

The Impact of ICT on the Professional Role of the Teacher from the Viewpoint of the Principal and Administrative Staff

Egoza Wasserman^{1*}, Tami Targani¹

¹ Herzog Academic College, Israel

*Correspondence: Egoza Wasserman, Herzog Academic College, Bar Cochva 103 Jerusalem 9789244, Israel. Tel: 972-2-5320906, fax: 972-2-5327208, E-mail: egozaw@gmail.com; Tami Targani, Tel: 972-2-5320906, fax: 972-2-5327208, E-mail: tamib11@walla.com

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Abstract


The purpose of this study is to investigate whether changes have occurred in the teacher's professional pedagogical role as a result of the implementation of ICT in the schools, from the point of view of the principal and administrative staff of the school. The study was conducted in Israel, using the qualitative method and included eight semi-structured in-depth interviews with the administrative staff of elementary schools: the principal, the assistant principal, the computer coordinator, the grade coordinator and the teacher. The research findings suggest that the program does influence the teacher in a number of aspects: the teacher is required to rethink his teaching methods and increase his team work with his work staff and colleagues. In addition, the results highlight the need for the teacher's continued professional development in the field of computerization.

Keywords: implementing change, technical innovations, ICT program, teachers and ICT

1. Introduction

1.1. Technological Innovation

The integration of the computer into all aspects of life teaches us that the schools of the future will become more and more computerized and the implementation of technological innovation in the classroom will be an integral part of the teaching, learning and training process (Halverson & Smith,

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2009; Selwyn, 2010). These technical innovations magnify the importance of the teacher's role in implementing these changes. Any technological development, no matter how good, cannot replace the teacher in the classroom (Mevarech & Hativa, 1996). In the past it was believed that with the introduction of the computer into the school the role of the teacher would be minimized. Today however, the prevailing view among researchers is that the teacher and his teaching methods have a central role in educational renewal (Sarason, 1995), because the teacher constitutes the professional and human infrastructure of the educational system. (Mevarech & Hativa, 1996; Katz & Offir, 1996; Woodrow, 1989) believed that the computer is only a tool. Placing it in the hands of the learners does not guarantee its correct operation nor the ability of the learners to derive the most benefit from it. Moreover, the computer cannot, and is not intended, to replace the personal educational guidance of the teacher and his individual attention to the student's needs. As Peled (1991) explains, the computer does not come to replace the teacher. On the contrary, the computer is a powerful tool in the hands of the teacher. Therefore the system must train him to obtain the skills needed to meet this challenge. The key to proper utilization of the computer is the teacher's independent ability to use the computer wisely.

1.2. Changes in the Perception of the Teacher's Role

The integration of the computer in the field of teaching has been accompanied by changes in the perception of the teacher's role. Many researchers (Taylor, 1987; Fischer, 1996; Mevarech & Hativa, 1996) discuss the anticipated changes in the teacher's role, as a result of the use of computers in teaching. In their opinion, the role of the teacher as a person whose authority comes from the knowledge he possess changes to one whose authority comes from his ability to organize and control the information available, to guide, navigate and assist in the learning process. Fischer (1996) also supports this opinion and adds that the computer changes the role of the teacher in the classroom. In computerized lessons the teacher, for part of the lesson, discards his role as leader or master of knowledge and replaces it, albeit temporarily, with one of colleague or advisor who observes from the side and intervenes only when guidance is necessary.

Zahavi and Shemesh (1996) indicated that it is not enough to prepare learning material or even precise instructions on how to teach with a computer without the technical-pedagogical knowledge of the teacher. In their opinion one must consider the interaction between the learning and teaching process: Pupil-data-computer-teacher. They report, after visiting classrooms and personal discussions with teachers, that teachers today see their main role in computerized teaching as instructional and general guidance of the subject matter. Teachers are concerned about how to manage the lesson when the rate of advancement varies between pupils. The teachers feel that the role of teaching is dependent upon the computer and they are not supposed to interfere with the learning process taking place between the pupil and the computer. Teachers are not certain what the pupils are doing on the computer. They cannot help the pupils when they ask for guidance, and they are not familiar enough with the structure of the subject matter and the various problems it presents to the pupils. In addition, the teachers do not make a concrete connection between the work on the computer and teaching in the classroom.

