research method (Wester, 2011). The present research was formed within a socio-cultural institutional context which is the daily work environment of the researcher. For this reason, the researcher was faced by significant dilemmas and challenges posed by ethical rules (Hertz-Lazarovitch, 2007; Sabar Ben-Yehoshua, & Hashahar, 2000). In reference to the professional literature, it was the conclusions of Punch (1994), Birenbaum (1993), and Sabar Ben-Yehoshua (2001) that contributed to the preservation and strict observance of ethical rules. At first, permission was received to conduct the research, to hold interviews and observations, to have questionnaires filled out, and to collect background material (see Appendix 7: Authorisation to Conduct Research). Secondly, maintaining interviewee anonymity, and the non-exposure of the personal details of the participant. The knowledge that failure in securing the secrecy of information could cause damage to the responders (Hinkle, Oliver & Hinkle, 1985), led the researcher to describe details concerning the research population in general terms, to keep the documentation of the data in the field separate from the documentation of data about the research population, and to keep the research data confidential during the entire course of the research and at its end.

In addition, one of the ethical rules that was established at the beginning of this research was "granting informed consent to participation in research" (see Appendix 4). This rule is one of the fundamental principles in every research that includes human beings; it ensures that candidates for participation in research understand the research process in which they have been asked to participate and are capable of deciding freely and intelligently whether they wish to participate in it (Sabar Ben-Yehoshua, 2001). In the research process, and especially at the stage of data collection, the researcher took care to inform the participants about all the relevant aspects of the research and to make sure that the candidate did indeed understand that his agreement to participate in the research is given freely.

Reicher-Atir (2008) claims that the information that is supposed to be transmitted to the research participant by the researcher includes wide areas of the unknown, and suggests regarding the unknown as a type of knowledge which is essential in a process of interpretative research. Consequently it is this exchange of knowledge that the research participant is asked to agree to. The researcher signed the participants on an Informed Consent form (see Appendix 4: Informed Consent Form) which included the following components: The aim of research, processes, dangers, anonymity of the gathered data, cessation of participation, and opportunities to ask questions (Weisman, 2008; Weiss, 2008; Howe & Dougherty, 1993). As Lieblich (2008) notes, informed consent has various meanings and emphasis in accordance with the stages of the research, the character of the publication, and the questions asked. It is therefore important to take ethical principles into account and to be aware that at every stage in the research questions and ethical issues will arise that have to be considered.

Furthermore, the intimacy in this research and the dialogue concerning its significance and interpretation create the ability to maintain ethics through cooperation and reciprocity between the researcher and the researched. The dangers that lie in wait for the researcher include taking advantage of the connection with the participants, and not giving equal voice and representation to all the participants. In order to cope with this ethical obstacle, the researcher asked herself how her awareness of her strength and commitment shapes her work. She wanted to develop her understanding, empathy and involvement in order to be able to describe and interpret the reality as it seen by the research participants. The professional literature claims that the complexity of the situation is due to the duality between the intimate character of the dialogue, and the desire to meet the standards of good academic research (Lieblich, 2010). It should be stressed that the researcher understands the existence of two aspects: on the one hand, the commitment to scientific truth, the methods of investigation, and the means of verification and validity, and on the other hand moral commitment to the teacher participants to understand their world through their own perspective (Sabar Ben-Yehoshua, 2006; Denzin & Lincoln, 2003). The researcher therefore paid special attention to the principle of respect for persons in accordance with Kantian principle, that is to say, of treating people as an end in themselves and not as a means to serve the purposes of her research. This is a position that requires mutual respect and trust so that ethics becomes one of the components of the methodology in the research.

The researcher who shapes an entire picture, is committed to ensuring dialogue between her and the research participants, to reflect the world of the research participants, and to report the truth (Shlasky & Alpert, 2007). "Transparency" – which is expressed by the commitment of the researcher to report clearly and explicitly on every stage of the research – includes her personal positions, the method of collecting data, the analysis method and the way the conclusions are presented at the end of the process. This complete exposure allows every reader to judge the research process and to evaluate it (Glaser & Strauss, 1967; Kvale, 1996; Lincoln & Guba, 1985).

To sum up, the importance of ethics in qualitative research, and the choices made during research are not only practical, methodological or strategic decisions, but also ethical ones. The researcher was meticulous about "transparency" throughout the course of the research, received permission to carry out her research, maintained the anonymity of the participants and the secrecy of the material, received "informed consent" for participation in the research, upheld the principle of respect for others, kept her commitment to reflect the world of the participants and to report the truth, since: "In every research issue that the qualitative researcher uses, he has to cope with issues of ethical significance that are revealed during the gathering of data and their description, and in the course of data analysis and interpretation, and the distribution of written reports" (Sabar Ben-Yehoshua, 2001:344).

## 3.8 Analysis of the Data and their Processing

The term "data analysis" refers to the process of working with the data and processing them (Shkedi, 2003; Bowen, 2006). It transfers the researcher from the collection of pages filled with descriptions to the outcomes (Bogdan & Biklen, 1998:57). This process demands the division of the collected information into units in order to search for patterns, to find what is important, what can be learnt from them, and what to publish (Spector-Marzel, 2010; Mills, Bonner & Francis, 2006). The analysis process is systematic with fixed structural stages dependent upon each other (Bernard, & Ryan, 2010). However, as a preparatory stage, it was important for the researcher to reach a situation of intellectual clarity about the process and its aims as a key to analysis.

The reference to the findings of the questionnaire consisted of two aspects. On one hand there was a qualitative analysis of the answers, and on the other hand an analysis by

statistical means to find the relative frequency of every answer and statement. No correlative analysis was made among the variables or carried out (Beavers et al., 2013; Glynn, Taasoobshirazi, & Brickman, 2009). A qualitative analysis together with a statistical-differential analysis contributed to the clarification of the general picture of the new perception of the role of the teacher who integrates technologies with teaching, and to the derivation of the initial categories in the research. The findings of the questionnaire will be presented in tables and graphs (in the content of the research and its appendices). Reference to the open question in the questionnaire was part of the qualitative analysis process.

Interpretation in qualitative research must be based on theory on one hand, and on the text from the research (data) on the other. This means that the interpretation of the research is theory based. The analysis of the qualitative data was based on content analysis which was done by the encoding method and code development for the categories of the research. Encoding is the core centre of the process of textual analysis. It is a process in which the reclassification and reorganisation of information can be done in accordance with the subjects in order to derive conclusions about human behaviour and the perception of the teachers participating in the research. Encoding forces the researcher to examine the meanings and to link the sections of the text together in a constructive and complex process (Ryan & Bernard, 2000).

Content analysis was carried out according to the hermeneutic principles characteristic of the process of rereading the data and is composed of four stages:

1. **Preparation for the official analysis** – reading from a phenomenological viewpoint, that is to say, a thorough study and familiarisation of the collected data in their precise sense. This stage includes a comprehensive reading of all the documents, both official and unofficial, in order to obtain a complete picture of them (Agar, 1980).

2. **Open encoding of the data** – with the aim of creating categories that represent subjects that have arisen from the open question in the questionnaire, and from the observations, interviews and documents (Corbin & Strauss, 1990). The construction of the codes was based on the data accumulated during the

research. (Bogdan & Biklen, 1998). But at this stage the categories are temporary without any hierarchical order amongst them.

- **Review of the subjects and their organisation** – search for routine and repetitive patterns. Marking words that stress the defined subjects. Presentation of data that strengthen the encoded subjects that were selected.

- Contextual codes – general information and discoveries in the research.

- Definition of states/situations – reference to the way in which the subjects of the research are defined and their points of view of the events, processes and people in the website (how the school, teaching staff, management, pupils and technology, etc. are perceived).

- Perspective of the research subjects – the line of thought which also includes norms, rules, and perceptions of the research subject – the language of the school and the technologies in it.

- The line of thought of the research subjects on people – the perceptions of others, of themselves, and the objects that build their world.

- Codes of process – various events in the course of time, and the transition from one status to another.

- Codes of activity – the sum total of activities (formal and informal) that take place in the school.

- Codes of events – special activities that occur during the course of life among the research participants (such as those in which they took part and used).

- Codes of strategy – tactics, strategies, techniques, maneuvers, and other ways in which people achieve various things (such as the ways in which teachers keep order in the classroom, study techniques, etc.).

- Codes of relationships and social structures – social functions, hierarchy, employment positions, etc.

**3. Division into meta-themes** – Organisation of the main themes through transition from the theoretical level to the interpretative level. This involved the linkage and unification of a number of units that have similar content about an idea into an organised meta-theme that combines patterns of perceptions and positions (Creswell, 1998; Padgett, 1998).

**4. Mapping analysis** – Description of the interrelations between the themes. The aim of this stage is to find links between the various categories that were found and their placement in a logical system. This is a process of selective coding in which the researcher identifies the story line that creates the connection between the different categories. Construction of a theory or typology at a higher abstract level in order to understand the nature of the perception through the creation of connections, understandings and significance among the themes (Cresswell, 2007; Moustakas, 1994).

In addition, the researcher used the following framework of enquiry set out by Bogdan and Biklen (1998):

1. **Speculations** – To estimate, think and reflect on the process and the findings. Yet to remember that speculations must be grounded in data.

2. **Insights** – Ideas and insights during the research. It is important to register them and talk about them.

3. **Key words** – To mark the key words and those words which the research participants repeat, and to stress what is important for the research.

The text reading process, sentence after sentence, marking similar sections, category definition (in an open encoding)**,** category searching, rereading of the text, changing categories, making connections between shared categories until final stage in which the categories are set (axial encoding), constituted the process of data analysis in this research. Bogdan and Biklen (1992) define this strategy as inductive analysis. Patton (1990) emphasises that "analysis aspects are caused by open observations when the researcher starts to understand the patterns that exist in the researched empirical world". (Patton, 1990:44). The researcher chose to use the concept of consistency which refers to the sense that the readers should have when they read the findings of the research, that

these results are logical and consistent, and that the different parts of the research hang together. The process of data collection and their analysis included an in-depth consideration of the validity and reliability of the data.

## 3.9 Validity, Reliability and Credibility

With the widespread use of qualitative research, discussion on the issues of quality are gradually increasing. However, it is still difficult to formulate the criteria and clear procedures that the researcher must adopt in order to base his research on the appropriate standards of quality (Lieblich, 2012). In order to analyse research data in a critical, analytical and reflexive manner, a discussion was conducted on the work of the researcher in the research field, and the quality of the measurement was tested by the validity and reliability of the data and its collection (Lieblich, Tuval-Mashiach & Zilber, 2010):

- Validity – The extent in which the tool actually examined what was meant to be examined.

- Reliability – The extent in which a revised examination with the same tool will obtain similar results at different times for different researchers.

The **validity** of this research will be examined in accordance with the structure and assumptions of the research by other criteria, and the extent to which the researcher measured what she had actually intended. The internal validity was examined by the search for correspondence between patterns, construction of the explanations, and the analysis. The use of a variety of research tools and triangulation led to the cross-reference of the data and their verification, and accordingly strengthened the internal validity of the research (Krefting, 1991). The external validity is examined by cross-referencing the research data with the findings in the research literature (Silverman, 1989).

The **reliability** of the research is measured by a re-examination with the same tools and methods, and the receipt of identical results. Since according to the guidelines of qualitative research there are many specific interpretations for the realities, it is difficult to carry out a similar research and to received reliable results in the quantitative sense. But Sabar Ben-Yehoshua (2001:277) notes that "the degree of reliability indicates the extent of differential error involved in measurement".

In order to strengthen the reliability of the research, a number of rules were observed. According to the recommendation of Chenail (2011) the researcher answered all the questions herself, made certain clarifications, and determined the series of questions. And in accordance with the recommendations of Van Teijlingen and Hundley (2002) and Seale (1999), a pilot study was carried out, the research stages were estimated, and clarifications, corrections and adjustments were made. In the interviews, the researcher took strict care to ask similar questions, to have a uniform interview structure (content and order of questions, and deepening of relevant questions). All the interviews lasted for the same amount of time (about half an hour), and the location of the interviews (school library) was also the same except for the interview with the school principal which took place in her room at the end of the school day. This allowed for a comparison between the data of the interviews and assurance of the reliability of the tool and of the interpretations. The questionnaires were distributed in white envelopes for their return, and to maintain their anonymity; in the observations, the observed categories were explicitly defined and a systematic recording was carried out during the observation and afterwards; and the use of documents enabled the exposure and reflection of realities as expressed in writing, which provided additional quality to the research and to its reliability (Sabar Ben-Yehoshua, 1997). In addition, the interviews were conducted at meetings held separately from the observations and the questionnaires, which ensured a higher level of reliability for each of the data received. It was also found that a multiplicity of sources allows for a better and fuller understanding of the researched phenomena and makes it possible to maintain a higher level of reliability.

An important measure for the scientific standard of the research work is the level of its trustworthiness. This term was coined by Guba and Lincoln (1998) at the beginning of the 1980s in order to replace the scale measurements of validity and reliability required for quantitative research. Trustworthiness is distinguished by four criteria: credibility, transferability (the transference ability of findings), dependability (reduction of research errors), and confirmability (confirmation ability for the findings). Sabar Ben-Yehoshua (2006) broke down the reliability measurement into six distinctions: ensuring the professional gathering of data (see Appendix 14: Curriculum vitae of the researcher), the use of condensed description and judgment by the research readers, candid self-criticism of the researcher, control over the analysis of data (see Appendix 15,16), and

triangulation. These criteria have guided the researcher and gave expression to the post-modern perceptions of this naturalistic research.

## 3.10    Research limitations

Since this research has been focused on the perception of the role of the teacher who integrates technologies with teaching in the framework of one school (Intermediate school) there are necessary limits to the representative character of its conclusions. In particular, the fact that the case study is a school found in the northern periphery of the State of Israel, in which a "computer notebook" program that provides every pupil and teacher with a personal laptop for learning and teaching, has been running for 20 years, means that we should be cautious about generalising the findings in extension to other Israeli schools or beyond. It is therefore recommended that further research be conducted in order to clarify the perception of the role of the technology integrating teacher in various educational frameworks and at different levels of integration.

Another limitations of this research derives from the intentional focus on a research sample that included teachers and not pupils. In view of the influence that it has been argued that the pupils' generational characteristics have on the role of the teacher, a valuable focus for future research would be to examine these generational characteristics, with special emphasis on the pupil aspect in relation to the education system and the perception of the role of the teacher.

## 3.11    Conclusion

**Qualitative methodology** was chosen with the help of reading the theoretical background that distinguishes between various research approaches. The differences between the qualitative and quantitative paradigms were studied, and their suitability for this research project. During the process of the research work, it became clear that a symbiotic relationship existed (Shulman, 1988; Janesick, 2000) between the subject of the research "The new conception of the role of the teacher who teaches Generation Z pupils in a technological learning environment" and the qualitative methodology. This methodology makes it possible to study human behaviour with the aim of understanding it and lays stress on the subjective interpretation that people give to the socio-cultural realities in which they live.

The choice of the **case study approach** was based on the focus upon a unique case in its natural context and enabled to study the conception of the role of the teacher who teaches in a technological environment. The case study approach allows for the research of a real-time phenomenon in real surroundings, in which the lines between the conception of the role of the teacher and its various connections are not completely clear. This method enables the preservation of the holistic and significant characteristics of events taking place in reality (Yin, 1994; Stake, 2000).

The research participants (24) were sampled by some uniform as well as unique or different criteria. That is to say, the schoolteachers were chosen from the "computer notebook" classes in which technology was integrated with teaching, and were teachers with differences in seniority, disciplinary backgrounds, and gender. Teachers who did not teach in "computer notebook" classes were not included, and the levels of usage in technological tools were not defined.

**The research process** included four main stages: a) Pilot research. In the 2011-2012 school year 3 interviews and 2 observations were held and the collection of relevant documents began (e.g. The school constitution, presentations, work programs). b) The questionnaire stage. It included the construction of the questionnaire, its validation by the regional computerization coordinator, and its distribution towards the beginning of the 2012/2013 school year (September 2012) to 20 teachers. c) The first round. In the 2012-2013 school year 12 interviews were held (including the school principal and the regional computerisation coordinator), 5 observations, and the collection of additional documents (protocols, scanning of the school websites, class websites, computerized learning units, pupil assignments, etc.). d) The second round. In the 2013-2014 school year in which 12 interviews were held with additional teachers (including the director of the Sciences Center), 3 observations, and the collection of background material on the school.

A description of the process of gathering data presents the relevant research tools for this research and the difficulties that may appear during the process. The researcher chose a variety of research tools: questionnaires (20), interviews (24), observations (8), documents, and the school website, with the aim of identifying in depth the characteristics of the challenging new conception of the teacher's role in integrating technologies with teaching.

**The process of qualitative data analysis** included content analysis in the encoding method and the development of unified themes (collection of ideas identified into higher level themes) codes in four stages (Cresswell, 1998; Padgett, 1998): phenomenological reading, encoding of data, organization of central themes, and a description of interrelations among the themes. The qualitative data analysis process for the questionnaire included two aspects: qualitative analysis and the analysis of the relative frequency of answers and statements.

The researcher used the triangulation of the four research tools, careful attention to the conditions of similar research, explicit definition of the questions and the observed categories, the systematic analysis of the findings, and the cross-reference with the findings of the professional literature. This was used to strengthen the internal and external validity of the research, its trustworthiness, validity and reliability.

Research that deals with people in general and with teachers in the education system in particular, gives highest importance to the preservation of ethical principles and propriety. Several central principles in the ethical codes were maintained during the course of the research. granting of free consent of the participants – informed consent; preservation of secrecy for the materials; anonymity – protection of the participants against any damage that might be caused to them through participation in the research; preserving trustworthiness; mutual respect in understanding the world of the research participants through their own perspective and the researcher truthful report.

The aim of this chapter is therefore to note the key milestones of research. As Levitzky (2007) proposes the thread that links them all is **transparency**. The intention here is to explicitly demonstrate the logic that runs throughout the research, from the emergence of the idea or subject, the development of the research questions, through the choice of the methodology, the research approach, including the collection of empirical material, its processing and analysis. The next chapters will report on the results of the research in an epistemologically sound manner, the discussion of findings as pertains to the theory and the research literature, the research summary and conclusions and the contribution of the research beyond itself.

# 4. Analysis of Findings

This chapter presents the analysis of the findings and their division into meta-themes. The **first and second themes** describe the change required in the teacher's conception of their role in relation to the introduction of new technologies, and their response to Generation Z pupils. The **third theme** describes the differences between the role of the traditional teacher and the role of the technological teacher. The new role adopted by the technological teacher can be seen as a new pedagogy which includes pedagogical, interpersonal, and technological dimensions. Analysis of the questionnaire findings in this theme includes the roles, outputs, skills and abilities required from the technological teacher, and the patterns of usage by the teachers of new tools. The **fourth theme** presents the obstructions and challenges in the application of this new pedagogy.

**Figure 7: Mapping of Analysis of findings.**
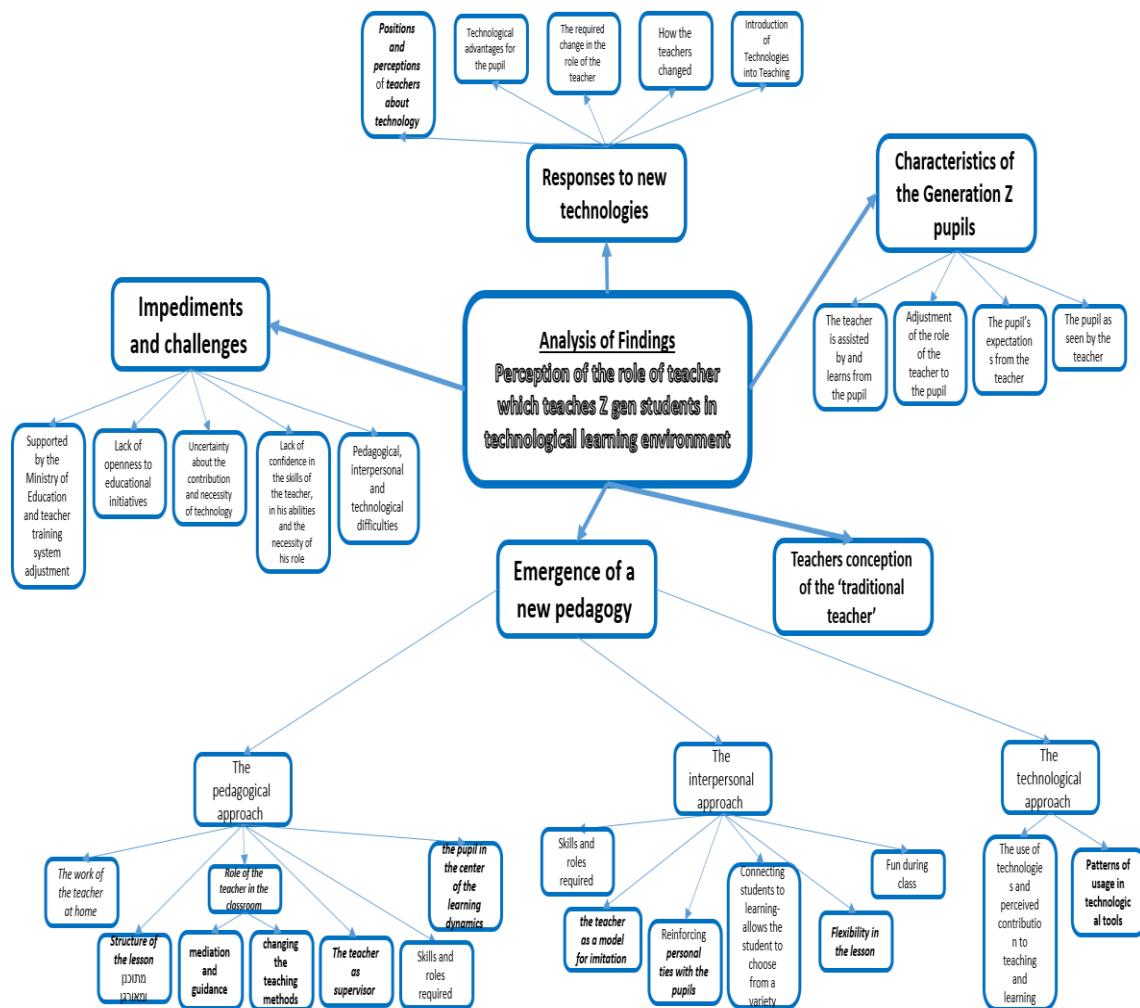
## 4.1 Teachers responses to new technologies

The analysis of findings showed that participants believed that the development of global technology and the introduction of new technologies into schools required teachers to reconceive their roles. In the interviews the teachers described their reaction to the introduction of technologies and their influence on the teacher and his or her feelings, the process of acquiring skills, the changes required in the role of the teacher, and the advantages of technology for the pupil. The analysis of the protocols, the observations and the findings of the questionnaire exposed and supported the positive positions and perceptions of the teachers in relation to technology and its integration with teaching.

### 4.1.1 The Technological Revolution – Introduction of Technologies into Teaching

The research participants described the introduction of technologies into the school, its influence on teaching, and the need for change in the conception of the role of the teacher. These influences can be exemplified by the Katia's description (4):

> *They [the Ministry of Education] engraved it on their mast! They now make use of technology, they changed the textbooks accordingly, there are courses, supplementary studies, guidance, etc.*

And the description of Riki (9):

> *First of all there is the encouragement to do everything through the Internet, email, etc. All communication is through the media whether it is grades, reports, everything ... the education system also supports the schools with equipment, interactive blackboards, computer rooms, etc. ... Everything in the education system is directed towards the accessible usage of computers in classrooms.*

Neri (15) also describes the development of technology and the need for change in the conception of the role of the teacher:

> *With all the technological revolution that has occurred in the world, even the people are changing, as it happened in the industrial revolution. People have gone over to different requirements, to another standard of living. Because of all these things I think that the conception of the role of the teacher must change.*

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The research participants described the introduction of technologies into teaching by the intense desire within the education system to instil technological teaching. The very introduction of these technologies demands change in the role of the teacher and the role of the traditional teacher.

### 4.1.2 "I had no interest in the computer" – How the teachers changed

From the interviews it was found that teachers felt that policies and priorities within the education system had demanded changes from them including the acquisition of new skills and the need to rethink their role. This was a long process from traditional teaching and is continuing to mature until today.

The interviewees described how they were exposed to technologies in teaching, acquired technological skills, and changed. An analysis of the interviews found that many teachers were initially terrified of computers and technology, but engaged in courses and supplementary studies and ultimately found a connection with technology, even becoming dependent on it. Some felt that this engagement with technology brought them closer to their pupils. Tali (18) describes her exposure to technology in the supplementary studies she took during her free sabbatical year:

> *... A few years ago I and the computer were far apart. I had no interest in the computer, and when I had a sabbatical, one of my supplementary courses that I took was first steps in the computer. The teacher taught you how to touch the mouse, what was a program, courseware, a presentation, and everything to do with emailing ... slowly I found methods to prepare lessons which really turned out to be very good.*

And Dafna (5) describes her position, fears and personal experience:

> *At the beginning of my teaching career I did not know anything, did not know what a mouse was, a presentation, emails, etc. Really, really nothing. The children knew more than me and this frightened me. But today this no longer exists. I write on the interactive board, I take the computer with me everywhere ... I love the creativity very much.*

The research participants used a variety of descriptions for the changes that they made from the beginning until today. Four main sub-themes emerged on this process of change:

- Before the change – a description of their previous abilities and skills

- The changes made – a description of the changes they made and what contributed to the change

- After the change – a description of their present abilities and skills

- A view ahead – what is still necessary to be done in the future.

The descriptions of the former abilities and skills of the teachers were accompanied by expressions of detachment and lack of basic knowledge in technologies, and a general sense of apprehension and fear. The lack of knowledge was described as follows:

> *I did not know anything, what was a mouse, a presentation, emails; I was not with it, this was something new to me; I did not want "notebook computer' classes; I am from the old generation, unable to be updated, it takes me time to begin; I hardly knew how to type my name; I did not know how to do Enter; I did not know what email was, and how to upload a lesson to a website; I did not know what the Internet was; I and the computer were detached.*

The feelings of the teachers in the past were:

> *I was afraid of the computer, I was afraid to get stuck; it scared me, I felt pressured, terrified, ashamed, surprise; the children knew more than me.*

The teachers mentioned the factors that enabled them to make a change in their teaching methods. These ranged from participation in supplementary courses and the realistic demands for technology in their surroundings as well as the need for independent learning. The factors that enabled change were described in the following manner:

> *I took a basic course I became an expert in that field; I attended supplementary studies at the initial level; I was exposed on the first skills upgrade; I attended courses. The computer was introduced into the school in an intensive manner; I became an expert because I was exposed to the computer; all the pupils have laptop computers; I study alone; I am making an effort; going through a process.*

After the change the teachers made, the new situation in which they find themselves today was described by the teachers:

> *Since then everything is computerised; today the computer goes everywhere with me; I use the Internet a lot; I upload assignments to the website, rolling flash messages, forums, presentations; slowly, I find methods to make good lessons.*

They described their feelings after the change as follows:

*Satisfied; brings us into new worlds; amazing; love the creativity.*

The participants described their perceptions as follows:

> *I believe in integration and in the use of technologies; realise the advancement; the moment I begin I see the advantages; the teacher is an independent learner; shows the pupils that we are partners in learning.*

For the view of the future – the participants used expressions that describe a situation of dissatisfaction and the need to continue to upgrade their expertise:

> *One must innovate in technology; teach with new programs; I do not feel that I know enough; to learn a variety of teaching methods; the whole education system and all the classes have to be technological; I would like to know more; I lack tools and prepared materials; if one does not become professional, the "tool loses its value".*

The descriptions by the participants of their changing relationships with new technologies provide insights into how this process of change occurs. Teacher's perceptions about their role and their relationship with technology changed as they exposed themselves to technology and gained a basic knowledge of the skills needed to use it. After their exposure and the initial change, the teachers described their positive feelings and belief in integration but also the need to continue experimenting in the field and to learn new tools.

### 4.1.3 *"It is always necessary to think of something new"* – The required change in the role of the teacher

The required change in the role of the teacher was described by the participants through a description of the requirements for change with regard both to technology and to the pupil, and in finding a balance between them and his role as a teacher. The required change in the role of the teacher is exemplified by Katie (4) as follows:

> *....[The teacher needs] to keep up to day with websites, books, different teaching methods, to do a lot of homework and a mental "switch" in what he plans to do. The teacher must understand that teaching is different, learning is different. One has to be very innovative, creative, and also insert his position as the mediator, supervisor ... Obviously, a difference exists. This is not the same person, not the same way of working. His whole way of thinking has to be conducted differently. He must instill the way so that the children will adopt the way ... if the teacher wants to teach in an efficient and effective manner he must direct his pupils in his teaching and in the study matter ... He must always think how to innovate, what*

*goes well, what does not go well, and all the time to reflect ... to think and know how to merge teaching with the computer and to know his place. The computer does not replace us.*

Leah (17) explains that:

*...[The teacher] needs to know the proportionate use and effectiveness of certain tools because there are things that are really just a waste.*

The teachers described the required change in the role of the teacher with regard to the updating of material, reconceptualising the role of the teacher and rethinking to the pupil's needs. The teacher must know what is the right and effective way to integrate the computer with teaching since the computer cannot substitute for the teacher.

**4.1.4 Positive approaches to technology and its integration in teaching**

In addition to the influences of technology, the changes made by the teacher, and the new demands made upon him, all the research tools (the interviews, questionnaires, observations and documents) showed that a positive approach by the teachers towards technology and its integration in teaching. The participants described the broad spectrum of technological advantages for the pupil which included references to personal, organisational, motivational, pedagogical, and cognitive aspects. The integration of technology in teaching, especially the use of laptops, has advantages such as order and organisation through filing, ability to complete material that has not been done. The computer helps pupils with difficulties, brings them to higher levels of thought, allows for variety, new methods of teaching, independent learning at different thought levels, adaptation to the abilities and convenience of the pupil (to work at home), progress and aids the development of abilities that the teacher cannot support, etc. The teachers repeatedly stressed the contribution of the laptop computer for pupils with difficulties or disabilities. Shosh (2) gives the following example:

*The personal computer for every pupil allows them to create files and a concise syllabus of topics for every study subject ... it helps those who have dysgraphia and writing problems. It also helps the weak pupil or those with difficulties to learn at his own level and to submit assignments ... The personal computer makes it possible to transmit study material to the pupil who is absent in a quick and efficient manner and to work at his own pace.*

The cross-reference of these statements with the **protocols** from the grading meetings, produced findings that support the contribution of the computer to pupils in general and

for pupils with difficulties in particular made by the computer (see Appendix 8: Photocopy of a Protocol). The teachers of the 'notebook computer' classes noted, for example, that "*the computer saved him*", "*It helps him a lot*", "*this arranged things for him*". The contribution of the computer to pupils with difficulties or disabilities was repeated a number of times in reports on teachers' meetings and in a document on alternative estimation which is possible in classes with integrated technology. For example: "*I allowed him to make a presentation of pictures with a short explanation*" and "*I asked him to bring to the class a film that describes ...*".

Even during **observations**, occasions arose in which the teacher tried to help pupils with difficulties or pupils who had missed study material. The participants were seen to have reduced the assignment for certain pupils (Observations, No. 2). The teacher was observed turning to the pupil and allowing him to do only part of the work required: "*Do only this ...*" and did not allow other pupils to interfere with this consideration: "*Everyone has his own assignment*". Another teacher (Observation No. 5) allowed a pupil who had been absent from studies in the previous week to only do the display, "*You were not here yesterday, so do it this way...*" etc. It was obvious that the teachers tried to adjust the assignment to the needs of the pupils and to make it easier for them with the help of technology.

Support for the above findings can be found in the analysis of the characteristics of the teachers' positions and perceptions in relation to technologies. Figure No. 8 shows the level of identification by the teachers with the statements relating to technology and the use of its tools as found in the **questionnaire**.

**Figure 8: Characteristics of the Positions and Perceptions of the Teachers who Integrate Technologies with Teaching (N=20):**



## POSITIONS AND PERCEPTIONS

| Percentage | Statement |
|---|---|
| 65% | I make use of email (or other computerized… |
| 65% | I encourage pupils to work in cooperation with… |
| 80% | I make use of the computer to respond to the… |
| 75% | I direct my pupils to continue with their study… |
| 70% | In lessons, I make use of presentations /… |
| 85% | I teach my pupils to consider and estimate the… |
| 80% | I direct my pupils to use study programs for… |
| 90% | I encourage pupils in class to look for relevant… |
| 65% | I make use of the computer as a means to teach a… |
| 90% | I make use of the computer for providing… |
| 85% | Computers can assist the teacher to treat… |
| 80% | Skills and computer applications must be more… |
| 60% | The use of computers improves the writing… |
| 85% | The computer increases the pupils' degree of… |
| 80% | Pupils with learning difficulties are greatly… |
| 80% | The computer, as a means of learning, increases… |
| 80% | The use of computers increases learning… |
| 95% | The computer provides an opportunity to… |
| 5% | I prefer not having the principal watching me… |
| 5% | I find it difficult to explain to pupils how to use… |
| | I do not know what to do in order to encourage… |
| | Even when I try very hard, I am unable to use the… |
| | I do not efficiently supervise the work of pupils… |
| | Whenever possible, I refrain from using the… |
| | I usually use the computer in class in an… |
| 80% | In my opinion, I have the required skills for using… |
| 15% | When pupils encounter a problem in using the… |

100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0%

An examination of the **characteristics of the positions and perceptions** of the teacher who integrates technologies with teaching also showed a high level of identification with a range of positive statements relating to the relationship between computers and teaching. Further support for this can be given since the responders showed a low level of identification with negative statements, which indicates a positive perception such as: "Even when I try very hard, I do not succeed in using the computer as well as other means of teaching at my disposal". This implies that the teachers do succeed in using the computer as well as other means of teaching. "I do not know how to encourage the pupils to use the computer"; and "I find it difficult to explain to the pupils how to use the computer". This implies that the teachers are capable of explaining the use of the computer to the pupils. "When possible, I refrain from using the computer in my class".

