ISSN: 0975-833X

*Available online at http://www.journalcra.com*

*International Journal of Current Research*
*Vol. 9, Issue, 07, pp.54189-24200, July, 2017*

**INTERNATIONAL JOURNAL OF CURRENT RESEARCH**

## RESEARCH ARTICLE

# TEACHERS EXPERIMENT LEARNING BASED ON FUTURE-ORIENTED PEDAGOGIES

***Anat Raviv**

Tel-Hai Acadmic College, Israel

**ARTICLE INFO**

***Article History:***
Received 21st April, 2017
Received in revised form
20th May, 2017
Accepted 16th June, 2017
Published online 26th July, 2017

***Key words:***

Online training program, Learning by doing, Postmodern era, Teaching and learning processes.

**ABSTRACT**

Leraning by Doing a research project aimed at identifying the impact of approaches based on learning in an online training program. A questionnaire, operationalizing four learning modes and the implementation of those methods, was used to solicit responses from teachers in different teaching frames 3 times during the study. The modes explored some learning models such as: independent learning, instrumental learning, interactive learning, and collaborative learning. The results point a significant change in teacher's abilities and teaching skills during the program and 6 months after it. This model of teachers training is based on the requirements of teaching in the 21 century.

***Copyright©2017, Anat Raviv.*** *This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

**Citation: Anat Raviv, 2017.** "Teachers experiment learning based on future-oriented pedagogies", *International Journal of Current Research*, 9, (07), 54189-24200.

## INTRODUCTION

This paper reports on a research project aimed at identifying the impact of approaches based on learning in an online training program. A questionnaire, operationalizing four learning modes and the implementation of those methods, was used to solicit responses from teachers in different teaching frames 3 times during the study. The modes explored some learning models such as: independent learning, instrumental learning, interactive learning, and collaborative learning. The results points a significant change in teacher's abilities and teaching skills during the program and 6 month after it. This model of teachers training is based on the requirements of teaching in the 21 century.

### Chapter 1: Literature review

Learning by doing means learning from experiences resulting directly from one's actions, as contrasted with learning from watching others perform and reading others' instructions or descriptions, which is the main strategy of traditional learning (Yosifon and Shmida, 2006). The postmodern era is presenting complex global and local changes. Assuming that postmodernism is not a temporary phenomenon that will pass quickly, the education system must be open to local and global changes and face the challenges that this period presents. The postmodern era requires a fundamental change in the existing educational concept and the creation of new teaching/learning concepts (Aviram, 1999). Practitioners of education, in theory, and practice, must recognize the need to develop a comprehensive and systemic education strategy that will combine the reforms and partial changes that have been made in the past into a solid educational paradigm based on global principles (Yosifon and Shmida, 2006). The realization of educational ideas and theories is reflected in the work routines in the classroom and the transformation of educational theory into pedagogical practice. The core of educational practice, according to Elmore (1996), consists of two aspects:

1. The way teachers understand the nature of knowledge transfer and teaching strategy,
2. The role of the pupil and the transformation of information into a routine in the teaching and learning processes in the classroom.

Teachers' beliefs, perceptions, and opinions influence their understanding of what knowledge is, who their pupils are, what are "good" and "correct" teaching and learning processes, and what teaching/learning activities are desirable. Therefore, in their actions in the classroom, the teachers represent, to a great extent, their perceptions and attitudes in combination with the Ministry of Education's perceptions. The complexity of structuring teaching processes adapted to learners in the postmodern era involves the integration of a significant number of factors, such as learning environments, physical

**Corresponding author:* **Anat Raviv,**
Tel-Hai Acadmic College, Israel.

conditions, teachers' relationships with their students, assessment processes, teacher-parent relationships, and more. A paradigmatic change in the educational system in the postmodern era requires an examination of applied practice and its expression in educational life routines (Yosifon and Shmida, 2006).

The pedagogic practice can be examined from two angles:

1. The desired practice in the education system in the post-modern era, and
2. The current practice in schools.

Today, pedagogic practices are in an intermediate state, on a seam line, and pedagogic experiences of different types coexist: traditional practice alongside innovative experiences based on progressive pedagogical approaches (Yosifon and Shmida, 2006). Hence, a change in perceptions and teaching-learning methods should be built in a pincer movement, that is, a significant investment should be made in the professionalization of the teaching staff, alongside systemic changes in the definition of the desired graduate in the post-modern era. Such a definition will lead to a deep understanding of the "knowledge box" with which the graduate is required to leave the school gates. This aspect may lead to a significant change in teaching-learning environments, through the intelligent integration of technological means.

**The required skills of teachers in the 21st century**

The redefinition of the goals of education and the necessary changes in teaching-learning methods directly affect the role of the teacher in the classroom and the skills required to grow students in the image of the ideal graduate (Kupferberg and Nirland, 2012; Van Leer Institute, 2010). According to the Ministry of Education, the teachers' role is to know how to design and develop teaching strategies and to independently integrate learning activities that integrate technology to promote learning processes and to use information systems and distance education to advance their professionalism (Ministry of Education, 2012b). In relation to the perception of the future-oriented pedagogy, the role of the teacher is growing stronger and the expectations from the teachers are that they will move from conventional learning,i.e., imparting knowledge in the fields of learning, to multidimensional teaching/learning based on the principles that transcendthe boundaries of the class and subject. These principles are based on a pedagogical approach in future-oriented learning environments. The principles are personalism, collaboration, non-formalism, glocalism, exchange, and inclusion (in the making). Learning environments should be flexible, aesthetic, and inspiring in order to encourage innovative and creative learning and provide an answer, to the extent possible, to all students (Ministry of Education, Experiments and Initiatives R&D, October 2016). These principles will also influence physical work environments that integrate technology, to address the physiological, psychological, and social needs of the students.

Figure 1 describes the components included in future-oriented pedagogy.

Most teachers who teach today in the education system completed their training years ago, and young teachers who have just completed their training have not always acquired the tools and skills they need during their training.

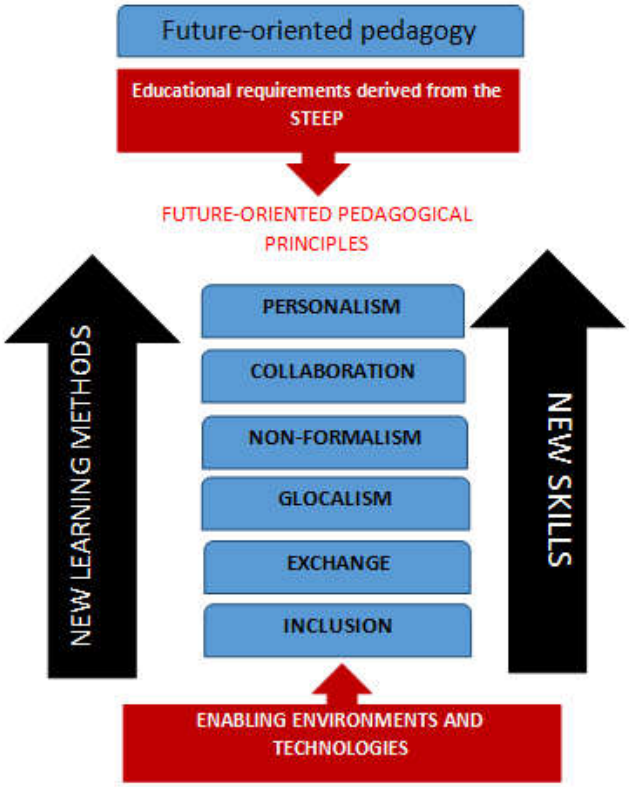


**Figure 1. Components included in future-oriented pedagogy**

For teachers to succeed in their mission in the classroom, that is, to develop a graduate with 21st-century skills, teachers must own these abilities themselves. Therefore, the Ministry of Education places emphasis on the importance of continuous professional development among teachers, based on the LLL (Life Long Learning) concept, and even defined criteria for the continued professional development of teachers after completing their training and during their ongoing work (Ministry of Education, 2010).The entire education system is designed to facilitate lifelong and "lifewide" learning opportunities for teachers. The concept of lifelong learning requires a paradigm shift away from the ideas of teaching and toward training and from knowledge-conveying toward learning for personal development. This shift is needed at all levels of education as a basic model for teachers' development (UNESCO Education Strategy 2014-2021).

