TEL AVIV UNIVERSITY אוניברסיטת תל-אביב

SCHOOL OF EDUCATION
SCIENCE AND TECHNOLOGY EDUCATION CENTER

OECD/CERI ICT PROGRAMME

From a Project to a School-Wide Adventure
The Implementation of ICT Projects in a Systemic Approach
Neot David , a religious public elementary school,
Petach Tikva, ISRAEL

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OVERVIEW

It was fun seeing how other people live. For instance, one of the boys sent [a letter saying] that he really likes guns, and other children said that they didn t know any guns, because they do not know what a state of war is. We... do not need the teacher to explain to us what to do. We just surf the site looking for answers. We have independent-learning habits (student).

Neot David is a religious state elementary school[1] founded in 1974 in the suburbs of Petach-Tikva, a large city in the center of Israel. The student population is heterogeneous: students from a well-established neighborhood together with low SES families from another neighborhood, Israeli born children (Sabra) and about 20 Ethiopian newcomers. The school comprises of 623 students, divided into grades 3 to 6, with 6 classes per grade (22 classes), separating boys from girls. The school employs 44 female teachers, and 6 Rabbis who teach religion in the boys classes. The school had won an award of the religious education sector in the previous year, for implementing unique teaching approaches, combining Jewish studies, science and social involvement.

Neot David school uses ICT-related projects as a lever for developing learning communities for teachers

and students in the different subject matters. The project is part of a larger project, Beehive [3] of CET[4], the Center for Educational Technology. The school sees ICT projects as a major means of realizing its educational rationale: developing an independent learner. Therefore, the computer is integrated as a means, not as a separate subject matter, and ICT skills are practiced in all school curricula and in school life in general.

The institutional implementation of the innovation is expressed in three dimensions:

Scope: 25 teachers implement the project in all classes, some classes being involved in more than one project. In addition, skills and knowledge acquired in the ICT projects are implemented in other learning and social situations (e.g., the students applied data manipulation skills using Excel studied in the project Surf and Eat , during the elections for the students council).

Integration: the projects are an integral part of the curriculum in almost all subjects: mathematics, geography, literacy, science studies and English as a foreign language. Among the projects:

- Mathematics: the Gamba project (in Hebrew, the initials stand for surfing math on the web), dealing with solving unconventional word math problems relating to curricular topics (e.g., fractions, decimals, percentages)
- Science: two projects dealing with health and space.
- Geography: students inquire about problems within their settlement, compare between settlements, and address issues dealing with the quality of living.
- English: focusing on acquaintance with different cultures around the world and their ways of life.

Students work 2 hours per week on each project: one hour in the classroom focusing on skills such as planning, writing texts, editing a report, managing a virtual discussion etc. The second lesson is held in the computer lab, where the students learn to use ICT for their assignments. In most projects students collaborate working in pairs or triplets.

Collaboration with the community: the parents are actively involved in the innovation. They see themselves as leaders of educational processes, donating funds, participating in teachers CET training courses, helping their children in these projects and sometimes acting as experts for domains involved in the projects.

Students use synchronous and asynchronous tools for communication among students, between students and teachers, and with project directors and specialists in different areas.

The teachers receive support from CET specialists, and participate in courses dealing with the pedagogical, organizational and technological aspects involved in activating the project. Online forums allow teachers to become a learning community within the school and beyond school boundaries, together with teachers from other participating schools. They exchange professional information, opinions, didactic and educational ideas, advice and reports.

The innovation is based on intensive in-house and outside training of the teachers. CET courses -112 hours- are spread throughout the school year, each teacher specializing in her field. In addition, a 112-hour in-house training was administered. According to the teachers, the in-house training was *the main source of growth for teachers, enhancing their self-confidence* . The computer coordinator became a leading figure in school. In the last three years, she had coached courses such as Introduction to ICT, Use of Computer Applications, Introduction to the Internet or ICT Implementation in Education. As opposed to outside training, the in-house training met particular professional needs of the teachers, emphasizing the combination of pedagogy and technology in accordance with the school curricula, and alternative assessment.

As a result of the innovation, teacher/student dialogue broadened. A computer trustees group was established among 5th-6th grade students, for helping 3rd-4th graders in their ICT lessons. The projects are highly valued by the school community -teachers, students, administration and parents. One of the fathers,

stating that his son is in need of constant stimuli in order to excel, claims that *my son loves to inquire, and the computer helps him. He s blooming.*

Taking part in the projects brought about pluralism in the teachers attitudes and ideas relating different cultures. According to one of the teachers, this openness spread beyond school boundaries, effecting their private world: *Eventually, I brought home to my children the book about mixed marriages.* The principal sees openness as a value, though controlled according to one s way of life: *The main importance is openness to new things, not to be locked up, to consider what is appropriate. Like in a store, we have to buy only whatever fits us, our size.*

THE PAST

The striving force behind ICT implementation in a systemic approach is the principal, who arrived to the school three years ago and faced a reality in which a large number of schools in a relatively small area compete on students registration.