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This implies that I do not refrain from using the computer in my class even when it is possible for me to do so. These findings represent a positive position of the research participants towards technology and its integration.

The research participants described the influences of technology on the teacher, on the education system, and the encouragement to use it and to teach by its means. They also described the changes required in the role of the teacher since he had to be innovative, creative, and be updated with new books and websites. The research participants described the courses and supplementary studies that they had taken. The triangulation of the research findings showed a positive attitude by the teachers towards the integration of technologies with teaching.

## 4.2  Characteristics of the Generation Z pupils

With the aim of identifying how the technology integrating teachers define the pupil generation, the participants were asked in the interviews to describe if they felt that something different or new exists in the pupil generation of today, and why. This theme focuses on the definition of the characteristics of the pupil generation as it is perceived by the teacher who integrates technologies with teaching, and presents a number of aspects that were raised by the research participants, such as the pupil as viewed by the teacher and the teacher as viewed by the pupil; recruitment of the pupil to assist the teacher; adjustment of his role for the needs of the pupil, his characteristics; and the influence of these characteristics on the required change in the role of the teacher in its various dimensions. (Appendix 12: presents all the expressions that were made in the interviews in relation to the characteristics of the pupil generation and the reasons and explanations that the teachers gave for it).

### 4.2.1 The description of pupils by the teachers:

The research participants described the pupil generation in various ways, both negative and positive: characteristics of abilities and technological skills and excessive exposure to technologies; personal traits of disquiet, hyperactivity, impatience, etc.; characteristics of communication and written and oral characteristics such as meagre vocabulary, laconic writing, speaking in slogans; value-based characteristics of respect and authority; and characteristics that influence the learning abilities of the pupils, such as the search for immediate output, response without speculation, difficulty in thinking deeply,

superficiality, disinterest, etc. The use of negative and positive expressions were strung together in the description of the characteristics of the pupil generation by the participants. An example of this can be found in the words of Irina (7) in the following quotation:

> *During the past five years, the pupil generation is one that easily dispenses its daily routine in the study classes ... It is very difficult, it does not matter what material is being studied. It is of less interest to them. Their desire is to speak about themselves, about their experiences. Their method of communication is different, they use WhatsApp, Facebook, and other such means. The language is different, meagre. Everything has to be instant, quick, ready to chew. They have no patience to sit down. They want everything here and now ... and they have no fear of technology. This is a tool for them just like any other tool ... If, for example, I give them some work to do, we would have gone to the encyclopaedia, but they go to the Wikipedia. This means that this technology is very clear to them.*

**4.2.2 The expectation from the teacher to operate "Push-Button":**

One of the expressions that recurred in the descriptions of the teachers was "at the touch of a button" as Shimrit (14) describes in the following quotation:

> *They are connected to all kinds of rapid digital means of communication, computers, iphones, Whatsapps, and ipods from a very early age. They are used to having everything appear at the touch of a button, they think that we (the teachers) could also sometimes put pressure on us to get a response which does not always happen. They are used to just a "tack" and everything comes out quickly, and if it does not respond fast enough or immediately, the pupil puts up his hand and asks for help. It has to happen now, as though a delay of ten seconds is not right. "What's wrong? I am used to the fact that whenever I press the button I get a response". This is the generation of today, they are used to having us respond to them and to serve them ... sometimes the children become impatient with each other and also with the teachers (more problems of attention and concentration) since they are used to the having the computer function rapidly at the touch of a button.*

Participants felt that technology and the media expose pupils to endless stimuli and this in turn has an influence on the school. Participants felt this meant that pupils expected to receive something innovative and exciting from the teacher, he must be attractive and interesting, and had to have a rapid and immediate response to their needs. The characteristics of the pupils have an effect on the pupil's perception of the school and

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engender a real need for change in the conception of the role of the teacher and the adjustment of the teacher's role to the needs of the pupil.

**4.2.3 The teaches' commitment to adapt itself to pupils, their characteristics and their needs.**

The participants noted the implications of failing to adjust their role to meet the needs of the pupil and to the shifting environment of the classroom. Sigalit (22) describes this adjustment in the following quotation:

> *This is a different child. One must adjust this to the child, and those who do not will experience very difficult problems in the classroom. Children have a certain threshold of attention, they are incapable of doing so if it bores them and is not mixed with some colours, with some changes in voice level, to make it interesting, using hands, movement. You have to be more interesting and interest them otherwise you will lose them ... In the computer, there are things I can also leave for them to do at home, in their free time, whenever it suits them. When they are concentrated they sit and carry out the assignment... Traditional learning, which means to sit and teach them frontally for a whole lesson is out of the question ... this tires them ... If I come and oppose them, obstruct them, I will not be able to teach. They will not feel good about this and the whole system will lose ...*

Shimrit (14) reinforces her words in relation to the teaching, the class, and the level:

> *Every class is something different. An ideal class is one in which there is independent thinking and research ... I have ordinary classes such as Grade 8 (3) or a weak achievement class. If I do not work with them it will not happen. The pages will remain as empty as they are ... I have to adjust myself to the level of the pupils ... You have here the possibility of a game to suit the ability, to suit the level of the class. In such classes I write the words larger and mark the correct answers, and this makes it easier for them ... The pupils need the teacher to be dynamic, to have everything moving fast, to have a presentation, an exercise, to keep running all the time and changing, and pictures,... They really need the dynamic ... the moment that the teacher is very dominant, and concentrated on learning, this is the kind of teaching that I do not believe in. I think that their method of experimentation, activity, film strips and exercises, internalization a more significant kind of learning is carried out. This is the way to teach.*

In one of the **observations** (No. 2) the teacher was teaching about verbs. She opened the file in which there was a table divided into the different forms of the Hebrew verb (active, passive, intensive active, intensive passive, causative active, causative passive, intensive reflexive) and together with the pupils she filled out the table. At the end of the lesson the teacher was asked by the researcher why she did this with the pupils rather

than letting them do it by themselves. The answer given by the teacher was: "*More than half of the pupils in the class know how to do this*". "*You must understand*", she went on, "*if I do not do it with them they will not do it ... I have been teaching this subject since the beginning of the year, and still a lot of pupils in the class are incapable of doing it by themselves*".

Many of the participants therefore perceive a real need for the adjustment of the role of the teacher to the pupil. The adaptation of teaching in various ways is based on the perception that the pupils need a dynamic teacher. In addition, the teachers noted that they did not believe in a dominant teacher, but rather believed in a teaching style which makes use of experimentation, activity, exercise, and internalisation as this leads to significant learning. They believed that failing to adjust can cause great difficulties in the classroom, inability to carry out assignments, and a lack of learning.

### 4.2.4 The teacher uses the technological abilities of the pupil.

On the other hand, the teachers reported being assisted by the technological abilities of the pupil during the lesson. The teacher can make use of his technological weakness to empower the pupil, as described by Sharona (16):

> *... Because, in effect, they have more knowledge in the use of the computer than me. I often ask a pupil to help me with the computer, I don't have a technical sense ... There is a child who assists me technically and it gives him a kind of pride to come and help. I know that I can depend on him to help them, he has a sort of role in the class ... The pupils can feel a little more expert, especially with me because they help me technically... Sometimes there is need for ideas from other children, especially with having a variety of assignments, so you can get an idea from a pupil, you can get a comment ... I ask for help because I myself do not know.*

Participants describe fruitful cooperation between the teacher and the pupil. The teacher accepts and understands the abilities of the pupil with regard to the computer and technology, and realises that they surpass his own ability. On this understanding, the teacher recruits the pupil to assist him, and the assistance is given a double significance. The first is for the teacher who needs technical help, and the second is for the pupil who feels pride and a sense of expertise. The assistance of the pupils is not only expressed by their technological expertise but also from their ability to make comments and raise ideas in a varied work environment.

In the **protocol** of a meeting (Appendix 8). The teachers described the demonstrations of the involvement and goodwill of the pupils to help them, such as:

> *... he immediately jumped up, I want to help. ...always volunteering to help, ... they like to sit at my table and help me, etc.*

An analysis of these documents provided additional perspectives of the help given by pupils not only in response to the request by the teacher but also through voluntary recruitment and offers of assistance.

During the **observations** pupils were recruited to assist the teacher immediately after she entered the classroom. For example (in Observation No. 3) one of the pupils approached her and took the computer bag, brought out the personal computer of the teacher, connected it to the interactive board, and the teacher told him which display to open for the beginning of the lesson. Recruitment of the pupils to help the teacher was seen during most of the observations. Cooperation between pupil and teacher was also recognisable in the fact that certain pupils during the course of study were asked by the teacher to help other pupils, to work together, and to cooperate among themselves.

In the **questionnaire** a consensus was also found with the following statements: I sometimes create study units based on the desires and needs of the pupils (65%); When a pupil makes a mistake or is confused, I manage to provide him with an alternative explanation or an example that will help him to understand (95%); I apply alternative teaching strategies in the classroom (90%). The high percentage of agreement with these statements also shows the desire of the teacher to adjust teaching and learning to the characteristics and needs of the pupil.

From the interviews, various descriptions were found for the characteristics of the pupil generation and its expectations from the teachers which influenced the role of the teacher and his conceptions in the classroom. The observations, documents and questionnaires supported this by the showing how the teachers attempted to adjust themselves and their classroom teaching to the demands of the pupils, to the level of the class, and the level of the individual pupil. The teachers were assisted by the technological abilities of the pupil and thus "gained" the empowerment of the pupil through overcoming the technological inabilities of the teacher.

The reaction of the teachers to the new technology and to the characteristics of the Generation Z pupils, leads to change in the perception of the role of the teacher and to the emergence of a new kind of pedagogy. As a preliminary stage to the emergence of a new pedagogy, a description is presented of the essential differences between the role of the traditional teacher and the role of the technology teacher.

## 4.3 The conception of the role of the 'traditional teacher'

With the aim of identifying how teachers conceived the role of the teacher who integrates technologies in comparison with the traditional teacher, participants were asked to describe, both in the interview and the questionnaire, the differences between the role of the traditional teacher and the teacher who integrates technologies with teaching. This section will discuss how they saw the differences between these roles. This gap was expressed by descriptions such as the 'traditional teacher" as possessor, transmitter, and source of knowledge. This was contrasted with a situation where knowledge is accessible to everyone. The traditional teacher was the central pivot in learning in contrast to now where the pupil stands at the centre of the learning dynamic, is dominant in the learning process, while the teacher "*stands aside*" (See Appendix 11 for the table that summarises the comparisons between the two kinds of teachers from the interviews and the questionnaire). This gap is exemplified in the words of Tal (1):

> *There was a time when the teacher used to transmit knowledge, but today there is so much accessible knowledge. ..the traditional teacher held a central role. He was the possessor of knowledge, and the questions were dictated, built upon his knowledge, on memory and on close attention [of the pupils]. On the other hand, the technology integrating teacher presents the subject to be studied but it is the pupil who researches and develops it in accordance with his creative abilities, and his output cannot be similar to the output of someone else. The problem is to turn the knowledge into something creative, to get out of the box. Wisdom is not in memorising the material but in creating new knowledge from existing knowledge ...*

Eva (11), on the other hand, claims that there is no difference between the roles, although she notes the existing differences in the following quotation:

> *I do not think that any difference exists. The traditional teacher used to bring a newspaper and the teacher today brings it up on the website. With regard*

*to stimulus, it is the same stimulus ... with regard to the work assignments there is a difference. The homework assignment is not done on printed pages but on the website, yet while using different tools you still examine the same questions ... There is the illusion that it is easier, but both of them still have to lead to the same place. The role is the same, the question is only how it is done ... In my opinion everything can be done even without technological means.*

Most of the participants reported the existence of a gap between the role of the traditional teacher and the role of the technological teacher. Almost all of them described the traditional teacher as being in the centre of the learning dynamics, the possessor of knowledge, the central pivot in the learning process, and transmitting knowledge, while the pupil is passive, listening, and remembering the words of the teacher. In contrast to this, the technological teacher is described as directing, guiding and supervising, acting "*behind the scenes*", while the pupil stands at the centre of the learning dynamics, active and creates new knowledge from the extensive information accessible to all. Even the teacher who claimed that no difference exists between the two types of teachers, noted the differences between the teaching methods, the setting of assignments, the working methods, the demands on the pupil, etc. This shows that all the research participants recognise a difference between the two types of teachers and these differences were detailed throughout the findings. These differences lead to a deeper examination of the new approach to teaching with the emergence of the new pedagogy.

## 4.4   Emergence of a new pedagogy- The role of the teacher and the role of the pupil in a technological learning environment.

The next theme describes the approach to teaching that allows for the use of technologies by the pupil of Generation Z in the pedagogical, interpersonal and technological dimensions, with a description of the functions, abilities and skills required from the teacher in a technological learning environment.

Participants were asked to express their views on the technological teacher and to describe the way that learning was conducted in the integrated classes. This was done to help identify how teachers conceived the role of the teacher who integrates technologies with teaching. From an analysis of the interviews, it appears that most of the participants gave serious thought to the emergence of the new pedagogy and to the pedagogical,

interpersonal and technological demands in their role as teachers. The findings of the interviews received support from the findings of the questionnaire, observations and relevant documents that are presented below.

### 4.4.1 The pedagogical approach in the emergence of the new pedagogy:

The research findings reveal that teachers described a new pedagogical approach. This section describes this approach through the features which were identified by the teachers such as the use of home preparation, planning and maintaining a well organised lesson structure, a shift in the role of the teacher in the classroom which includes variety and change in teaching methods, mediation, guidance, encouragement for creativity, interest in learning, and supervision and control.

### 4.4.1.1 The role of the teacher:

**Home Preparation**

The teachers especially noted the extensive time required to search for materials relevant to the lesson and to the lives and of pupils, their adaptation to the various classes and levels of the pupils, the creation of an interesting lesson and the construction of study units. Preparations at home are described by Tiki (23) in the following quotation:

> *I say that the teacher can talk less if he works. Work must be done on this at home, to search. Because yesterday this really took me until one o'clock at night to find this lecture with a display and to listen to it. To see how it connects ... but in principle, if you do homework, the lesson can be a paradise. You need not speak at all. Everything is presented through the display ... Since I listened to it at home I knew what to say afterwards. You must prepare .. you only need to know ... and this takes time ... and this means spending time sitting at home ... I don't always do this, just so you are not mistaken. Because one must invest time for this ... And to bring this to the class sometimes requires hours of searching at home. I cannot search for this in the class, I have to prepare this at home ... But to look for a suitable display ... there are a lot of things ... this takes me time at home.*

Rinat (20) adds to and strengthens the words of Tiki about the preparatory time which is also required at home and not only before the lesson but also after it which is needed for updating the class forums and to correct assignments at home:

> *I keep preparing all the time, I upload forums and prepare them all the time. This of course demands a lot from me ... the teacher works harder at home ... more*

*correcting of assignments at home ... so that the children will know that they have been checked and a grade was given.*

**Structure of the lesson**

During the course of the interviews, the participants were asked to refer to the way their lesson was conducted in the technology integrated classes and in which they chose to describe the structure of the lesson and its course. Most of them described their conduct of a uniform lesson structure which usually included three main parts: a frontal opening by the teacher with explanations and transmissions of the study material; the main body of the lesson – independent work by the pupils; summary through general discussion or joint examination of pupil assignments with the teacher. According to them the pupils in the 'computer notebook' classes sit for many hours facing the computer, and therefore it is important to divide the lesson and to vary it. As Neri (15) has noted:

> *...[I] divide the lesson because in the 'computer-notebook' they sit for 7-8 hours facing the computer. This is not like in a normal class where they write, read, stop and listen. Here the moment the pupil sits opposite the computer ...*

And as Riki (9) describes it:

> *The lesson is divided into three parts: 15 minutes of a narrated work (story/poem/play extract). 20 minutes for work in groups, on the Internet, on the school website. 10 minutes for class discussion and summary ... In the first part this was frontal and cooperative. In the second art this was individual and independent teaching. And in the third part it was collegial participation, fruitful discussion, and summary.*

**The role of the teacher in the classroom**

Besides the preparations at home and the division of the lesson, the research participants referred to the work of the teacher in the classroom on two levels: the level of the pupil and his work and the level of the role performed by the teacher during the lesson. The first level was described by the teachers as group work, working in pairs, or as individuals, and the advantages of each of them. At the second level of the teacher's performance, the teachers described their role in focusing on the learning process and on the work done by the pupil, preserving the framework of the lesson and the learning process, alternating work methods, using information correctly and effectively, transmitting information and tools to the pupils, exposing them to material, mediating between it and the pupil etc. The teachers also described work that interested the pupils,

gave them wider horizons, put tools in their hands, encouraged them in independent learning and research, made learning a challenge, developed thought on a higher level, etc.

      a.   Varying teaching methods

Perry (6) describes the activity during the lesson as in the following quotation:

> *... (in class) work is done in pairs and group cooperation, asking questions, preparing displays and presentations of the pupils ... (I) change teaching methods from independent learning to group learning. Afterwards I go over to the lectures given by pupils to their friends, etc. ... In the class that integrates technology, one of the important functions in my opinion is to teach the pupils the right and wise way to use this tool ... Work in computerised classes brings the pupils up to a high level of thought and independent work that makes learning interesting ... I teach them to extract information, which sources to use, how to work with the material, how to change the search titles in order to find more precise sources, to sift information beyond extracting it.*

      b.   The role of the teacher as mediator, guide and supervisor

In addition to the variety of teaching methods in the classroom, the participants described the role of the teacher as a mediator, guide, supervisor and sifter, etc. in the learning process, which leads to independent learning and the acquisition of tools for research and study even in other fields of knowledge and also in the future life of the pupil, as can be found in the follow description by Lena (3):

> *... I think that the most important part for me is to act as mediator and guide, to direct them towards the right sources, because the abundance of knowledge is enormous. There is a large amount of knowledge, and it is necessary to direct them to the right places, to help them to gather it and to be focused ... They must go through this process independently, and the more you make an attempt to do it .... I would be happy if this was used in other subjects in which they carry out research processes ... The teachers teach the use of the tools: "How do I take and organise it? How do I collect the information? How do I draw conclusions from the data? How do I learn to think and make an effort to achieve it by oneself?" Give them the tools so that later on they can research or succeed in developing and advancing in every subject that they may want.*

Riki (9) adds that:

> *In this teaching method, the teacher is the director, guide, and the dominant person behind the scenes ...*

And Dafna (5) explains:

> *They themselves do not need to question you, they have everything on Google. Actually, they have a complete world of knowledge in the computer ... but It is most important to encourage the child to be an independent researcher ... The assignments are less boring, encourage more investigation, motivate further search in the websites, so that responses will be composed from a number of spheres.*

The participants describe guidance as the most important thing in their teaching. The teacher's role is to direct the pupils to the right sources of information, to help them to focus on and gather specific materials. The aim of the teacher is to have the pupil compose the answer himself from a number of information sources. The teachers show how to use the tools in order to collect and organise information, to think independently and draw conclusions, since these tools allow the pupil to investigate, to succeed in developing themselves and advancing in every subject they may wish (in the present and the future) through interest. In the quotation above, Shimrit exemplifies this with the questions: "*How to do it, to collect, to summarise?*", which she uses in the process of teaching, with emphasis on the fact that the pupil is the one who undergoes the process independently through personal trial and error which means that the pupil is dominant in the learning process and the dominating presence of the teacher at centre stage no longer exists. At the same time, there is a reservation and a claim that this process does not yet exist in all the subjects, which is a pity.

### c. The role of the teacher as watchfulor and control

It was clear that when the teachers described their pedagogical function, there was a repeated use of the words: guide, supervisor, and mediator, but when the teachers described their actual role in the class, there was a repeated use of the words: making sure, overseeing, being in control, examining, and concentrating (making sure that they are concentrated on the assignment). As seen from the description of Perry (6) in the following quotation:

> *... The teacher has to be watchful during the entire lesson and not to remove her eyes from the pupils after they have received guidelines and an assignment. It is necessary to go to the back of the class and to move about among the pupils when needed. Supervision during the working period in the lesson turns the teacher into a kind of policeman which is not a desirable thing ... and I remain at the back to see that all the pupils are concentrated on their assignment and not*

*talking to others ... I pass among them, go around the classroom and supervise the pupils ... there are situations in which one has to oversee the pupils because there are 30 of them sitting in the classroom with personal computers. One has to make sure that the pupils are following the assignment and not avoiding it. Whoever teaches in a 'computer notebook' class must learn and teach all the loopholes in technology, how to be careful with it, since it can be harmful to us. Although this is one of the tools we work with, but one has to know how it should be used and to be careful of it.*

Since there are many temptations in the computer and every pupil has a personal one, the teacher has to keep intensive watch "*without removing her eyes from the pupils*". At the same time, the teacher has to learn and teach his pupils about the technological dangers and loopholes and to use the (technological) tools they are working with carefully in the classroom and outside it.

A comparison of the data from the interviews and the documents with the data found in the observations, strengthens the new pedagogical approach to the role of the technology teacher. In the **observations,** it was found that the structure of an organised lesson included an introduction, the main body of the lesson, and a summary.

The <u>introduction</u> to the lesson consisted of a check on pupils' present, and concern for those absent, organisation of the classroom and the pupils for study and then the presentation of the lesson by a film strip or display.

The <u>main body</u> of the lesson consisted of directing the pupils to independent work on their personal computers. Observation was made of lessons (Observation No. 1) conducted with working in pairs, in groups (three to four pupils), or individual study. The assignment and its guidelines were prepared ahead in the class website, and the work of the pupils was accompanied by the guidance of the teacher who made the rounds among the pupils. The teacher encouraged the pupils to carry out the assignment, answered questions posed by the pupils, put a few of them together for cooperative work (for assistance), and aided all those who need her help. During the observations, the teachers explained to the pupils the question that was asked and the assignment that was required, and at the same time emphasised the criteria for estimating the task. During the main body of the lesson (Observation No. 8) observations were made of additional teaching methods for class discussions and the presentations of pupil outputs. The pupils (individual or pairs) presented their work before the class and the teacher, a class

discussion was held on the outputs with the guidance and comments of the teacher for improving the submitted work and the estimation of classmates. Towards the end of the lesson, the teachers summarised it.

The <u>summary</u> of the lesson included a call on the pupils to end their work on the computer, to save the files, and to listen to the summary of the lesson and guidelines for continuing with the assignment. In the lesson summary, as in the introduction, the participants asked the pupils to close their computer screens and to listen to the guidelines. The teacher stood in the centre of the classroom and taught the lesson frontally. In most of the observations the participants asked the pupils to send their outputs to the teacher by email for examination, correction and estimation. It was noticed that it was difficult for the pupils to stop working on the computer and difficult for the teacher to focus the attention of the pupils on him for a summary of the lesson.

The analysis of the observations broadened the research picture and created a link between the declarative thought level (in the interviews) and the level of actual activity (in the observations). Triangulation of these findings with the findings of the **questionnaire** presented a complete picture of the new pedagogical approach to the role of the teacher. Figure No. 9 presents the roles and outputs which are most required from the technology teacher, and Figure No. 10 presents the abilities and skills most required for the technology teacher in the Pedagogical dimension.

**Figure 9: Roles and Outputs Required from the Technology Teacher (N=20):**
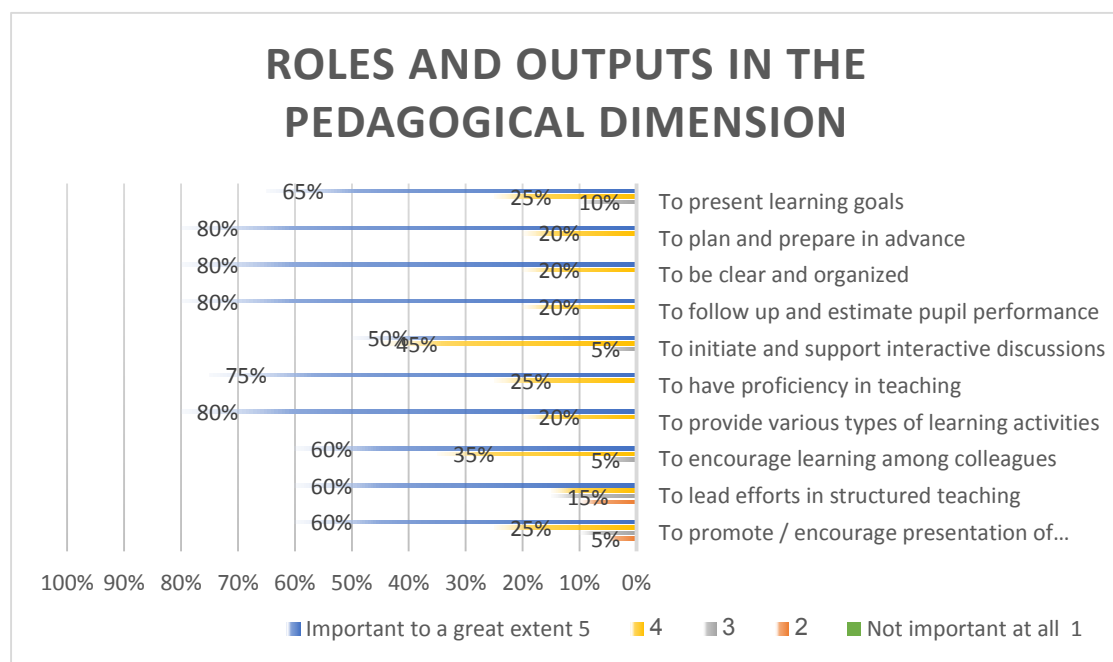
The responders thought that the most important **functions and outputs** in the role of the teacher who integrates technologies in teaching in the pedagogical dimension included having a clear and organised lesson structure; planning and preparing the lesson in advance; following up and estimating the performance of the pupils. The teacher should provide various types of learning for the pupil. The components found to be less in demand for the role of the teacher were to encourage collegial learning; to present the aims of learning before the assignment, during the assignment, and after the presentation of the study outputs; to promote/encourage the presentation of information; and to lead efforts in structured teaching.

**Figure 10: Abilities and Skills Required of the Technology Teacher (N=20):**
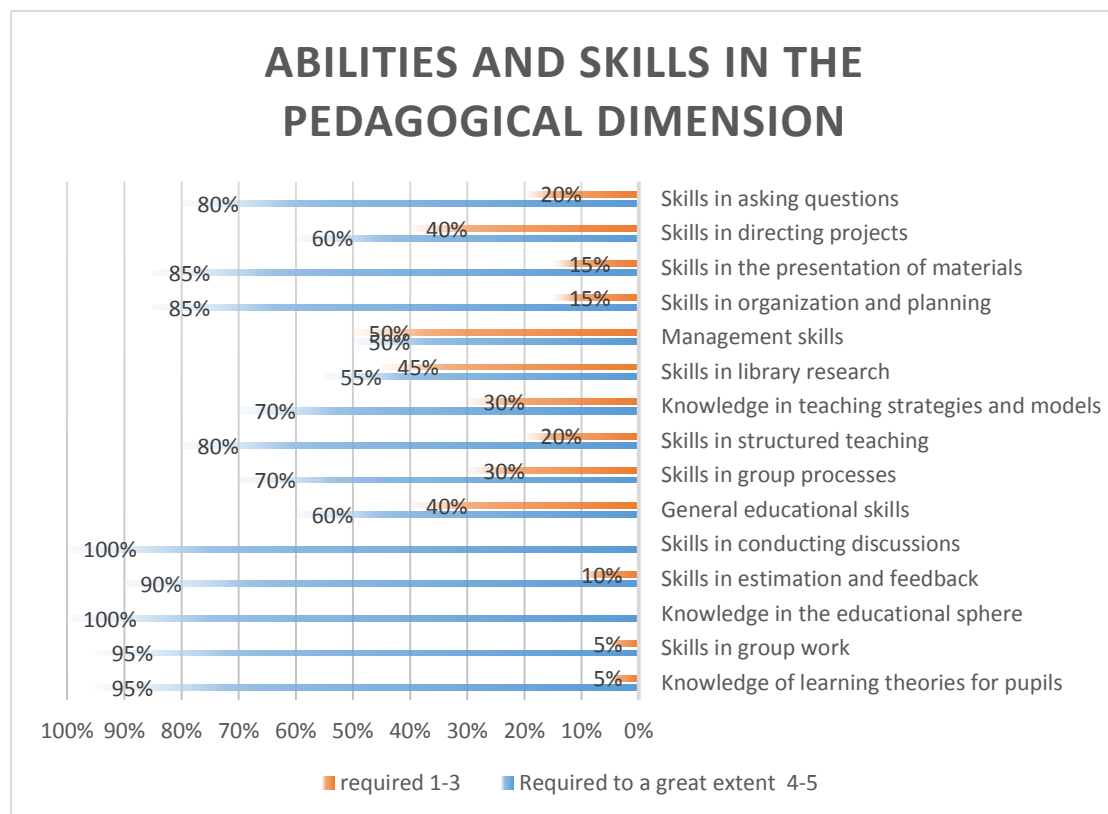


The **skills and abilities** that are most highly required are that of estimation and feedback; skills in conducting discussions; knowledge of learning theories for pupils; skills in group work; skills in organisation and planning; skills in the presentation of materials; and above all, knowledge in the field of teaching. The skills that were less required were library research skills as noted by Connie in the interview: *"... I tell you that the computer is like a library on the back. It has everything ..."*. Other skills were found to be less important in the questionnaire and received support in other findings. For example,

no management skills were necessarily required, yet the teachers conducted the lesson and created learning frameworks; no skills in conducting projects were required, yet they created class projects, personal and group assignments, and conducted them with presentations of the task and its requirements, its estimation, and the presentation of the outputs in front of the class and on the school website; and no knowledge in teaching strategies and general educational theories were in demand, but a variety of strategies in teaching and estimation were applied.

### 4.4.1.2 The role of the pupil

Besides the role of the teacher at home in the organisation of the lesson and learning management, the new pedagogy places the pupil in the centre of the learning dynamics. The teacher allows the pupil to stand in the centre of the learning process and demands research work in which the pupil initiates, creates, cooperates, investigates, collects material, examines, derives conclusions, and presents a variety of written work outputs, presentations, models, posters, etc. as Genia (13) describes it:

> *The child turns from being a passive pupil who receives everything from the teacher to becoming an active one who creates and learns by himself. Since he is active, learning is significant because he remembers what he writes and what he was searching for. He creates, he is involved and engaged in materials so he remembers it better that if he had received it from the teacher. ... The pupil understands the meaning of the complex materials and becomes a graduate thinking person who reflects ... There are pupils who make a trail blazers and you can hardly believe that they will reach maturity, and here they are becoming graduates and all because of ... the activity, the involvement in learning, significant learning ... He (the pupil) understands the meaning of things and does not only learn them by heart or receive processed material ... Children enjoy learning through play, without feeling that they are learning, this is significant teaching, real learning, because they do not learn by rote, with the teacher teaching and the child sitting and writing, but rather through engagement, involvement, becoming part of it, and this they do not forget.*

The claim made by the research participants is that significant learning is based on collaborative study that is achieved through investigative work carried out by the pupils. As Shimrit (14) says:

> *The high point of collaborative work is in the creation of a research project when the children have to join up in groups and investigate together some subject relevant to them. This can be something that they want from the field of science,*

*and to have it approved. They have to think together about a subject that interests all the trio or quartet, and then begin to carry it out. This means they have to think how to do the experiment together during their leisure time. This could be during the recess periods. Who will write? Who will design the results? Who knows how to do tables? Who knows how to do graphs? They also have to present a poster, a presentation, a written work. Always at the end of Grade 9. This is half a year of work. The child sits during the lessons, collects findings, arranges with Aviv (the laboratory worker) to go to the laboratory. They take a lab instrument home with them, and know that they have to return everything. They make a graph, arrive at conclusions from what they receive ... But the moment the child works independently, we get many more results, and he can apply this in the future, because he is acquiring tools. If today he succeeds, he can do the same thing on another subject because he already has the tools, how to do this and how to organise it. He is ready for academic life Bottom line they are preparing it ... I met a pupil whom I had taught in the past, and he asked me: "Do you remember the research project I did?" Did he actually remember after three years (that he studied with me?). And what is he doing now! Not what I taught. This is significant learning ... this is strong, .... He remembers this from Grade 7 because this is what he did ... collaborative learning – improved cooperation among the pupils in the class, especially in research projects through the use of shared documents ...*

The research participants described the new approach which allows the pupil to stand in the centre of the learning dynamics, to be active and creative in the learning process and to carry out group investigative work. This kind of learning enables the pupil to acquire the tools that will prepare him for academic life and that can also be used in other fields of knowledge in the future. According to them, collaborative learning, active, continuous and progressive learning, is significant for the pupil. The pupil is no longer passive in the learning process, but is active, creative, involved, and understands the significance of what is learnt. All these enable the pupil to remember and internalise what he has learnt and to become an independent, mature person who reflects and advances forward. The participants claimed that significant learning is not possible in the traditional approach in which the pupil is passive and receives everything from the teacher, while in the new approach the pupil is active, creating and learning by himself. He writes, he searches, he chooses to study and deepen his knowledge in areas that interest him, he is involved, and he understands the significance of the complex materials and remembers what he has learnt.