**Developing a sense of efficacy among the teachers**

Teachers' sense of self-efficacy is related mainly to the field of teaching and describes the teachers' assessment of their ability to manage the knowledge and skills they possess, and their belief in their ability to perform the necessary actions to achieve their future goals, which are especially related to the promotion of their students' achievements (Chen, 2010). Another issue examined concerns the relationship between the sense of competence and teachers' willingness to adopt innovations and changes in their work. A study by Nissim, Becker, and Ben-Zvi (2012) found that the higher the teachers' sense of competence, the more willing they are is to experience new and advanced methods of work. They feel confident about their teaching abilities and function more effectively in the classroom. The research literature indicates that during the

development of the teachers' sense of self-efficacy, improvement and diversity of teaching strategies in the classroom make a significant contribution to this feeling (Romi and Leyser, 2006). In this context, it is found that teachers with a high sense of competence are more receptive to innovative experiences and informal learning opportunities. Significant experiences will lead to the implementation of new teaching methods and the integration of innovative tools for adaptive teaching in the 21stcentury (Romi and Leyser, 2006).

**Professional development as a resource for developing the teacher's efficacy perception**

According to the instructions of the Ministry of Education, each teacher must devote 60 hours per year to study and professional development in a school or training courses in their disciplines. The aim of these courses is to expand the teachers' knowledge and experience as a tool for professional development in their various roles. However, just as the teaching methods of students need to be changed, fundamental changes must be made in the way teachers acquire knowledge and develop their skills and abilities. For teachers to have the abilities expected of them and own the tools to develop students who meet the requirements of the system, it is not sufficient to teach the theory alone. Teachers must experience and experiment with quality learning in an innovative environment similar to that which they are required to implement in the classroom.

**Adapting professional development to the needs of the teacher**

In the past two decades, a dynamic theoretical discourse has been held on adapting professional development processes to teachers in the 21stcentury. The researchers' conclusions regarding the changes required in the teachers' professional development process are based on the creation of learning environments for teachers that are characterized by a high level of collaboration while including experiential elements. Another significant dimension is anchored in the high interaction of teachers with learning materials through sharing and exchanging information with peers (peer learning). This professional development concept is based on "future-oriented innovative pedagogy," which is based on a flexible study structure adapted to the socio-cultural, economic, and technological changes, which are the essence of knowledge in the post-modern era (Videslavsky, Peled and Pevsner, 2011). The process of the professional development of teachers is becoming more complex and deeper while adopting an intellectual orientation with an emphasis on imparting generic skills rather than pedagogic techniques. One of the implications of this approach is the requirement that the role of master teachers will be changed from knowledge transfer to learning facilitators (similar to the change in the teachers' role definition) so that learners will become independent and proactive, and generators of knowledge. Teaching and learning methods that are linked to the constructivist paradigm are considered innovative because they can provide participants with a more adapted response through the development of the diverse, personal, and interpersonal skills required today in a society that is rich in innovative information (Vidislavsky, 2015). In fact, the teacher must experience in practice learning that is based on quality pedagogy in an innovative environment and participate in training courses in which the approach is implemented, so that the process of teaching and learning that takes place in the course will serve as a role model for the teacher (Holzer, 2007).

According to the Ministry of Education's Professional Development Program for the Advancement of Learning (2015), this approach is based on a number of principles. Teaching that encourages visualization-infographics, that is, learning through visual illustration of teaching (e.g., use of visual representations during instruction) to clarify abstract concepts or terms. Teaching that encourages higher order thinking, that is, teaching that is performed through complex problems and dilemmas that do not have one correct answer, which are presented to the students. In the learning process, the students are required to examine a number of alternatives and explain the choice they have made. Teaching that encourages inquiry-based learning. This kind of teaching is characterized by research activity that combines thinking and learning about topics that are significant for learners. It offers students the opportunity to seek answers to issues/dilemmas/phenomena of value that are of interest to them. Such learning may include a personal or group research project, conducting laboratory experiments, research tours, and more. Teachingt hat promotes reflective learning. A teaching method that encourages students to perform in the present a formative internal assessment in order to improve their performance. The reflection process is a metacognitive activity during which the learner reviews his/her learning and reflects on his/her thoughts and actions and analyzes them for improvement and optimization (Nissim, Barak, and Ben-Zvi, 2012). The development of these skills among the learners requires that the teachers have practical knowledge. Future-oriented innovative pedagogy includes these elements and others, which the teachers are required to master toward meaningful learning in the 21stcentury. In line with these concepts, it is necessary to develop adapted professional development processes (Vidislavsky, Peled and Pevsner, 2011).

The professional development environments for teaching staff should meet the learning requirements of the 21stcentury, including learning technologies. The design and implementation of models in this spirit for the development of teaching staff are based on active learning in and out of the classroom, learning through virtual tools in a variety of models for collaborative and self-learning, and models for the consumption and dissemination of information. All these will provide an appropriate response to the development of teachers toward future-oriented learning that is adapted to learners in the 21st century. Therefore, in keeping with these concepts, innovative applied models should be developed that give teachers opportunities to experience the skills defined by the Ministry of Education as basic for developing the learner in the 21stcentury.

**Designing and planning courses for optimal professional development of teachers in the 21stcentury**

This study is based on specialized courses designed to provide a response to teachers in the postmodern era. These environments are based on interactive learning on a digital platform and practical experience with 21st-century skills and future-oriented pedagogy while learning in a multi-participant forum. The cluster of courses developed according to this concept structures teachers' professional development on two main axes: the content axis, the subject of the course in which the teacher acquires knowledge in the fields of pedagogy and

learning research, and the practice axis, where the teacher experiences a variety of activities based on the 21st century learner's skills, which include information management, higher-order thinking abilities, use of online tools, skills for self-learning, communication skills and information sharing, language skills, ethics, and the protectionof intellectual property.Also, future-oriented learning skills that are part of the structuring of the experience in learning activities and meet the criteria of personalism, collaboration, non-formalism, and inclusion are included.