1.3. Difficulties in Implementing ICT in regard to Teachers

One of the obstacles that prevent implementing ICT is described by Weil, Rosen and Sears (1987) as "technophobia". Technophobia is defined as fear of immediate or future interaction with computers or computer-like technology, and a negative attitude towards computers, their function or their social influence. From some of the evidence presented, researchers concluded that computers are accessible in the school but are not used by many of the teachers and that many of the teachers were technophobes, especially humanity teachers or elementary school teachers. Teachers were also wary of dealing with the technical aspects of the computer.

Fennema and Sherman (1976) suggest that the fear surrounding this topic can influence the learning process and can become a deterrent to learning. Koochang (1989) agrees that this can be correct when negative or ambivalent attitudes towards computers exist, which can then become a deterrent to using computers in the learning environment. It appears that the acceptance of computer technology, such as learning on a computer, can be important in the interactivity of electronic technology in the classroom. Results of his research indicate there is a connection between the attitude towards the computer and its acceptance. The author points out that a positive attitude is more accepting and decreases the objection to using technology.

An additional bstacle which can be described as one of the biggest obstacles to assimilating ICT in the school is a lack of advanced training dealing with the integration of technology and the school curriculum (Glennan & Melmed, 1996; Becker, 1994; Franklin, 2007). Teacher training is most effective when it creates a community of teachers who learn together and constitute a source of insight and knowledge to deal with the theoretical and practical problems that arise when using ICT in the classroom (Wasserman, 2015). The planning of teacher training sessions to integrate ICT must become an integral part of implementing computers/ICT in the schools. Wasserman and Millgram (2005) assert that the successful and qualitative use of ICT is based on teacher's training and experimenting with integrating the computer into the learning process. In addition, studies have indicated that the key to the correct implementation of the computer in teaching is dependent upon the training and preparation of the teacher (Glennan & Melmed, 1996; Woodrow, 1989; Becker, 1994; Almog, 1997; Netz, 1988). The more the teacher increases his training in computer studies, and the more training sessions he participates in that relate to specific topics of teaching, the more willing he will be to implement the computer in his teaching method (Yaghi, 1996; Hebenstreit, 1985). When giving courses to teachers, the emphasis must be on the fundamental change in the role of the teacher when transitioning from conventional teaching to computer-based instruction (Hatfield, 1992; Morris, 1992; Steen & Taylor, 1993). Furthermore, the teachers' willingness to integrate the computer into instruction affects his mastery of the computer (Cohen & Bernstock 2014).

1.4. The National Computerization Program

The Israeli national ICT program (also called "Adapting the Educational System to the 21st Century") is a program that was formulated in Israel by the Ministry of Education to promote pedagogy and learning in the school using ICT and its implementation in the curriculum. The Science and Technology Department of the Ministry of Education built a long term program which was presented to the Knesset Educational Committee in April 2010. The program is a multi-year plan which was implemented gradually, starting in the peripheral areas of the country. The program is based on a computerized model of innovative pedagogy (Information and Communication Technology-ICT). The goal is to implement the best pedagogy on a systematic level in the school while teaching 21st century skills to the pupils (Ministry of Education, as cited in "Adapting the education system to the 21st century", 2010). The ICT model intensifies the role of the teacher in relation to his pupils and his school and continuously changes his function in the classroom (Kozma, 2003). The aspiration is that all teachers in the school will apply the best technologically based pedagogy in the life style of the school and will use the system to manage information and establish communication with the parents and community.

1.5. The Purpose of the Study

The program focuses on the teachers and the combining of components which creates a complex program of change and adaptation of curriculum, building digital content, the development and training of the teaching staff, construction of infrastructure and maintenance of telecommunications and computers and concluding with the monitoring and evaluation of the program (Ministry of Education, as cited in "Adapting the education system to the 21st century", 2010).

The purpose of the study is to examine the process of implementing changes in the school as it is reflected in the application of the ICT program. The study examined the changes in the teacher's professional pedagogical role from the point of view of the principal administrative staff of the school.

2. Method

2.1. The Research Method and the Interviewees

The study was conducted using the qualitative method and the paradigm of constructivist interpretation. Eight staff members from several elementary schools in Israel participated in the study. All the staff members participated in the administration of their schools. In addition, the selected interviewees had more than four years of experience in administration and were familiar with the situation before and after the integration of computers in the schools.