Support for the above findings can be found in the results of the **questionnaire** which examined the **characteristics of the positions and perceptions** of the teacher who integrates technologies with teaching. The findings gave high importance to statements such as: "*I involve pupils in estimating their work*"; "*I direct pupils to set learning goals for themselves*". At the same time, there was a noticeable low level of identification with negative statements such as: "*I do not supervise the work of pupil on the computer with efficiency (when they are working on the computer)*", which means that I supervise the computer work of the pupil efficiently. This finding strengthens the need of the teacher to supervise and control.

The approach to pedagogical teaching which participants believe allows for the use of technologies for the pupils of Generation Z includes three parts that are linked to the structure of the lesson. In the first part, the teacher presents the subject of the lesson frontally, which demands from him the knowledge in the sphere of teaching and the investment of many hours of preparation at home. Home preparation requires deep thought about the presentation of the subject, adaptation of the study matter to the level of the pupil and the class, examination of the work assignments and feedback response to the pupil. In the second part, the position of the teacher changes from being in the centre of the class (frontal) to the back of the class or moving around among the pupils. The body of the lesson includes the process of independent work (individual, pairs, groups), variety in teaching methods, mediation, focusing, guiding and control over the work process; and in the final part of the less, the teacher is once more in the centre of the class to summarizing the lesson. This part requires skills from the teacher in conducting discussions, and deriving common conclusions. The culmination of this approach is reflected in the placement of the pupil in the centre of the learning dynamics, dominant, and composing answers in several areas of knowledge in the process of significant learning as an independent researcher who internalizes, remembers and knows how to use the tools he has acquired even in the future. What especially marked the research participants was that their descriptions were focused and anchored in the perception of their role in the past and the present, and in the ongoing perception of activity through the recurring use of words such as direction, supervision, mediation, etc. It therefore seems that one cannot separate between the new pedagogy and the change required in the perception of the role of the technology teacher.

### 4.4.2    The interpersonal approach in the emergence of the new pedagogy

The change in the conception of the role of the teacher is not expressed only in the change of the pedagogical dimension, but also in the interpersonal dimension. In this interpersonal dimension, one can see the need to be flexible during the course of the lesson. The teacher needs to serve as a model for imitation, to encourage enjoyment in the lesson, foster interest in learning, and the support the connection of the pupil with the learning process. In this the teacher allows the student to choose and conduct research amongst a variety of possible subjects.

### 4.4.2.1    A Personal Example

Rinat (20) explains:

> *We constantly have to transmit the values of friendship, generosity, giving to others, family feelings and human feelings ... since these things are disappearing. ... and you have to pass on your beliefs to the children, you values and not the computer ... We are in a state of advancement, but we must always remind ourselves to guard the person, the one who is behind the teacher. Because in the end we work with people.*

And Sharona (16) describes the teacher as a personal example:

> *I say that I am a personal example in my own way, in my work, in my own style. I hope that this is relayed to them, perhaps slowly but ... personally, in my behaviour, what I transmit, what I want. When I ask someone to respect me then I also respect him. I hope that what I ask for is transmitted through my behaviour. A personal example is not to give yourself up, to despair, the things that are mine, or that I believe in and want to convey to others. Especially a personal example.*

Teachers described the challenge of serving as a model at the behavioural and learning level. Teaching in this way requires the teacher to have a new approach to advising and supporting children. The teacher responds to the deprivations the child suffers from his close surroundings – family/society – and makes up for any deficits with love, caring, and readiness to listen and understand the child. The teacher believes in the student so that the student will believe in his or herself and in his or her ability to study and succeed, as described by Tikva (8):

> *It is very important for me that the children feel good and feel free to turn to me with any problem. Both professionally and personally ... My motto, as Carlebach said, is that "it needs only one person to believe in a child for him to succeed". It is*

*very important for me that the children believe in themselves and utilise all their abilities and be unrelenting and present to their own greatness not to give up ... to foster the personal contact, to create in them a sense of security. It is very important to me what they feel in the classroom, that they are safe and protected ... that they should always have an address to turn to at any time and place ... It is important to me that they should be happy children. I do everything in order to create this feeling, because there are all kinds of children with different problems and I as a teacher must be responsive. I believe that when a child feels good he is ready to learn, and it is important for me to direct him to centres that can give help to children. When the children feel good, they are prepared to study and therefore it is important for me that they confide in me so that I can help them ....[I am] very satisfied with my work, love the children very much, and try to reach out to as many children in the class as possible and remain in contact with them.*

The teachers claim that the current generation of pupils are in need of emotional support to be ready for learning. The teachers give great importance to the interpersonal approach of belief in the child, fostering personal contact, creating a sense of security, giving a good feeling, etc. The teacher allows pupils to come to her with any problem, to confide and consult with her at any time or place, and even refers them to professional centres for help. The participants speak about the close connection between the interpersonal connection with the child and his ability to succeed in learning. The child who feels secure, whose belief in his abilities is based on personal contact with the teacher, is ready to learn and succeed.

In the **observations,** personal and interpersonal ties were revealed between the pupils and the teacher, and among the pupils themselves. At the beginning of the lesson all the participants were seen taking the roll call of the pupils with concern for those absent. The participants showed a personal relationship with the pupils, they asked how they were, showed concern for absentees, asked about their doings in previous days, requested personal contact with the absentees: *"Who can find out why ... did not arrive?"* (Observation No 3) and *"Who can undertake to pass on the material to.....?"*, (Observation No 5) and took an interest in the well being of the pupils. The observations strengthened the interpersonal approach and personal ties that had emerged from the interviews.

### 4.4.2.2 Teacher's flexibility in the lesson:

In the **observations**, there was a recognisable amount of flexibility in the lesson. Most of the teachers uploaded on the screen (smart board) more than one file, made use of the

Internet and various websites, developed different kinds of displays according to the demands of the pupils and questions that were raised in the class and the interest in various subjects. For example, (in Observation No. 4) the teacher taught the subject of fertilisation. The pupils asked whether the process occurred as it did in the laboratory, and the teacher immediately opened the website that showed the process of fertilisation by means of a short illustrated film. The teacher said that a difference should be made between fertilisation outside the body (as with fish and frogs) and inside the body, and she showed a short film strip on the subject (the fertilisation of a frog's egg). One of the pupils asked "*Does fertilisation always require a male and a female?*" and the teacher explained that there were some living things such as germs or grass that subdivided and proliferated themselves, and she showed them pictures she had found in Google.

In another lesson (Observation No. 1), the teacher taught the subject of weather. Here also there was evidence of a surprising amount of flexibility during the lesson. The pupils were interested mainly in the weather at the North Pole and asked about the temperature in that area. The teacher went into the website and showed them the temperature at that moment (when the temperature in the class was 36 degrees above zero and the temperature at the North Pole was 48 degrees below zero). The pupils asked whether could live in such weather, and the teacher opened the website pictures and showed them how peoples lived there. They then asked what the peoples could eat there, and how they did not die of the cold, and the teacher opened up a short film strip about life in the polar regions.

In the interviews as well, the teachers spoke about considerable flexibility which technology integrated with teaching could provide. An example for this can be found in the words of Tali (18) which are quoted here:

> *I let myself flow along. If a child suddenly asks a question I then change the order because it is not a problem if they go into this file or the other, one that I did not photocopy for them and I don't have the pages that he wants. My flexibility is greater because all the things can be found on the website. If for example he asks me about, for example we spoke about the subject and about bicycle riding, so by chance I have a file on bicycle riding, although today I had planned to talk about other physical activities and the effort made by the heart to make the blood flow, and how this affects us. So I had no problem with the bicycle and that they should go to this section of the file. I am more flexible and often adapt myself to the questions of the pupils because I have no problem with this... There are all kinds of names for lizards which the children do not know. So I immediately go in and the*

*children directly see the picture of a lizard, well what this lead to now? What does it resemble? Because he might think that a lizard is a kind of bird, and someone else could think it was an amphibian, but the moment he sees that it is a lizard he knows it belongs to the family of reptiles because we already spoke about the features of the reptile family. So I am very flexible with this business of directly entering the YouTube, entering Google, to search for what the class wants, for this and this? what is this and this? Wait a minute: I will show you the picture and you will immediately see. This is the say the lessons are conducted with me, and sometimes I feel that the subject is lost, but it is not lost, because in the end this gives them something ... this comes from them and the lesson flows in a different way that what was planned. Now the plan is already different ... Here things can be changed.*

The high level of flexibility is based on the accessible material in the Internet, on the possibility of change in the order of things, and on the uploading of additional pictures and film strips during the lesson. The flexibility of the teacher is led by the questions of the pupils, their interest in further subjects connected with that of the lesson, the desire to understand and see with their own eyes what is being said in the classroom, and even to display before the class certain things for which the teacher himself does not know the answer. Participants argued that perhaps the lesson or some of the planned studies are lost (the doubt is very low), but flexibility in the lesson gives the pupils much more since she responds to their needs and desires during the course of the lesson and provides a connection with the pupil, with his feelings, and the things that interest him.

**4.4.2.3   Enjoyable and interest learning:**

The connection with the pupil and the adjustment of the role of the teacher to the pupil allows for enjoyable learning both for the pupil and the teacher. The participants described the technologies and its tools as an inseparable part of the pupil generation and in a certain sense as an integral part of the technology teacher generation, as well as the use of a variety of techniques during the course of the lesson which allows for learning with interest and pleasure for both of them. As Genia (13) explains:

*This is a new tool, an additional tool, part of myself, part of him, a relevant tool so he will enjoy learning one lesson like this in every subject. In another lesson we shall insert films, in another one the experience in all kinds of games, and in another we shall include the creation of games with animations in the science classes ... playing a game with a laptop and smartphone for assignments, using it as a tool in the field causes them not to forget the material learned. This is real, close to their hearts, they will enjoy this and then will surely not forget something*

*like this ... for the pupil the teacher is more interesting, more with it, closer to him, more in fashion, understands his mind better ... Teachers feel relevant, a teacher needs something to feel good, to feel he belongs, is valued, is of worth, initiates, innovates, all these are things that the teacher needs ... he feels he belongs and in this he feels he is of worth, he needs significance, and when he has it he feels good ... The significance of education is personal and is very meaningful, and there is the belief that every one can and the belief in the capabilities of each child. All these things together strengthen the significance of the teacher, when the teacher is strong the child is strong ... there are children here who are happy and love the school, there is no violence, this is a treasure which is worth everything! ... The teacher even feels good if the they like his lesson, never mind how long he has been teaching, 11 years of 18 years. A teacher feels good if they like his lesson, and if they say "I enjoyed your lesson very much". The pupils know how to compliment, and also know how to slay, and if they compliment the teacher he feels good ... During the class they have a lot of fun. A group of interested friends surfacing the computer, simply a delight ...*

The teachers described a situation in which the enjoyment of the pupil in the learning process creates significant learning that the child remembers. The relevant technological tool for the pupils and the varied uses of it creates enjoyment and the internalisation of the material. A lesson that is conducted properly, in a system of collaborative work, with variety that creates enjoyment and interest for the pupil, will contribute to the process of effective learning. Enjoyment and interest makes the teacher feel relevant, belongs, is valued, has worth, etc. According to the participants, if the teacher feels so, the pupil will also feel so. The teacher who believes in the child and recognises his strengths, in return receives from the child love, strength, and significance. This mutual strengthening brings the child closer to the school through love and a sense of belonging, prevents violence, and reinforces the significance of the teacher.

The cross-reference of what was said in the interviews with relevant documents that were scanned in the research included in-depth reading of the **school constitution**, which presents a picture of the desired future and results that the school aimed to achieve (see Appendix 9: Photocopy of the school constitution). The analysis of the school constitution allows for the exposure of the world view of the school, as reflected in the text. It tacitly implies a pedagogical teaching approach (the role of the teacher in the learning process); to the interpersonal teaching approach (the role of the teacher for the pupil, the figure of the teacher, the personal connection, etc.); and to the environment of the pupil today and in the future:

*We are working for the sake of the best possible integration of our pupils into a competitive society, with the aim of producing a mature and independent learner ... The school creates an atmosphere of mutual trust and acceptance, and strives to produce a pupil who develops a decent way of life in his community, takes care of his environment, knows how to act in a democratic society, and contributes to his state.*

An analysis of the school constitution indicates the function of the institution in creating an atmosphere of mutual trust and acceptance which encourages supportive personal ties between teachers and pupils, and strengthens the educational approach which aims at fostering pupils to develop a decent way of life within the circle of his surroundings: his family, society and community. This approach encourages the teachers to adjust their role to the pupil and his needs. The constitution refers to the pupil in the learning process and to the aim of the teacher to produce a mature and independent learner. Besides this, it refers to the teachers who work for the sake of the best integration of the pupils in a competitive society. The constitution stresses the need for the teacher figure in promoting environmental, social and democratic values and contribution towards the state. This reference strengthens the findings that emerged from the contents of the interviews.

The triangulation of the findings for the interviews, observations and documents with the findings of the **questionnaire**, expands and deepens the interpersonal approach in the new perception of the teacher's role. An examination of the **characteristics of the positions and perceptions** of the teacher included: the ability of the teacher to influence the motivations of pupils who show little interest in their studies, the ability to calm a pupil who disturbs or is noisy during the lesson, and is capable of making the pupils abide by the rules of class behaviour, as was found in the interviews.

In addition, the **questionnaire** examined the roles, outputs, abilities and skills required of the technology teacher. Figure No. 11 presents the roles and outputs required from the technology teacher and Figure No. 12 presents the abilities and skills required from the teacher in the Interpersonal dimension.

**Figure 11: Roles and Outputs Required of the Technology Teacher (N=20):**

## ROLES AND OUTPUTS IN THE INTERPERSONAL DIMENSION



| | Important to a great extent 5 | 4 | 3 | 2 | Not important at all 1 |
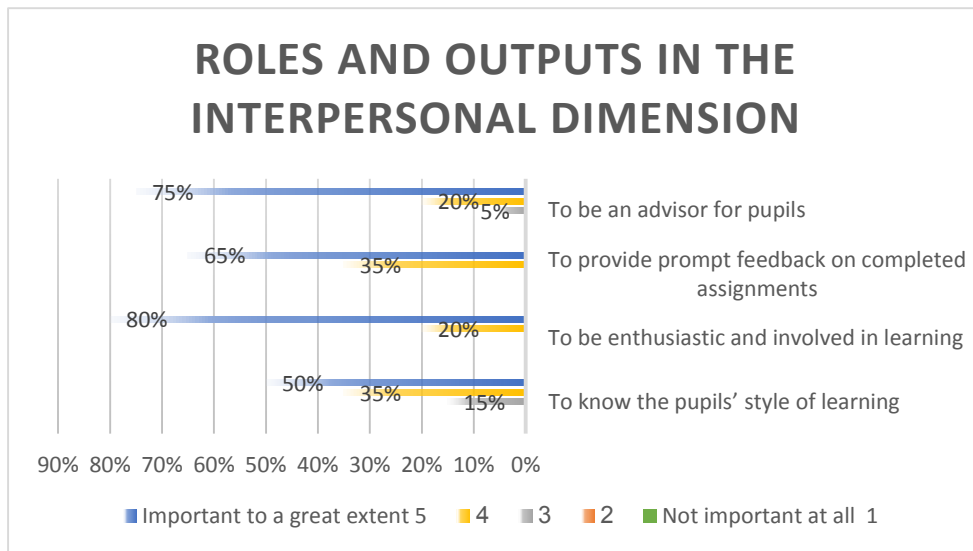
From Figure No. 11, it may be seen that the **roles and outputs** of the greatest importance in the role of the teacher who integrates technologies with teaching in the interpersonal dimension were to advise pupils; to be enthusiastic and involved in learning; to provide time for feedback on the assignments, while to recognise the learning styles of the pupils. The teachers noted their attempts to hold class discussions, to adjust learning and study topics to the needs of the pupil and the class level, and to be flexible during the course of the lesson in response to questions by the pupils.

**Figure 12: Abilities and Skills Required of the Technology Teacher (N=20):**

## ABILITIES AND SKILLS IN THE INTERPERSONAL DIMENSION



Required 1-3   Required to a great extent 4-5
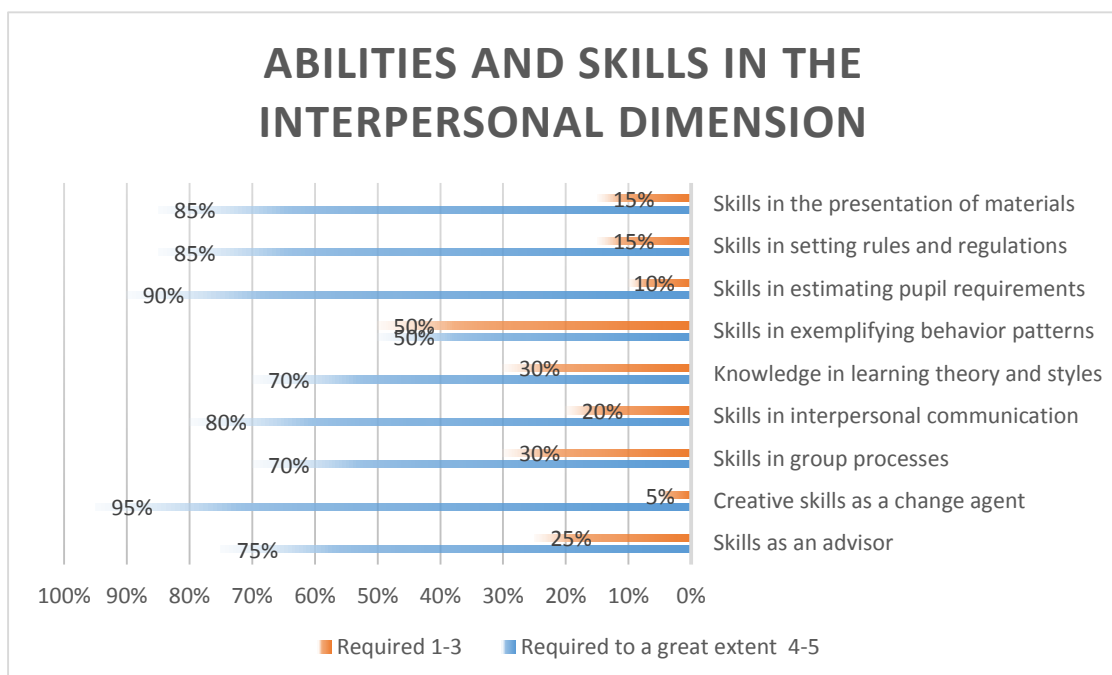
In accordance with the other findings, Figure No. 12 shows that the **abilities and skills** most highly required for the role of technology teacher included skills in estimating the needs of the pupil; skills that create change processes; skills in setting down rules; and skills in presenting material. In contrast with this, the abilities and skills that were less required for the technology teacher were given more importance in the findings of the interviews, observations and documents. The responders to the questionnaire thought that no skills were necessarily required in the group processes, yet they demanded group research processes. There is no necessary demand for skills in giving advice and skills in interpersonal communication, but they referred very specifically to interpersonal ties and advice for the pupil. Moreover, the skills in exemplifying behavioural patterns were found in the questionnaire to be the skills least required in the interpersonal role of the teacher, in spite of the fact that the interview findings showed that to be a model for imitation and to serve as a personal example for the pupils were the foundation stones in the new conception of the teacher's role.

To sum up, the interpersonal approach to teaching which allows for the use of technology for the Generation Z pupil presents a new conception of the role of the technology teacher. Participants believed that the role of the teacher in the new Interpersonal approach was to "enable" the teacher to estimate the needs of the pupil, and to trust him, to provide feedback for his work, to recognise the learning style of the pupil, and to serve as a model for imitation and a personal example.

### 4.4.3   The technological approach in the emergence of the new pedagogy:

The technological approach presents the role of the teacher and technology as they are perceived by the research participants and by the patterns of usage by the teacher in technological tools. Although the technological approach to teaching presents a new conception of the role of the teacher, it stresses that the role of the teacher and technology have not yet arrived at its full realisation and utilisation of his fullest potential.

### 4.4.3.1   The use of technology:

In the interviews, the participants described various uses of the technological tools for different purposes, the use of the computer required from their pupils, and the possibilities derived from these usages. The description of the participants were collected, classified and divided into three main groups:

- The use that the teacher makes of technology, both with regard to the technological tools and to pedagogical teaching

- The use of technology that the teacher demands from the pupil

- The contribution that the use of technology gives to the learning process with regard to teaching, to the learning process, and to the interpersonal dimension.

From the observations, interviews and the questionnaire it was found that a variety of technological tools were used by the teachers in the classroom: Computer; Interactive board; Displays; Animation; Film Strips; Games; Articles; Pictures; Digital books; Tables; Internet; Communication Programs (Facebook, Whatsapp); Maps; Emails; Word; Shared Document; Prepared Files in the School/Class Website; Google; The use of Google Docs. The following table sums up the various usages of technological tools that were derived from the interviews:

**Table 2: Various usages of technological tools and their contribution to learning and teaching.**

| Purpose of usage | Use of technology by the teacher | Usages in technology that the teacher demands from the pupil | Contribution provided by technology in the teaching process |
|---|---|---|---|
| Physical uses in the classroom | Projecting material on the blackboard; Searching in the Internet; Presenting a lecture as a constructed lesson; Presentation and playing songs (music); Use of prepared material; Weather presentation; Directing to websites; Use of websites (not only for personal use); Constructing games. | Projecting outputs on the classroom blackboard (interactive board) and Using technological tools: presentations, documents, links, etc | Variation of projection possibilities instead of copying; Tool for exemplification and concrete display of visual models; Connection to the senses (sight, hearing); Enrichment tool. |
| Uses for communication with pupils. | Notices for pupils (Whatsapp program); Use of a social network; Emails for communication with pupils; Facebook for | Possibility for uploading various subjects; Sending assignments for examination by the teacher (by email). | Relevant and immediate; Something which affects the emotional dimension; Raising of beautiful ideas from the Internet; Developing skills in the |

| | | | |
|---|---|---|---|
| | personal communication and transmission of information. | | computer that are helpful |
| Use of various parts of the lesson. | Presentation of the lesson subject (introduction); Summary of the subject (for the pupil); Summary of the material in a table/chart; easily; Saving files for repetition. | Transmission of a lesson by the pupils through the use of technology; | Alternative plan for pupils with difficulties; Variation in teaching methods; Critical learning (noting sources of information in submitted assignments). |
| Usages for learning purposes (in the learning process). | Study programs; Prepared study units; Broadcasts and TV programs connected with the subject; Computerised work assignments (ready made or prepared by the teacher); Computerised lesson and activities; Ready made activities from websites (also from the school and class) for learning; Assignments and tests; Usage for alternative teaching and creation of interest; Simulation (of processes/geometrical forms); Interpretation of expressions in the Internet; Showing additional things; Use of cultural and enrichment subjects; Direction of pupils to websites in which they can research by themselves. | Exercises at home; Assignments for carrying out on the computer; Computerised assignments for repeating the material and summarizing it; Use of the Internet to research and carry out an assignment; Direction to websites and computerised books; Writing and exercise; Preparation of presentations; Saving files. | A tool that empowers teaching and learning; Shortens the process of work in the classroom; Allows for variation; Constitutes sources for additional knowledge; Enrichment of knowledge (of the pupils) easily and quickly; Access to websites with explanations; Learning from a film strip; Sending by email avoids excuses for not carrying out the assignment; Allows for independent research; Allows for fruitful discussions arising out of film strips and presentations; Makes learning comfortable. |

This table presents the variety of uses made of technological tools. These range from the usage of technological tools by the teacher during the learning process in order to communicate with the pupils, to using tools to add variety, stimulation and to create an interest in learning. The variety of usages and that their division into categories enables proper coverage and understanding with regard to the purposes of using technological tools, the process of their usage, and the contribution that is apparent to the research participants for every usage of these tools.

**From the observations,** as in the interviews, it was found that all the teachers who were under observation used the film projector and the computer in the study classes for: computerised assignments (from the class website or in link with the assignment); the Internet to search for information and to upload material in the lesson; the word processor; presentations; film strips; and edited programs. etc. During the lesson the teacher used prepared study units from the class website; the teachers checked attendance and reported this in the website with the help of a pedagogical management tool; they asked the pupils to send them their work through email or forum for examination and to receive a grade. In the course of the lessons, the use of displays both by the teacher and by the pupils was noticeable. The teachers presented (usually during the introduction) displays that they had designed and prepared themselves, as well as ready made presentations they found were suitable for the lesson. The pupils submitted printed work or displays, and even presented them for class discussion.

Besides the findings of the interviews, observations, and the class / school websites, the **questionnaire** examined the patterns of usage by the research participants in technological tools. In the questionnaire the participants marked their responses from "use to a great extent" to "do not use at all" for each of the tools that was presented to them. The use "to a great extent" included email (correspondence), management of personal knowledge, word processor, tools for pedagogical management, and the use of the Internet, as can be seen in the following figure.

**Figure 13: Patterns of usage by the teachers in technological tools.**
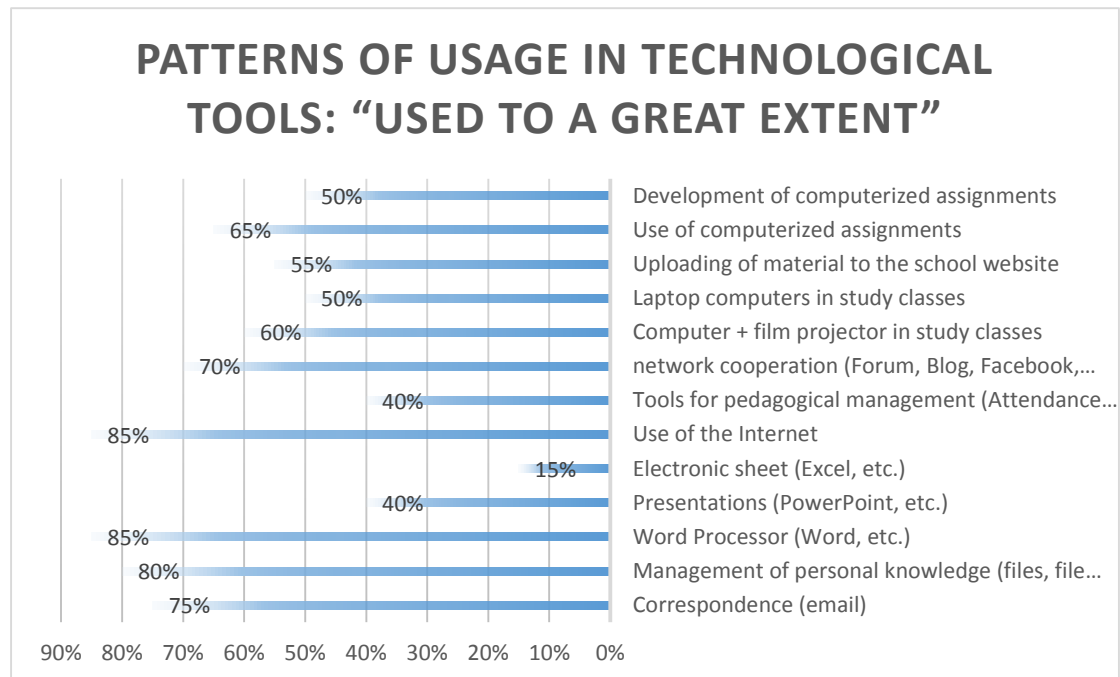


It is important to note that the teachers' response to the patterns of usage in technological tools in the questionnaire (unlike the interviews, observations, and the documents) was to their entire teaching range, to all the classes in which they taught, whether the regular classes (without laptops) or teaching in the "computer notebook" classes. Therefore, the claim that the use of laptop computers in classes was at the level of only 60% is merely due to the fact that all the teacher participants teach in "computer notebook" classes but in the regular classes there is no laptop computer for every pupil. This assumption is based on the fact that in all the observations and the reports in the interviews, it was found that computer laptops were exclusively used during the "computer notebook" classes.

An analysis of the patterns of usage in technological tools showed that 80-85% of the research participants claimed they used a word processor (Word), in the Internet, and in the management of personal knowledge (files, file folders, printing, etc.) and less than 60% claimed they developed computerised assignments, uploaded material to the school website, and used laptop computers in the classrooms. Only 40% claimed they used presentations (PowerPoint) and network cooperation, while only 15% claimed they used the electronic sheet (Excel, etc.).

The percentage of cooperative usage in the network (40%) was found to have strengthened the content data that emerged from the interviews regarding the difficulty and failed attempt at cooperation in the network and the use of shared documents. As Limor (24) noted:

> *Sometimes there are also computerised assignments which we assign for the whole class to work on the same document. Google docs. A little difficult ... they write one on the other, ...this is not exactly synchronized, all of them together and then each one writes some kind of answer ... they all write together. Sometimes this is a little difficult because you cannot see, they write one on the other, this erases, by mistake they erase the words of others.*

Or as Tiki (23) notes:

> *Shared documents were hardly done, because the children found reasons to curse one another. They go into the shared document and erase, and it does not always work. I did this once or twice, but on the whole it does not work.*

The low percentage of use in displays (only 40%) is surprising since all the participants, showed repeated use of ready made presentations and those prepared by the teachers and by the pupils. The displays, which were watched during the lesson on the class website and in the school website, included graphic designs, a combination of pictures, connections with websites, the addition of film clips and various animations. There was a large variety of presentations which ranged from information displays to complex ones constructed as learning games on the subject under study. Even in the interviews, the teachers repeatedly described the intense care in preparing displays for the lesson and their usage. This issue will be examined in greater detail in the Discussion chapter.

In addition, the findings of the **questionnaire** showed that among the **roles and outputs, the abilities and skills** most required from the technology teacher, the most important of all is being able to use technologies; to present the support services to the pupil; to have skills in the field of technology; knowledge in the field of integrating technologies with teaching; and technological knowledge. On the other hand, among the qualities that the responders listed as not necessarily required were skills in computer networks, skills in graphic design, skills in dealing with technical problems. The least important requirement was a knowledge of computer hardware. These findings will be reviewed in connection with other findings in the Discussion chapter.

To sum up, the approach to technological teaching includes the role of the technology teacher, the required abilities and skills, and the patterns of usage in technological tools. The positive attitude of the research participants towards technology and skills in integrating technologies with teaching, constitutes the basis for the patterns of usage by the teachers in technological tools. The participants described the various usages of technological tools that ranged between the usage of technological tools by the teacher; pedagogical usages for purposes of exemplification, teaching and learning; the use of technology that the teacher demands from the pupils, for purposes of repeat exercise and summary; and technology usage that enables a variety in teaching strategies, which contributes to the learning process, and to the teacher personally.

In the description of the following theme, the impediments and challenges to the new pedagogy are presented, and a description is given of the difficulties that emerged in the pedagogical and interpersonal dimensions, the disadvantages of technology for the pupil, the technological difficulties, and the environmental difficulties.

## 4.5  Impediments and challenges to the new pedagogy

This theme describes the impediments and challenges of the new pedagogy, that were found to delay change in the perception of the role of the technology teacher. The findings showed various difficulties and raised repeated doubts concerning the contribution of technology to the pupil and to learning, and even an expectation for the end of the technological development in the school and an examination of its influences. In addition, one could see that a conflict existed between a sense of support and non-support of the teacher's environment (the school, and the educational system) in the teacher. A description of the difficulties derived from a personal perspective and from the needs of the teacher that arises from the field of experience.

### 4.5.1  Difficulties

From an analysis of all the research findings, it was found that the integration of technologies with teaching involved difficulties in the professional-pedagogical, interpersonal-perceptual, and physical-technological aspects. Irina (7) describes the amount of time devoted to preparing lesson schedules and the problem of obtaining sufficient material required for the study program.

*... Just because they thought they were making a revolution in education they introduced the computerised project, they said they would invest in giving the teachers supplementary courses, instruction, laptops, equipment in the classrooms. But one thing they did not take into account, that in order to prepare one single study unit of good quality one needs a lot of time and no one took this into consideration.... previously in order to give a lesson I had to prepare the material. Today, in order to give a lesson I have to prepare a whole system, to construct study units ... The Ministry of Education provides units, but unfortunately even if there are ready made study units prepared by the Ministry of Education, they are not always suited to the level of the class in pace and content, and therefore it is difficult ... Also regarding coverage if we are talking about the waste of time, not all the material can be covered.*

Tal (1) adds that:

*... On the other hand, in teaching itself it is difficult to focus the children on their assignments and to follow their progress ...*

Rinat (20) describes the difficulties with the pupils:

*Most of the children are not very motivated ... It is difficult to motivate the pupils ... the work is examined through dialogue and discussion, but this is very difficult ... A situation occurs in which the class does not verbalize. The pupils prefer to remain in their world and it is difficult to hold discussions as before ... I try to do so after arousing some feeling through a film, or developing a discussion.*

And Shimrit (14) describes the problem in locating learning difficulties among the pupils:

*In the lessons held face-to-face the teacher can immediately locate situations of incomprehension among the pupils and thus repeat the material to be learnt. On the other hand, learning with the computer which can be done at any time and place, the teacher does not have the ability to locate difficulties among all the pupils ...*

Quotations were also found in the protocols in which the teachers noted the need for supervision during the lesson. For example:

*"I just turn to the blackboard and they are chatting ", "it is difficult to control them", "they begin to work, forget that they will listen to you" etc.*

The need to supervise and control and at the same time to teach about the dangers that exist indicates a new challenge in the role of the teacher.