**Training in the perception of future-oriented pedagogy**

The training process of teachers as part of their professional development has been designed as a virtual training program, delivered by the Ministry of Education's Teaching Staff Development Centers (PISGA).The participants in these professional development processes experience themselves an innovative pedagogy based on the learner's toolbox for the 21stcentury. During their professional development, the teachers experience collaborative learning using a variety of tools, strategies and tools for thinking development, and the organization and presentation of information in a significant way. The teachers experience meta-cognitive learning processes based on personal reflection throughout the learning process by writing a personal blog. These learning and experience processes create an adapted platform that combines the teachers' potential and changes in teaching-learning methods in the post-modern era. This process takes place concurrently with the learning of contemporary content adapted to the teacher's professional development, combined with an innovative pedagogy based on technological tools. The online courses offered teachers fertile ground for practical experience in the skills required of teachers in the 21stcentury. In a variety of studies, it was found that learning on online digital platforms embodies the possibility of strengthening the professional knowledge of teachers through peer learning and collaboration between learners. Learning on a virtual platform leads learners to be responsible for their learning, to create knowledge and ideas on their own, and then to share the knowledge and information they have acquired with their peers. In the later stages of the learning process, reflection on learning and sharing with peers takes place (Sachou, 2013). The combination of these two concepts has given rise to a range of interdisciplinary courses adapted to a variety of teaching staff in different age groups and provides a personal and differential response to the teachers' professional development. The training includes dedicated courses that offer a unique process of experience and training on virtual platforms for self-learning. These platforms facilitate the training process of teachers in quality pedagogy in an innovative environment. In order to examine the suitability of the course to the concepts of future-oriented innovative pedagogy, anindicator for diagnosing the training courses was developed (see Appendix 1).

Recent research in the field of learning development in the 21stcentury revealed the increasing need in recent years to adapt the teaching-learning-evaluation methods of teachers in Israel and abroad to the rapid changes taking place in the 21stcentury. This practical experience greatly influences the teachers' creative and innovative teaching-learning methods in their classroom and constitutes the basis for creating a different graduate who leaves the school gates (Vidislavsky, 2015). Traditional teaching and frontal learning methods are not necessarily appropriate for the present age, while teaching that is characterized by creativity and/or innovation may make learning original and exciting for students. Similarly, the teaching process becomes more meaningful for students and teachers alike (Shaham and Shoretzky, 2015). It seems that one of the significant factors that constitutes a meaningful variable in the teacher's experience in renewing and diversifying his/her teaching methods is the perception of self-efficacy. One of the methods of developing self-efficacy among teachers is based on Kolb's (1971) method. A meaningful learning takes place through concrete experiential learning in a four-stage cyclical process whereby: (a) the individual experiences his or her condition through concrete experience and (b) observes and reflects on the experience (reflection), (c) integrates and conceptualizes on a reflective basis, and (d) reforms and re-implements anew.Studies found that educators with a high self-efficacy perception feel more confident in the use and implementation of innovative and creative teaching methods in the classroom, which are based on their experience (Sachou, 2013). In light of this, adapted professional development is a basis for the development of a teacher with a perception of self-efficacy for challenging teaching in the 21stcentury.

**Chapter 2: Methodology**

The aim of this study was to examine the relationship between teachers' experience in a virtual training course that was based on innovative pedagogy and their experience as 21st-century learners and their ability to transfer the skills they learned and apply them in the classroom and the learning field. The question is: To what extent does the experience of learning and the practical experience of teachers with future-oriented innovative learning in virtual training develop among them the ability to use this kind of teaching in their class?

**Research population**

The data were gatheredas part of the framework of virtual training courses that train teachers throughapplied learning in future-oriented pedagogy based on the 21st-century skills for meaningful instruction combined with experiencing virtual tools in different fields of knowledge. The workshops were conducted in eight different PISGAcenters across the country (from Acre in the north to Dimona in the south) with a potential to collect data on three different dates from approximately 480 participants who participated in the study:
Pre-opening of the course of the school year 2015/2016 = total participants 388 (N).

End of the course of the school year 2015/2016 = total participants 482(N).

Six months after the completion of the course in the school year 2015/2016 = total participants 348(N).

The general study population consisted of N = 482participants, most of whom participated in the study three times. In total, findings from 1218 respondents were collected. The distribution of the population by gender is illustrated in Figure 1.This figure reflects well the distribution of the population among the teaching staff, which is characterized by a majority of women in the education system at all levels. Another aspect of the study was the participants' seniority in the education system.

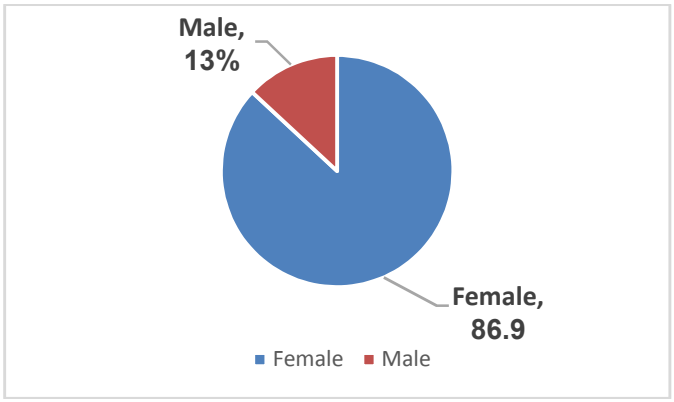


**Figure 1. Distribution of the study population by gender**

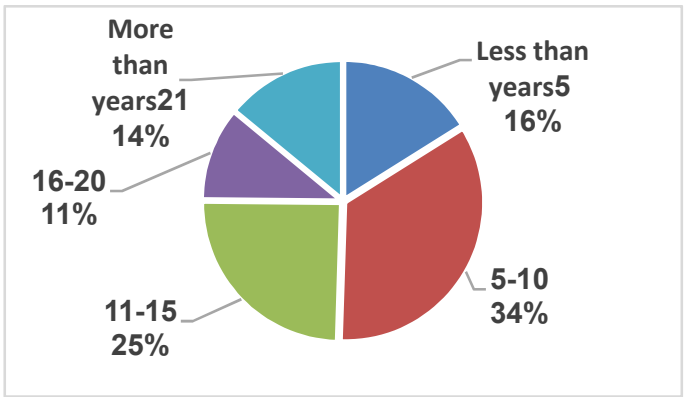


**Figure 2. Distribution of the population by seniority in the education system**

An analysis of the distribution of the study population shows that most of the participants were teachers with a seniority of 5-15 years in the education system, a relatively young population who learn and continue their training as part of their professional development. The study population was divided in this study into three main teaching subjects: math and sciences (N = 445), which included math/arithmetic and geometry, sciences, physics, and chemistry; Humanities (N = 611), which included languages (Hebrew, English, Arabic), literature, religious subjects, Bible, history, and civics; and the field of arts and therapies (N = 162), which included practical art, music, design, therapy, art therapy, and speech therapy.

Figure 4 describes the distribution of the population by fields of teaching and occupation.

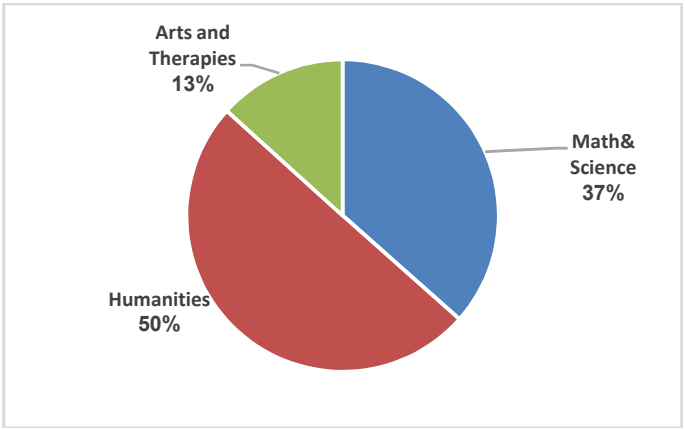


**Figure 3. Distribution of the population by fields of teaching and occupation**

An analysis of the research findings shows that most of the teachers (50%) who participated in the training courses are teaching the humanities, and a small proportion belong to the arts and therapy fields (13%).