2.2. The Process and Research Tools

The research tools were semi-structured in-depth interviews. The interviewees were asked questions relating to the implementation of the computer in education, such as: ICT tools, the method of implementation in teaching and the difficulties involved in its implementation. The interviews were between one hour and one and a half hours in length. The interviews were recorded and transcribed and were analyzed using Content Analysis where material is divided into content categories according to their similarity. The final stage is drawing conclusions according to the various categories.

3. Results

Six central categories were deduced from the answers of the interviewees that relate to the impact of the ICT program on the teacher, the categories are as follows:

1. Professional development
2. ICT tools
3. Rethinking of teaching methods
4. Using ICT tools
5. Collaboration between teachers on the staff

The impact of the program on the teacher parent relationship.

3.1. Professional Development

The interviewees reported that the first year the program existed the teachers received training in the field but it was shorter than expected and not complete. The principal Y described the process of preparing the teaching staff for the program from the training aspect. *"In the first year the teachers participated in a training program that was supposed to last for two years and in the end..."* H the ICT coordinator describes the training program that the teachers had in her school: *"The teachers trained only in the first year and this was a shame because it was not enough, in my opinion there needs to be a program where every year the teacher can choose to train in ICT in an organized manner"*. According to the ICT coordinator the training the teachers received was unsatisfactory and teachers should be allowed to increase their knowledge of the subject.

From analyzing the interviewee's statements we can learn that the teachers underwent 30 hours

of training before the program was introduced but according to their answers the training was **partial and not satisfactory**.

Most of the interviewees indicate a need for continued learning and training in the field of ICT. Like the ICT coordinator M said *“As a coordinator I try to be as available as possible to help when needed but unfortunately there is no organized learning where they can sit and learn in a professional manner how to use digital tools and maybe there should be”*. This statement by the coordinator reflects the need for continued teacher training in this field.

The assistant principal A commented on the nature of the training: *“there is a need to professionalize the teacher more regarding how to build an ICT lesson. I know that there are facilitators who do work on this within the framework of their teaching in certain fields like mathematics or English, they are more focused on the subject matter than on the method. But I think there is a need to open more teacher training courses so they can acquire additional tools”*. The assistant principal emphasizes the need for more professionalism from the teachers in the field of ICT.

In conclusion, from the comments of the interviewees we learn that with the inception of the program there was an effort to develop the skills of the teachers in the field of ICT but the training program was not comprehensive or effective enough for the teachers to acquire skills and tools in computerization. It is clear from the research findings that there exists a need for long term guidance especially for the older teachers who experience difficulties in the field, which is being fulfilled mainly by the ICT coordinators. A majority of the interviewees agreed that there is a need for more training programs for the teachers.

3.2. ICT Tools and Frequency of Use

From analyzing the interviewees comments we see that throughout the training program the teachers use many and varied computer tools. Their answers indicate a number of primary tools that teacher use in the teaching and learning process, use of content providers, databases, spreadsheets, videos, presentations, widgets, digital textbooks and computer demonstrations. The training program requires every teacher that teaches a core subject: Primary language, English, Mathematics, Sciences, to plan at least one online lesson per week per class. Teachers who teach Social Studies and Geography must plan one lesson every two weeks. The interviews revealed that the teachers are aware of these guidelines but do not always apply them. Assistant principal A said *“We do not track the frequency of the lessons even though technically we could do that.... In the beginning the requirement was one core lesson using ICT per week, unfortunately because of time constraints the reality was not so simple... and there were those teachers who created even three or four lessons per week while others barely prepared any”*.

By analyzing the assistant principal’s comments we can see there is a division among the teaching staff. There are teachers who create more ICT lessons than required and there are teachers who rarely use the computer.

Principal Y corroborates the interviewees views *“as a principal I am aware of this and I see who comes every day with a computer and who takes one home so that it is never available when needed... this is something you can see and remember”*. The principal shared with us another way to map the level of use among the teachers in his school. From his explanation we see that there exist differences of approach among the staff.

In conclusion, the analysis shows that there is an awareness of the requirements, and most of the teachers create a number of online lessons per week, some even more. However, there are some teachers that do not fulfill the requirements and use the ICT tools sporadically.