The teachers describe a series of difficulties in the professional-pedagogical sphere which include the skills required of the teacher in preparing lesson schedules, in uploading

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material from the website and obtaining a supply of study material for the study program. At the same time, they describe the lack of motivation by the pupils, the difficulty in focusing them on their studies, in supervising their work, in drawing their attention, in conducting classroom discussions, and in locating learning difficulties among the pupils.

In relation to the **personal-perceptual** aspect, the teachers describe the influences of technology on people, and the damage to verbal communication and to language enrichment among the pupils, as well as the lack of personal face to face contact between teacher and pupil, and between the pupil and his classmates as described by Rinat (20):

> *... There are visual expressions that cannot be replaced through the computer such as a smile, a glance, facial expressions, and we lose this ... things that can be transmitted and felt. The senses are deprived, except for sight, and this has a very strong effect on people – all the expressions, smells, smiles, looks, facial mimicry, are all adversely affected in the world of the media ... I think that somehow this tool obstructs personal communication between the children, between teacher and pupil ... it also affects communication ... I look around my home, we are sitting down, each one with a mobile phone or tablet and it is very difficult for me ... A pupil becomes used to working by himself. In my opinion this is harmful for personal, verbal communication with his friends. There is no eye contact between them, and the learner lacks social and human talents... We thus create mechanized pupils, used to mechanical communication ... The technological world constitutes a kind of damage to personal, human communication. We sometimes find a group of pupils in a room, each one with his computer – in his own private world and there is no communication.*

Sonia (12), for example, describes the influence of the media on the pupil:

> *... All that this media gives them is to feel that the summit is far away from them and even impossible to attain. They sketch for them the dream of a perfect body, a perfect home, perfect salary, and it seems to them that everyone has everything perfect and only they do not deserve anything.*

And Keren (2) adds that:

> *First of all, they do not know how to speak Hebrew well, they are so closely linked with the screen that this reduces their linguistic abilities and vocabulary...*

Besides the difficulties described above, the teachers mentioned the **physical-technological difficulties** and the technical breakdowns they had to cope with. According to them, the many technical failures affected the concentration of the pupils during the lesson; Collapse in communication recurred frequently and did not allow for

the regular and continuous course of a lesson; There were blocking programs in the computers of the pupils that sometimes deleted files and class work; and tempting distractions during the lesson occurred more frequently than in an ordinary lesson. As Limor (24) explains:

> *... The technical disadvantage is that programs that are installed in the computer for protection and blockage purposes can delete their files ... and it often happens that contact is broken ... The additional disadvantage is that the temptation is very strong. They refrain from doing other things, they want to play on the computer and to download programs during the lesson... this is tempting. It tempts us, and this is not something that I cannot understand. It is accessible to them and sometimes it is not they themselves but other children who correspond with them, and the temptation is not only at their initiative.*

And Shimrit (14) adds:

> *So ... there are quite a lot of problems with this.... Ther are many technical difficulties which delay and disrupt the pupils' and teachers' ability to concentrate.*

Besides what was said above, an analysis of the **protocols** of the meetings on grades (see Appendix 8: Photocopy of a protocol) also included references made by teachers in the "computer notebook" classes to the technological difficulties and technical breakdowns. The teachers claimed for example that:

> *"It never has Internet", "there is always a problem with Internet", "I prepared such a nice lesson, I come to the class and there is no Internet".*

And difficulties with the personal computers, as for example:

> *"How can I transmit a lesson when eight pupils do not have a computer?", "Why must his computer take two weeks to be repaired?", "He does nothing because his computer is being repaired".*

These technological problems are also accompanied with the demand by the teachers for the help of a technician and his accessibility so that the personal computers of the pupils will be repaired quickly. These difficulties may be the cause for a delay in the perceptual change required in the role of the teacher.

### 4.5.2 Lack of confidence in the skills of the teacher, in his abilities and the necessity of his role

It may be that these difficulties are intensified when the teachers sense the domination of technology over the world and over the school, while the teacher himself does not fully control computer skills and technological aids, uses them inefficiently; and is unsuccessful in using cooperative tools. And alongside this, teachers who participated in this research perceived that their pupils were in control of technology, were born to it, and that they stand in the centre of the learning dynamics. This is a gap that may cast doubt upon the status of the teacher and his raison d'être. Ariela (19) describes the difficulties in the following quotation:

> *Besides the fact that teachers are knowledgeable and well versed in pedagogical subject, less thought is given to technological tools that the teacher has to cope with. For example, a plethora of passwords the flood of all kinds of free software so that it is not clear when it is worthwhile or not worthwhile to use them. Regarding graphic design for study units, the demand today is to design them in an internet website, but not enough attention is given to it and therefore teachers often construct study units that miss their aim ... And I see that the teacher does not always have the tools to do so. They took supplementary courses but finally speaking, what has been done in the field Technology changes in level, I only blink and it changes. Who can keep up with it?. The second thing is, the teacher will need is how to use technologies. In one class he has one kind of technology and a different kind in another class ...In other schools there are no technicians ... and a technician comes once a week ...*

The fears of the teachers are expressed by Sigalit (22):

> *In my opinion I cannot compete with them (The pupils) ... this pressure that perhaps a child knows more than me through the computer and undermines the self-confidence of the teacher ... (The pupil) is more adept with the computer ... it is alright that the child knows better than you on the computer. It is okay. Nothing can be done, this is a fact, a fact. One must accept it with understanding, and even consider it for your own good ... and we as well. ... go into it even with all the fears. There are fears here for the teachers. I see, and I filled out a questionnaire in my supplementary computerised teaching courses, and I saw that those who reported that they had fears, that it was a waste of time, as compared with other teachers who found it much easier.*

The research participants described their fears of technology integration, of failure and the sense that the pupil is more knowledgeable in the use of the computer. They have no doubt regarding the expertise of the teacher in pedagogy and in the field of knowledge

which he teaches, but the connection between the technological tools and pedagogy is difficult and also lacking, and this may even cast doubt on the role of the teacher and the necessity for him. The teachers explained that some of them spent hours on preparing study units that fall short of their aim. Those who try to use ready made study units find that they are unsuited to the level of the class and the pupil. The teacher is required to use complex design tools and to cope with a plethora of passwords and the flood of free software (Internet and technologies), the constant and frequent changes in technology and he does not always understand when it is worthwhile to use them, which raises doubt and undermines the confidence of the teacher.

### 4.5.3 Lack of Certainty

The difficulties mentioned above led the research participants to wonder about the contribution of technology and its necessity in teaching. According to them, the influences of technology on the teacher, the pupil, on learning, and on people in general should be examined. Limor (24) describes this as follows:

> *I cannot say that they learn better because I have never examined whether ... I have no control group .. I have no control group to say how this group would have learnt with or without a computer.*

Sigalit (22) adid:

> *And its not always clear to what extent the pipil is getting value out of the learning.*

And Ariela (19) supports her words by saying that:

> *In my opinion, a stage will come when technology will be halted. The education system will stop the technological advance. Because there is no end to this, we keep buying equipment and after two months it is old. The education system will begin to examine the influence of this on people. What happens to the person himself? Should a pupil sit all day in front of a tablet/computer/laptop, does this really contribute anything to him? What does it contribute to their connections with each other? Is their use of "Whatsapp" and "Instagram" the kind of connection we want them to have or not? ... There will be some kind of halt in the technological race, so as to examine where we stand. Because until today the test is whether there are results or not. Soon the personal matter, the objectives the mental aspects the psychological intent will enter into this, and then there will be some kind of halt to examine it.*

The issue of uncertainty was raised a number of times in the descriptions of the participants. In continuity of this, a description was made by the participants of their

belief in the halting of technological development by the Ministry of Education in order to examine the influence of technology in its various aspects. The reference to the issue of uncertainty and its influence on "change" will be brought in detail in the Discussion chapter.

### 4.5.4 Does the Ministry of Education support the technology teacher?

In addition to the difficulties and lack of certainty, the research participants claim that although the education system and the school constitute the environment required to support the teacher who integrates technologies with teaching, they range between support and non-support. On one hand they hold supplementary courses, school guidance, and class equipment that enables support for teaching integrated with technologies as can be seen in the description given by Neri (15):

> *The whole system has become technology integrating, everything has turned into this. Some of it is supplementary course, some of it is data bases that already exist in one website or another (Ministry of Education website). It is not only supplementary courses, it is also guidance, and if the teacher wants guidance he only needs to take it.*

On the other hand, the teachers feel that they do not have sufficient tools, that there is no investment in the personal development of the teacher, no optimum pedagogical reinforcement (pedagogy accompanied by technology), no auxiliary programs, no support that is needed by the teachers during their work (as a rule), the prepared material is unsatisfactory, there is no monetary compensation for the hours of home preparation and financial support for the use of technology that the teacher makes by himself. as described by Ariela (19):

> *The education system does not support, because, I pay for the Internet at home. The education system does even cover the expense for this. Give me "cloud services" (wireless charging), give me possibilities ... come and relieve us of all these reports and give us tools, give us supplementary course on tools ... Here I am now, doing supplementary studies at the 8-9 level of study coordination IT coordinators, what is the connection between what they teach there and IT coordinators, Nothing !! Nothing that will serve me and serve the staff ... I would recommend listening to the teachers room and build up supplementary courses in them, what the teachers room needs, and not to give us seminar assignments (at the end of the courses) but one that will be the transmission of a lesson in class and an examination of it whether the child knows or does not know the material, if the*

*teacher integrated the technology properly or not. But for the needs of the teacher – no theories! That is the first thing.*

The teachers thus claim that the education system supports the teacher on one hand through supplementary courses, technological equipment, prepared materials and online study textbooks, yet on the other hand the courses are not suitable for the needs of the teacher and do not contribute to the teacher the school staff. The monetary refund does not cover the time invested, and the pressure and demands from the teacher are constantly increasing.

### 4.5.5 Lack of openness to educational initiatives

In addition to the difficulties that emerged in the various dimensions and to the description of support/non-support of the education system in the teacher, another difficulty arose that was described by the headmistress of the school and the director of the science centre regarding the acceptance and recognition of the Ministry of Education in educational initiatives. They described the problems they encountered during the course of launching the initiative of the "computer notebook" project in view of the fact that the difficulties came from the education system (Ministry of Education) and not from the teachers themselves. This is how Genia (13), seconded by Neri who was a partner in the initiative process, describe the difficulty of inserting new initiatives and having them accepted by the Ministry of Education:

> *The whole Ministry of Education thought we were mad: "You are not from this world!", "You must be from some other world ...", "You are not focused", "Continue to dream". They laughed and joked behind our back. They called me "copy paste" in the Ministry of Education, they called me all kinds of names. My back is filled with arrows from so much disillusioned love. Every year I submit a request for an educational initiative to the Ministry of Education in Jerusalem, and every year they reject it. We thought they were laughing at us, making a joke out of us! In the end, after three years, they told me "Yalla, take it and break your head, do what you want" ... They approved the initiative. I almost fainted! This was 18 years ago when the computer was still in diapers, in "Pentium 2". Yes, it was as though the computer was really in its diapers. They thought I had gone completely mad....*

This implies that the education system is not open and ready to give real recognition to educational initiatives. From the description of all the difficulties facing the teacher, it appears that integration of technologies with teaching confronts the new perception of the

role of the teacher with difficulties and the need to cope with a number of dimensions. In the pedagogical dimension, they have to cope with the new characteristics of the pupil generation, the lack of motivation in learning, the focus on the assignment, the creation of stimuli and interest in the lesson, supervision and follow up on the progress of the pupils, the insufficiency of materials. In the interpersonal dimension, they have to cope with the lack of interpersonal communication in the technological world "that fosters a mechanised and non-communicative pupil" which causes damage to verbal communication and linguistic proficiency.

In the Technological dimension they have to cope with the disadvantages of technology that include technical breakdowns, the temptation to play instead of learning, and coping with the new situation in which the pupil is more in control of technology than the teacher. In the environmental dimension they have to cope with the education system that does not provide support adjusted to the needs of the teacher, does not provide close pedagogical-technological guidance, is not open enough to accept educational initiatives. In addition to all this, the teacher has to cope with the lack of certainty regarding the contribution of technologies in teaching for the pupil and for people in general.

## 4.6  In summary

An analysis of all the research findings showed the important components in the new perception of the role of the teacher who integrates technologies with teaching, The chapter on Findings was divided into five main themes: (1) the reaction of the teachers to the new technology; (2) the response of the teachers to the characteristics of the Generation Z pupils; (3) the perception of the role of the traditional teacher; (4) the emergence of the new pedagogy; and (5) the challenges inherent in it. Each of these themes included descriptions and the integration of quotations from the interviews, descriptions of observations, testimony form the documents, and the findings derived from the questionnaire.

The triangulation of the research findings created a full picture of the new conception of the role of the teacher. The questionnaire, based on prepared statements, provide the framework, depth and precision to the data. The interviews spread out and detailed the picture at the thought and perception level, while the observation reflected and presented

the actual activity level, and the documents strengthened the data and the existing realities unconnected with the research itself.

The first two themes mentioned above describe the factors that promote change in the conception of the role of the technology teacher.

**The first theme**, which presented the reaction of the teachers to the new technology, included the technological developments, the introduction of technology into teaching, the change required in the role of the teacher, the change that the teacher made since the introduction of technologies, and the positive attitude of the teachers towards technology.

**The second theme**, the answers to the second research question, arose mainly from the findings of the interviews, observations and documents which presented the reaction of the teachers to the characteristics of the pupil generation, included the attitude of the teachers towards the control of the pupils over technologies and their apprehensions about this, the recruitment of the pupil to aid the teacher, the advantages of technologies for the pupil and his learning process, the adjustment of the role of the teacher to the pupil.

After the description of the factors that promote change, **the third theme** presented descriptions from the open question in the questionnaire and from the interviews relating to the first research question: How do teachers perceive their role in a technological learning environment in comparison with traditional teaching? Here descriptions were included of the traditional teacher who stands at the centre of the learning dynamics, a possessor of knowledge and the main source of knowledge for the pupil. A comparative analysis between the role of the traditional teacher and the role of the technology teacher was conducted throughout the Analysis of Findings chapter.

**The fourth theme** presents the emergence of the new pedagogy in relation to the fourth research question: What is the most efficient approach to teaching that facilitates the integration of technology with teaching for Generation Z pupils? This question was in relation to the pedagogical, interpersonal and technological dimensions. In each of these dimension, descriptions were presented that relate to the third research question: What roles, abilities and skills are required so that the teacher can integrate technologies with teaching? Descriptions by the participants included the following: the role of the teacher in the classroom; the structure of the lesson; the work of the teacher at home; flexibility

which is made possible during lesson time; and the teacher under supervision. In the interpersonal dimension: the figure of the teacher as a model for imitation; enjoyment of the lesson; the pupil in the learning process; the connection with the pupil and the possibilities of choice; the personal ties required between pupil and teacher; the role of the teacher and technology. The Technology dimension in this theme included references to the third research question which deals with the patterns of usage in technological tools by teachers who integrate technologies with teaching. This theme presents the foundation stones for the new pedagogy and the components of the new perception in the role of the teacher.

Finally, in **the fifth theme,** the impediments and challenges of the new pedagogy were described, which included the difficulties in integrating technologies with teaching and the factors that hindered change in the perception of the teacher who integrates technologies with teaching. These impediments will constitute a new foundation from which the continuation of the required perceptual changes can be pursued and will stand at the centre of the recommendations of the present research.

In the next chapter, the Discussion chapter, the findings that were presented in this chapter were examined with a critical eye in the various dimensions and were positioned in relation to the aims of the research and the research questions. The Discussion chapter includes an interpretation of the research findings, the expression of the personal opinion of the researcher, an estimation of their significance, a discussion of them in relation to the findings that emerged in other research, and their scientific and public value in advancing knowledge in the field of conception of the role of the teacher who integrates technologies with teaching, the subject with which this research is engaged.

# 5. Discussion of Findings

In recent years the Ministry of Education in Israel has been conducting a national computerisation program called "Adapting the Education System to the 21st Century" with the aim of achieving pedagogical changes that would significantly advance learning and the acquisition of skills in the 21st century (Department of Science and Technology, Ministry of Education, 2013; National Computerisation Program, 2013).

Information technology influences society, the world economy, scientific research and a range of other social phenomenon. However, the impact of technology on schools has been far less evident. (Handal, 2004; Salomon, 2006). The policy of the education system in Israel is to introduce technology into school teaching (National Computerisation Program, Department of Education, 2013). However, the research literature criticises this and claims that it is relatively easy to buy computers but much more difficult to instil cultural change in schools (Voogt & Knezek, 2013). Although schools have been equipped with computers and communication lines, yet there need to make changes in the school structure, the dynamics in the study classes, the work of the teacher, the methods of teaching, and the conduct of the pupil (Shner, 2009). Researchers and educationalists in the field of learning which integrates technology with teaching stress the essential change required in the transition from the role of the traditional teacher to the role of the technological teacher (Salomon, 2000). The research literature shows that many teachers adhere to deeply rooted approaches and beliefs, and coping with the complex and multi-dimensional changes are often challenging (Weber & Mitchell, 1996; Langer, 1989; Nisbett & Ross, 1980; Levin & Wadmany, 2005).

## 5.1 Factors that influence change

This research deals with the role of the teacher who teaches Generation Z pupils in a technological learning environment. It attempts to "capture" the lived experience of teachers from various disciplines, who integrate technologies with teaching at various levels of integration, for 5 - 20 years in "computer notebook" classes. It is argued that while there has been a change in teachers' conceptions of their roles the extent of this change is insufficient. The research focuses on factors that support or inhibit a change in these conceptions. In this research, it was found that awareness of the need for change, the necessary recognition in the essential difference between the role of the traditional

teacher and the role of the technological teacher, the introduction of technology, and the characteristics of the pupil generation have a significant influence on the change in the conception of the teacher's role.

### 5.1.1    Recognition of essential change

The difference between the conception of the role of the traditional teacher and that of the technological teacher was found to be a leading factor in the teachers' conception of their roles. Their narratives expressed a substantial difference between the traditional teacher who was knowledgeable and took a key role in the learning process, transferring information to the pupils who listened and had to remember what was learnt and the technological teacher who "moved aside" when teaching the class and carried out activities primarily in the background.

With reference to the first research question: **How do teachers conceive of their roles in a technological learning environment in comparison with traditional teaching?** The research findings were listed in Table 3 which reveals a significant gap between the role of the traditional teacher and the role of the technology teacher. The findings were divided into six categories for a comparison between the roles of the teachers: source of information, lesson preparation, lesson structure, centralisation, the teaching/teacher role, and the pupil in the teaching/learning process.

**Table 3: Summary of the description of the research participants on the comparison between the role of the traditional teacher and the technological teacher.**

| Dimension | Traditional teacher | Technological teacher |
|---|---|---|
| Source of knowledge | The teacher is the sole source of knowledge in the learning process. Teaching opportunities and sources are limited. | Media information is accessible to all. Teaching opportunities are unlimited and teaching depends on many sources, local and global. |
| Preparations for the lesson | Preparation of the subject of the lesson in accordance with study program. | Extensive preparations are required in classification, location of interactive materials suited to the subject of the lesson, the level of the pupils and the class, interesting and relevant to the daily lives of the pupils. |

| | | |
|---|---|---|
| Structure of the lesson | Frontal teaching in lecture style. | Variety in teaching methods, working in pairs/groups, individual work on the computer, individual teaching suited to the pupil. |
| Centrality | The teacher is placed at the centre of the class, the teaching and the learning process. | The pupil is in the centre of the learning dynamics. The teacher is "behind the scenes", the "guiding hand". |
| Role of the teacher and of teaching | Teaching is dependent on the transmission of disciplinary knowledge (specific knowledge area) intended to bring the pupil up to the required standard in examinations. | Teaching is dependent on guidance, mediation, direction, advice, focus and estimation of materials that will arouse curiosity and long-lasting independence in learning to enable self-realization, location of knowledge sources and the creation of new knowledge. |
| The pupil in the teaching and learning process | Passive, learning by rote, and remembering what the teacher taught. | Active, independent learner, dominant, researcher, searches for and develops special outputs, and remembers what he did. Pleasure in the learning process for pupil and teacher. |

Table 3 shows deep differences between the way participants characterise traditional teaching and technological teaching. While the traditional teacher is the sole source of information in the learning process, and the opportunities and sources of teaching are limited, the technology teacher uses accessible information and unlimited teaching opportunities and sources based on local and global sources; While the traditional teacher prepares the lesson in accordance with the study program, the technology teacher is required to make extensive preparations in classifying and locating interactive materials suitable for the subject of the lesson, for the level of the pupils and the class, and for interesting subjects relevant to the daily lives of the pupils; Traditional teaching relies mainly on frontal teaching while technological teaching allows for a variety of teaching methods, working in pairs or groups, personal work in front of the computer, and individual teaching adapted to the pupil; The traditional teacher who stands in the centre of the classroom, facing the pupils in the teaching and learning process, changes his centrality in technological teaching in which the pupil is in the centre of the learning dynamics and the teacher moves to the back of the classroom, and passes among the

pupils like a "guiding hand" "behind the scenes"; While traditional teaching relies on the transmission of disciplinary knowledge intended to bring the pupil up to the standards required in examinations, technological teaching relies on guidance, mediation, direction, advice, focus upon and estimation of outputs. This is an approach that is meant to encourage curiosity and independent learning that will last and allows for self-fulfilment, the location of information source, and the creation of new knowledge. Finally, in traditional teaching, the pupil is passive in the learning process and his learning is based on remembering the material that his teacher taught. In technological teaching on the other hand, the pupil is active in the learning process, studies independently, is dominant, investigates, searches, develops special outputs and remembers what he has done. In addition, technological teaching provides pleasure in the learning process for the pupil and for the teacher, a matter which is not discussed in traditional teaching.

The new conception of the teacher's role requires an essential change in the role of the teacher as summarised in this table. Change in an organised system requires adaptability, adjustment and alteration in accordance with the members of the organisation (Kotter, 2007; Kanter, Stein, & Jick, 1992; Bakker, & Schaufeli, 2008). This research presents teachers who are trying to comprehend the cultural realities in which they are working and to examine what can be derived from it with regard to their role and how they must position themselves as professionals in the field of teaching. The role of the teacher in the learning process constitutes the basis for the understanding by the research participants that teaching has become different, learning is different, he is no longer the same person, and it is no longer the same method of teaching. Another way of thinking must be applied, and the teacher must make an essential change in thought and become more innovative, creative and reflective and to ensure that they keep updated with new websites, books and teaching methods.

The comparison between participants' conception of the traditional teacher and that of the technological teacher in this research, parallels the existing debate between the traditional approach which depends upon epistemological knowledge as a positivist and objective theory (Cunningham & Fitzgerald, 1996; Guba, 1990), and the constructivist approach which depends on knowledge created through active construction (Prawat, 1996; Brown, Collins & Duguid, 1989; Lave & Wenger, 1991; Phillips, 1995; Cobb & Yackel, 1996). This means that the role of the teacher changes from being a source of knowledge and an authority who transmits knowledge in a hierarchical structure divided

into small units, to the role of a supervisor who supports learning and guides the pupil towards deeper understanding. At the same time, the role of the pupil also changes from being a passive consumer of knowledge to an active constructor of meaning (Bonk, 1999; Hiltz & Wellman, 1997; Rossman, 1999).

Yet, in spite of the fact that most of the research participants pointed out the differences between the traditional teacher and the technological teacher, one of them claimed that "*no difference exists between them*". According to that person, "*the traditional teacher used to bring the daily newspaper, the technological teacher uploads it from the website ... it is the same role, the only question being how it is done*". This means that the traditional teacher and the technological teacher could stimulate the pupil to learn in various ways, they examine the same questions and lead him to the same goal. This finding accords with the literature in which the attitude towards the two types of teachers is ambivalent. Some claim that the needs of the teacher are for a technology that supports frontal teaching which preserves the position of the teacher in the centre (Meishar-Tal, 2012; Mandinach & Honey, 2005; Shamir-Inbal, Dayan & Kali, 2009; Shamir-Inbal & Kali, 2009), and others think that it is necessary to adapt the technological environment to support innovative teaching that activates the learner and enables him to conduct an active, investigative type of learning (Cox et al., 2004; Strayer, 2007).

The research findings also show that there is an ambivalent attitude towards the differences between the roles of the traditional and the technological teacher. For example, the findings indicate that the introduction to the lesson and its summing up are in accordance with the traditional conception of frontal teaching, while the learning process, the role of the teacher in the classroom and the role of the pupil in the learning process are in accordance with the conception of technological teaching. But, all the findings in the research indicate that there is an essential difference between the two types of roles, and at the same time they show that the **very realisation** of this essential difference **leads to a conceptual change** as an essential stage in this process (Weick & Quinn, 1999; Dewhurst & Lamb, 2005; Lea & Collaghan, 2008; Mevorach & Strauss, 2012).

### 5.1.2 The influences of technology and of pupil characteristics on the required change in the role of the teacher

In addition to the recognition of the essential change between the role of the traditional teacher and the role of the technology teacher, the research findings exposed two main themes that influence the change in the role of the teacher. One of the influences is the introduction of technologies into teaching and the other is the influence of the characteristics of the pupils on the role of the teacher and on his conception of that role.

From a review of the assimilation of the computerisation programs throughout the world it appears that teachers have had a decisive role in the successful assimilation of these programs in schools (Halverson & Smith, 2009; Kozma, 2008; Melamed & Salant, 2010). In the literature one can find many testimonies to the special influence of constructive-educational conceptions regarding assimilating computerisation (Tondeur, Valcke & Van-Braak, 2008; Wozney, Venkatesh & Abrami, 2006; Adams, DeVaney & Sawyer, 2009; Overbay et al., 2010). These are conceptions that regard intelligence as the outcome of adjustment and the ability to preserve a balance between the stable and the changing, constraint and openness, continuity and variety, and between adjustment and assimilation (Elyakim, 2011).

The research participants described how they perceived the environment in which they are teaching as one in which "*technological developments have influenced all spheres of life*", "*we are living in a new reality*", "*Israeli society has undergone change ...*", and "*the entire technological change that has occurred in the world, made people change as well. Just as it happened in the Industrial Revolution, people changed to other requirements and a different level of life ... for this reason ... the conception of the teacher must change*". It may be that contemplation of global reality as a society that is replete with technology and communication appliances will provide a way for a different insight (Shner, 2009; ChanLin et al., 2006) which leads to change in the conception of the role of the teacher in school.

The **positive positions** of the teachers in relation to the use of technology in teaching which is expressed on one hand in the reports on their usage of technological tools, and on the other hand by their understanding of the additional pedagogical value that they attribute to the use of these tools for the pupils, for the teacher and for the learning

process. The teachers showed a high level of identification with the details in the questionnaire, such as *usage of computers to increase efficient utilisation of study time*; *using the computer as a means for learning a new subject; directing pupils to use study programs for exercise and practice; good usage of the computer as another means of teaching; knowing how to encourage pupils to use the computer; able to explain to pupils how to use the computer; not refraining from using the computer in class even if this is made possible*. Support for this emerged in the interviews in which the teachers noted that the use of technological tools enabled better communication with the pupils even outside study hours (for example: personal attention, response and feedback for their work, etc.), alternative arrangements, variety in teaching methods, supervised learning (indicating information sources in their work), intensification of teaching and learning, rapid enrichment of knowledge, access to additional sources of information, facility in learning.

Some of the research participants referred to the empowerment they felt as teachers through the use of technological tools that allowed them to develop the world of teaching and learning beyond what they had known until today. The research participants noted that "*this is a comparison between a world of darkness and a world of light*", in which technology opened new worlds of another and better kind of teaching. The literature tells us that this experience is liable to influence the development of positive perceptions (Ahmad, 2011; Kay, 2006; Abbott & Faris, 2001), and the perceptions of teachers (Ertmer & Ottenbreit-Leftwich, 2010; Fullan, 1992; Leung, Watters & Ginns, 2005). From this, the supposition arises that the experience of many years (5-20 years) in teaching in a technological learning environment in which every student and teacher has a personal laptop, has produced a positive stance in the educational conceptions of the teachers and in their methods of activity in the classroom. From the research literature it appears that teachers who adopted such teaching conceptions were more active in applying computerisation as compares with those who held traditional approaches to teaching (Ertmer & Ottenbreit-Leftwich, 2010; Judson & Rozenblit, 2005; Totter, Grote & Stutz, 2006; Zhao et al., 2002; Rotin, 2000).

With regard to the second research question: **What are the characteristics of the Generation Z pupils that obstruct or facilitate change in the conception of the role of the teacher?** The research findings show that how participants percieved the

characteristics of the pupil generation was found to be a leading factor in the their conception of their own role. The findings of the present research indicate that teachers perceive a series of negative traits in their pupils such as hyperactivity, easy of distraction and propensity to be bored, take less interest, use different and poorer language and lack patience. They also perceive a number of positive traits in their students such as rapidity and attachment to and competence in the use of technology. These descriptions resemble Prensky's (2001a) description of the "Digital Native".

Teachers perceptions of the characteristics of Generation Z were central to the way in which they believed that they needed to develop their practice. The participants emphasised the need to interest students and to be attractive "*like the magician that pulls rabbits out of a hat*" and for the school and the teachers to act "*at the touch of a button*". Participants perceptions align with Prensky's (2001a) claim that the the old approach (of didactic teaching) is not suitable for the intellectual, social and motivational sensitivity and needs of the new generation.

As a result of this, a discussion has arisen around the issue of whether technologies should be integrated with teaching (Dillenbourg, Scheider & Synteta, 2002; Levin, & Wadmany, 2006) in order to adapt teaching to the pupil generation and to the technological changes in the world. Although some have claimed that the relationship of this generation to technology is complex, that the use of technology does not correspond to the expectations of this generation, and was not found to be necessary for learning among youngsters (Bennett, Maton & Kervin, 2008; Czerniewicz & Brown, 2010; Jones, Ramanau, Cross & Healing, 2010; Salajan, Schonwetter & Cleghorn, 2010; Thinyane, 2010; Waycott, Bennett, Kennedy, Dalgarno & Gray, 2010), there are other studies that have reinforced the perceptions of teachers and shown that technology occupies a significant part of the free time available to children and youth (Ben-Refael, 2006). This includes personal communication and constant engagement with the mobile phones which have become a basic fixture in the social lives of young people (Thinyane, 2010). The research findings strengthens the claim that very use of technology is relevant for the pupils and can even be seen as a real necessity for teaching this generation (Blair, Millard & Woollard, 2014; Palfrey & Gasser; 2008; Gibbons, 2007; Rainie, 2006; Underwood, 2007; Zevenbergen & Logan, 2008; Tapscott, 2008; Prensky, 2001b). This means that it also becomes a realistic factor in the new conception of the teacher's role.

The research participants noted that the use of technological tools was vital for giving concrete examples through which the other senses of the pupil would be stimulated in unexpected ways. They even claimed that sometimes the technology makes all the difference between understanding and not understanding through the digital interactive exemplification of an abstract concept. Mouza (2008), the supervisor responsible for technology and estimation in the education system, confirms this in his claims that as a result of these usages the pupils do more homework, and that due to the tools given to them, their work is of a much higher quality level than what they used to produce.

Moreover, it was found that the research participants believed that they needed to adapt their learning to the individual pupil. Unless this was done there would be serious difficulties in the class; to allow the pupils to learn at home at their own time and convenience; to adapt learning to the level of the class, otherwise they would not carry out the assignment; to link the learning to the daily lives of the pupils and to interest them because of the low level of attention, otherwise they would "lose" them. This echoes the research of Hwang, Shih & Chu (2011) who found that pupils were liable to lose interest in learning and that the level of their achievements would be impaired. This means that it is necessary to integrate technologies with teaching, to interest the pupils, and to adapt the role of the teacher to the new technologies and to the characteristics of the pupils.

To sum up, the research findings indicate that participants perceived a difference between the role of the technology teacher and the role of the traditional teacher and believed that they needed to become technology teachers. They saw both technological change and generational changes as driving this need to reimagine their role.. The technological developments and the global changes are not in themselves the motivations and the demands for change in the conception of the role of the teacher. Influences on the pupil generation have an indirect and even direct influence on teachers and how they think about their role. In the era of the computer, information and communication technologies, an essential change is required in the conception of the role of the teacher who integrates technologies with teaching, and in which the teachers stand at the centre of the teaching process and the pupils stand in the centre of the learning process, while pedagogy constitutes the heart of the process (Cohen & Omer, 2012; Melamed & Salant, 2010).

## 5.2 The role of the technology teacher

The most interesting findings were received in relation to the third research question: **What roles, abilities, and skills are required so that the teacher can integrate technologies with teaching?** Three main dimensions were identified in the new conception of the role of the teachers: the Pedagogical-Cognitive dimension, the Interpersonal-Motivational dimension, and the Technological dimension. Also identified were eleven skills and abilities most required for the technology integrating teacher as follows: Knowledge of learning theories of the pupils; Skills that create change processes; Skills for working in groups; Knowledge in the field of learning; Skills in estimation and feedback; Skills in conducting discussions; Knowledge in the field of integrating technologies with teaching; Skills in estimating the needs of the pupils; Skills in setting rules; Technological knowledge; Skills in the field of technology.