**Research procedure and research tools**

The range of training sessions held at the PISGAcenters from which the study population was sampledis described in Figure 4.

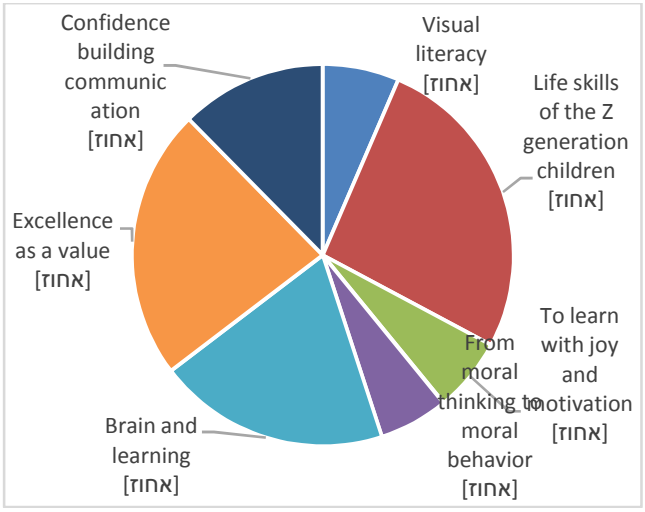


**Figure 4. Variety of virtual courses in the study**

Characterization of the training courses: In order to characterize the virtual courses that were conducted at the PISGA centers and to determine the extent to which the courses meet the criteria of future-oriented pedagogy in combination with 21st century learner skills, a multi-dimensional indicator was constructed, based on six criteria that characterize pedagogy that is based on the perception of the learner in the 21st century and six criteria that characterize future-oriented pedagogy (personalism, collaboration, non-formalism, glocalism, exchange, and inclusion).The indicator was sent to four experts in their fields: two IT coordinators at the PISGA Centers, a lecturer at Tel Hai College, who is an expert in innovative pedagogy, and an MA program graduate who specializes in technology and learning. The experts evaluated three generic courses that were held simultaneously at several PISGA Centers, using a five-point Likert evaluation scale, where 5 = to a very large degree and 1 = to a very small degree. Table 1 describes the evaluation data collected using the evaluation indicator. The training courses were evaluated by the four experts in their field. Table 1 describes the evaluation data collected using an assessment indicator.

Characteristics of the "21st-century learner": An analysis of the findings shows that the three generic courses meet the criteria that were examined to a good-very good level. Skills of the "21st-century learner": the parameter that received the highest rating (5 = to a very large degree) by the four evaluators was higher-order thinking abilities. The evaluators noted that the analysis of the learning environments found that the participants used the following skills: analysis, projection and transfer, personal reflection, and development of an indicator and its implementation in peer evaluation. One of the participants noted in the course summary, "The course exposed me to additional learning methods that are adapted to the

**Table 1. Characterization of the training courses using the indicator**

| Course | Conducted during the 2015/2016 school year at the following PISGA Centers | Total participants | 21st-century skills | Future-oriented pedagogy |
|---|---|---|---|---|
| Children of the Zgeneration | Kiryat Gat, Beit Shemesh, Ashkelon, Beer Sheva, Kfar Saba | N = 138 | M = 4.5<br>SD = 0.816 | M = 4.5<br>SD = 0.76 |
| Brain and learning | Dimona, Beit Shemesh, Ashkelon, Acre | N = 81 | M = 4.0<br>SD = 1.30 | M = 4.1<br>SD = 0.67 |
| Excellence as a value | Beit Shemesh, Ashkelon, Kfar Saba | N = 60 | M = 3.75<br>SD = 1.54 | M = 4.25<br>SD = 0.87 |

learner in the 21st century, which are closer to the student's world, challenging and stimulating for self-learning andgroup learning. Also, Iwas exposed to learning tools and construction of lesson plans that I have not yet used. I experimented with new digital tools, which made me challenge myself and introduce new interest into the discipline."Use of online tools: The analysis of the learning environments seems to indicate that the learners employed a considerable number of online tools, such as Google Docs, Linoit, Padlet, Roojoom, Computerized Concept Maps, Glossary of Concepts, Forum for Discussion, and Peer Assessment. A participant in the "Children of the Z Generation" course wrote on her blog, reflecting on her learning process, that "During the training course, I was exposed to new technological tools that I used in my lessons. Through technological tools, I was able to teach the students in an experiential and interesting way how to work in a team, divide roles, develop personal and social awareness, and develop a personal role within the group. Also, I found that there are outstanding advantages for joint research work in the group, combined with computerized tools, such as active participation of all group members, integration of students with different abilities, communication among peers, sharing of feelings and experiences, and acquiring social skills.

It should be noted that the construction of day-to-day teaching units, such as those I have developed during the course, takes a long time, which is not always available to the teacher. Searching for effective and appropriate digital tools for students constitutes a significant part of lesson building. However, the result is that these tools will almost certainly make these lessons much more meaningful and effective for students."The parameter that received the lowest rating was ethics and protecting intellectual propertyrights (mean = 2, to a small degree). An analysis of the environment shows that the participants use citation rules for sources of the information mentioning the author's name to a small degree or not at all. The subject of intellectual property was not addressed at all in the learning environments.

Future-oriented pedagogy: An analysis of the findings by the four evaluators found that the three training courses meet a considerable part of the criteria that characterize future-oriented pedagogy. The criteria examined represent the implementation of this teaching/learning perception in the virtual training courses to a good-very good level.

The parameters that received the highest evaluation scores were personalism (4.8 = to a very large degree), collaboration (4.8 = to a very large degree), and glocalism (4.4 = to a large degree). The evaluators noted that the analysis of the learning environments found support for collaborative learning of groups with dynamic characteristics exists, that the learning environment supports collaborative and border-crossing learning, and that the learning environment supports the establishment of a learning and proactive community and the implementation of the contents by the teachers. A closed position questionnaire was administered to the participants on three different dates: at the beginning of the training course, at the end of the training course (2015/16 school year), and six months after the end of training the training course (2016/17 school year). The questionnaire examined the contribution of the training course beyond the learned content to acquiring the 21st-century learner's skills and their implementation in the classroom.

**Sampling the research population**

The research population was sampled during the research on three different dates: at the beginning of the course before the first session (October - November 2015), at the end of the course (May - June 2016), and six months after the completion of the course (December 2016). Data collection was conducted using an online closed position questionnaire, where responses were given on a 5-point Likert scale (5 = to a large degree and 1 = to a very small degree) for quantitative date collection. The questionnaire was embedded in the training course's Website, and the participants filled the questionnaire at the beginning of the course before the first session, at the end of the course with the submission of their final assignment, and six months after the completion of the course, on December 2016. Also, a reflective blog written by the participants during the course was used, in which the participants detailed their learning experience in the course and their ability to implement and use the skills acquired in their class.