3.3. Rethinking Teaching Methods

Many of the interviewees stressed the need for rethinking their teaching methods. Assistant principal A says *“I must point out that preparing an online lesson takes a lot of work and preparation in advance. You can't just take something from YouTube and insert it into the lesson and you're done... You have to think in a more informed manner... it requires a totally different type of preparation and allows you to do special things... but it definitely calls for introspection and planning ahead to search for tasks that are suitable”*. The assistant principal claims that in order to integrate ICT optimally you need to dedicate a lot of time to thinking and planning ahead.

The teacher Y corroborates her comments *“I am constantly thinking how I can integrate the media? At what point in the lesson? Related to what? What yes and what no? First I look at the sites and see what are they offering? I look at the books... I see what is suitable and relevant and what is not, what is the length of the video? What is the level of the video? Is the video suitable to the spirit of the school? All kinds of things like that and then I decide whether to include it or not”*. From Y's comments we see that she must check the suitability of the material from a number of aspects: is it suitable for the lesson, is it ethically suitable, at what stage to integrate the ICT content. The assistant principal as well as the grade coordinate and the teacher all emphasize the need for advanced preparation and innovative thinking in order to use ICT effectively.

In conclusion, the analysis shows that the teachers are required to rethink their teaching methods. This rethinking is reflected in an effort to revitalize old teaching methods and to integrate them with the use of ICT tools in order to enrich the learning. In addition, many interviewees reported the need for investing considerable thought on how to integrate the technology into their teaching in the most efficient and qualitative manner.

3.4. Using ICT Tools

3.4.1. Illustration and Demonstration

Some of the interviews reported they used the ICT tools for Illustration and demonstration when teaching complex learning materials. The ICT coordinator H: *“there are complex subjects in Science like learning about the human body where you can use all kinds of software programs for Illustration and demonstration of the processes”*. From this we can learn that she uses the advantages of the ICT tools for Illustration and demonstration of new and complex material. The principal G described a computerized lesson that he observed. *“During the lesson they discussed many concepts that were not clear to the pupils and every time the teacher mentioned a concept, a picture or explanation jumped on the wall as part of the presentation. This was an excellent exploitation of the tools because the teacher did not have to stop and waste time drawing or explaining the concept. She spoke freely and smoothly and the pictures appeared on the wall simultaneously with her explanation of the difficult words she was trying to teach”*. From this description we can see another example of efficient use of the ICT tool for acquiring new material and illustrating unfamiliar concepts.

3.4.2. Drilling the Learned Material

Some of the interviewees pointed out the importance of using the ICT tools for drilling the learned material. Assistant principle A describes: *“As a math teacher I often use certain programs for drilling, it diversifies the learning, is less frustrating and especially gives the pupil independence... he does not need me to approve the solution. The computer does this in an experiential manner. I have a pupil that finds it very difficult, this year he learned mainly using various applications on the computer...”* From this we learn that in her capacity as a teacher she uses the ICT tools for drilling the material that was learned in the past. In her words the "computer" assists her and the pupil by allowing the pupil to check *his* own work.

3.4.3. Inquiry-Based Learning

Another use of ICT tools that was mentioned by the interviewees was the need for inquiry-based learning. Computer software opens before the pupils and teachers the possibility for exploring a wide of varied array of information. The principal G brings an example from the field: *“I had a teacher last year who used inquiry-based learning in her sixth grade class using the program net research and it was wonderful to see the results and the performance of the children”*. The principal's story exemplifies the uniqueness of the ICT software which can reveal new and varied worlds.

3.4.4. Cooperative Learning

ICT tools facilitate cooperative learning. The ICT coordinator M claims. *“I use digital books and try to use it as an interactive board, this way there is interaction between the pupils and the learning...and I try to encourage the pupils to make real use of the computer...during independent study hour this is easy to do”*. From her comments we can learn that it is possible to raise the lever of teaching by active participation of the pupils in the learning process.

The assistant principal T adds: *“There are teachers that build joint presentations with the pupils, using Google Docs which allows sharing of documents...”* From this we see that with the use of software and technological tools the teacher has the ability to create cooperative learning with the pupils.

In conclusion, the integration of ICT tools is achieved in various stages of teaching: for illustrating and demonstrating complex and abstract subjects especially when learning new material. Integration of ICT tools for drilling material that was learned in the past. In addition, ICT tools being used for higher level learning such as inquiry-based and cooperative learning.