In the **Pedagogical dimension** teachers claimed that the main work of the technological teacher was transferred to the home in the form of lesson preparation. They referred to the elements of time, quality and suitability of the material required for preparing the lesson schedules in comparison with the traditional teacher. The preparation of a lesson that integrates technologies with teaching requires skills in searching for the appropriate study materials both for the study program and the subject of the lesson relevant to the level of the pupils and of the class. The research participants claimed that the pupils lacked motivation in learning and they had to adapt the learning to the pupil. In this connection, the participants tried to find relevance to the lives of the pupils and the need arose to construct lesson systems that would have some connection with the daily realities of the pupils (Levin, & Nevo, 1997). This attempt by the teachers may be attributed to their awareness that the more the pupils felt that the subject being studied was relevant to them, the more they were interested and capable of creating significant connections with it, which improved their ability to understand the material. In this connection, Avargil, Herscovitz & Dori (2012) in their research recommend a teaching approach that relates to the everyday problems of the pupils, which focuses on learning concentrated on the pupil with the aim of making it relevant to him and arousing his interest. Technologically-supported learning can create a typology for different purposes that can be useful to pupils in their future career development. And the growth of

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computer gaming is one of the key technological trends that is likely to influence the practice of career development (Hooley, Hutchinson & Watts, 2010).

Another finding concerns the importance of organising the lesson structure. The research participants repeatedly claimed that in classes that integrate technologies with teaching ("computer notebook"), in which the pupils "*spend many hours facing their personal computers*", it is important to have a planned and well organised lesson structure, i.e. a divided lesson that allows for frontal teaching and the presentation of the lesson subject, individual or group work by the pupils with their personal computers, and a summary of the outputs at the end. They also stressed that the organisation and division of the lesson makes it possible to provide variety and interest in learning. This finding is in accord with the findings of other studies that claim that the field in which the contribution of technological integration is regarded as its highest level lies in the pedagogical conduct and efficient organisation of the lesson (Inbal-Shamir & Kali, 2009; Meishar-Tal, 2012).

In accordance with the diagnosis of Tondeur, Valcke & Van-Braak (2008) on the adaptive aspect in the planning and preparation of the lesson and its aspect of balanced and controlled management, the research participants claimed that they laid emphasis on the presentation of the subject and the aims of learning, defined the criteria for estimation and encouraged the pupils to work, and searched for information through the Internet, while they went the back of the classroom, circulated among pupils to supervise the process of learning during the lesson and to direct it. This capability was found to be related to the teacher's estimation of his ability to plan, organise and apply the methods required for the achievement of educational goals, and for their organisation and application (Skaalvik & Skaalvik, 2007).

In this connection, the research participants described the flexibility during the lesson in response to the questions of the pupils and their needs that arise in its course. They also described the different learning activities with the same study program by different teachers and sometimes by the same teacher in different classes. These descriptions strengthen the claim of Grossman and Thompson (2008) that teachers undergo a process of constructing pedagogical knowledge through their encounter with learning materials. They also strengthen other studies that note the importance of introducing computerisation (Ittigson & Zewe, 2003; McGehee & Griffith, 2004; Baya'a & Daher, 2010), which contributes greatly to the process of teaching and learning, allows for

flexibility and variety (Lewin, Somekh & Steadman, 2008; Wall, Higgins & Smith, 2005) and for change and improvement in the teaching methods for different classes (Locke & Latham, 2002; Jones & Vincent, 2010). But it should be remembered that this accessibility and flexibility presents a new challenge in the conception of the role of the technological teacher.

Another finding referred to the importance of <u>estimating the outputs of learning</u>. The findings indicated that it was important for the teachers to follow up and estimate the performance of the pupils and to be skilful in estimation and feedback. The research participants claimed that they were capable of helping the pupils to estimate their own learning by themselves and of involving them in evaluating their work. The outputs of learning by the pupils were presented in the class and received the estimation of the teacher and the estimation of the other pupils during the course of the lesson and afterwards. The estimation of learning outputs is associated with external motivations for learning, with activities that aim at achieving a specific result (Ryan & Deci, 2011). This makes learning more effective and prompts the person to persist in his concentration upon the performance of activities so as to achieve his goal (Adinit, Nuri, Karni & Waterman, 2012; Carlson, 2013).

In this connection, the teachers stressed the importance of rapid estimation and feedback for the work done by the pupils, a finding that received support relative to the perception of the characteristics of the pupil generation as one that lacked patience and was in need of immediate response and feedback for its work. Besides this, the research participants claimed that the demands of the education system to take conventional examinations did not accord with the demands of teaching in a technological environment in which, as they said, required an alternative form of estimation which assesses the learning process along with the assessment of the outputs (Clarke-Midura & Dede, 2010; Wortham, Barbour & Desjean-Perrotta, 1998). The awareness shown in the words of the research participants of the need for an alternative estimation necessitates consideration regarding the determination of defined and accepted criteria for an estimation that will allow for a comprehensive and realistic picture of what the pupil knows and is able to do in the field of knowledge.

At the same time, the teachers stress the need to be in <u>constant supervision and control</u>. They claim that they must keep watch and supervise the carrying out of class

assignments, otherwise "*you only have to turn your head, and they are already surfing the websites ...'; "... the temptation is very strong. They refrain from doing other things, they want to play on the computer and to download programs during the lesson... this is tempting*". In addition, the teachers claimed that they were required to direct the pupils in critical reading and the sifting of information sources used in their work. The research participants stressed that in order to educate the future generation, they must direct and instruct, control and keep watch over the use of this media. As it is noted in the research literature, the teacher has to teach and educate for good behaviour and less cheating in learning which has accelerated among this pupil generation (Grieve & Elliott, 2013; Jones, 2010; Thomas & Zyl, 2012; Gross, 2011; Blau, 2011). Since the Internet offers a wealth of information at the touch of a button, there is a need for abilities and skills in critical reading, analytical skills, and problem solving skills of the teacher himself, and their transmission to the pupils (Woollard, Wickens, Powell & Russell, 2009). It is recommended that future research should examine whether the technological teacher has the abilities and skills required for this and what is the appropriate training that he will need.

In view of the findings of this research, in connection with other theories and studies, and with the aim of sharpening the examination of the role of the technological teacher, one can define the Pedagogical dimension as related to teaching and learning; the shaping of the learning environment; the use of various methods and strategies; to be clear and organised; to plan and prepare in advance; to be flexible during the course of the lesson; to be capable in the teaching sphere (professional expertise of the teacher in the study material); to be responsible for supervision and control over the learning process; to be trained in the mediation of knowledge and the construction of knowledge; to enable access to a variety of information sources; and to provide estimation and feedback for their work.

**The Interpersonal-Motivational dimension** is measured by the ability of the teacher to direct and guide the pupils, to calm them and make them follow the rules of behaviour in the class. The teachers showed a high degree of identification with the following statements from the questionnaire: "*I am able to influence the motivation of pupils who show little interest in learning*", "*I can calm a pupil who disturbs or is noisy in class, and make the pupils follow the rules of behaviour in class*", and "*I am capable of persuading pupils to believe*

*that they can succeed in their studies*". In this connection, the personal capabilities of the teachers are defined in the research literature as the level of confidence that the teacher possesses regarding his ability to help the pupil to learn (Gurvitch & Metzler, 2009), and the sense of self-confidence is dependent upon the teaching and management on the class from the professionally applied and personal aspects (Friedman & Kass, 2002) and from the emotional skills of the teacher which are perceived today as vital for his professional effectiveness (Stronge, Ward & Grant, 2011; Jones, Bouffard & Weissbourd, 2013).

One of the research findings concerned the <u>figure of the teacher</u> and his role in transmitting values. Ever since the establishment of the education system, it was expected that the pupil would develop (beyond family and home influence) in the imitation of the teachers, in the idea of "a wise man learns from every man", without negating himself and his own creative powers (Shner, 2009). Even in these days, there is no disagreement about the fact that young people search for models to imitate, and perhaps one of the duties of the teachers is to encourage them to transfer their object of imitation from the fictive movie figures or other figures from the music world to those of the spiritual and educational world, but this is not an easy process. Despite this, the teachers participating in the present research noted the high importance inherent in their role of being a personal example and a model for imitation by their pupils and their role in providing them with social, family and environmental values, which are gradually disappearing in the world. The emphasis is on the personal skills required for this purpose and on their desire to awaken the awareness of their students with respect to moral issues (Klaassen, 2007; Kidder, 2005).

One of the main arguments that arose in this research was that new and updated technological tools are part of the life of the teacher and pupil, and that their integration in the processes of learning brings <u>enjoyment into the lesson</u>, creates interest, and helps the pupils to retain what they have learnt. This argument is associated with inner motivation and the carrying out of activities for pleasure (Rosenberg, 2010; Waks, 2000; Spitzer, 1996). The research findings show that teachers perceive that participants exhibited certain characteristics (such as being easily bored) and that they believed that this requires enjoyable and stimulating learning during the lesson alongside the accessible technological environment which even demands this kind of learning experience. Similarly, Pimentel (1999) asserts that when the process of learning is carried

out in an environment based on computer communications, an enjoyable experience of learning is especially important as part of the learning process. That is to say, technology makes it possible to have an enjoyable learning experience and effective learning (Alghazo, 2006; Shapka & Ferrari, 2003; Gruper, 2010), and the very insertion of technologies into the education system constitutes a trigger for increasing the range of pleasure in learning (Ma, Wan & Lu, 2008). Furthermore, the research participants claimed that pleasure in a lesson strengthens the relevancy of the teacher in the life of the pupil, the pupils show their appreciation of the teacher when they enjoy learning something, which strengthens the teacher, his feelings and the significance of his role for the pupils, a significance that encourages a change in his conception of his role. The research participants also claimed that the subject of enjoyable learning is not discussed at all in traditional teaching, while it constitutes an essential basis for significant learning in his new conception of his teaching role.

In addition, Nir-Gal (2002) raised the obligation of the teachers to pay attention to the personal-sensitive needs of the pupil, and Levi (2010) stresses that the technology of the 21st century constitutes a vital component for narrowing the gaps in education, yet it apparently takes second place to the personal link between teacher and pupil, to love, amity, and friendship. These findings were found to be in accord with the findings of this research that raises the importance of the personal ties and attitude of the teacher towards the pupils, which contributes to learning motivation. The research participants claimed that it was important for the teacher to be enthusiastic and involved in learning, to consult with the pupils and have the skills in estimating their needs, in the belief that "*a child who feels good is also open to learning*". This claim is instructive about the influences of the teacher's characteristics and his social and emotional skills in creating a positive and healthy class atmosphere (Jennings & Greenbery, 2009; Velayutham, Aldridge & Afari, 2013; Anderson, 1982) in a technological learning environment. Thus, stress was given in this research to the importance of class fraternity, "unit pride", and the positive social atmosphere in the "computer notebook" classes, both in the interviews and in the analysis of documents, such as: "*Even during recess, the pupils remain in their classrooms*". Davidovitch (2009) claims in her research that the more the social and learning atmosphere contains supportive and personally interactive social elements, the more will the perception of self-confidence be strengthened.

While the research conducted abroad lays stress on the social dimension which constitutes an inseparable part in the creation of a learning atmosphere, and was found to be of considerable weight in fostering successful learning and pupil achievement (Samdal, 1998, Katz & Aspden, 1998), the findings in this research show that there is no reference to this aspect. Moreover, the importance of the attitudes and feelings of the pupils towards the social environment in which they are studying includes a sense of belonging and social relationships did not raise the issue whether they constituted a significant cause for producing achievements. Moreover, the research participants claimed that they are "*unable to examine the achievements of the pupils in relation to other classes, and that there is no control group to examine the achievements obtained*". This is an interesting find in view of the extensive literature that has been published in recent years which suggests seeing computerised learning environments as social environments in which the social component is a decisive one for successful learning in them (Mojavezi & Tamiz, 2012; Reyes et al., 2012). It is therefore recommended to continue conducting comparative studies in which the social climate of study in the "computer notebook" classes will be examined for their influence in other connections.

In view of the findings in the present research in connection with other theories and studies, the Interpersonal dimension was measured at several levels. At the level of interaction, the level of personal attitude, and the level of motivation. This dimension was examined in relation to the connections between pupils and teacher, and among the pupils themselves. In view of this, the Interpersonal dimension may be defined as relating to the issues concerning human relationships between pupils and teachers; to the social aspect and enjoyable learning; to the ability to identify the needs and feelings of the pupils and to persuade arouse interest; to encourage and motivate learning; to be involved with the pupils in the learning process; to serve as a model for imitation and a personal example, to educate for values.

The **Technological dimension** is measured by the characteristic usage of technological tools and by the exposure of the pupils to the inherent capabilities of these tools. The abilities and skills mentioned by the research participants as those required from the technological teacher are technological knowledge and technological skills, but the demand for understanding computer networks, for skills in dealing with technical

problems, and knowledge about hardware were not found to be required in his role as teacher.

The first challenge that faces the teachers is to become familiar with the technological tools at their disposal and to find a way to integrate them in an efficient manner within the teaching process (Levin & Fullan, 2008; Hew & Brush, 2007; Lih-Juan et al., 2006; Kanaya et al., 2005; Hernández-Ramos, 2005). One of the factors that has had a significant influence on the integration of technologies in teaching is the increasing computer skills of the teachers and the sense of readiness to integrate technology in teaching (Armenakis, Harris & Mossholder, 1993; Levin & Fullan, 2008). This was how the teachers participating in this research described the supplementary studies and courses they took in order to acquire basic skills in integrating technologies with teaching, and the attempts they made in the field to integrate these technologies in their classes. They said that they even discovered this to be useful for their work as teachers. The teachers want to feel comfortable with technology before it is integrated (Snoeyink & Ertmer, 2002), and control in computer skills constitutes one of the dimensions of success in the computerisation program (Department of Science and Technology, Ministry of Education, 2013; Naraian, Brown & Navarro, 2011).

The claim raised in the research literature was that whenever the advantages and disadvantages inherent in the use of advanced technological means for educational purposes are examined, it is necessary to question the aims and goals of education, and to see whether the possibility exists of utilising the help of technology in order to advance these goals (Linn & Eylon, 2013; Scalise, 2012). Likewise, the participants in this research claimed that the correct and appropriate integration of technology can contribute to a dynamic, interesting and effective process, but it should be remembered that pedagogy leads this process, and that "the computer is not a replacement for the teacher", that technology should be integrated only where it can contribute significantly and not merely because of its availability.

With regard to the continuation of the third research question that concerning the patterns of usage of the technological tools by teachers, mention was made of the use of these tools by the teachers; the use that the teachers required the pupils to make with these tools; and the contribution that the use of these tools made possible to the process of teaching. The reports referred to the details about technological tools; to their physical

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use in the classroom; to their use in communication with the pupils; to the pedagogical uses in various parts of the lesson; and to the uses in the learning process. In this connection, Insung (2001) divided the changing characteristics of teaching into a) the characteristic of expansion, which relates to the use of a variety of sources in general and to multimedia in particular; b) the characteristic of adaptation, which expresses the response to the needs of the pupil and to the different styles of learning (as discussed in the section on the Pedagogical dimension); c) the characteristic of visual layout.

The research findings show that 80% of the teachers use the computer for personal usage and noted the variety of technological tools they integrated into their teaching as well as the advantages inherent in them. For example, tools such as laptops, interactive boards, displays, animations, digital books, film strips, etc. were used during the lesson for various purposes such as the projection of displays, to film pupil outputs, for access to a variety of information sources, to build games, to expose the pupils to the capabilities inherent these tools, etc. As noted in the research literature, the use of a variety of tools has became an integral part of class teaching and not merely an extraneous matter (Kent, 2004a, 2004b). The research participants also noted that the usage required of the pupils was for exercises and practice at home, for computerised assignments and revisions of the material, to prepare displays, to save files, etc.

On the other hand, when the teacher has to integrate technology with pedagogy by developing computerised assignments and uploading programs into the school website, the percentage is reduced (less than 55%). The teachers claimed that they found it difficult to create computerised assignments by themselves, they did not know how to upload them to the school website, were in need of support and guidance, and generally used ready made assignments and computerised materials, "*There is no need for every teacher to invent the wheel once again ... there is a lot of prepared material available*". This is despite the claim that "*...unfortunately even if there are ready made study units prepared by the Ministry of Education, they are not always suited to the level of the class in pace and content, and therefore it is difficult ...*".

These findings support previous studies which found that the initial application of technological teaching is basic and is integrated with existing learning activities (Shamir-Inbal, Dayan & Kali, 2009). Moreover, the way in which it is integrated, preserves traditional pedagogy (Ilomäki, 2008), as a means to give variety to existing methods of

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teaching (Zhao, Lei, & Frank, 2006; Kozma, 2005; Kozma, 2010) as well as aspects of accessibility to information and study material in the Internet (Ertmer & Ottenbreit-Leftwich, 2010), and less on advancing the application of technological and pedagogical innovations (Abd El-Gawad & Woollard, 2013; Ben-Zadok, Nachmias, & Mintz, 2006).

The present research also found a low percentage (40%) in the use of cooperative tools in the Internet, which means that teachers refrain from using these Internet tools. In addition, it showed how difficult for teachers to initiate and support interactive discussions, their negative attitude towards the preference of pupils to join tables together in the classroom (to work in pairs or threes at the most), and the demand that pupils meet face to face to carry out research work. These findings do not accord with the constructivist theory and with the findings of other studies (Sherry, 2000; Alzahrani & Woollard, 2013; Gilbert & Nir-Gal, 2003, cohen, 1999) which testify to the importance of using cooperative tools in the Internet. They do not accord with importance of interaction among pupils and between pupil and teacher (as was found in the Pedagogical and Interpersonal dimensions), and do not even accord with the potential possibilities with the personal laptops that are available to every student and teacher (Salant, 2011) in the "computer notebook" classes.

From the research findings it appears that confirmation was given by the research participants concerning cooperative learning and cooperation in the Internet as a technological tool, which strengthens the Interpersonal dimension in creating a learning atmosphere that would lead to success, the Pedagogical dimension in training independent pupils, and the Technological dimension as a powerful tool to encourage fruitful study. Thus, the claim was made that: "*There is a mutual fruitfulness among pupils through cooperative learning, fruitful forum discussions in the class by means of film strips and displays, and the pupil turns into a creator, researcher and rhetorician. There are constant innovations in the methods of teaching*". This allows the teacher himself to create teaching activities in accordance with his pedagogical needs and to enrich and vary his work (Shamir-Inbal & Kali, 2009), as a means for encouraging active learning, immediate feedback, and a better connection between teachers and pupils (Chickering & Ehrmann, 1996; Davidovitch & Soen, 2011), and the pupils are also given the opportunity to be active and to create knowledge from the information. However, in actual fact, the teachers in this study refrain from using this tool. Thus, a relationship was

found between the findings in this research and those that were received from other studies which indicate that a gap exists between the declarations of the teachers and their actual activity in the classroom (Nir-Gal, 2002; Calderhead, 1996; Ertmer, Gopalakrishnan & Ross, 2001; Fang, 1996). On one hand, the research participants noted the importance of cooperation, mutual fruitfulness, the abilities inherent in the cooperative tools and their contribution to teaching and learning, but on the other hand they refrained from using this tool in their teaching, and even claimed that "*not cooperation specifically ... cooperation is not always the motto*". It is therefore recommended to continue conducting extensive research in which the influence of the usage of cooperative tools will be examined in other connections and that future studies should not only be based on personal reports.

A number of explanations may be assumed for the low rate of usage in cooperative tools in the Internet: One of them can be derived from a wider perception of the concept of cooperation in which the pupils join a social network of the teachers, although the education system in Israel limits the teachers in cooperation and friendship in a social network with the pupils (Director's Circular, 6.1.2013). Another explanation could be that the concept of cooperation on the Internet was not sufficiently clear, and the teachers treated it as the synchronic or a-synchronic performance of lessons that were not included in the researched class. A further explanation could be that the greater the interaction required for the activity the lower the frequency of the use of this tool (Meishar-Tal, 2013; Van Braak, Tondeur & Valcke, 2004; Eshet, 2012; Blau, 2011). The research participants described the failed attempts to work with cooperative documents in the classes and explained that: "*because the children abuse other children, take the cooperative document and erase things, and this does not always succeed*". These attempts led to a lack of motivation and wish to integrate cooperative tools in teaching. From this it may be said that perhaps the teachers lacked the required skills in the efficient usage of the cooperative tool.

In this connection, the research participants asserted that they were obliged to continue with professional training, learn how to use new technological tools, and develop their abilities and the abilities of their pupils so that they would be able to promote their future advancement, otherwise the tool will "*lose its value*". This realisation may be of help in

deciding how to train teachers to make efficient and effective use of the technological tools at their disposal in the processes of teaching and learning (Cochran-Smith, 2004a).

Consequently, the findings of this research suggest that a conceptual change exists in the role of the teacher in different dimensions but at different levels of integration for each dimension. Moersch (2010) and Dwyer, Ringstaft and Sandholtz (1991) noted the different levels of integration, and the findings of this research showed a certain correlation with these levels. In the interpersonal dimension the teacher is found at the high level of expansion and refinement, the level of invention. The teacher serves as a personal example and a model for imitation, allows for enjoyment during the learning process, strengthens personal ties, and promotes class fellowship in learning.

In the pedagogical dimension, the teacher is at the intermediate level of exploration and infusion, the level of adaptation and appropriation. The teacher works hard in preparing interesting and suitable study materials before the lesson, but finds it difficult to construct computerised study units, and feels inadequate. The teacher organises and plans the lesson structure but maintains the traditional frontal style of teaching. He is flexible during the course of the lesson in response to the questions of the pupils and the subjects that interest them, but this flexibility imposes a new challenge in his role. He estimates their learning output and encourages them to work and find information by themselves, yet "Alternate assessment" is not yet in conformity with the demands of the Ministry of Education. He supervises and controls the learning process in a computerised environment, but still does not have confidence in his skills and abilities for doing so.

In the technological dimension, the level of integration was even lower. The teachers were still at the level of awareness and exploration, that is to say at the level of adoption. Despite the integration of technologies with teaching, it seems that the innovative method of conception of the role of the technological teacher is not yet fully realised, and the use of computer technologies in teaching does not ensure the realisation of it inherent potentiality. Most of the teachers use technology as additions to the existing forms of teaching and learning and do not apply a deeper change that could lead from traditional teaching to technological teaching that would allow cooperative learning that also occurs outside the framework of lessons in the classroom.

## 5.3 The pupil in the centre of the learning dynamics and the role of the teacher

The components of the pedagogical, interpersonal and technological dimensions are related to the fourth research question: **What is the most efficient approach to teaching that facilitates the integration of technology with teaching for Generation Z pupils?** Yet the placing of the pupil in the centre of the learning dynamics poses new and additional demands on the role of the technology teacher.

The findings of the research were found to be in accord with the constructivist approach. In this approach teachers attend to the construction of knowledge, while responding to the differences between pupils, to the relevancy of the study programs, and to the follow up of learning progress for every individual in the group (Weiss, 2010). One of the main finds in this research is the **placement of the pupil in the centre of the learning dynamics**. The findings indicate the importance that teachers give to the centrality of the pupil in the teaching process and his dominance in the learning process, while the teacher in a certain sense "moves aside". Moreover, the research findings show that significant learning, independent study, dominance in the learning process, autonomy of the pupil, active trial and error experience, a pupil who investigates and develops unique outputs, responsibility of the learner, and self-motivation, are all the basic cornerstones for a new conception of the teacher's role.

Salomon notes that information technologies bear an enormous potentiality for significant learning and the development of **meta-cognitive** thought in particular (Salomon, 2000). The research participants described approaches to teaching and learning which support this contemporary view and differs from the classical view of Piaget (Piaget, 1948, 1974). According to Piaget, the cognitive ability of children depends on the developmental stage in which they are found. By contrast with this, the contemporary view regards cognitive development as more varied (Kuhn et al., 1995; Siegler, 1989, 1996; Rimor, Wadmani, & Rozner, 2006). Children at every stage of development hold different thinking strategies at the same time but make use of them at irregular frequencies. The research findings exposed the understanding and recognition of the **different mentalities** of the pupils and the response to this through various learning strategies and estimations, and through variety during the course of the lesson that allows for the adaptation of pupils with different learning styles and areas of strength as can be found in the research literature (Abd El-Gawad & Woollard, 2010). The teacher

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allows the pupil himself to choose the subject to be researched, how to research it, which sources of information to use, how to present his work, and what technological aids to use, in an individual style of teaching. This means that the new conception of the role of the teacher adapts learning to the pupil through relevance, recognition of mentality differences, and the choices given to the pupil.

Salomon also adds that the availability of rich and varied hyper-textual databases and accessible global communication can be a fertile soil within which learners can create their own knowledge (Salomon, 2000). From the research findings it can be seen that the role of the teacher is to learn how to use this extensive information and to train **independent learners** who have the ability for the active construction of knowledge, for significant learning, and to develop capabilities that will allow them to cope with the challenges of life in the 21$^{st}$ century, as mentioned in the school constitution. The research participants stressed that they use a "guiding hand" in the classroom, directing the pupils to set learning goals for themselves and steering the learning process, but their activities are only "behind the scenes". This means that the new conception of the role of the teacher places the pupil in the centre of the learning dynamics, based on a process that is intended to encourage, direct and support independent and sustainable learning, for the self-realization of the pupil, and for significant learning in the future as well.

In the same context, a growing number of researchers believe that the **experience of trial and error** has a very important function in advancing **cognitive** processes (Efklides, 2002, 2006, 2008; Koriat & Levy-Sadot, 1999; Carver, 2003). One of the claims made in the present research was that a pupil who is actively engaged in the process of learning, involved and creating material by himself, researching and developing unique outputs, will also remember what he searched and wrote. The research participants described the process of "research work" by the pupils which was carried out in cooperation among pupils and contributed to their development in learning and to the application of the knowledge and abilities they acquired in the future. This implies that "learning by making" serves as a scaffold for pedagogical construction (Grossman & Thompson, 2008). It may be said in this connection that the teachers relate to the process of acquiring knowledge through awareness, stimulus and interest; the processing of information through planning, processing and creativity; and the application of knowledge through

independence and control by means of active thought processes (Cam & Geban, 2010; Shamir-Inbal & Kali, 2009).

Even though the synthesis and construction of knowledge as described above is perceived today by theoreticians in the field of education and cognitive psychology as vital processes for the significant processing of information (Ben-David, 2012), the research findings indicate that the construction of knowledge is still confined to the hands of the teachers and its transference to the pupils has not yet been achieved. The teachers continue to be in charge of organising the material, filtering it, and preparing it for the pupils, which shows that the conceptual change in the Pedagogical dimension is still incomplete and therefore is not essentially a real change. This finding does not accord with those of Fulton and Turney-Purta (2000) which indicate that the use of information-intensive assignments in technologically rich classes may constitute a natural and efficient framework to increase the responsibility of the pupil for his own learning and turning him into a person of independent motivations based on the trust that teacher gives to his ability and knowledge (Hativa, 1997, 2003). The essential conceptual change will be realised the more the use of the tool of Internet cooperation is increased and broadened, the signs of which can already be seen in the field. Teachers can then treat technology as a well-based source of information which serves as a means for the construction of knowledge and a cognitive tool (Amdor, 1996) in the process of learning that is intended to develop cognitive thought processes and raise the range of learning to a higher level (Rimor, Wadmani, & Rozner, 2006; Glassner, Ben-David et al, 2011).

We may sum up by saying that the perception that arises from this research is in accord with the new conception regarding the position and role of the teacher and the position and role of the pupil, and leads to the theoretical consolidation of a new paradigm which includes the following:

a. Increasing legitimacy for the whole person development of the pupil (Elliot & Morris, 2001), which leads to the recognition of the multiple intelligences of the individual and the development of cognitive and non-cognitive spheres of knowledge (Gardner, 1993).

b. Encouraging knowledge to be developed from the daily life of the pupil, and the practical aspects of the knowledge he encounters, as well as giving less weight to abstract and theoretical knowledge (Alberta's Commission on Learning, 2004).

c. Encouraging the acquisition of knowledge through personal study and the development and perfection of this knowledge in such a way as to allow for the continued expansion of knowledge and the creation of new knowledge (Cheng, 2005).

d. Transition from the spheres of traditional knowledge towards the increasing legitimacy of a wide variety of knowledge spheres and even to the development of interdisciplinary knowledge through the estimation of the learning process and not only its outputs (Passig, 2005).

e. Increasing realisation that the teacher, among his other roles, is a kind of 'facilitator' who directs the consolidation of the pupil's knowledge from a few sources and supports him instead of being the central or sole authority for knowledge (Cheng, 1996c; Cheng, Chow, & Tsui, 2001; Cheng, Mok, & Tsui, 2001).

f. To create real change in the methods of teaching in the classroom – from a focus on the teacher to a focus upon the pupil (Cuban, Kirkpatrick & Peck, 2001; Webster & Murphy, 2008).

This paradigm was found to be in accord with all the findings of the present research that testify to the new conception of the role of the teacher in class concerning the variety of teaching methods, the mediation and direction of learning, the concentration and focusing of the pupils in learning, the flexibility of the teacher during lesson time, all of which allows for adaptation and learning according to the questions posed by the pupils, the improvement of the learning performance and the broadening of knowledge among the pupils, the accessibility of study materials, etc. These are in accordance with the research of Fullan (2011), that the use of technological tools provides for significant learning which is relevant to the world of the pupil, encourages activity and creativity, promotes active cooperation among the pupils, which allows for learning that is adjusted in consideration of the differences among pupils, relieves those who find difficulties in learning, and invites further research. The research findings indicate that the new conception of the teacher's role leads to the placement of the pupil rather than the teacher in the centre of the learning dynamics and educational activity.

## 5.4 Challenges and barriers in the application of the new pedagogy in a technological learning environment:

One of the claims often heard was expressed in a survey conducted by CET - Centre for Educational Technology (2010) was of a feeling that the education system was in need of backing for the subject of technological education and preparation for life in the realities of this age of information technology. The introduction of technological equipment into the education system at a given point in time was in response to the developments of technology and the changes in the characteristics of the pupil generation in the short term. But in the long term new problems were created that were more serious and were not expected by the Ministry of Education, the initiator of the computerisation program, which acted within a very well defined space and time and did not understand the larger picture. This picture included information derived from the work of teachers who integrated technologies with actual teaching in their study classes. The models for organisational change (Weisbord, 1976; Lewin, 1951; Kotter, 1996; Kanter, Stein, & Jick, 1992) stress the importance of establishing continuity and assimilating of change, a stage in which the organisation continues to support desirable behaviour, and at the same time, to deal with the difficulties that arise during the process of change.

In this connection, the research findings showed both conceptual and physical difficulties with which the teacher had to cope in his teaching, each reinforcing the other, and together delaying an essential change in the conception of the role of the teacher who integrates technologies with teaching in various dimensions. The difficulties included the lack of motivation in the pupils to learn by themselves and the need for encouragement in motivating the pupils to learn; the disadvantages of technology that does not encourage face to face communication; damages to verbal communication and the enrichment of language among the pupils which leads to difficulties for teachers in encouraging and conducting class discussions; difficulties in focusing the pupil in the learning process since the temptation of being in front of a personal computer during lesson time is very great. The teachers noted that the media portrays a perfect world to children in which the distant summit is unattainable; that the growing dependence upon technology often leads to situations in which technology comes at the expense of the pupil and his learning. These findings are given support in the extensive theories about the status of teachers that may influence the efforts to implement essential change (Armenakis, Harris &

Mossholder, 1993), and as asserted by Porras and Robertson (1992), change in the behaviour of the individual within an organisation is the core factor for organisational change, and the Ministry of Education should give this some consideration.

Besides the conceptual difficulties in integrating technologies with teaching, there were physical difficulties in the management of a technological class. An essential finding made during the research dealt with the existing gap between the expectations and demands of the Ministry of Education and teaching realities in the classroom, and with the use of technologies in teaching. This is reflected in the conventional texts required by the Ministry of Education; in the prepared study units offered (by the Ministry of Education) which were insufficient; in the lack of allocating time and payment for the development of computerised assignments; and the non-existent monetary compensation for expenses incurred by the teacher himself in the use of technology. The research participants described technical failures in communication and the Internet, and on the repeated breakdowns in personal computers; on difficulties in the supply of material; difficulties to locate problems among the pupils; and unsuccessful use of cooperative tools such as the interactive board. The experience of failure or lack of success can be a meaningful hindrance in perceptual change (Bauer & Kenton, 2005; Kozma, 2003). The teachers also noted that there were different kinds of technological equipment in different classes which made it difficult to acquire the skills for operating it, and a lack of support by a qualified technician who could deal with the technical difficulties that arise during the course of a lesson. These findings support the first dimension in the theory of Holt et al. (2007), the wherewithal of the individual for self-generated change, which expresses the measure of individual ability and skill to implement the change and carry out the required tasks during the course of implementation.

The findings show that there is a dissonance in the conception of the role of the teacher. While technology dominates the world and the school, the teacher himself does not fully control technological tools and in conducting a technological class, yet the pupil "*feels comfortable*" and has control over technology to which he born. Although the teachers allow the pupil to be placed at the centre of the learning dynamics, accepting and recognizing the technical abilities of the pupil and even being assisted by him during the lesson, these put the role of the teacher to the test and can even cast doubt on the status of the teacher and his indispensability (Shatz-Oppenheimer, Maskit & Zilbershtrom, 2011).

This **problem of uncertainty** was expressed also in the reference made by the teachers to the contribution of technology. In the opinion of the research participants, there is still no estimation or criticism of the Ministry of Education regarding the contribution of technology. According to them: "*the contribution of integration was not examined and there is no control group for comparison*". The professional literature reflects this uncertainty. Although many studies claim that technology has contributed to teaching, learning and achievements (Shamir-Inbal & Kali, 2009; Hargreaves, 2005), yet other studies show no clear evidence has been received that the insertion of information technology influences teaching or improves learning processes (Nikerson, 1997; Bereiter & Scardamalia, 2008; Salomon, 2000).