**Research Method**

The research method is based on Creswell's mixed method of study (Croswell, 2013), which combines the collection and analysis of both quantitative and qualitative data in order to deepen, enrich, and support the statistical knowledge gathered by verbal evidence.

**Research question**

To what extent did the learning experience and the practical experience of teachers in innovative, future-oriented learning (based on the 21st-century learning skills) in virtual training courses develop among the teachers the ability to apply 21st-century learner's skills in their class?

**Sub-questions**

1. To what extent is there a connection between seniority in teaching and the ability to use and apply the 21st-century skills identified with future-oriented pedagogy?
2. To what extent is there a connection between the field of knowledge taught by the teacher (humanities, math and sciences, arts, and therapy) and the use and application of future-oriented pedagogy (based on the 21st-century skills)?

**Research hypotheses**

1. A relationship will be found between seniority in teaching and the application and use of 21st-centurylearning skills based on future-oriented pedagogy.
2. A relationship will be found between the field of knowledge taught by the teacher and the application and use of the 21st-centurylearning skills based on future-oriented pedagogy.
3. A teacher who learns about and experiences future-oriented pedagogy based on 21st-century learner's skills (information-processing skills, high-order thinking skills, use of online tools, self-learning skills, communication and information sharing skills, language skills, and ethics and propriety rights protection) will be capable of transferring the skills acquired through classroom teaching.
4. Teachers who participated in virtual training courses on future-oriented pedagogy - the 21st-centurylearner's skills - will be more capable of implementing these tools during teaching. This aspect will be examined through qualitative findings.

**Chapter 3: The study findings**

Table 2 summarizes the findings of the questionnaires examining the acquisition and implementation of the 21st-century learner's skills by the training participants in the three different time frames: before training (October-November 2015) at the end of the course (May-June 2016), and six months after completing the course (December 2016).

**Table 2. Questionnaire findings regarding the acquisition and implementation of the 21st-century learner's skills**

| Skills of the 21st-century learner | To what extent did you use the following skills before the course? | | To what extent did the course contribute to the development of the following skills? | | To what extent do you use these skills in your class today? (This question was presented6 months later) | |
|---|---|---|---|---|---|---|
| | Cronbachα = .945 | | Cronbachα = .941 | | Cronbachα = .963 | |
| | Mean | Std. Deviation | Mean | Std. Deviation | Mean | Std. Deviation |
| Media and information literacy: using information management tools (e.g., Roojoom, Map of Concepts) | 2.760 | 1.3018 | 3.539 | 1.1378 | 4.036 | 0.9993 |
| Communication skills: Active participation in the forum, writing a personal blog | 2.351 | 1.3139 | 3.617 | 1.0633 | 2.964 | 0.8812 |
| Critical thinking and problem solving | 2.825 | 1.3109 | 3.883 | .9587 | 3.6 | 0.9027 |
| Reading papers in an informed and critical manner | 3.269 | 1.2215 | 4.002 | .8922 | 3.414 | 0.8325 |
| Collaborative learning: Peer learning and peer assessment | 3.140 | 1.2461 | 4.1 | .9090 | 4.0 | 0.94 |
| Collaborative learning: building a common database of concepts – concepts glossary | 2.657 | 1.3590 | 3.987 | .9267 | 3.214 | 0.8325 |
| Peer learning/peer feedback: providing feedback to colleagues' work through the indicator | 3.074 | 1.2408 | 4.048 | .8344 | 4.036 | 0.9993 |
| Collaborative learning and information literacy: using tools to represent personal and group information (e.g., Linoit/Padlet) | 2.628 | 1.3813 | 3.623 | 1.1750 | 3.464 | 0.8812 |
| To what extent did the course contribute to developing an independent learner regarding managing learning time, developing commitment and responsibility for learning | 3.173 | 1.2606 | 3.998 | .9602 | 3 | 0.9027 |

**p≤.01

**Hypothesis 1** examines the relationship between seniority in teaching and the application and use of 21st-century learner's skills based on future-oriented pedagogy. A Pearson Correlation test was conducted to examine the connection between 21st-century skills and seniority in the school. Table 3 presents the relationship between acquiring the learner's skills of the 21st century and their application and seniority. The population was sampled at the end of the course (May-June 2016) and half a year after completing the course (December 2016) (n = 736).

**Table 3. Relationship between acquiring the learner's skills of the 21st century and their application and seniority**

| | The 21st-century learner's skills |
|---|---|
| The 21st-century learner's skills | --- |
| Seniority in school | 0.016<br>(0.750) |

The table shows that no correlation was found between the acquisition of the learner's skills in the 21st century and their implementation and the teacher's years of seniority. It follows from this that teachers who study a chosen discipline/field of knowledge through the learner's skills of the 21st century by a virtual course and experience the application of these skills will not find it difficult to implement these skills in their classroom, regardless of their seniority in teaching. Thus, Hypothesis 1 was not supported.

"Personally, I was exposed through the course to many websites dealing with education and digital tools, which I did not know before. I became very interested in them and found myself 'surfing' the net beyond the course requirements. Following my experience, I applied some of the tools in my class. Ilearned to believe more in my students, to trust and to let them learn in a manner that is more active. Irealized that learning which is adapted to the learner through digital tools and explorative skills is more meaningful. I try to be more passive and allow my students to be more dynamic."

**Hypothesis 2** examined the relationship between the field of knowledge taught by the teacher and the application and use of the 21st-centurylearning skills based on future-oriented pedagogy.

The population was sampled at the end of the course (May-June 2016) and half a year after the completion of the course (December 2016) (n = 736).

**Table 4. Means and standard deviations of learning skills of the 21st century by fields of knowledge (n=736)**

| | Math &Sciences (n=214) | | Humanities (n=393) | | Arts/Therapy (n=129) | | $F_{(2,875)}$ $\eta^2$ |
|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | M | SD | |
| 21st century skills | 3.54[a] | 0.71 | 3.59[a] | 0.69 | 3.24[b] | 0.68 | 6.803** 0.015 |

**p<.01

Table 4 shows that there is a significant difference in the application and use of the 21st-century learner's skills among the different fields of knowledge ($F_{(2,875)}$=6.803; p<.01); the effect size was ($\eta^2$=0.015),and accounted variance was 1.5%.Bonferroni multiple comparisons (post hoc) analysis found a significant difference between the humanities (M=3.59; SD=0.69) and arts/therapy (M=3.24; SD=0.68), and between math and sciences subjects (M=3.54; SD=0.71) and arts/therapy (M=3.24; SD=0.68). The significant differences indicate that teachers who teach humanistic and math and sciences subjects use and implement the 21st-century learner's skills more than teachers in the field of arts and therapy. No significant differences were found between teachers from the humanities and the math and science fields. Thus, hypothesis 2 was supported.

**Hypothesis 3** examined the relationship between the teachers' ability to transfer the skills acquired during the virtual training courses to their teaching in the classroom.

An analysis of the findings from the three time periods (before the course, at the end of the course, and half a year after the course) revealed that there is a significant difference between the teachers' ability to use and apply the 21st-century learner's skills before and after the course. To examine the differences in the 21st-century learner's skills, a one-way ANOVA analysis was conducted.