3.5. Collaboration between Teachers on the Staff

From analyzing the interviewee's comments we see that as a result of implementing the ICT program the level of collaboration and mutual assistance increased amongst the teachers in the staff. The principal Y stated, *“What was very effective was the concept of team work with sharing of materials and skills, when there is the right use there is a significant advancement of the staff...there are staffs that you see them in staff meetings sitting around the computer and creating and building and then sharing it via disk on key or e-mail. And there are other staffs that sit with the computer on the side or at home... and this is something that as a principal I am well aware of and observe it.”* What stands out from the principal's comments is the mutual assistance amongst the staff members. He describes a situation that as a principal he is aware of because he sees the staff working together and assisting each other.

The assistant principal A agrees: *“I think there is more cooperation and it is an additional tool that did not exist in the past. The subject of sharing materials is splendid in my opinion. In the past if you lost a page then that's it, it was gone...now we send pages from one to the other in a simple and convenient manner. Even from school to school...”* From analyzing her comments we see that the cooperation she is witnessing knows no bounds and can occur between colleagues teaching in different schools. The principal G describes a similar situation: *“I see teaching staff that work together and share materials between themselves; I also try to send documents to the teachers every week...”* The principal is describing another example of staff cooperation which is the personal example of the principal who also shares learning material with the staff.

The assistant principal A raises another point which is an additional means of communication between staff members, she says: *“As assistant principal I send announcements via the e-mail about schedule changes and I definitely rely on this as a communication tool. I also post messages on the bulletin board because unfortunately not all the teachers are at the same level in this respect, but*

certainly most are.” From her comments we see that the initiation of the program has added a new tool for creating communication between the staff members i.e. the electronic mailbox, which has become more accessible.

The ICT coordinator M describes how she communicates with her teaching staff. *“I communicate via e-mails and whoever wants various links I send them to him...the program also created a tool for consultation within the staff, we pass all the forms to Google Docs and share forms using this tool; and this is a new form of communication that we did not have in the past. I can see at any given time what the teacher is writing, this creates a special type of sharing”*. From this description we see a higher level of communication like “Google Docs” or sharing forms amongst the staff. This sharing was possible only after the initiation of the ICT program.

In conclusion, from analyzing the interviewees’ comments we see two central themes: one is mutual assistance. Principals and teachers reported sharing learning material between staff members, mutual assistance in the field of computer skills is something that advances and optimizes team work in the school. Another theme that arose is: the use of ICT tools as an additional means of communication between the teaching staff and the administration and between the teaching staff itself.

3.6. The Impact of the Program on the Teacher Parent Relationship

From analyzing the results of the research we can conclude that the implementation of the program affects the level of communication between the teacher and the parent. The ICT coordinator H: *“it created more of a connection of the school with the home, especially the school website which became a very active site. We rebuilt the site with a more user friendly platform. The parents have the opportunity to see exactly what's going on in the lessons; there is a flow of information in real time from the teacher. But we do not post grades on this system. In addition the site includes test schedules, homework assignments, updated pictures, and day to day bulletins such as snow days, early and late dismissal, etc. For example I edit a short video at the end of each month and send it to the parents and I receive very positive feedback...”* From analyzing this description by the ICT coordinator we see the advantage of the program for the parents as it gives them access to information and updates, sometimes in real time, on what is happening in the school.

The assistant principal gives us an example from the field: *“I think the parents are much more aware of what is happening in the school. I once had a pupil who said to me – but teacher it was not written in the school website – it was related to my homework assignment and it was my responsibility to update the site and I did not do so. I told him you are right! And I did not penalize him. Parents do check the site; it is a fact that they check it”*. From analyzing this example we learn about a new type of parent-teacher communication that as a result of the computerization of the school and the parent's use of the tools, allows the teacher to update the parents using the school website and e-mails.

In conclusion, it appears that the ICT program has created a teacher-parent connection, from analyzing the interviewees’ comments we see that parents are more up to date with what is happening in the school because there is better access to information and a new means of communication. In addition the teaching staff is more accessible to parent’s requests which increase the quality of the connection.

4. Discussion

This study deals with implementing ICT in schools program.

The purpose of the study was to investigate the changes that have occurred in the teacher's professional pedagogical role as a result of the implementation of ICT in the schools, from the point

of view of the principal and administrative staff of the school.