In this regard, the teachers noted that they believed technological development in schools would be halted by the Ministry of Education in order to estimate and examine its influences on the pupil, on learning, on the teacher, and on people in general. Uncertainty, which is linked in the mind of a person to change, is perceived as threatening, and opposition to change is not considered as a rational reaction but an emotional one, so that the lack of attention or understanding of this phenomenon may be one of the frequent causes for the failure to instil essential change in the conception of the teacher's role (Gujski, 2003). The literature, which deals with systematic changes of the first and second order, frequently describes system breakdowns and deep crises in the process of change (Katz & Piorko, 2006).

In connection with this, the claim was raised that the Education Ministry provides physical (technological) tools, but the teacher must learn how to use them through his own personal experience and investment of his time. In an organisation like a school that has ideological principles, in which the teachers work beyond the expectations normally accepted in their surroundings, they for the sake of the general good, both at the level of principle and at the higher moral level. The research findings present teachers who regard themselves as the symbolic representatives of collective values and believe in themselves and in their own strength in what is described as transformational leadership (Popper, 2007). Thus they succeed in changing their conceptions and adapting their teaching through personal effort and experience. These things are also connected to the final stage, the stage of stasis, in the three-stage model of Lewin (1951) in which, after the implementation of change, the new situation should be preserved by a balance between

the motivating forces and the delaying forces. At this stage, the education system must stabilise and assimilate the elements that have undergone change so that they become part of the fixed routine of the system. This is a stage which preserves the change and makes sure that they will endure for a long time, through carrying out a general estimation of the process and in drawing conclusions from it.

The education system and the school, which are required to support the teacher who integrates technologies with teaching, cannot swing between support and non-support as described by the research participants. On one hand there are supplementary courses, school guidelines, and class equipment which gives support to technology integrated teaching. On the other hand, the teachers feel that they do not have enough tools, the courses are not suited to the needs of the teachers, there is no investment in the personal development of the teacher, no good pedagogical or technological guidance, no programs for close consultation, and in effect no support for what the teachers need during their work. Studies have shown that faulty development, professionally unsuitable, constitutes a significant barrier to successful technological integration in schools (Kopcha, 2010). Confirmation for this can be found in the cognitive approach for implementing change (Ellis, 2001; Conti, 1989) which gives importance to the teachers' understanding of the change but requires the initiators of the change (the Ministry of Education) to focus also on leading the learning process in the school and the school teachers. The training of educators requires a variety of strategies in order to carry out study programmes in a way that will be easier for the learner (Rotin, 2000; Woollard, 2005; Ageel & Woollard, 2012).

The researchers stress the necessity of the stage of the establishment and utilisation of success (Weisbord, 1976; Kotter, 2007; Kanter, Stein, & Jick, 1992). The contribution of this stage was vital to the construction of a culture that encourages and strengthens initiative, the taking of risks, etc. It is not enough that the Ministry of Education publishes encouragement for educational initiatives (Ministry of Education, Director's Circular No. 5, 2014), when in practice it is not found to be open and sufficiently prepared to accept them. In order to realise this stage it is necessary to determine new patterns and to institute them with the help of formal and informal mechanisms.

It is furthermore recommended that exceptional importance should be given to the Action Research approach (McHugh, Groves, & Alker, 1998; O'Keeffe, 2002) which deals with

the processes of learning and continuous change in the organisation. Its point of departure is that planned change is a recurring process that does not begin and end in a single closed cycle, so that in fact the first change serves as the basis for further changes. Awareness of the required recurring process, together with the gap that was presented between the demands of the system and the difficulties emerging from the field and the support or non-support of the education system for the teacher who integrates technologies with teaching, makes it necessary to give thought to the means required for technological assimilation and training (Bell, & Gilbert, 1994). It is reasonable to suppose that if the education system supports the training of teachers and finds the right way to pave the pedagogical and technological path in the most consistent, systematic and suitable manner, a significant change may be expected in the characteristics of the role conception of teachers in relation to the integration of technologies with teaching and in accordance with the needs of Generation Z pupils within the next few years.

## 5.5 Conclusion

The research describes a process in which teachers who integrate technologies with teaching have undergone and are still undergoing. It presents three main factors that underlie the required change in the role of the teacher. Firstly, the **recognition** of the existence of a real gap between the conception of the role of the traditional teacher and the conception of the role of the technological teacher, not only because the technological teacher no longer stands in the stage centre of the class, trained in the transmission of the study material and of knowledge to the pupil, but by the fact that the entire structure of his role is completely different, and constitutes a basis for change in his educational conceptions.

Secondly, the global technological developments, the introduction of technologies into teaching, and teachers' perceptions about the significant changes in the characteristics of the pupils in contrast with those of previous generations, **are the factors that encourage and promote essential change** in the conception of the role of the teacher. In order to integrate technologies with teaching and to adapt the role of the teacher to the new conception, the teachers took supplementary courses, **acquired basic computer skills**, and began to integrate the technological tools with their teaching. But the research findings indicate a lack of satisfaction with the existing situation, and show that these measures are insufficient.

The new conception of the role of the teacher is focused on the **pupil** who is at **the centre of the learning dynamics**, his feelings, his motivations for and pleasure from learning, and the personal attitude given to him. **In actual practice**, centre of work was transferred to the home in the search for suitable, relevant and interesting material, while his role in the classroom was to direct, supervise and instruct the pupil in independent and investigative learning.

Alongside this, it seems that certain components of the pedagogical dimension such as lesson structure, preparation of materials for the pupil, responsibility for learning, etc. still retain the characteristics of traditional teaching. Also, the patterns of usage in technological tools and their integration as aids to teaching, prove that there remains a lingering adherence to the methods of traditional teaching, and no essential conceptual change was found in the integration of **cooperative tools in the Internet** and in the conduct of interactive discussions for significant group learning at a high cognitive level.

All these are reflected in the fact that the education system, which is required to encourage educational initiatives, to support the teacher who integrates technologies with teaching, was found to be without suitable response to the needs arising in the field. The education system did not suit the supplementary courses to the needs of the teacher nor did it provide guidance for the required technological pedagogy. It was not open enough to accept new educational initiatives; and did not even give any **response to the lack of certainty** regarding the necessity of technologies in teaching, its contribution to learning, to the pupil, and in general.

# 6. Summary, Conclusions and Recommendations

In trying to adapt to 21st century the education system needs to respond to change in the structure of the school, the teaching methods and the role of the teacher. This research is an attempt to map the influencing factors (whether positive or negative) on the changes in the conception of the teacher's role, the abilities and skills required for the technology teacher, the patterns of his or her usage of technological tools, and to understand in depth the conception of the teachers who teach Generation Z pupils in a technological learning environment.

The relevance of the present research derives from its examination of the conception of the role of the teacher who integrates technologies in comparison with the role of the traditional teacher. It considers these different conceptions of teaching in relation to the characteristics of the new pupil generation and argues that this is not just about the use of technology but also about the adoption of a constructivist pedagogy.

The research findings reveal three main factors that influence change in the conception of the teacher: a. Recognition of the essential difference that exists between traditional teaching and technological teaching. b. Expectations of the Ministry of Education and the introduction of technologies into teaching. c. The teachers' conception of the characteristics of the Generation Z pupils and the identification of its expectations from the teacher.

With reference to the first research question: **How do teachers conceive their roles in a technological learning environment in comparison with traditional teaching?** The research findings indicate that the recognition of the essential difference between the role of the technology teacher and the role of the traditional teacher which constitutes a vital stage in the process of change. The difference in conception relates to the extent to which the teacher is stage centre in the class and focused on the transmission of course content and knowledge to the pupil, but this is not all. The entire structure of the roles are different with regard to information sources; preparation and planning of the lesson; the structure of the lesson; the centrality and dominance of the pupil or the teacher, the role of the teacher; teaching style and methods; the teaching process and aims, and the pupil

in the process of teaching and learning. The recognition of this gap leads to a need to conceptualise the role of the teacher as a basis for the process of perceptual change.

The recognition, understanding and dismantling of the teacher's role into its components, provides a broad and fruitful field for the consolidation and realisation of constructivist teaching approaches. These constructivist teaching approaches which can be found in the present research, constitute an essential and necessary basis for change in the conception of the teacher's role.

With reference to the second research question: **What are the characteristics of the Generation Z pupils that obstruct or facilitate change in the perception of the role of the teacher?** The teachers participating in the research defined positive and negative characteristics for the pupil generation. Some of these characteristics included lack of patience, hyperactivity, interest only in themselves and their world, lack of interpersonal communication (face to face encounters), spending many hours in front of their computers, etc. Besides these descriptions, the teachers claimed that the pupils were born to technology, were familiar with it, and felt free in their usage.

The research findings show that teachers' perceptions of pupils' generational characteristics exerts considerable influence on how they see their own roles. According to the teachers, any teacher who did not adjust himself to the class and the pupil, enlarges the written text, is dynamic, moves about, uses his hands, varies the learning strategies, connects the study material with something relevant to the lives of the pupils, is interesting, allows for choice, etc. will experience very difficult problems in the classroom. The pupils do not carry out their assignments, do not learn, create disturbance and lose patience. The research findings also show that teachers feel that the pupil generation with its characteristics expect the teachers to change their approach and perception in teaching. The pupils expect the teachers to be attractive and interesting, to act 'at the touch of a button', to supervise and control their work like a 'policeman', and to lead the learning process with pre-arranged interest and variation.

In the ongoing encounter of the teachers with Generation Z pupils in a technological learning environment, a double learning process occurs between them of recognition and performance. Teachers felt that their pupils opens their awareness to new opportunities that require them to rethink their role. The teachers feel that the expectations of them

have changed. The education system which has introduced technologies into teaching, expects the teacher to integrate these technologies and to promote their use in teaching and learning and the new generation of pupils expects teachers to change their roles and their classroom conduct.

An important contribution of the present research is in the understanding of the variables that are involved and influence the teacher who integrates technologies with teaching. The identification and recognition of these factors enable the mapping of their force and influence in strengthening their adaptation.

With reference to the third research question: **What roles, abilities and skills are required so that the teacher can integrate technologies with teaching?** The research findings revealed three main dimensions in the role of the technology teacher: pedagogic, interpersonal (motivational) and technological. And eleven skills were identified that were required of the technology teacher: knowledge of learning theories for the pupil; skills that create change processes; skills in group work; knowledge in the teaching field; skills in estimation and feedback; skills in leading a discussion; knowledge in the field of integrating technologies with teaching; skills in estimating the needs of the pupils; skills in setting rules; technological knowledge; and skills in the field of technology.

In the pedagogical dimension, the centre of the teacher's work is transferred to the home to make preparations for the lesson which involves time, quality work and adaptation of materials. The teacher prepares and organises the lesson using a variety of learning strategies to interest the pupil, and then mediates and guides the learning process, placing the pupil in the centre of the learning dynamics, and supervising his work during the course of the lesson.

In the interpersonal dimension, the teacher serves as a model for imitation and a personal example, strengthens his ties with the pupil, advises, encourages learning, and enables the pupil to connect with subjects that interest him through personal choice. The teacher is flexible during the course of the lesson in accordance with questions asked by the pupil, and provides pleasure during the learning process.

In the technological dimension, the teachers has technological knowledge and the ability to integrate technologies with teaching. He uses technological tools, demands that the

pupils use a variety of technologies, and presents the advantages and possibilities inherent in them for varied, interesting and effective study in the learning process.

Most of the teachers in this study have adapted their conception of their role in response to the changes that they have experienced in relation to technology, its role in the education system and the changing expectations of students. They place the pupil in the centre of the learning dynamic, vary the teaching methods, spend many hours over the choice of study material and adapt lessons to the level of the pupils and the class, allowing for choice among the variety of options, using materials that are relevant and of actual interest to the pupil and to his world, directing, supervising and instructing, and focusing the pupil in the learning process, serving as a personal example and a model for imitation, advising the pupil, strengthening the personal bond and personal attitude towards the pupil, providing for enjoyable and significant learning, showing flexibility during the lesson in accordance with the questions of the pupils, trying to find a balance among the various technological and pedagogical tools, and are prepared to continue to become more expert in the use of the new technological tools that support pedagogy and the pupil as an independent learner.

These findings indicate that a comprehensive change has occurred in the approach to teaching in pedagogical, interpersonal, and technological activities. Yet, in the long-term this is still not a complete change. In general the teachers in this study claimed to be more constructivist and better at integrating technology than they actually were. The research findings showed that the teachers were in the process of integrating technologies with teaching yet were still not utilising the full potentials inherent in them. The pedagogic dimension involves the difficulties in the lengthy and unrewarded time for preparation. At the beginning and end of the lesson the teachers still make use of the traditional frontal teaching. They still tend to organise the material and its contents, and do not believe in the ability of the pupil to do this by himself. In addition, the teachers feel a lack of skill in supervising, controlling and developing assignments that link technologies with pedagogy. The recommendation is therefore to reexamine the training required of the teachers in preparing computerised material and in the skills needed for supervision and control in a technological learning environment.

The technological learning environment and the conception of the role of the teacher in this environment strengthens and stresses the possibilities that the new technology offers

us including the tools that facilitate online cooperation. Creation of social learning and the encouragement of interactivity in technology integrated teaching strengthens the need for improvement in the communication skills of teachers with their pupils and the need for creating a cooperative learning community.

Under the definition of the technological dimension it was found that the new method of integrating technologies with teaching has not yet been fully realised. The actual usage of these tools does not ensure their full potential. This research showed that most of the teachers use technology as additions to existing methods teaching and learning, without exploiting their full potential. For example, the internet offers a range of tools which can facilitate cooperative learning which makes significant learning possible both inside and outside of the classroom (Nichols, Miller, & Raymond, 1994). One of the recommendations derived from these findings is the necessity to examine ways to encourage cooperation in the internet, to raise the importance of learning processes and to develop tools for assessing cooperative learning based not merely on personal estimations.

Much has been said about integrating technologies with teaching (Volery, 2001; Capper, 2003; Dori, Tal & Peled, 2002; Rosen & Salomon, 2007; Moore, 1996; Yelland, 2006; Hill, 2004), but one of the main contributions of the present research is the identification of the dimensions of the roles and outputs and the identification of the skills and competencies required for efficient learning and teaching by teachers who integrate technologies with teaching. These dimensions and skills were found on the basis of the data from the present research in relation to the theories and findings of other studies (Insung, 2001; Thach & Murphy, 1995; Wegerif, 1998, and others). The isolation of these variables allow for the identification of relevant issues in the training and consolidation of the conception of the role of the teacher who integrates technologies, including the following: characteristics of the role, outputs, skills and competencies required by the teacher for the intelligent integration of learning through technologies in education. Moreover, the isolation of these variables enables the identification of the characteristics required from the technology integrating teacher. Besides familiarity with computerised technological tools and specialisation in the pedagogical field (study content), there is a need for the skills and competencies that characterise the roles and outputs required by the teacher for learning and teaching in a computerised environment.

With reference to the fourth research question: **What is the most efficient approach to teaching that facilitates the integration of technologies with teaching for Generation Z pupils?** The research findings indicate that many teachers have responded to the changes that have occurred by acquiring basic skills in the use of new technologies and tools both through taking supplementary courses and through personal experience and experimentation. This research points to the positive positions and perceptions towards technology and its integration in the education system. The teacher is capable of making the pupil abide by the rules of behaviour in the classroom, involving the pupils in the estimation of their work, directing them to set up learning goals, effectively supervising their work on the computer, influencing their motivation for learning, using the computer efficiently, prompting the pupils to use the computer for practice and training, encouraging the use of the computer and explaining how to use it. The teacher knows very well how to use the computer as well as other teaching means, with the realisation that computer use enhances the efficiency and exploitation of students' time in learning. These positions and perceptions were found to be in accord with the constructivist approach to learning which enables an efficient integration of technologies into teaching.

The research findings show that the efficient approach to teaching is one that places the pupil in the centre of the learning dynamics and requires the teacher to recognise the mental differences among the pupils, to vary the learning strategies during the lesson, and to allow the pupil to choose the subject that interests him. This new approach is related to the construction of knowledge by the learners themselves, to the training of independent learners, while the teacher serves as the "guiding hand" in placing study goals and in directing the learning process.

The new approach gives importance to the actual experience of learning by the pupils. The pupil is active in the learning process, is involved and creates knowledge by himself, investigates and develops special outputs, while the teacher works "behind the screen", encouraging and supporting independent learning. In the new approach, the responsibility for learning is transferred to the pupil, but the research findings show that the teachers still continue to be in charge of organising the material, sifting and preparing it for the pupils, and do not yet have any faith in the ability and knowledge of the pupil.

The qualitative methodology that was chosen for this research did not examine of pupil attainment. The findings of other studies raise the issue of the close connection between a

technological learning environment and achievement (Lewis, 1998; Mojavezi & Tamiz, 2012) and the close connection between enjoyable learning and a positive atmosphere in class and achievement (Alghazo, 2006; Shapka &Ferrari, 2003; Samdal, 1998). This research deals with learning in technological environment and in the positive atmosphere in the "computer notebook" classes, but the achievements of the pupils in this connection have not been examined. It is therefore recommended that additional studies be conducted to determine the connection between the new conception of the teacher's role and the achievements of the pupils; the gaps and changes in the achievements of pupils who learn with the help of laptops (Raskind, & Higgins, 1998); the influence of integrating laptops for pupils with learning disabilities; the influence of a positive atmosphere in the "computer notebook" classrooms on achievement; and the gap between the conception of the teacher regarding the characteristics of the pupil generation and their achievements. It is recommended that the determination of new criteria for an alternative estimation be examined for the learning process and the acquisition of knowledge, and not merely for its results.

Besides this, and perhaps even more importantly, the research indicates three main factors which inhibit and delay a change in the conception of the teachers role. The first is the difficulties that arise during the attempt to integrate computerisation with teaching. These include preparation in lesson schedules, the gaps between the demands of the Ministry of Education for conventional examinations and alternative estimations that also examine the learning process, uploading material to the school website, supplying material, lack of motivation in learning, locating difficulties among the pupils, conducting discussions, technical breakdowns, and temptations to play with the computer during the lesson. The second factor is the lack of certainty regarding the contribution of technology to learning, to the pupil and to people in general. The third is the lack of adaptation of the supplementary courses given to teachers to the needs that arise in the field and the lack of technological-pedagogical assistance to the teachers who integrate technologies with their teaching.

These factors constitute the obstructions and challenges in assimilating the new approach in the conception of the teacher's role that were not foreseen by the Ministry of Education, but which have emerged from the work being done by the teachers and their experience (for a period of 5-20 years) in the field. From the accumulated experience of

recent years in which there was an accelerated introduction of new technologies into the educational system (laptops, interactive panels, etc.) the impression is that the supplementary training of teachers is still based on the concept of the transference of pedagogical and technological information (Levin, 1995; Shapira, 1999) without taking into consideration the modern perception of learning and cognition which integrates technologies with pedagogy and adapted to each teacher differentially and personally.

The practical implications of this research is that they have the power to guide policy makers in plans for efficiency and development in the schools and in leading towards change in the system of supplementary studies and courses offered to the teacher. Proficiency in relation to outlining the demands heard in teachers' rooms, the lack of certainty, and the difficulties that delay essential conceptual change can be achieved with the help of online questionnaires, which could improve the system of supplementary studies offered to the teachers, and provide the appropriate guidance for the teachers in these courses. Overcoming these obstacles by giving suitable response to the needs arising in the field will supplement and strengthen the new approach.

To sum up, the findings of this research provide the knowledge, understanding and essential insights regarding the conception of the role of the technology integrating teacher, which lead to the main conclusion that there is a need for the development of an intelligent model for teacher training. An initial outline is needed that will constitute the basis for continuous teacher education which is capable of addressing the issue of how to integrate technologies with their teaching. This model can be universally adapted to every teacher in every educational system. This research proposes a model that is constructed on the basis of research findings, on the reading of comprehensive professional material, and grounded upon theories of personal training. The aim of the model is to construct a work plan that is personally adapted to the new conception of the role of the technology integrating teacher and that corresponds with the characteristics of the pupil generation. The model is not self-sufficient but requires personal technological and pedagogical adaptation to the teacher in the framework of supplementary teaching courses or personal instruction for teachers in a technological learning environment. The application of this model will be examined by further research planned for the future and is also offered for examination by other studies that may be conducted in the future (Appendix 13).

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# 8. Appendices

## Feedback Questionnaire

In the framework of my doctoral studies in the Education Department of Derby University, I wish to understand in depth the challenge of **the perception of the new role of teachers who integrate technologies with teaching**. I would be grateful if you could assist me in carrying out the research through filling out this questionnaire.

The questionnaire is anonymous and no connection will be made between you and the information submitted by you. The information that will be gathered will be confidential and serve only the needs of the research.

Part I: **Personal Details**

Age:

School:

Elementary     Intermediate     Junior High
☐     ☐     ☐

How many years of seniority do you have in the Ministry of Education? Please list the number of years:

How many years of seniority do you have in teaching integrated with technology?* Please list the number of years:

What is the main teaching subject in which you integrate technologies with teaching – in lessons in which the pupils learn with laptops?

☐ Language competence (Hebrew / Arabic)

☐ Mathematics

☐ English

☐ History / Geography

☐ Other

The last four numbers of your cellular phone* This serves as a data code in the research and possible comparison with previous interviews you have held. No other use for it will be made.

Below is a list of **various tools that were used for teaching in a computerised environment**. What is your **degree of usage** with each of these tools? Mark the appropriate answer on a scale of 5 degrees: 1 (not at all) to 5 (to a great extent).

|  |  | 1 Not used at all | 2 | 3 | 4 | 5 Used to a great extent |
|---|---|---|---|---|---|---|
| 1 | Email correspondence |  |  |  |  |  |
| 2 | Personal information management (files, folders, printed texts) |  |  |  |  |  |
| 3 | Word processing (WORD etc.) |  |  |  |  |  |
| 4 | Presentations (PowerPoint etc.) |  |  |  |  |  |
| 5 | Spreadsheets (Excel etc.) |  |  |  |  |  |
| 6 | Internet usage |  |  |  |  |  |
| 7 | Web participation (forum, blog, facebook, twitter) |  |  |  |  |  |
| 8 | Tools for pedagogic management (reports on presence, estimations, information management systems) |  |  |  |  |  |
| 9 | Computer + projection screen in study classrooms |  |  |  |  |  |
| 10 | Laptops in study classrooms |  |  |  |  |  |
| 11 | Uploading material to the school website |  |  |  |  |  |
| 12 | Use of computerised assignments |  |  |  |  |  |
| 13 | Development of computerised assignments |  |  |  |  |  |

Part II: **Roles and Outputs**

Below is a list of the roles of the teacher who integrates technologies with teaching.

Indicate to what degree you think **each of these roles is important** for the teacher who integrates technologies with teaching.

|  |  | 1 Not important at all | 2 | 3 | 4 | 5 Important to a great extent |
|---|---|---|---|---|---|---|
| 1 | To promote / encourage presentation of information |  |  |  |  |  |
| 2 | To lead efforts in structured teaching |  |  |  |  |  |
| 3 | To know the pupils' style of learning |  |  |  |  |  |
| 4 | To encourage learning among colleagues |  |  |  |  |  |
| 5 | To provide various types of learning activities |  |  |  |  |  |
| 6 | To be able to use technologies. |  |  |  |  |  |
| 7 | To cooperate with school staff members |  |  |  |  |  |
| 8 | To have proficiency in teaching |  |  |  |  |  |
| 9 | To initiate and support interactive discussions |  |  |  |  |  |

| | | 1<br>Not important at all | 2 | 3 | 4 | 5<br>Important to a great extent |
|---|---|---|---|---|---|---|
| 10 | To be enthusiastic and involved in learning | | | | | |
| 11 | To provide prompt feedback on completed assignments | | | | | |
| 12 | To present support services for pupils | | | | | |
| 13 | To follow up and estimate pupil performance | | | | | |
| 14 | To be clear and organised | | | | | |
| 15 | To be an advisor for pupils | | | | | |
| 16 | To plan and prepare in advance | | | | | |
| 17 | To present learning goals | | | | | |

Part III: **Abilities and Skills**

**To what extent, in your opinion, are the following information and skills required for the teacher who integrates technologies with teaching**.

| | | 1<br>Not required at all | 2 | 3 | 4 | 5<br>Required to a great extent |
|---|---|---|---|---|---|---|
| 1 | Knowledge of learning theories for pupils | | | | | |
| 2 | Skills as an advisor | | | | | |
| 3 | Technological knowledge | | | | | |
| 4 | Creative skills as a change agent | | | | | |
| 5 | Skills in group work | | | | | |
| 6 | Knowledge of computer hardware | | | | | |
| 7 | Skills in computer websites | | | | | |
| 8 | Knowledge in the educational sphere | | | | | |
| 9 | Skills in data analysis | | | | | |
| 10 | Editing skills | | | | | |
| 11 | Skills in estimation and feedback | | | | | |
| 12 | Skills in conducting discussions | | | | | |
| 13 | Feedback skills | | | | | |
| 14 | General educational skills | | | | | |
| 15 | Skills in graphic design | | | | | |
| 16 | Skills in group processes | | | | | |
| 17 | Skills in structured teaching | | | | | |
| 18 | Skills in interactive technologies. | | | | | |
| 19 | Skills in interpersonal communication | | | | | |
| 20 | Knowledge in the field of integrating technologies with teaching | | | | | |
| 21 | Knowledge in teaching strategies and models | | | | | |
| 22 | Knowledge in learning theory and styles | | | | | |
| 23 | Skills in library research | | | | | |
| 24 | Management skills | | | | | |
| 25 | Knowledge of various media advantages | | | | | |
| 26 | Knowledge of Microsoft Office Programs | | | | | |
| 27 | Skills in exemplifying behaviour patterns | | | | | |
| 28 | Knowledge of multimedia (integration among technologies) | | | | | |
| 29 | Skills in estimating pupil requirements | | | | | |
| 30 | Skills in organization and planning | | | | | |
| 31 | Planning skills | | | | | |

| | | 1<br>Not<br>required<br>at all | 2 | 3 | 4 | 5<br>Required<br>to a great<br>extent |
|---|---|---|---|---|---|---|
| 32 | Skills in setting rules and regulations | | | | | |
| 33 | Skills in the presentation of materials | | | | | |
| 34 | Skills in directing projects | | | | | |
| 35 | Skills in asking questions | | | | | |
| 36 | Knowledge of strategic planning | | | | | |
| 37 | Technological knowledge | | | | | |
| 38 | Skills in dealing with technical problems | | | | | |
| 39 | Skills in the pagination of texts | | | | | |
| 40 | Skills in the technology field (e.g. filing) | | | | | |
| 41 | Skills in writing and editing | | | | | |

**The teacher who integrates technology with teaching and the traditional teacher**

How, in your opinion, does the traditional role of the teacher differ from that of the teacher who integrates technology with teaching?

Part IV: **Positions and Perceptions**

In this part various statements appears regarding the perceptions and positions of the teacher. For each statement, mark the extent to which you agree with it.

| | | 1<br>Do not<br>agree at all | 2 | 3 | 4 | 5<br>Agree<br>to a great<br>extent |
|---|---|---|---|---|---|---|
| 1 | I give preference to the cooperative work of pupils in class | | | | | |
| 2 | I involve pupils in the estimation of their work and direct them towards setting goals for themselves in learning | | | | | |
| 3 | I believe that basing myself on the ideas of pupils is an efficient way to construct my learning program | | | | | |
| 4 | I prefer to have pupils join their tables to work together | | | | | |
| 5 | I prefer to estimate pupils in an informal manner through observation and conversation with them | | | | | |
| 6 | I am capable of influencing the motivations of pupils who show little interest in their studies | | | | | |
| 7 | I am capable of influencing and controlling disciplinary problems during a lesson | | | | | |

| | | 1<br>Do not<br>agree at all | 2 | 3 | 4 | 5<br>Agree<br>to a great<br>extent |
|---|---|---|---|---|---|---|
| 8 | I am able to calm a pupil who disturbs or is noisy during a lesson | | | | | |
| 9 | I use a variety of estimation strategies | | | | | |
| 10 | I compose good questions for my pupils | | | | | |
| 11 | I am capable of making pupils abide by the rules of behaviour in class | | | | | |
| 12 | I have the ability to make pupils believe they are capable of succeeding in their studies | | | | | |
| 13 | I am capable of conducting group learning with attention given to each group | | | | | |
| 14 | I am capable of enlisting parents in helping their children succeed in their studies | | | | | |
| 15 | I apply alternative teaching strategies in the classroom | | | | | |
| 16 | I am capable of helping my pupils to estimate their own learning abilities | | | | | |
| 17 | When a pupil makes a mistake or is confused, I manage to provide him with an alternative explanation or an example that will help him to understand | | | | | |
| 18 | I sometimes create study units based on the desires and needs of the pupils | | | | | |
| 19 | When pupils encounter a problem in using the computer, I usually do not know how to help them | | | | | |
| 20 | In my opinion, I have the required skills for using the computer for teaching | | | | | |
| 21 | I usually use the computer in class in an inefficient manner | | | | | |
| 22 | Whenever possible, I refrain from using the computer in my classroom | | | | | |
| 23 | I do not efficiently supervise the work of pupils using computers (when they work with a computer) | | | | | |
| 24 | Even when I try very hard, I am unable to use the computer as well as I use other teaching means at my disposal. | | | | | |
| 25 | I do not know what to do in order to encourage pupils to make use of the computer | | | | | |
| 26 | I find it difficult to explain to pupils how to use the computer | | | | | |
| 27 | I prefer not having the principal watching me during a lesson that integrates technologies with teaching | | | | | |
| 28 | The computer provides an opportunity to improve learning capabilities | | | | | |

| | | 1<br>Do not agree at all | 2 | 3 | 4 | 5<br>Agree to a great extent |
|---|---|---|---|---|---|---|
| 29 | The use of computers increases learning efficiency and the use of available time | | | | | |
| 30 | The computer, as a means of learning, increases the motivation of the pupil | | | | | |
| 31 | Pupils with learning difficulties are greatly assisted by the didactic possibilities of the computer | | | | | |
| 32 | The computer increases the pupils' degree of creativity | | | | | |
| 33 | The use of computers improves the writing abilities of the pupils | | | | | |
| 34 | Skills and computer applications must be more fully integrated in study programs | | | | | |
| 35 | Computers can assist the teacher to treat differences in competence among pupils | | | | | |
| 36 | I make use of the computer for providing examples through prepared presentations that I found or were prepared for me | | | | | |
| 37 | I make use of the computer as a means to teach a new subject | | | | | |
| 38 | I encourage pupils in class to look for relevant material on the Internet | | | | | |
| 39 | I direct my pupils to use study programs for practice and exercise | | | | | |
| 40 | I teach my pupils to consider and estimate the implications and opportunities of computer usage | | | | | |
| 41 | In lessons, I make use of presentations / computerised materials that I have prepared by myself | | | | | |
| 42 | I direct my pupils to continue with their study tasks at home with the use of their computers | | | | | |
| 43 | I make use of the computer to respond to the different needs among my pupils or to assign a personally adapted learning task | | | | | |
| 44 | I encourage pupils to work in cooperation with each other through using laptop computers | | | | | |
| 45 | I make use of email (or other computerised communication means) to communicate with my pupils outside study hours | | | | | |

*Thank you for your cooperation!!!*

**Appendix 2: Guidelines for Interviews.**

The main aim of the **interview** is to deepen the knowledge and understanding of the interviewee, of his or her worldview, beliefs, behaviour and lifestyle of the research participant. The intention is mainly to obtain trustworthy and reliable information that cannot be garnered through other means or as supplementary to them.

In my opinion, **an interview will be considered as good** when the research participant speaks freely and fluently about his or her viewpoints. The interview will provide me with a wealth of information that will reveal the worldview of the participant, rich raw material in examples and details.

**I shall conduct a semi-structured interview** which can also be called **a guided and focused interview** (Bogdan & Biklen, 1998).

> Details of the subjects that will appear in the interview will be determined in advance.
>
> Flexible formulation of the questions and their order of appearance.
>
> The interviewee will receive an introduction and explanation about the subject and the aims of the research, and during the course of the interview the participant may raise new questions on his or her own initiative, in view of the responses received.

**Plan of the Interview:**

> The questions / assignments I shall focus upon will be prepared in advance. I shall make sure that the selected assignments are appropriate for the expected level of the participant.
>
> I shall choose various issues related to general questions that are suitable for different aims.
>
> I shall ensure that the questions are clearly understood by the participant.
>
> I shall make sure that the atmosphere is pleasant, give personal attention to the participant and explain the aims of the interview.
>
> I will give a specified time limit to the interview and organised its course accordingly. If there are limitations in time, I shall begin with the important questions so that the interview does not end without the main questions being asked.
>
> I shall explain in advance that this is not a test, and I am only interested in the ways in which the participant thinks and in his or her worldview.

I shall listen with patience and alert attention. I shall allow the participants to express their thoughts with sufficient time for response. I shall try as far as possible to refrain from interjected comments.

I shall avoid being judgmental – I shall show interest in the words of the participants without expressing any position (positive or negative). I shall give responses (verbal or body gesture) that are encouraging but neutral.

In cases of uncertainty in comprehension, I shall paraphrase what is said for the sake of clarity.

All the interviews will be held in a private and closed staff room (I have received personal keys to the room to hold my interviews).