**Table 5. Means and standard deviations of acquiring and Implementing the 21st-century learner's skills at three sampling dates: before the beginning of the course, at the end of the course, and six months after the completion of the course. (n=1218)**

| | Before the course (n=388) | | At the end of the course (n=482) | | Six months after completion (n=348) | | $F_{(2,875)}$ $\eta^2$ |
|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | M | SD | |
| 21st century skills | 2.87[b] | 0.62 | 3.86[a] | 0.66 | 3.55[ab] | 0.80 | 61.928*** 0.123 |

***p<.001

Table 5 shows that there is a significant difference between the different sampling dates in the application and use of the 21st-century learner's skills ($F_{(2,875)}$=61.92; p<.001); the effect size was ($\eta^2$=0.123),and accounted variance was 12.3%.Bonferroni multiple comparisons (post hoc) analysis found a significant difference between the acquisition and implementation of the 21st-century learner's skills at the end of the course (May-June 2016) (M=3.86; SD=0.66) and the beginning of the course (October-November 2015) (M=2.87; SD=0.62). The significant differences indicate that teachers who participated in the virtual training courses applied and used the 21st-century skills after the training more than before the training in 2015. Also, a t-test for paired samples was conducted to compare the ability of the teachers who participated in the course to use and apply the 21st-century learner's skills at the end of the training and six months later. To examine the differences in their acquisition and application of the 21st-century learner's skills at the end of the course and six months after the completion of the course (December 2016) a t-test for paired samples was conducted.

**Table 6. Means and standard deviations of acquiring and implementing the 21st-century learner's skills at the end of the training (May-June 2016) and six months after the completion of the course (December 2016) (n=348)**

| | End of course (n=482) | | Six month after completion (n=384) | | $t_{(348)}$ | Cohen's D |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | | |
| 21st century skills | 3.86 | 0.61 | 3.55 | 0.79 | 1.03 | 0.200 |

Table 6 shows that no significant difference was found in the application and use of 21st-century skills at the end of the course and half a year later. Effect size (Cohen's D) was 0.200. In this case, there was no significant difference between the dates, indicating that the ability to use and implement the skills acquired by the teachers was preserved six months later.

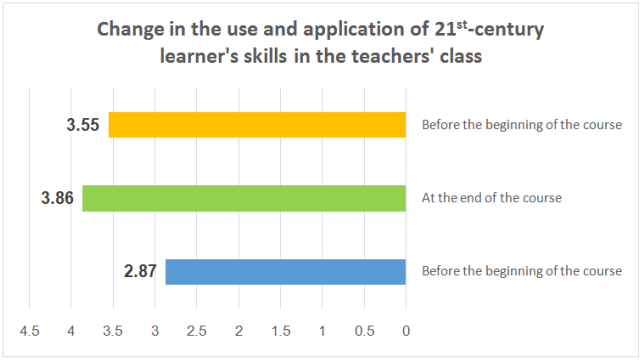


**Figure 3. Change in the use and application of 21st-century learner's skills in the teachers' class**

The analysis of the findings shows that there was an increase (M = 3.86) in the use and application of skills following the learning and experience of the teachers in the virtual course. This increase was moderated to some extent six months after the completion of the course but was still higher than at the starting point (M = 3.55). Table 6 indicates that no significant difference was found in the application and use of the 21st-century learner's skills after the course and half a year after the training. The Effect Size (Cohen's D) was 0.200. These findings establish two basic principles that are leading today in the world and are based on UNESCO studies (UNESCO, 2014), emphasizing LEARNING BY DOING and the long-term professional development principle of LLL.

"Active learning through play and computer tools takes a more prominent place for me in learning (after the course) than they once did - I'm no longer afraid of it. I see a class that likes to study, to research, to ask, to take an interest, to initiate and to create - and I cooperate with them. This makes the lessons more joyful, interesting, challenging, and learning is meaningful and lasts for a long time. In conclusion, as far as I am concerned, after the experience in the course and the classroom, the concept of "meaningful learning" includes a change in the perception of the teacher's role in the education

system. From the role of "transferring knowledge" to a teacher-instructor who gives students the professional tools that will accompany them in the long term. Therefore, we as teachers must learn and experience on a regular basis new technological tools. Also, peer collaboration will contribute to building quality learning environments."

Developing a sense of competence among teachers to use the 21st-century learner's skills. This subject was examined using qualitative findings. The qualitative findings were derived from the blog that the teachers wrote throughout the course as a reflective personal learning journal and formed the basis for understanding the ability to use the skills acquired during the course and their implementation in the classroom. A teacher who took part in the "Brain and Learning" course wrote on her blog. "The course gave me points to think about and gave me tools for teaching through applied digital tools that I use in the classroom, to strengthen the students and empower them." A teacher who took part in a course "To Teach Differently and Evaluate Differently" wrote, "Thank you for the opportunity. Iwas very enriched by the materials learned in the course and the technological tools I was exposedto. As a result, the great beneficiaries are indeed my students." Another teacher, who participated in the course "Feedback as a Learning Promotor" wrote: "During the course, I witnessed how much the knowledge I gain helps me to be a better teacher, helping me to bring my students to a more meaningful learning and with pleasure… thank you." Another participant wrote, "The methods and the digital tools gave me a lot; they have contributed greatly to the improvement of learning among my students." A participant in the course on "Visual Literacy" added "I enjoyed very much building the digital conceptual map. It was a new technological tool that I used, and I'm going to use it in my learning process andmy work in the classroom. I hope that each time we will use a new technological tool so that we, the teachers, will learn new tools and use them in the teaching process in the classroom," she said.

A participant in the "Respectful Discourse" course wrote in her blog following an assignment dealing with one of the 21st-century learner's skills, "When I was asked to do the assignment on critical thinking, I was a little nervous and did not understand at first what was required of me. I began to think about the subject I could raise that is related to the world of the students and which is part of our lives. The first topic I talk about is cyber bullying, and so I thought I would relate it to the world of the children and the discourse held in the classroom every day. This topic is directly related to critical thinking and the questions discussed in the article. After reading the article, Iwas exposed to the deep discourse that allows the students to express their views, to disagree with others, and to voice their critical thinking, to express students' views, and all that and still to maintain respect for one another. The subject that made me nervous at first brought me great success. Itaught the lesson a week before going on Pesach holiday, and after the fruitful discussion, I felt that I could send the students to the holiday wholeheartedly without worrying about any incident, although the subject of cyber bullying arises in our life on a daily basis. It was important for me to share my feelings and thanks to the lecturer after the lesson and after reading all the relevant materials."

Future-oriented pedagogy is an innovative teaching concept that includes several parameters that transform the principles of learning and learning experience into learning that differs in essence from the traditional classical learning that teachers experience in some of the courses so that subsequently their students are exposed to the same traditional methods. A change in teaching strategies will result from the personal learning experience of the teachers. The personal blog, which constitutes a kind of travel log of the participants, reflects a large part of the learning experience during the virtual courses that were based on some of the principles of future-oriented pedagogy. A qualitative analysis of the teachers' travel logs will illuminate the main principles applied in the virtual courses.

**Personalism.** Studies are personally adapted to the learner regarding level, pace, learning methods, and environments. The learner develops and implements personal and independent skills of evaluation. The learner develops self-managing learning capability, monitors the progress of learning, and responds to it based on his or her mastery of skills and content (self-directed). This parameter is expressed by the fact that the training is virtual, the participants choose their learning time and the place of learning - learning without time and placelimits; they progress independently and individually according to their paceand receive virtual guidance if difficulties arise. The participants learn to manage their learning and to develop the skills of independent learners. A participant in the "Visual Literacy" course wrote on her blog, "I feel that the tasks given require something beyond learning and practical application. Overtly or covertly, I find it difficult to fulfill the tasks, and I do it at the last moment. Not because of the difficulty in content, but because I feel that I have to get things out of my heart. It's not a simple process, it's an ongoing learning process ...Thistaught me to deal with things that I do not always love and do not always connect with. At the same time, there is something mature and grown-up about it, the understanding that life is not always the way I want it, and even if I did not "fancy" them, I still acquired the tools to deal with my learning management."