4.1. Rethinking Teaching Methods

The integration of the computer in the field of teaching has been accompanied by changes in the perception of the teacher's role. Many researchers (Taylor, 1987; Fischer, 1996; Mevarech & Hativa, 1996) discuss the anticipated changes in the teacher's role, as a result of the use of computers. In their opinion, the role of the teacher as a person whose authority comes from the knowledge he possess changes to one whose authority comes from his ability to organize and control the information available, to guide, navigate and help in the learning process. The ICT model intensifies the role of the teacher in relation to his pupils and his school and continuously changes his function in the classroom (Kozma, 2003). The teacher and his teaching methods have a central role in educational renewal (Sarason, 1995), because the teacher constitutes the professional and personal infrastructure of the educational system. The research results clearly showed that there is a change in the method of teaching and of preparing lessons by the teachers. This finding is significant and emphasizes that the change is dependent upon the teacher, according to his level of knowledge and motivation. The implementation of the ICT program forces the teachers to rethink their didactic methods. Many interviewees emphasized the need for advanced preparation, using judgement and innovative thinking regarding their usual teaching methods in order to optimize their instruction. According to Berger (1997) the role of the teacher when integrating computerized activities is more complicated than his role in integrating conventional activities. The teacher is required to function as an autonomous, educated consumer who can use his judgement and didactic pedagogy in order to choose from existing material, changing it, offering his alternatives and adapting it to suit the needs of the pupils and the instructional circumstances. In the past few decades computer technology has penetrated the classroom as an integral part of the teaching, learning and training process (Halverson & Smith, 2009; Selwyn, 2010). Solomon (1996) argued that the computerization process should lead to the formulation of a pedagogical concept of a learning environment that allows optimum integration between teaching and ICT.

A study was conducted by researchers in the Ministry of Education and published in June 2013. They examined the major use of technology by the teachers for the purpose of teaching-learning. It showed that 40.8% of the teachers reported that the main change that occurred to them as a result of the national ICT program was the use of technology for purposes of illustration. 33.7% of the teachers reported they used technology to motivate the pupils to learn.

In this study we see that teachers integrate the ICT technology for various teaching purposes. The interviewees reported that the teachers use the ICT tools for illustration and visual demonstration, for drilling learned material, for cooperative research and learning, these findings match the findings of Wasserman (2015).

4.2. Professional Development

Teachers need appropriate training before changes in the traditional teaching methods can be expected (Rotem & Avni, 2009). Designing teacher training sessions which integrate ICT technologies must become an integral part of the implementation of the ICT program in the school (Cuban, 2001). Research findings reveal that training the teachers was a condition for initiating the program in the school. Yet, the comments heard from the interviewees reveal that that the training was partial and not sufficient. In addition it emerged that not every teacher has the requisite knowledge to use the program to its full potential. Zahavi and Shemesh (1966) noted, it is not enough to prepare the learning material or even to write basic and detailed instructions how to use the computer to teach, without the technical-pedagogical knowledge of the teacher, the digital material will not lead to pedagogical changes (Voogt, 2012). The research findings proved that not every teacher mastered the ICT knowledge at the same time and in general the older teachers of the

staff find it harder to meet the requirements of the program and the computer skills. From analyzing the interviews it emerged that all the participants emphasized the need for continuous professional development of the staff, additional training in the field and organized cooperative learning of computing skills at different levels. Because the more the teacher trains in the field of computers on a wider scale the more he will be inclined to integrate the computer in his teaching method (Hebenstreit, 1985; Yaghi, 1996). The research shows that bringing about a successful and significant change in the school requires guidance and professional development in the fields of pedagogy and ICT.

4.3. Cooperation between Staff Teachers and Colleagues

A staff is a group of people with a high degree of mutual dependence aimed at achieving a goal or completing a task. Team members agree on a goal and agree that the only way to achieve it is by working together. The quality of the instruction and the effectiveness of the school are dependent upon the degree of professional cooperation amongst the members of the teaching staff (Rotem & Avni, 2009).

One of the most significant conclusions that emerged from this study is that implementation of the ICT program contributes to teamwork within the school.

From analyzing the comments of the administrative staff it was discovered that during the course of their day they are exposed to collaborative work between staffs. In addition, the mutual aid and support that was provided in the area of mastering computer skills was obvious, such that skilled teachers sharing their knowledge with their colleagues causes the advancement of the staff as a whole. There is also a sharing of learning material between the teachers and amongst the school staff. This cooperation is not limited to the school, but also expands to include other schools as well. It can be said that the use of computer tools has "broken down" the barriers of the school we once knew.

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