# <u>Personal Interview with a Teacher</u>

**Date and hour:** ……………………....

**Place:** …………………………………

**Interviewee Number:** ………………………….

## <u>Role of the Teacher who Integrates Technologies with Teaching –</u>

## <u>Interview Framework</u>

**Introduction:** In the framework of the my doctoral studies in the Faculty of Education, University of Derby, I wish to understand in depth the challenge of the changing perception of the role of teachers who integrate technologies with teaching.

I am conducting a research in which I wish to understand and deepen existing knowledge in the field of the challenging perception of the new role of teachers (belonging to Generations X and Y) who teach pupils in the Intermediate level (Generation Z) by means of laptops and the integration of technologies with teaching, and I wish to help teachers working in this field.

I hope that the findings of this research will help to advance research information in the field of generation gaps, the integration of technologies in teaching, and the application of this information in the education field. I therefore require your assistance and cooperation (for about one hour). Details of the interview will remain anonymous and no connection can be made between you and the information that is transmitted by you. The information that will be gathered will be classified and serve only for research purposes. Thank you very much for the time that you have allocated and your readiness to assist me.

Tell me a little about yourself.

How many years have you been teaching in computer-notebook classes that integrate technologies with teaching?

What, in your opinion, is the main role of the teacher who integrates technologies with teaching?

How do you conduct your teaching in class while integrating technologies with teaching?

On what do you focus while teaching computer-notebook classes that integrate technologies?

What teaching methods you use in your work?

In your opinion, is there any difference between the role of the traditional teacher and the role of the teacher who integrates technologies with teaching?

Do you feel that there is something else / different / new in the pupil generation today?

Why do you think so?

What do you define as the most important part of you as a teacher?

Do you feel that the education system supports teachers who integrate technologies with teaching?

What other comments would you like to make about the role of the teacher who integrates technologies with teaching?

*Thank you very much for your cooperation!!!*

**Add:** Questions that could be intermediate questions to strengthen the answers of the interviewee: What does this mean?   Do you have anything to add?

What for example?  How does this find expression?   In what case / cases?

 What tools do you possess?   Can you give an example?

**Clarifications / remarks at the end of the interview:**

**Appendix 4: Informed Consent Form.**

Informed Consent Form for Participation in Research

First Name _____Last Name _____ ID Number _____
Address _____ _____ ZIP Code _____

a. I hereby declare that I agree to participate in the research "Integrating Technologies in Teaching" as described in this document.

b. I hereby declare that researcher Sigal Shmul has explained to me the following:

1. The researcher Sigal Shmul received an approval from the school management to conduct the research at my school.

2. The researcher Sigal Shmul received an approval from the Ethics Committee of Darby University to conduct the research.

3. The conducted research is about the development processes and changes among teachers (Generation X and Generation Y) who teach children in Junior High schools (Generation Z) with the aid of laptops.

4. I am free to terminate my participation in the research at any time.

5. Confidentiality is promised regarding my identity in scientific publications.

6. In the event of any problem related to the research I may approach researcher Sigal Shmul for additional counselling or consult the services of the school counsellor / ICT coordinator.

c. I hereby declare that I received detailed information about the research and specifically the details related to the following: Research aims, methods, estimated time span, hidden risks, and any discomfort that may be caused.

d. I hereby declare that my agreement above was given of my own free will and that I understood all the above-mentioned statements.

_____          _____          _____
Participant name         Signature               Date

e. Researcher declaration: The consent given above was submitted to me after I explained all the statements to the participant and verified that they were understood by him/her.

_____          _____          _____
Name of the researcher        Signature              Date
who declared the above

# Observation Schedule

- The schedule was arranged for each separate school year in accordance with the research progress

- The schedule was fixed after approval of the headmistress to conduct the observations.

- The observations were arranged after coordination with the class teacher and her approval to conduct the observation in the study class in its physical location and to be held on the date and time of the observation.

- The observations were arranged with different teachers and included a variety of lessons in various study classes.

- The observations were documented in writing according to the criteria that had been determined (<u>teacher</u>: roles, conduct and structure of the lesson; <u>pupils</u>: interrelations in the classroom, attitude of the pupils towards the lesson; <u>pedagogy</u>: teaching methods, preparation before the lesson, use of <u>technologies</u>), and separate documentation of remarks and thoughts.

| Observation Number | Teacher (pseudonym) | Study Class | Location of Classroom | Date, day and hour | Subject of Lesson | Remarks |
|---|---|---|---|---|---|---|
| **Pioneer Research (2011-2012)** | | | | | | |
| 1 | Tal | Grade 7 Class 4 | Science Building Laboratory No. 13 | Wednesday 2/11/2011 9.00 | Science: "Sport and bodily health" | |
| 2 | Sonia | Grade 8 Class 1 | Mathematics Room No. 1 – Building No. 2 | Monday 2/1/2012 12.00 | Mathematics: "Squares" | |
| **Research – First Round (2012-2013)** | | | | | | |
| 1 | Perry | Grade 9 Class 2 | Main Building | Tuesday 4/12/2012 11.30 | Geography: "Climate - Weather" | |
| 2 | Suzy | Grade 7 Class 1 | Computer Laboratory Building B | Thursday 24/1/2013 10.00 | Computers/Technology: : Scratch | |
| 3 | Ilana | Grade 9 Class 2 | Main Building | Monday 4/2/2013 9.00 | History/Civics: Separation of authorities | |

| 4 | Eva | Grade 8 Class 1 | Science Building Laboratory No. 10 | Wednesday 13/3/2013 8.00 | Science: "Fertility" | |
|---|---|---|---|---|---|---|
| 5 | Irina | Grade 8 Class 2 | Main Building | Sunday 2/6/2013 10.00 | Education: "Human Happiness" | |
| **Research –Second Round (2013-2014)** | | | | | | |
| 6 | Limor | Grade 7 Class 2 | Main Building | Wednesday 23/10/2013 8.00 | Language: "Verbs" | |
| 7 | Dafna | Grade 8 Class 2 | Main Building | Wednesday 20/11/2013 12.00 | Bible: "Contemporary Biblical Newspaper" | |
| 8 | Riki | Grade 9 Class 1 | Main Building | Monday 16/12/2013 10.00 | Literature: "Book Report" | |

**Appendix 6: Observation Report.**

# Observation Report in "Computer Notebook" Classes

## Date: _____  From: _____  To: _____
## Class: _____

## Location of Classroom: _____  Teacher: _____
## Lesson: _____ Subject: _____

| Observation Focus | Report (Description without Interpretation) | Teacher's Remarks |
|---|---|---|
| **Teacher's remarks before the lesson** (During free conversation with the teacher before the observation) | | |
| **The teacher:** Where does she stand, what does she do, how does she begin the lesson, addressing the pupils, requesting assistance from the pupils, attitude towards the pupils, teaching methods, pupil cooperation, preparation before the lesson, conduct of the lesson, difficulties during the course of the lesson, guiding, supervising, mediating, solving problems, dealing with disturbances, managing technical difficulties, remarks, body language.<br><br>**Pupils:** What are the pupils doing, how do they sit, do they show interest in learning, bored, know what they have to do, disturbing, equipment suitable for the lesson, listening, involved, cooperating, remarks, questions, working, interested, working independently, asking for help, questions asked (of the teacher / other pupils).<br><br>**Classroom atmosphere:** A studious atmosphere, attentive listening, disturbances, moving around the classroom, discipline problems, atmosphere of activity, independent learning, remarks, noise, spontaneous expressions, enjoyment, weariness, focus on the subject learnt, lack of | | |

| | | |
|---|---|---|
| attention.<br><br>**Pedagogy:**<br>How the lesson is begun, conduct of the lesson, teaching methods, strategic changes in teaching, subject of the lesson (new/continuation), cooperation, explanations, answers to questions, demands by the pupils, pupil expectations of the required work, creation of new knowledge/study of existing knowledge, assignments, pupil cooperation, pupil involvement.<br><br>**Technology:**<br>Technological tools, technological aids, study programmes, control of teacher/pupil over the technological tools, lesson preparation, breakdowns, difficulties, solution of problems, assistance, use of technological tools (by teacher/pupils), applying to technological aids, surprises. Additional remarks (by the researcher) at the end of the observation (soon after it). | | |
| Remarks of the teacher after the observation (after leaving the classroom with the researcher). | | |

## Soon after the end of the observation

- **Marking and emphasising the outstanding or exceptional events**

- **Marking and emphasising events that repeated themselves**

- **Writing down general impressions**

- **Adding remarks and other events**

- **Estimations and remarks for future observations.**

**Appendix 7: Authorization to Conduct Research.**

**Request for Authorization to Conduct Research in an Institution / Organization/ Society**

My name is Sigal Shmul and I am a PhD student in Education at the University of Derby, England. I am currently engaged in research work with the aim of examining the perception of the new role of the teacher who integrates technology with teaching in accordance with generation differences.

I wish to conduct the research at the Junior High School "Ya'arat Haemek".

I would be grateful if you could authorize me to conduct the research at this school.

Sincerely yours,

Sigalit Shmul, Researcher

Telephone for clarifications about the research: 0505330995

_____

Authorization to Conduct Research in the Institution / Organization / Society

Re: Authorization to conduct research in the Junior High School "Ya'arat Haemek".

By virtue of my authority as the principal of the school, I hereby authorize the student / teacher Sigalit Shmul to conduct research at the school in the framework of her doctoral studies at the University of Derby, with the aim of examining the perception of the new role of the teacher who integrates technology with teaching in accordance with generation differences.

Signed: ………………………

Principal of the School

**Appendix 8: Photocopy of a protocol.**

תל שעבור הכיתה קיבוש ביתתי
ד' צירה מהבתית בשת מרה
גברו תהליך של התברתה

3

...ה הדבות
... הכיתה השונ לו, יש שיפור מהחינה חברתית
המתנהגת טוב, מרבית התלמיבים שותבים, יש כמה
תלמיבים הצויחים עם הכיתה מתמקחת תקוה וט
נכון, יש שיפור בהברה? התלמיבה שותבים הטורא
מתתפים, במצע עם כ'הטנה חוט? אכל שיונו אין
אלא רק יותר עצוה שה תוספרויות
תלמיבים יש מוטיקה ב
מעניים ...

שעור

4

כגון - אוה ליאונות
יש קבוצה של כגית שהיו שילט

ראשון, עובדם הכגולות הם עובבים
ובה

 רה כ. — קשה לי לעבוד הכיתה כל?

2/6/05

39

התלמיבת אזון שיחות את הכדורים
והבלמונות אל עציני הכדר למורים
... מחוורים ... היו מולמום לבגא
הכיתה מתחם מתברת.

לעשורה רימון לעודות שלומ בות הכיתה מתה

הכיתה כג — לוקח להה יותר כאן להתיק

24.1.96

52

הכיתה מאן בשוה מהתין הכרתית התלמונבים
הכיתה אצלה תחרותים שאום יותר בתש
תחרות מנצונם,
הכיתה קם מושיקה לי ליונום.

כיתה חילות, הם אוהבים לשבת בשולחן שלי ולמזר

...ירון הוא ילד שלא קשה, אני חיבה למזר, להיה למזבה למזר

233

11.1.95

51

- ולדים להדריך בני (הלמידות מחונכים)
עשיית אותם לבנוים מנוסוית.

- חז שיבדר הרגשות אין ... סוס וולז
... מפשרת לו לעשות אותה אחונות
את הסתר קצר. ועמי לוצ'ון מהתאם.

- חז שיבדר הלמודות וכהתן הגרים
... מתקשי אמנן לבהו סרט המחור אות צלחות
הליפה.

5

-ה- המדינה (הדרים) יש הרבה מלומקי' כת
הבניה

- המדינה יש לכ ה הברית אות ג' ושן
אווירה טשונה לשונה.

-י- באנה לכלד למנדות שונה.

19.1.99

6

-ם- כתנת אתהשה מתקדמ
... הבית הבניה ונוק הסכ
התחלמים, הבלעידוים לו ולבות להתפסם
את הכאן נבשונם בבניתם.
יש לבם עולם ... אלות.

-ה- הרא שעבד בברית וו ולוחו חיים המון
עונשים לבנים הברית האתנשפ
להבלאמנדנם שלך בולאבנם התשנ'אה כלי.
בלונה יבה שלונב.

- ... עולם ... או הושנה
שונה ... התאת אמנה בהנכ
... לנותה.

- מכלה שה... ידרם לו אתיה סום לאנכה
שרוניים באתס פ בם, ואלכתי לאסור אזן
... את שפ בם, למנתם, ... לפבר של

**8**

בשלב — הבינה ישקם מעצים = מעצים

שמקונים לגביל שויט', הרבה מילים שונה

שיטת הכח לגו צודנת שובם.

אין שימושי שלוהה עו את הבינה

הבינה לצונו של עובר. התרגילה

לוהוב בצרה בינעם יותר.

מלוג דת רת חלן מהכלמוידים, לדוק

ורתח. נשיטתי לוך בוניות ושלוי. לואג

המרפים.

**9**

לת — בירת מאוג מרגלבות תכרותרה

דיולרים שהר לשן.

כיתה שלבה מבהית השלרים לימועים

דינה שלבה מאוג.

וקסאן - דינה ל 2 שלים לבהם לנוים

ל. ולשאג הה.

נסאט ושלן נשפים הלימודים

ועד' הבינה השולשלנה ' כזוה. והלבוץ

לו מהיש תהכת. וליאוידים שלבות מאוג.

אין עבתנולה הבינה ל. שויני מתנקת

ולאן שונה מרגליין.

**10**

הדלת נפתחה טובה ויש רכבת3 שנושא חלפה ל?

לוית אוסטניה צריך להשקיע?? הצאן אוסטניה

הבנית מוד הזהירית.

22.01.01

**12**

מאז התינוק ב-20.10.00 – תהרה נטאבית קשר הדוק סיונית.

3 פגישות נעשים אצי הבנה.

רוצים בתבנית הבכלא אין בהייב סעיקים

**13**

תוסי השתלהנוב, את 36'ל על ולצרים מה' הכאיה.

על פה פ אין שם אינקולוגי. אוגיד יש בלוית פ אינקולוגי

חתיי ג פעור אני עושה אבבק ים ים בלוציה.

שקפלות אבלה ולרבית אליה.

**14**

קך ותאבת אי פ של הבונ ילדו ו?הב פ הבאה

הנא' שיבתי כל רכ יפה. אי אבניה 'בית אין אינקולוגי

**15**

11/06/01

**17**

**18**

**19**

13/6/01

**21**

**22**

אולי בכיתה את המאמינה, כל הכח מאמינים
מאמינים. הקבוצ, ואני הכת. והאמנת מאמינ
על תשבון, וליפ אחרים ש'יק, ועד כעל כלה שלא
בכולנ/א'ת המאמינים.

ועוד אני אוהבת במקומ/שמואל הם מאמינם כמת
כמקות לואב.

— הכיתה פשוט אדים ועובדת לנם אבתיונק
השנה הרבה יותר נעים להדבה לכיתה. 2

2/6/02

המרבה הכללי – סבל –כולא יותר ואהבת שואוש
עולמה.

השנה הכיתה עולמה יותר שלא ועובם.
ונתה הרבה יותר סימפטית, ואני ורבה בהם
אור נקוינה –

ונלול אולמית – ממאונות שעולפי על הכניית, ואולא
כי רחון שונו שליבן שליבת שלמת
שעונה שנית.

ונלול סתרה – נכל מה שהמתה היותם בקולקה לו

29.1.04

29

— דינה אוהבת, שינה דינה של המן
3 דינה גמולות, הנה. נעשה לקנות הטוב
ושוב יש יכולה — הם כל המן עושים
אותנו.
תוך שיעור הנינה אני יודעת שלא

31.5.04

30

כיתה. — התלמידים מספרים לי את הקושי
שלהם הכיתה מאוד מתקבלת
מהתלמידים סיכולים עשה
יש גלמידים סיכולים ויתר מהחינה התןתליי
עני לא מעושה אותם

כינה ט. אחשב מתקיית — כיתה של המן
מתגאים לאורתים שנמצא לריהם

השנה העולין שלו אבא הנ' — סער
שותן ואם כיתת אחשב מתקיית

31

הם מאוד ואוהבים והעובד מאתם יודע

הרגשת מהתורים לפרש לתלמים.
ש ההרה מכהינים חולאים וזתר ארוחות ו

ו שיעור ההיל״ם

התלמידים שמגיעים לארגך למידה

קשה להם ההתות הנקרו. ואתן פם
ספידהסקרת, קפיא שלהם.
נלחצה הכיתה וו שובל. הכהה תלמידים

יש סיפור היסטורית וגם בהתל עובדות
ויש סיפור נבדתו
יש עוידה כללית שתי אישית

- לצפות פעם בשבועיים להרגיש
כל התלמידים שעובדים בכיתה. ב5

כדי לעשות את הכתובה באמת ולהביא
יש הרבה מתאבים - מקולקלים + הכל שלוים להם אמא
חייבת להגיד לעצור את ספר ו ומתקבלת

- אפשרת להבין תוכה הוא של ערבים

- התעסקות בכיתה - קשה - הסברים ולהם
הם הצליחו לעבוד ל יושון לאו ושני
לעבוד על האמת ב
התלמידים אנשים לתכלות בים לעצור הליהורים

- יש לי הרגלה שאיבות התלמידים
טופלים מהם מאזיות התמונות
ואו היה שערכתי וני אם המתחבת והם פרי ה כיתה
כל. יש להם קולי להיגע פעמן לעבר
ורם בעניים משבה בכל התחב

לעבתני יש שאם מי לעבר הכיתה
יש להם המון קשיים והם סוקנת התהך
צמצם
כדי לעבוד אותם על הכלים
איך שני יכולה לעבוד לעצור שאמונה לעבוד אין מהולה

- יש הרבה אזיות התכלהות
הבקה כל

כיתה כלי יש צבוט של. (כמה תלמידים)

הם מתהולים לעבור תלבתי שהם יקשו לך

ושהים, ושהביני נקיה
בשערים של אני נותן לתלמידים
להבין לעבדת ההיסטוריה -

יש הם של מתשבים,

כני - אני לכל מרכים הכיתה לי שהתלמידים
מרכים שיש להם מתשבים
אין ביווה יהודה

לאמר אני לאלאני, אתכטבה הכיתה לי

41

ולת – אין לי שום הצעה של התלותנות

ההצעה של שלוני נותנת קהל של סוכם

את מעשים תכונה אינדנוסי.

יש כמה תלמ'ד'ם שאינם מתלוננים לכיתה

35 – אהגל האת סהפ_

יונה – ה.ד'ונוסם שלצל אחראית צל ירך-

הד'ונ'ם. לוקח לי זמן לנתק שלונם

מתמ  מתחשבים_

ה – מלחמת של הנושאים ש האחרום הצל-

ה'שונה.

3 דליכים להתחיל איך שלמה חכינה זו

סבת הורים של כיתה 5 3

50

כיתה 5 C 2-

ת – תושה שיחות עם התלמנוסם כד' לעלות שאלות

המוסיקוה של התלמנדום.

שלותפת שלותם הסלצ.

ה – כיתה שלקה נהית לסהבד שלונם.

– אתהנוסה שהכורה שלמבת ה'ום יותר תלמידום

שיפרו את הד'ונ'ם לשוות. שנה שעברה.

שלושי – נכשלה ב 4 מקבוצות

**Appendix 9: Photocopy of the school constitution.**

אודות בי"ס חט"ב "יערת העמק"

ביס"ק חט"ב "יערת העמק " נוסד בשנת 1992 .

בהמלצת משרד החינוך ופרנסי הישוב, הפך לבית ספר בניהול עצמי החל משנת 1996 . צוות בית הספר שואף לאיכות חיים, למצוינות ולאחריות. מאמין שלכל תלמיד יש תחום מצוינות ובאמצעות פיתוחו יצליח בשאר מקצועות הלימוד. לכן, מפתחת ייחודיות כיתתית המאפשרת התפתחות בתחומי עניין: מחשבים, מופת, אמנות וספורט. מאמין שכל תלמיד יכול להצליח אם הוא רוצה ואם יש לו תנאים מתאימים: מורים מתאימים, אקלים נינוח ונגיש, גבולות מוגדרים, סביבה מגרה וטכנולוגיה מתקדמת.  ב - 1998 כתבנו את התוכנית מחשב מחברת,.המצליחה ביום במקומות שונים בארץ.

בשנת 2005  הצטרפנו  לתוכנית מופת - עתידים. ב- 2007 בית הספר קבל על עצמו את הרפורמה בחינוך האופק החדש: חינוך אישי, שעות פרטניות, תוכנית אישית לכל תלמיד, שיחות אישיות. שנה לאחר מכן החלו לפעול כיתת ספורט וכיתת אמנות. כך ביה"ס מאפשר לכל תלמיד לפתח את תחומי החוזק שלו.  בשנת – 2008 התחלנו לפעול במסגרת "סיסמה לכל תלמיד" ומאז פיתחנו פורטל בית ספרי.

... לבית ספר המצטיין ובשנות 2010 ו- 2011 זכינו בפרס ארצי

<u>מטרות ביס"ק חט"ב "יערת העמק"</u>

אנו פועלים למען השתלבותם הטובה ביותר של תלמידינו בחברה הישגית, בשאיפה לבוגר לומד עצמאי.

אנו מחנכים לערכים יהודים – ציונים, לאדם אסתטי, השואף לטוב, ליפה ולצודק, רגיש לערכו של האדם, ליחסו לזולת, לבחירה מתוך אלטרנטיבות, לקבלת אחריות, לחשיבה עצמאית.

ביה"ס  פועל בתאום עם משפחת התלמיד, יוצר אקלים של אמון וקבלה הדדית. שואף לתלמיד מתפתח באורח חיים הוגן בקהילתו, מטפח סביבתו, יודע לפעול בחברה דמוקרטית ותורם למדינתנו.

דרכי ביצוע המטרות וראעת מעומו

הגדרת מטרות פדגוגיות ברורה לצוות המורים, להורים ולתלמידים. ניסוח תוכנית עבו...

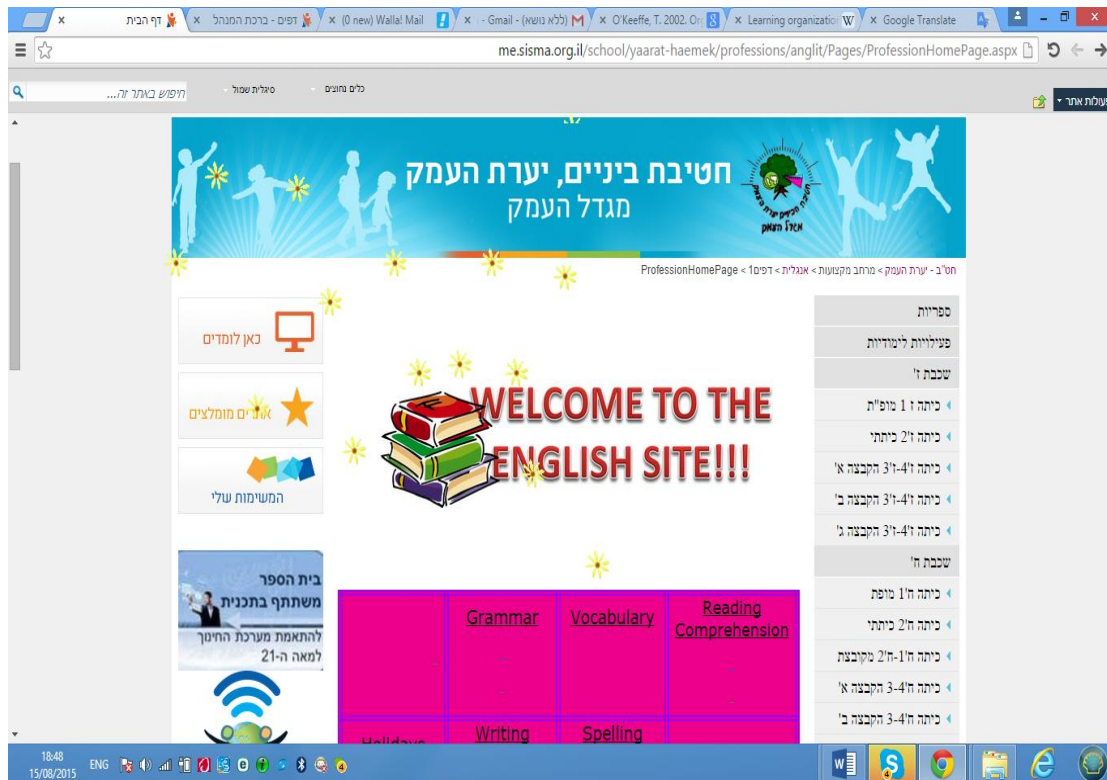1. " אני מאמין " בית ספרי, יעדים, תקנון והגדרת תפקידים.

2. התאמת תוכניות הלימודים למטרות ובניית תוכניות בית ספריות ייחודיות.

3. הפעלת משוב פנימי וחיצוני.

4. העצמת הצוות: ביזור והאצלת סמכויות, עידוד למידה מתמדת, עידוד יוזמות חינוכיות.

5. בניית תקציב שנתי בשיתוף ההורים, הרשות ומשרד החינוך בהתאם לתוכניות ולצרכים.

**Appendix 10: Photocopy of School/Classes/Subjects Web Site.**

**Appendix 11: Technology teacher quotes to compare with the traditional teacher**

## (From the open-teacher feedback questionnaire):

| Technology teacher | traditional teacher |
|---|---|
| אורה מנחה, מכוון ומדריך יותר מכוון לתלמידה | מקור הידע. |
| יש אפשרות לחשוף מקורות מידע, לתת לתלמיד מקור לאתר, לפסול חומר, ליצור מצגות וכו'. האורה... מאפשר לתלמיד להיות חלק מהצגת החומר. | מלמד באופן פרונטלי בשיטת ההרצאה |
| מכשיר את התלמיד למצוא את המידע בעצמו וליצור דברים ותוצרים יצירתיים, שרק הוא חוקר, מוצא על פי תחומי ענין שלו ונושא המתפקם. האורה הופך למנחה ויוצר. | מעביר את הידע |
| הוא מכוון, דוחפ, הלומד הוא חוקר צמאי. | הוא מרצה, פעיל מאוד בשיעור. התלמיד אינו חוקר צמאי. |
| מדריך, מכוון, יוצר מערכי שיעור מאתגרים לתלמידים בשילוב מולטימדיה. | |
| מאשר יותר כמכוון ויוצר ופחות כמקור ידע. | מקור ידע |
| משתמא פרמת כבלי למידה והצערה | מעביר ידע לתלמידים |
| אין הבדל. אפשר להיות מורה מאאותי כנה או כנה ולהפק | |
| יותר מתקרב לתלמידים כי המחשב זה העולם שהם. | |
| אוגר, מלמד כיצד לסנן חומר באינטרנט. תפקידו לא רק להעביר מידע אלא כיצד להתמודד עם הכלי הזה ואיק לצאות מימוי נכון של חומרים הנמצאים ומאנים לו לרשת בין רגע. | להעביר מידע |
| מנחה ואמנה למקורות הידע. | מקור ידע |
| אוגיל ומנחה את הכיתה | מקור הידע |
| מתווק, מעשר לא מעביר ידע אלא מכוון את תלמידיו לאתרים וחומרים באופן מעניין, יצירתי ויציל. | מעביר ידע |
| יותר אינטראקטיבי, יותר מעניין, יותר מאורגן ומביא למידה באמצעים מכוונים | אומד בפסו בכיתה ומעביר את הידע רק מתוק הידע האישי שלו. |
| להשתמא בתקשוב על מנת להתאים את ההוראה למאה ה 21 לצלות את רמת החשיבה והענין לפנות את אהבת האורה למנחה ואת התלמיד לפעיל אקטיבי | |
| | |

| Technology teacher | traditional teacher |
|---|---|
| מביא את הנושא הנלמד ואק את התלמיד הוא נה שחוקר ומתאם על פי היצירתיות של והתלמידים של לא יכולים להיות דואים לנה של מישהו אחר. כל אחד מתבסס על מה שאותו תלמיד למד ועל היצירתיות שלו. | בצל הציר המרכזי. הוא בצל היצר והשאלות היו מתוק הכתבה והיו מנויות על היצר של ועל זיכרון ועל הקשבה |
| יכול לשאת מתפקידים של המורה המסורתי אבל הוא גם משתלב עם התלמידים ביצירה, בשילוב, במחקר. | מעביר ידע מתרשל, |
| השיעורים מעוונים יותר בלמידה מתוקשבת בשילוב רב יותר של מולטי מדיה... התפקיד שלי משתנה כי אני צריכה לשלוט בתוכנה אני צריכה שם להכיר תוכנות חדשות, קבצים, תוכנות ציזוג ולשלוט בהם מספיק | |
| נה לא אותו אדם. הו לא אותה דרך צבודה. כל דרך האמצהה שלו צריכה להתנהל אחרת. הוא צריך להמציאה את הדרך כך שהילדים יאצו את הדרך. חשוב לי שהילדים יצאו ויהינו שיש יותר מפייסבוק ולמם שבאתריב יש כאו אורה פרטי. הם לא צריכים לחכות לי. הם יכולים ללמוד לבד ולא כאו המורה המסורתי. אני רק היד המכוונת. | |
| | צולם ואלואו כאו יצאה מהחולק אל האור, פיסית וטכנית |
| יותר קל, יש לו הכל באחשפ. הכל יותר פשוט ויותר קל. פחות מסורבל ופחות כבד, שם הילד יותר מתצניין. יותר חוקר ויותר רוצה לצדאם. הוא מרחיב אופקים הרבה יותר מאה שהוא היה מקבל מהאורה המסורתי. הילד נהנה יותר מהלמידה. | היה יותר קשה |
| חייבים לצצות שימוש בכלים חדשים ושונים. שימוש באתרים, הכנת מצגות ואוד...לצאד את התלמידים כלים נוספים מלבד החומר הנדרש באקצוא. כאו: שימוש נכון באחשפ, מיפוש חומרים, שיתופיות ואוד. | בניגוד למורה המסורתי |
| הוא המשסר בין הטכנולוגיה לידצ. ותפקידו לתת לתלמידים את הכלים שבאאצאותם יהפכו את המידצ לידצ אישי. | היה מקור הידע |
| צונר לתלמיד בלמידה צאמית וכמתווק בין התלמיד לבין מקור הידצ. יותר לאידת חקר צאמית. התלמיד לואד מתוק סקרנות ואניין, חוקר צאאי. | היה כאקור הידע |
| התלמיד הוא דומיננטי, הוא המביא את הידצ. | הוא דומיננטי בכיתה, הוראה פרונטלית ולא דינאית, שיברתית ופחות מאניינת |
| משרים, מתווכים, באון אוכל בין | היה להאביר ידצ, באאצאות ספרי לימוד. |

| | |
|---|---|
| לאחד ==מהידע של== ==המורה==. | התלמידים לבין הידע, שנה אומר ==להסביר== להם מה רלוונטי, מה נחוץ להם מבחינת ידע וכישורים. |
| אמינת מידוי, יש את אותו הפירוי. | |
| פעם מורה היה מגיע לכיתה והוא היה אלוהים. כמדנו ממנו והיינו קשובים אליו כאילו ==הוא טכאון==. | תפקידו של המורה היום צריך להשתנות לגמרי. הדרישות של הדור הצעיר שונות לגמרי מדרישות הדור של פעם... ==בלחיצת כפתור הם מגיעים לאידע==... והמורה כל הזמן צריך ==להיות אטרקטיבי==. |

### Conclusion The open questions in the questionnaire:

השאלה שנשאלה: במה לדעתך שונה תפקיד המורה המסורתי מתפקיד המורה המשלב טכנולוגיות בהוראה?

The question was asked: What do you think changed the traditional role of the teacher role teacher combines teaching technologies?

**Teacher's responses:**

✓ מורה משלב טכנולוגיה הוא מורה מנחה, מכוון ומדריק ואינו מקור הידע.

✓ המורה יותר מכוון לתלמידה.

✓ המורה המסורתי היה מלמד באופן פרונטלי בשיטת ההרצאה. באאצעות שלוב הטכנולוגיות יש אפשרות לחשוף מקורות מידע, לתת לתלמיד מקור לאתר, לאסוף חומר, ליצור מצגות וכו'. המורה לא רק מול הכיתה אלא שם מאפשר לתלמיד להיות חלק מהצגת החומר.

✓ המורה משלב טכנולוגיה בהוראה אינו מעביר את הידע אלא מכשיר את התלמיד למצוא את המידע בעצמו וליצור דברים ותוצרים ייחודיים, שרק הוא חוקר, מבצע על פי תחומי עניין שלו בנושא המתבקש. במדעים יש המון משימות מתוקשבות שהתלמיד מצא בכוחות עצמו לאידע. הוא קיים בכל מנועי החיפוש ואם שם עליו לאבצוע אלאות חקר על הנושאים שעליהם רוצה לגדוק ונה נעשה ע"י מכוון ידוע ובקבוצות המורה הופק לאנחה ויוצל ומחות מעביר ידע.

✓ המורה המסורתי הוא מרצה, פעיל מאוד בשיעור. התלמיד אינו חוקר עצמאי. המורה המשלב טכנולוגיות הוא מכוון, לוזה, הלומד הוא חוקר עצמאי.

✓ המורה הטכנולוגי מדריק, מכוון, יוצר מצרכי שיעור **מאתגרים** לתלמידים בשילוב מולטימדיה.

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- ✓ המורה המשלב טכנולוגיות בהוראה מאמץ יותר כמכוון ויוצר ופחות כמקור ידע.