**Collaboration.** The learning environment supports the collaborative learning of groups with dynamic characteristics. The learning environment supports cross-border collaborative learning, across the country; it supports the creation of a learning community and promotes the work of teachers. The virtual training sessions bring together, under one roof, teachers from all over the country, from different sectors and diverse teaching levels (K-12). The learning communities built during the course are based on professional cooperation and diverse professional practices. Teachers who participated in the virtual training courses testify that: "Reading an article posted by a colleague from the course and giving feedback expanded the knowledge in addition to the work that we created ourselves. It was nice to see and realize how our fellow teachers work and adopt the ideas that suit us." Another participant wrote, "I particularly liked the assignment of reading and responding to two tasks of the forum members, which enabled me to be exposed to wealth which is perhaps extra-academic but very relevant to my work as a practicing teacher. Eventually, my curiosity got the better of me and I ended up reading more than two tasks." Another shared the experience of collaborative learning in the virtual course in which she participated, "I loved the task because of the diversity and originality it brings with it. Together we created a kind of a summary of the course's concepts using a glossary. This gives meaning to our work, but also to work generated by the whole group work. It is a nice and interesting way to sum

up a subject that is also taught in the classroom. Thank you very much for the idea."

**Non-formalism and inclusion.** The learning environment supports learning at any place and time. This criterion is one of the foundations of the virtual course. The users themselves do not attest to this, but learning is possible at any place and at any time by virtue of the very fact that a large number of the sessions are asynchronous, allowing the teachers to enter the task, read and learn the materials, and prepare the task and implement it in their free time, until the intended submission date.

**Glocalism.** Supporting the formation of a glocal consciousness that balances globalism and localism. Support for green and sustainable schools, support for learning focused on specific areas of knowledge, support for interdisciplinary learning, and support for learning in cyber spaces. Based on the principle of glocalism, two main components form the basis for planning the implementation of the course: support for learning in cyber spaces, which constitutes the basis for the virtual training and interdisciplinary learning, thus combining the teacher's field of knowledge with the contents of the training,and transcending the disciplinary curriculum and tools for meaningful learning for the 21st century learner.A participant in the Info graphics - Visual Literacy course posted on her blog: "When I read the articles on visual information transfer, first of all, I understood the extent to which learners' learning habits changed following the development of the visual channel. I learned from this session very important learning strategies that are supported by the visual channel. This was the most meaningful virtual session for me, which enabled me to combine visual tools in the field of knowledge I teach."

**Exchange.** Flexible learning spaces that can be adapted to different learning characteristics, support for learning about decision-making under uncertainty, support for learning events, support for entrepreneurship centers and innovation labs, and support for self-learning spaces based on creativity and productivity in educational institutions and urban learning spaces. The principle of exchange is integrated into the virtual course in part and is expressed mainly in flexible virtual learning spaces. There is no one correct answer. Each participant can present his or her knowledge uniquely while choosing the platform for presenting knowledge. This aspect encourages self-learning, creativity and productivity. "I like very much and appreciate self-learning, and I think that it is beneficial to me as a learner to understand the material and the deep knowledge enables me to be innovative and creative in the planning of the assignment and the way it is presented."

**The principle of inclusion.** The principle of inclusion in learning refers to the learner's ability to formulate personal meaning in a world of transformations. One aspect of this principle is based on the learner's ability to deeply understand him or herself in relation to the local and global environment in a way that helps him or her answer significant questions. This principle is implemented at the participants' level and is actually a by-product of the course that allows deep insights into the self as a teacher, educator, and person in a changing world. The participants' insights reflect the value of inclusion in the insights they reached. "I discover myself in the tasks, in my role in the classroom. Because of the routine, I do not always pay attention to what I do automatically. I am learning something new about myself out of the assignments I implement in the classroom with my students!" Another participant in the Children of the Z Generation course wrote, "I must write and say how much I enjoyed the entire course, the articles, the presentations, the films and the videos –everything was carefully chosen and meticulously refined. It enriched my world and my knowledge and gave me tools to deal with the Z generation children in my class and at home. Also, the course helped me improve my technological abilities, especially using the computer and getting to know other technological tools such as building a concept map. I feel that I made progress and I can be a better teacher. Thanks!"Another participant concluded, "The course contributed a lot. From the personal aspect, I learned concepts such as reverse classroom, conceptual map, active learning, and so on. Irealizedthat I was implementing in my class the things that we learned in the course, sometimes intuitively and sometimes from previous knowledge, but I looked at them now from a different angle, and Irefined my understanding of my goals as a teacher in these activities."

## Chapter 4: Discussion and Conclusions

Learner skills in the 21st century are considered to be an interdisciplinary field that teachers are required to implement in their classroom instruction; however, in some cases, training on this subject is insufficient to provide a meaningful experience for teachers in their class. The process of applied professional development that enables the teacher to experience digital learning platforms "at any place" and "at any time," according to the principle of non-formality and inclusion, accompanied by guidance and peer feedback, enables the development of these skills. The findings of the study show that teachers teaching various age groups (kindergarten, elementary, and high-school) and various fields of knowledge (humanities, math and sciences, arts, and special education) develop a sense of efficacy and ability to implement the teaching methods that were acquired as a result of their personal experience. According to the teachers' testimony, these skills are for the most part maintained half a year after the completion of the learning process (M = 3.55), which indicates significant learning and experience among the teachers. An analysis of the qualitative findings revealed that the teachers experienced a meaningful teaching experience for themselves and their students that motivates them to experience more of this type. "I see a class that likes to study ... to research, to ask, to be interested, to create and to initiate, and I cooperate with them," testified one teacher half a year after completing the course in which she participated.

The process of adapted professional development includes content components and experience in a safe and enabling environment. It is a virtual training course where the participants do not know each other personally, thus creating a safe ground for professional development, regardless of their seniority and experience in teaching. In the virtual courses, young teachers participate alongside veteran teachers and build together shared knowledge bases and benefit from the knowledge and personal experience that each member brings to the learning group. The work norms that are built in the group are based on reciprocity, peer learning, and learning-promoting feedback. This method, applied on a digital platform, is perceived as a non-threatening method and enables each participant to take the recommendations tailored to him personally and to his or her class characteristics. In this type of learning, the main principle of collaboration (future-oriented

pedagogy) is maintained. It supports the learning of groups with dynamic characteristics in cross-border collaborative learning, transcending boundaries of territory (teachers from different schools and localities participated in the course), discipline (teachers from a variety of disciplines studied together), age group (teachers of different age groups), seniority, and sector (state, state-religious, and Arab).Another principle that has become a significant milestone in the implementation of the learning process was based on the principle of exchange. Each participant created and built teaching processes in various content areas and introduced digital tools adapted to the learners, the knowledge field, and the age level. Generic study units built by the participants contributed greatly to the principle of collaboration, and the mutual contribution supported the building of shared knowledge.

**Conclusion**

To develop teachers' sense of self-efficacy in future-oriented pedagogy, teachers must be trained in an environment that enables guided experience and implementation without criticism and judgment. Professional development processes in the postmodern era must correspond to the global trends of personal learning adapted to time and place and based on the principles of the learner in the 21st century (thinking-based learning at the higher levels of thinking, conducted in learning groups) and integrate adapted digital tools and means. The findings of the study show that collaborative learning in virtual courses that include practical experience with peer assessment and instruction create a sense of high self-efficacy among the teachers and the ability to effectively implement the tools. This approach is in line with the professional development concept prevailing today and is supported by studies conducted by UNESCO (UNESCO, 2014), which perceive the process of professional development as a process of practical experience throughout the professional life (LLL).The global changes necessitate a renewed view of the teachers' professional development processes and adapting these processes to global trends that take place in professional development processes in a variety of fields. One teacher summed up the learning process in her reflective personal blog, "Teaching Differently – Evaluating Differently is the product of the learning process in the virtual course I participated in. As teachers, we now find ourselves in a situation in which we need to diversify teaching methods and learning strategies and change conventional teaching. A large number of pupils in the classroom and children with special needs will find themselves in a much more comfortable place with alternative teaching methods. In this course, I was able to encounter different strategies, and different teaching methods: creating a conceptual map, meaningful learning, creating an indicator according to the six functions of the learner, the reverse lesson, building a feedback process that promotes learning, educational games and more ...

As teachers, we understand that this alternative teaching is not only an enjoyable experience, but also involves a lot of cognitive and metacognitive thinking, both of the teacher and the student, and most importantly being aware of the different intelligences and functions of the learner and optimizing them. I apply the tools I acquired in the course in practice and feel tremendous satisfaction both in terms of my profession as a teacher and regarding the experience of the learners in my class."

**Research limitations**

The study was conducted during 2015-2016 among 480 participants. The findings collected during the study at three points in time (before the course, at the end of the course, and half a year after the completion of the course) are drawn from the participants' testimony. To substantiate the findings and to examine in depth the ability to implement and assimilate the tools learned and acquired during the course, follow-up research is required to examine the actual implementation processes in the classrooms. One limitation of the study is that the acquired knowledge of the teachers is not based solely on professional development settings and courses. The teacher's professional development process is multi-dimensional and therefore the development in this field cannot be attributed solely to participation in courses on a virtual platform that integrates digital tools but should be viewed as another layer in the professional development processes of teachers.

**Recommendations for further studies:**

1. The creation of a pool of teachers who participated in the virtual courses and create learning communities based on peer learning and learning-promoting feedback, as a tool for professional development in a supportive and enabling environment.
2. A follow-up study that examines the ability to implement methods in the long-term via a structured questionnaire for the students of the teachers who took part in the virtual courses.

## REFERENCES


Aviram, M. 1999. *Steering through the Storm: Education in Postmodern Democracy*. Tel Aviv: Massada Publications (Hebrew).

Elmore, R .F. 1996. Getting a scale with educational good educational practice. *Harvard Educational Review*, Vol 66 (1) 1-26.

Holzer, E. 2007. Professional development of teacher educators in asynchronous electronic environment: Challenges, opportunities and preliminary insights from practice. *Educational Media International*, 41(1), 81-89.

http://meyda.education.gov.il/files/lemidaMashmautit/chozer/index.html(Hebrew).

http://s3-eu-west-1.amazonaws.com/schooly/da-gan/da-gan/%D7%97%D7%A9%D7%99%D7%91%D7%94_%D7%99%D7%A6%D7%99%D7%A8%D7%AA%D7%99%D7%AA_%D7%91%D7%9E%D7%AA%D7%9E%D7%98%D7%99%D7%A7%D7%94.pdf(Hebrew).

Kupferberg, A. and Nirland, D. 2012. Being a teacher in Israel in the 21st-Century. In: Kloir, R. and Kuzminsky, L. (Eds.), *Structuring professional identity: Professional training and development processes of teachers in Israel*, pp. 411-434. Tel Aviv: MOFET Institute (Hebrew).

Ministry of Education 2010. *Professional development for teaching staff within "Ofek Hadash": Policy and procedures*. Accessed August 8, 2016. :http://cms.education.gov.il/NR/rdonlyres/427736EE-9986-4276-B3AC-6FCE0A058C71/128306/Mediniut_Ofek_Hadash1.doc(Hebrew).

Ministry of Education 2015. *Something good is happening now - milestones for meaningful learning*. Accessed August 8, 2016:

Ministry of Education 2016. *A platform for thinking about alternative learning environments according to the principles of future-oriented pedagogy*. Accessed August 8, 2016:http://cms.education.gov.il/NR/rdonlyres/1F498DC4-0F2A-4422-9FDC-F64F9EAC8AE4/212279/resource_1936037872.pdf(Hebrew).

Nissim, Y., Barak, M. and Ben-Zvi, D. 2012. Role perception and teaching strategies of teachers who combine advanced technologies in their classes. *Dapim*, Vol. 54, pp. 193 – 216 (Hebrew).

Romi, S. and Leyser, Y. 2006. Exploring inclusion preservice training needs: a study of variables associated with attitudes and self□efficacy beliefs. *European Journal of Special Needs Education*, 21(1), 85-105.

Sachou, M. E. 2013. Innovative methods of teaching. In: *The Future of Education: Materials of International conference* (Florence, Italy 13-14 June, 2013).

Shaham, C. and Soresky, H. 2016. Creative Thinking in Mathematics: Its Encouragement and Nurture through Varied Activities.National Center for the Advancement of Mathematics, Science and Technology in Pre-Primary Education.Accessed March 27, 2017.

UNESCO Education Strategy 2014–2021 2014. The United Nations Educational, Scientific and Cultural Organization, 7, place de Fontenoy, 75352 Paris 07 SP, France.

Van Leer Institute 2010. *The Role of the Teacher in the Early 21st Century*. Accessed July, 8, 2016.http://www.vanleer.org.il/Data/UploadedFiles/ITEC_SitePages/23-sFileRedir.pdf(Hebrew).

Vidislavski, M. 2011. Innovative pedagogy. *Eureka, Journal for Teaching Science and Technology in Primary Schools*, 32. Tel Aviv University (Hebrew).

Vidislavski, M. 2015. *Routes to Meaningful Learning*. Jerusalem: Ministry of Education, Division A for Primary Education. Accessed June, 28, 2016. http://meyda.education.gov.il/files/yesodi/maslol/maslol.pdf(Hebrew).

Vidislavski, M., Peled, B. and Pevsner, O. 2011. Adjusting Schools to the 21st Century. *Eureka*, *Journal for Teaching Science and Technology in Primary Schools*, 30. Tel Aviv University (Hebrew).

Vidislavski, M., Pevsner, O. and Peled, B. 2011. Innovative Pedagogy or Quality Pedagogy in an Innovative Learning Environment. *The 4 Ms*. Jerusalem: Ministry of Education. Accessed June, 28, 2016.http://cms.education.gov.il/NR/rdonlyres/30FB0425-3CDB-4467-B5F0-E63A88728FE4/121933/27.pdf(Hebrew).

Yosifon, M. and Shmida, M. 2006. *Towards a New Educational Paradigm In the Israeli Educational System In the Post-Modern Era*. (Hebrew). Tel Aviv: Center for Educational Technology (Hebrew).

*******