- ✓ המורה המסורתי בעיקר מעביר ידע לתלמידים בעוד המורה המשלב טכנולוגיות בהוראה מתמקד ברכש כלי לתלמידה והמצרה.

- ✓ אין הבדל. אפשר להיות מורה מאמצותי כזה או כזה ולהפך.

- ✓ המורה המשלב טכנולוגיות בהוראה הוא יותר מתקרב לתלמידים כי המחשב זה העולם שלהם.

- ✓ מורה המשלב למידה במחשב צובר, מלמד כיצד לסנן חומר באינטרנט. תפקידו לא רק להעביר מידע אלא כיצד להתמודד עם הכלי הזה ואיק לצאות מיהוי נכון של חומרים הנכאים ומאינים לו ברשת בין רע.

- ✓ המורה המסורתי מקור ידע. המורה המשלב טכנולוגיה מנחה ומפנה למקורות הידע.

- ✓ המורה כבר לא מקור הידע אלא מוביל ומנחה את הכיתה.

- ✓ המורה מתווק, מאשר לא מעביר לא ידע אלא מכוון את תלמידיו לאתרים וחומרים באופן מעניין, יצירתי ויעיל.

- ✓ המורה המשלב טכנולוגיות בהוראה יותר אינטראקטיבי, יותר מעניין, יותר מאורגן ומביא למידה באמצעים מגוונים. לצואת המורה המסורתי שעומד בפסו בכיתה ומעביר את הידע רק מתוק הידע האישי של.

- ✓ להתאמה מתקבלת צל מנת להתאים את ההוראה למאה ה 21 לצלות את רמת החשיבה והעניין לצנות את מצדת המורה למנחה ואת התלמיד לפעיל אקטיבי.

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**Appendix 12: Characterization students Generation Z**

הנבדקים במחקר נשאלו בראיון האישי: האם הם מרגישים שיש משהו אחר/שונה/חדש בדור התלמידים של היום? ומדוע הם חושבים כך?

Study participants were asked personal interview: Do they feel that there is something else / different / new generation of students today? And why they think so?

## Teachers' Comments:

| Why | Something else today's generation |
|---|---|
| הם חיים בפחד עולמי מסביבה אם אצלנו היה אוזר אחד לחזור אצל הילדים ש היום מקבלים פחד ש מחירה וכל הזמן הם צריכים למחזר. אם האינדע יש פחד והם צריכים לסנן את האינדע למחזר אמנו להוסיל יצירתיות ושם על זה תוסיפי את הקטע ש חוסר הפקס הנה. לדעתי ההורים עם תוראים לנה, נותנים להם אין סוף מיוון ומחירות במשחקים, בפרטים בארון וזכל כך הרבה תחומים. | כולם היפראקטיביים הצירווים צריכים להיות מידיים, אין להם סבלנות לפרוק, הם מצייצים לאיזר במהירות ומצירתיות מהצעות הדפק. כאשר אתה מראה להם הרבה שירוויים על ידי סרטונים ופלייבקים, הם מצליחים לפגוד. אני מרגישה שכל הזמן אני צריכה לצאות משהו יצירתי ולנסות לחבר אותם כל הזמן לצניין אותם. כאן קוסם וגה מה שטוב הטכנולוגיה שנותנת להם ואן של פקס. |
| בגלל שהם חושבים לדברים שאנחנו לא היינו חושבים אליהם, אנחנו היינו אשחקים בחול הם דבוקים למסך. ההתפתחות הטכנולוגית משפיעה על כל תחומי החיים. | כן. הרבה. קודם כל הם לא יודעים לדבר עברית טוב. יש להם יצא טכנולוגי שראה שמוהה מאוד אבל שני הם כל כך מחוברים למסך שזה בוא בטוא בחוסר השלוני שלהם באוזר האילים ומאישלה השלוני. |
| הכל אצלם מהר אין להם סבלנות הכל כאן ופרסומות. | כן אני מרגישה שיש דברים טובים יותר וטובים פחות. טובים פחות: תרבות של אינסטנט, מהיר יותר קשה להם להתמקד בטקסט ארוך כשנה טקסט קצר זה יותר קל הם אוהבים קישורים לסרטונים כתיבה וקריאה של טקסט ארוך קשה להם. הטוב: המחשב נותן להם אפשרויות מהירות ונאמנות לאם פירוש מילים במילון, חיפוש מילה ופירושה, חיפוש חיפושי מילים... ובצייה בסרטונים רלווונטיים. |
| | ברור. הם נולדו לכל ההייטק ולכל הטכנולוגיה המקוונת. אם אורה רוצה ללמוד באופן יציל ואפקטיבי הוא חייב להתכוונן לתלאמידים שלו שם בהוראה שלו, שם בתכנים. ילדים כבר לא מתחברים לספר ואמהרת ולכן האורה צריך לצאת מתוק נקודת הנחה שהתפקיד שלו לחבר אותו לנושאים |

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|---|---|
| כי הוא חשוב להכרה יותר טכנולוגיה. הוא זאא לאידע אחר. באינטרנט יש כל הזמן התחדשות של אידע. כאם היינו לומדים אה שיש בספר ובהל. | הלימודים בדרכים שלנו. דרכים אחרות.<br>הילדים חושבים להכרה יותר מידע והתפקיד שלנו להבטיח אותם לחשיבה, לאידע שלא תואם לשילם. אנחנו האוסרים בדור הנה. בתחום של הבלישה ולאמור על למידה ושאלות. זה דור שהנה. יותר איוון. יותר בתחום האחשבים מתוחכם יותר. הדור הזה נהנה יותר ללמוד ותורם לו אבל חיים לשאמור על שאלות שאלות שאלות, שם בשיעור הם שולחים, הם הפייסבוק ובכל מיני דברים אבל כאשר הם נכנסים לאשיאה הם מתרכזים בה אבל האורה חייב להיות כל הזמן שונה.<br>אנחנו כאורים חייבים לדאות שהאשיאה תהיה מעניינת. להפנות אותם לאתרים רלוונטיים ולהבזיא מידע. צריך כל הזמן לעניין אותם.<br>האורה ... צריך לשנן את האידע, לעבד אותו ולזכור אותו כאילו איוונוויות צריך להשתמא. שם האורה צריך לעצור לתלמידים שלא יודעים להשתמא בכלים כאו אחרים. יש עדיין תלמידים שאין להם מחשב בבית.<br>חשוב ביותר לצודד את הילד להיות חוקר צעאי. |
| כל השירויי איתם צריכים התלמידים ביאינו להתאודד משיעים שם על ביה"ס. שם בבית הספר הם מחפשים שירויים ושינויים אין סופיים ואבזים אאיתנו האורים להיות ליבנים אשר יוצאים שפנים מהבולגה. | התלמידים היום שונים אמתקופתנו. יתרה מכך שונים מאוד מהדור שקדם להם. היום התלמידים מחפשים יותר אתגרים, אסתקאאים באהירות ונראה שהאורה צריך להאבזיא את אצאו כל כם אחד. באעבר התלמידים היו מכבדים ויראים מהאורים, רוב הדור החדש לא מכבד את תפקיד האורה וארשיש מאולש להבזיע לביה"ס.<br>שאל צוגדה לו שם השיעורים הפכו להיות הרבה יותר קשים. אני אולאאת את אצאי שאנה שיטות הוראה מלראה מלאמידה צאאאית לאמידה קבוצתית. ואחר כם צוגרת להבזאות של תלמידים מחבריהם ועוד. נראה כאילו אם מאה שלא תעשה, התלמידים אולאים את הדרך האהירה ביותר לסיבה חדשה שהשיעור משאמם. |
| זה קורה כי החברה הישראלית צברה | בודאי. בחמא השנים האחרונות דור |

| | |
|---|---|
| התלמידים הוא דור eאוסק בקלות ביואיות eלו, בכיתות הליאוד. מאוד קשה, לא מענה מה החומר הנלמד. נה פחות מעניין אותם. הeאיבה eלהם לדבר על צצאת ועל החוויות eלהם. דרק התקeורת eלהם eונה, הם מתקeרים בוואל אף, כייסבוק וכאלה. הeפה eונה. הכל 3ריק להיות אינסטנט כנה, מהיר, מוכן לצוס. אין להם את היכולת לeבת. הם רו3ים הכל כאן ועכeיו. | שינוי. אנחנו חיים באצ3יאות eל "להסביק הרבה", "לתפוס הכל". כחות מאמיקים ויותר סeתי. כאות e3ולה אבל סeמית. והילדים e3לים ב3ולם כנה. מנוסe לכל ילד יe את הטכנולוגיה מהieט יד. אם נה מחeבים, אייבדים, סבלבים וכאלה. ואין להם את הפחד מטכנולוגיה. נה כלי 3בורת בדיוק כמו כל כלי אחר. אם אני אתן להם לאמe צבודה, אנחנו היינו הולכים לאינ3יקלופדיה, הם הולכים לויקיפדיה. לאת אומרת נה מאוד ברור להם הטכנולוגיה היו. |
| כן. התלמידים eל היום דורeים מתרונות אידיים, הם חסרי סבלנות בקריאת טקסטים ארוכים. מחפeים דרכים קצרות לצנות צל מeימות, נה בציקר הבעיה eל הדור הנה. | בגלל eהם רגילים לeבת מול המחeב והם רגילים eהכל קורה מהר, בלחי3ת כפתור ואין להם סבלנות, לחeוב ולהבקיע ולחקור וכאeר דורeים מהם לחeוב ולהבקיע נה קeה להם. |
| כן. קודם כל התלמידים eל היום הם תלמידים eהמריב eל כל הטכנולוגיה היא ילד-אין. תלמידים סקרנים, מתצאמים בקלות, 3ריכים כל הזמן חידוeים, eירויים. הלוה והeיר נה "פסה" אהם. הם 3ריכים סביבה המספקת 5 סביבות אדיה: eמיצה, 3בייה (ראיה)....חוe מהטצם, הכל! | נה דור טכנולוגי פeוט. כאו eהיינו דור 5 הקופיות הם נולדו לצולם טכנולוגי. |
| תפיסת הצולם eלהם מתצ3בת ממה eהם רואים וקוראים ברeת. ולפצאמים מה eיe ברeת מeפיצ צליהם יותר אפילו מהחינוק eל ההורים וכה האורה ב3את תופס מאe תפקיד מרכני. ב3את כל ההסברה הנאת מאה להיות מושפצים וממאה לו. | |
| כן. חסרי סבלנות, מה eאומר eהם רו3ים תו3ר ומאיירי. הם מצדיפים eתומרי להם את התeובה מאeר להבeיג את החeיבה ולאנ3וק את התeובה ב3אמם. מאe מאוד תלמידים בוחרים לוחרים להב3יג ב3אמם לתeובה. נה דור האינסטנט. דור eבלחי3ת כפתור הכל מתקבל. הם עם כחות אצלים צניין. לא מעניין אותם דיונים. הם אינם אצלים צניין בכך. אדיeות מאאצותית למה eקורה סביבם. | אני מאeיאה את דור האינסטנט. כל האריה הנו מראה להם איק להתלבe, איק להירבות. eוסבים להם את האוח והם מוספים. האוח eלהם 3ציר והוא מתצ3ב ונה מה eנטאא eם. ורק הדברים הבחות מקראים נeאר eם. אני מרeיeה eחייבים ל3ל3צא אותם. |

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כן. וודאי. זה דור אחר לגמרי. לצערי אני חושבת שזה דור היפראקטיבי. דור שרוצה הכל כאן ועכשיו. דור שאין לו סבלנות. הוא לא מאמין. הוא שטחי. לא הרבה דברים מעניינים אותם. כל היום הם במתוק המסכים של הצ'אט והם מאמינים בתקשורת מילולית. השפה שלהם דלה וזה מדאיג.

בגלל כל הטכנולוגיה הזו. יש להם כל כך הרבה ואהבל. הם אובדים בפרטוסים ובאומטשים והם רוצים צד ועוד מהכל. הם לא צוצרים רגע ומתלבטים אם הם באמת צריכים את מה שהם רוצים. כל הזמן רוצים צד ועוד. לפעמים אני אומרת אלא שיש שאון וגו רק 24 שעות ביום כי נראה לי שאם זה לא היה הם גם לא היו הולכים לישון.

"אינסטנט...היפראקטיבי...אין להם סבלנות...לא יודעים לדבר עברית טוב... קשה להם להתמקד, כבר לא מתחברים לספר ולמחברת, חושבים להרבה יותר מידע, צריך כל הזמן לעניין אותם, מחפשים יותר אתגרים, מסתגאים במהירות, לא מכבד את תפקיד המורה ומרשים מאולגל להגיע לביה"ס. דור שאוסק בקלות, כמות מעניין אותם, האכיה שלהם לדבר על הצ'אט וגל החוויות שלהם, דרך התקשורת שלהם שונה, השפה שונה, הכל צריך להיות אינסטנט כנה, מהיר, אוכן ולצוס. אין להם את היכולת לשבת, הם רוצים הכל כאן ועכשיו, דורשים פתרונות מידיים, הם חסרי סבלנות, מחפשים דרכים קצרות, תלמידים שהמדיה היא גילד-אין, סקרנים, מסתגאים בקלות, צריכים כל הזמן חידושים, שירויים, צריכים סגירה המספקת 5 סגירות אדיה: שמיעה, צפייה (ראיה)....חוש מהטעם, הכל!. חסרי סבלנות, רוצים תולד ומיידי. הם מצפים שתומרי להם את התשובה מאשר להפגיל את החשיבה ולמצוא את התשובה בצ'אט. דור האינסטנט. דור שפתחיבת כפתור הכל מתקבל, כמות מלשים עניין. לא מעניין אותם דיונים, אצישות מאאצותית למה שקורה סביבם, דור היפראקטיבי, דור שרוצה הכל כאן ועכשיו, דור שאין לו סבלנות, לא מאמין, הוא שטחי, לא הרבה דברים מעניינים אותם, מאצישים בתקשורת מילולית, והשפה שלהם דלה."

The findings of this research provide the knowledge, understanding and essential insights regarding the perception of the role of the technology integrating teacher, which lead to the main conclusion: That it is necessary to develop a rational model to be applied to the educational system and to the process of training teachers how to integrate technologies with their teaching. This model can be universally adapted to every teacher in every educational system. It was built on the basis of the research findings and the reading of comprehensive professional material, and was structured upon theories of personal training. The aim of the model is to construct a work plan that is personally adapted to the new perception of the role of the technology integrating teacher and that corresponds with the characteristics of the pupil generation. The model is not self-sufficient but requires personal technological and pedagogical adaptation to the teacher in the framework of supplementary teaching courses or personal instruction for teachers in a technological learning environment. This application of this model will be examined by further research planned for the future and is also offered for examination by other studies that may be conducted in the future.

## The theory behind the model

From the research findings, it was seen that the traditional education system was built according to the following model:



**The past - Traditional teachers**
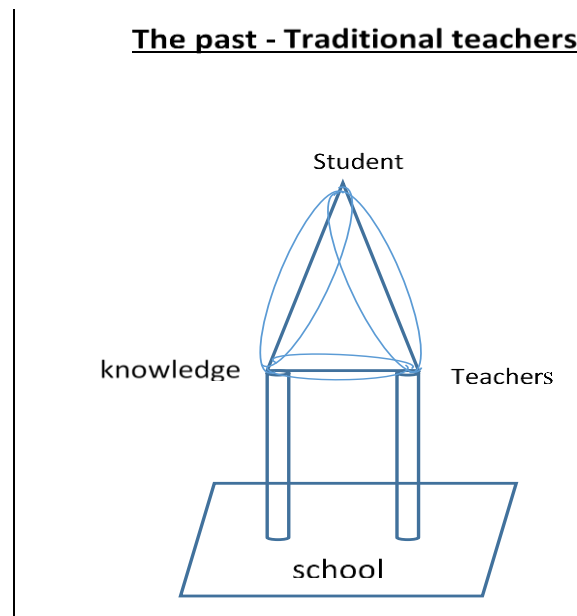
This means that there is a stable system in which the teacher is supported by the education system and by his knowledge, and leads the learning efforts of the pupil. The interaction among all the components – teacher-knowledge-pupil was stable.

After the introduction of technologies into teaching the balance among the teacher-knowledge-pupil components was undermined:

**The present - The current situation in the education system**
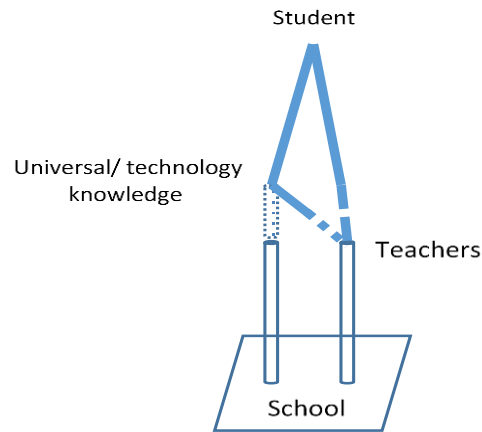


This means that the system is unstable, that there is a large amount of technological and global knowledge, that the pupil has connection and ability for technologies, but the teacher still remains in the sphere of traditional teaching and his status is undermined.

In order to stablise the system, the teacher must acquire new technological, interpersonal and pedagogical skills. Development in each of the above components creates a stable and complete framework for teaching.
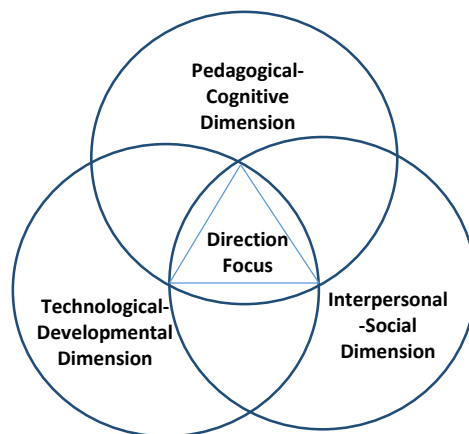


The teacher needs guidance and support from the education system in order to narrow the gap created between him, the pupil, and technology.

The futures - Recommendations to the education system and teacher
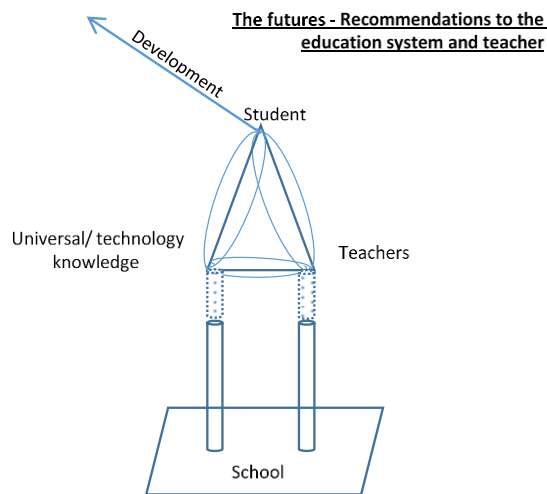
From this it may be seen that the entire system is raised in level. The teacher, the knowledge and the pupil, with the teacher and technology supporting the development of the child in his own unique way.

In the framework of supplementary studies, teachers and educators who integrate technologies with teaching can be trained personally.

Every teacher or principal will carry out an analysis at the beginning of the school year in accordance with his expectations, experience, desires, needs, and perceptions, with the perception of his role in relation to the characteristics of the pupil generation, and with what he hopes to accomplish by the end of the school year.

## The stages of personal training (personal strategic planning) and possible outcomes:

### Stage 1: The Interpersonal-Social Dimension

1.1 Prepare a list of words that include dreams and aspirations. Reference should be made first of all to ourselves, with guiding questions such as: What do I like to do? What excites me? What do I enjoy? What do I like in my work? What affects me emotionally? What arouses my curiosity? The list should continue in relation to the pupils in class: What do they like to do? What excites them? What do they enjoy? What do they like in the school? What affects them emotionally? What arouses their curiosity?

1.2 After we have this list, we draw an open table of 5-7 columns and intuitively insert the words into the columns (without headings).

|  |  |  |  |  |  |
|---|---|---|---|---|---|
|  |  |  |  |  |  |

1.3 After the insertion of the words, a title of one or two words is chosen to head each column.

1.4 After deciding on the title headings, 3 columns out of the 7 are chosen as those to which we are most connected and feel closest to, grading them in descending order – P1; P2; P3 (P stands for our inherent potentiality)

**Stage 2: The Technological-Developmental Dimension**

2.1 Prepare a list of words for all the skills and competencies that we possess. Reference should be made to our technological skills and personal competencies.
We may use guiding questions such as: What do I do best? What are my talents? What is easy for me to do? What are my qualities? What are my abilities? What are my skills? What problem would I be asked to advise upon? What abilities have I developed?

2.2 After we have a list of the skills and competencies, we allocate some of the words that are suited to each of the P categories we determined at Stage 1. That is to say, what words in the list allow us to realise the specific potentiality.

| P3 | P2 | P1 |
|---|---|---|
|  |  |  |

This above table is maintained to the extent that the order of P1, P2 and P3 is the same as in Stage 1. If not, then the order should be changed according to some new order.

2. 3 Construction of the plan to be carried out:

P1 answers the question: What am I supposed to do?

P2 answers the question: How should I carry out what is written in Column 1

P3 answers the question: With who / with what / where shall I carry this out?

2.4 Definition of the goal: On the basis of these three columns, we write one sentence that summarises the goal of the teacher for that year.

## Stage 3: The Pedagogical-Cognitive Dimension

This dimension defines the following: What experience does the teacher bring in? What is the situation in which he lives? Here each teacher will document the experience he acquired in various spheres of activity; his current situation; what is required; what exists; what are the constraints of reality; choices and values; the variables that influence his conduct; what he has done until today; what are barriers to success that disrupt the achievement of goals and aspirations; to what does he aim at achieving at the end of the year; how does he see himself and his class / his school at the end of the school year.

## Stage 4: Directional Focus

At this stage every teacher will examine the intersection between what he found in State 2 and what was raised in Stage 3. The area of intersection between the three dimensions allows for identification of the personal directional focus of the teacher within the potential space in which he operates.

## Stage 5: Focus on Writing the Work Plan for the School Year

Writing the work plan can be individual for each teacher according to his wish, but the schedule must be written in advance. I suggest writing a work plan according to the five stages for the realization of his envisaged aim written from the end to the beginning, from the point at which the teacher wishes to arrive at the end of the year to the point from which the year starts, with every stage constituting the basis and preparation for the next stage. The teacher begins to act from the lowest and broadest stage from which he grows and develops towards the realization of the aim he set for himself at Stage 2, and overcomes the difficulties and limitations that arose in Stage

3. Technical support will be given differentially and personally to the teacher according to his request. The teacher is focused on his aims.

In the diagram below, the model can be seen with the intersections between the dimensions:
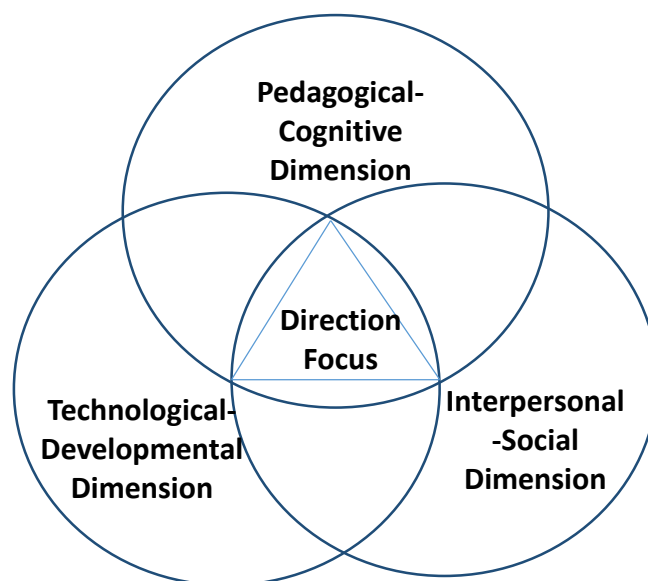
From this intersection of the three dimensions we receive a development triangle in which the pupil is found at the apex of the triangle, while the teacher and the technology form its base line. In fact, through the integration of the three factors and the personal analysis of each teacher, a plan will be constructed that is adapted to each teacher personally – to updated technology – and to the pupil generation.
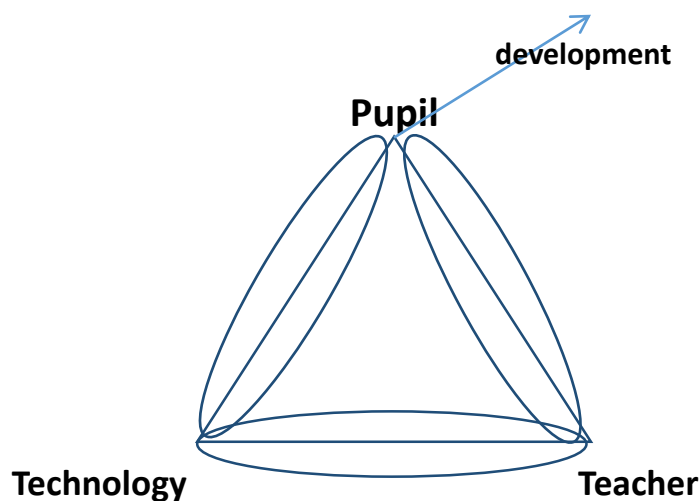


There is interaction and a flow of energy between each of the three points of the triangle: between teacher and technology; between teacher and pupil; between pupil and technology. The triangle itself presents the framework of rules and laws, usually those of the school, that correspond to the perception of the teacher.

The teacher and the technology positioned on the base line of the triangle, constitute the stable basis for the pupil which provides for his cognitive, interpersonal, social,

technological and pedagogical development. The base line of the triangle is constructed with the help of the five stages described above.

When the base line of the triangle is stable and firm (interaction streaming between the teacher and technology) the pupils feels stable and confident in using all the tools at his disposal for development. The child knows his direction and at what he aspires to and where he wishes and is able to arrive. The teacher enables him to do this and supports his learning and development. In effect, in this way the educational system, the principal and the classroom teacher allows the children to make maximal use of the resources and possibilities for full development and its prearranged direction.

I regard the changing perception of the role of the teacher in relation to reality as the choice, understanding and will of the teacher himself. The pupils find their place and the desired direction of learning for themselves. There are less disciplinary problems and more interest and the will to learn. The stability of a system that develops and improves is maintained in accordance with the development of technology and the changing pupil generation.

The model has been tried but was not proven on three teachers in the school.

Teacher No. 1: Literature teacher.

Teacher No. 2: Educator and Social Coordinator.

Teacher No. 3: Mathematics teacher.

In a personal encounter of five hours, the teachers underwent a program for writing their prospectus for the coming school year.

Teacher No. 1 underwent the process and finally decided not to continue in class education and intended instead to focus on the development of the field of literature in the school through the tool called "bibliotherapy". She decided to take supplementary courses that integrated technologies in bibliotherapy writing. She made contacts and organised meetings between pupils and writers in the field of children's literature and noted that her aim was to encourage pupils in creative writing during the coming school year. She also took a significant step and notified the principal of the school that she did not want to be a class educator but to focus only the study of the literary discipline even though she had already been assigned as the educator for Grade 8.

Teacher No. 2 underwent the process and finally decided on a new goal for herself during the year in group guidance. She found in herself certain abilities and talents for guidance and learning in a different framework from frontal teaching, and discovered that she had the strength to guide groups of pupils and teachers in social activity, in contributing to the community, and in mutual assistance and development through each group supporting the other (cooperative learning). The teacher applied to the principal and requested permission to guide groups on her own time and to take additional courses in this field.

The principal gave the required permission and even allocated place for this in the school schedule. The teacher then began writing her work plan and program for the first meetings. At the same time, she registered for courses in group guidance.

Teacher No. 3 (the researcher) underwent the process and finally found that her contribution to the educational system was to break out of the school borderlines and to disseminate information to other teachers in more extensive areas through lectures and study days. The teacher accepted an invitation to lecture at a regional settlement educational conference. Although the conference program had already been planned and constructed, she applied to the manager of regional settlement education and requested permission to present her research at the conference. Her intentions are to continue in this course during the coming school year. At the same time, she constructed a plan for development in her class through holding mathematic games three times during the school year and holding three encounters for her pupils (Junior High) with pupils of Grade 6 in elementary schools in the regional settlement. She composed a work plan to be carried out during the year through a cooperative approach and the transmission of information among the pupils themselves. For this purpose, the teacher also held a discussion with two principals of elementary schools who were impressed by the idea and responded to her request.

The three teachers mentioned above determined their goals for the coming school year. At the end of the process they expressed their feelings about it and described it as an interactive process that led them to develop a personal potential through self-investigation in order to achieve the goals they desired. The unique process and the accompanied support led to a breakthrough and the creation of a sense of balance and satisfaction. It allow them to take responsibility for what happens to them in a proactive manner and positive thinking as a basis for their personal conduct. The aim of the process was to define a goal for the coming school year and the operative methods to achieve the desired outcome. The teachers examined their personal situation, developed additional perspectives, overcame or bypassed personal limitations, and acquired new skills for effectively improving their perception of the role of the teacher.

The recommendation is for the continued examination of this model in other schools on teachers of various professional characteristics.

Addr: 16 Shani St, Shimshit 17906 Israel  .Cell: 97250533095 Email: sigal.shmul31@gmail.com

<u>Personal Information</u>

- Date of birth: 13/11/1972
- Marital Status: Married with 4 children

# Curriclum Vitae- Sigalit Shmul Cohen

**<u>Education</u>**

**2009-2013** doctoral student, integration of technology with teaching, Derby University

**2003-2005** 2nd degree: **M.A.** <u>Summa Cum Laude</u> specialization: Management in Education, University of Derby

**1996-1998** 1st degree: **B.A.** <u>Magna Cum Laude</u> specialization: Economics and Management, Yezreel Valley College

**1998-1999** Teacher's certificate No 6886 in Economics, Oranim Academic College

**2000** Permanent Teacher's Certificate in Economics No 58677

**<u>Work Experience</u>**

**Today I have different as well as related roles:**

**1999-today**

**teacher of mathematics, student counsellor and school management team member for 22 years at the Yaarat Haemek Middle School**

**2006- today**

Ministry of Education - **Community and publicity coordinator for Yaarat Haemek middle school management body in which I**:

- monitor, control and evaluate the grade 6 level before their move to the middle school level
- responsible for notification and advertising events in the school community and environment
- responsible for relations between school and the community and managing the awareness space between the school and parents in all matters relating to schooling

**2007 – today**

Ministry of Education – **teach and lead the "Amirim" program for excelling pupils in Yaarat Haemek middle school**:

- teaching content and higher level thinking skills through investigation and self-direction
- encourage pupils to be curious about what happens in their environment and facilitate their access to a variety of stimulating areas
- a member of the school's management team
- home room counselor for math excellence
- math teacher

## 1993 – 2000

Technion: **TALAM teacher for the Encouragement of Mathematics** (the Technion is Israel's premiere university for science and technology)

- responsible for the advancement of collaboration with middle schools and enrollment of excelling pupils (ages 12-18) to participate in the program
- responsible for guiding young students to advanced studies of science and technology in the Technion
- promoter and relationship builder between the Technion and schools

## 1993 – 1999

Coordinator Karav "Kito Marom" Scholarship fund – **Israel Northern Sector**

- responsible for the professional development of enrichment program counselors
- responsible for the management of day and excellence camps and the recruitment of intellectuals and economists
- responsible for the dissemination of the program, the recruitment of counselors and building a school program

**Knowledge of Languages**

**Hebrew** mother tongue

**English** good

**Familiarity with computer programs**

Ability to integrate technologies with teaching

Ability to develop websites

High proficiency in the use of Microsoft office products

To Whom It May Concern,

Sigal Shmul-Cohen is a teacher of mathematics in our school for the last 20 years. She has taken part in the management group of the school, initiated new projects and promoted the school. One of the leading projects in the study of mathematics today is the creation of math thinking games which are attuned to age and level.

The connection Sigal has with her pupils is very special. Pupils return to visit her after completing their studies and getting married. She is loved by her pupils and gives them added value beyond the learning of mathematics.

Sigal is the only teacher in our school who is studying for her third degree in education. She researches the school and the integration of technology and teaching. She advances and promotes the integration of technology in teaching and the change in the conception of the role of the teacher in line with generation Z pupil characteristics.

She has given lectures to both teachers and school management staffs in the area.


Respectfully,
Liya Golan,
School's principal

**Appendix 16: Recommendation from supervisor**

University of Derby
Kedleston Road
Derby  DE22 1GB
Tel: 01332 591267
Web: www.derby.ac.uk/icegs
Email: t.hooley@derby.ac.uk

8th December 2015

To Whom It May Concern,

Sigal Shmul (Israeli ID ▮▮▮▮▮▮) is studying for her doctoral degree in education at the University of Derby. Her studies commenced at the Derby Israeli Extension. This extension has since closed down and she is currently studying at Derby remotely from Israel which requires several trips a year to Derby for meetings in moving her research and thesis forward and completing her doctoral degree.

Sigal's research focuses on the integration of technology with teaching. She is interested in how teachers have conceptions of their role have changed in response to the introduction of new technology and working with generation Z pupils. Her research is interesting and offers a number of important new insights for the teaching profession in Israel as well as raising some important implications for policy.

Sigal's studies are progressing well. I anticipate that she will be able to submit her thesis during the next year and that she will be successful in defending it at viva. Sigal is a serious student who has been very successful in balancing her studies with her demanding work and family life.

Yours sincerely

Dr Tristram Hooley
Professor of Career Education
International Centre for Guidance Studies
University of Derby
www.derby.ac.uk/icegs