The principal, who has a B.A. in organizational counseling, chose ICT as a lever for the development and growth of the school. She identified inner strengths within the staff and appointed staff members as leaders of the project. For example, when she noticed the computer coordinator s readiness to implement the innovation, she encouraged her, turning her from a regular teacher into a leading figure in the school. In the past, in accordance with the national policy, the school was supported by ICT instructors from the ministry of education. However, the innovation began to be fruitful only when the computer coordinator took the lead.

Three years ago, the school became involved for the first time in an externally supported ICT project, together with 24 other schools from different sectors (mainstream, religious, Arab, Bedouin). The innovation exposed the students to opinions, ways of life, customs and points of view different from theirs, enabling dialogues in forums and virtual meetings between schools on issues and dilemmas from the students world. The school's successful activity within the project was then presented in an Innovative Schools convention held by the ministry of education.

A year later a connection was established with CET, and Neot David chose to start 6 ICT projects in two subject matters (mathematics and literacy) using one computer connected to the Internet. The success of these projects encouraged the implementation of the model in all subject matters and in all classes. The process was accompanied by a massive in-house training on a weekly basis for 112 hours, and an outside course organized by CET for an additional 112 hours. Staff and principal are satisfied with the CET training, but would have liked to plan the course so as to meet their specific needs: *We could have sat together, a few teachers, to form a plan.*

Obstacles

Along the way there were many obstacles, in the areas of infrastructure, training and time organization, and with reference to inner values and religious perceptions.

Infrastructure

Number of Computers: when the innovation began, there was one computer connected to the Internet. According to the CET instructor, the infrastructure was not sufficient, but the principal was persistent about participation in the online projects in spite of lack of appropriate means. The solution at that point was to organize turns to use ICT resources. Within a year, 40 computers were purchased by the parents, as reported by one of them: *If there are 100 computers here, it s because the parents decided on it, not the municipality and not the ministry of education. The parents invested here above 100,000 NIS.*

Computers Location: In the past, the computers were located in the classrooms, limiting their convenient use. This was solved by adapting the configuration according to the needs. For instance, two computer labs

with Internet connection were created, computers were transferred from regular classrooms to Science, English and Geography rooms, as well as to the library and the teachers room, and the old ones were moved to the hallways. All computers were connected to a local network.

Technical Support: The available technical support is not frequent enough. The technician, budgeted by the municipality, arrives once a week, while the massive usage of ICT causes frequent technical problems, and requires continuous technical support. The compromise is an effort by the computer coordinator as well as by the staff to solve as many technical problems as possible. Students who function as computer trustees also assist in solving technical problems.

Teacher Training

When the innovation began, the staff was not trained in ICT skills, and most of the senior teachers resisted using computers or adopting innovative approaches to teaching. These problems were dealt with by in-house and outside training in a supporting environment (see above). As a result, there was a rise in the teachers self confidence, and some of them even purchased computers and Internet services at their homes.

Organizing Time

The school timetable was not compatible with the needs of the innovation. The time allocated for student practice was not enough considering the nature of the assignments. In addition, the participation of teachers in online forums was low, due to lack of time in their schedule. These limitations were overcame by organizing time according to the innovation demands. For example, teachers are attentive to fellow teachers needs (e.g., extra time for online conferencing or for completing assignments) switching lessons or classrooms. In addition, 80% of the students in the school have computers at home, enabling them to do some tasks after school hours.

Values and Points of View

From a religious school s point of view, there are some Websites which carry problematic contents. The nature of the CET projects, characterized by exposure of students and teachers to cultural and ideological pluralism, collide sometimes with religious values. This issue is dealt with by teachers who approach in mindfully manner these situations, and the selection of the materials that the children can be exposed to. Parents are also involved in choosing learning materials. In addition, the school purchased a system for filtering unwanted sites.

THE PRESENT

The Innovation

Patterns of Distributing the Innovation

A number of factors influenced the expansion of the innovation:

Leadership: The principal is considered by the teachers as a successful role model. She continuously undergoes training along with her staff, initiating and leading educational reforms. In her first days as a principal, she had stated a policy of renewing teaching and learning methods. The principal gives the teachers ample autonomy. She sees her role in supporting the process, especially in its organizational aspects, bestowing responsibilities to others:

 It has to be said that I am very open to teachers initiatives. There is here a great deal of autonomy for all staff members. But one cannot operate an organization without the cascade method , since I can t reach every teacher at every minute... Maybe I can t be physically at once in 21 classes, but I m informed very highly about all the little details.

The Computer Coordinator: She is a major figure in leading and transferring the innovation within the school. She was identified by the principal and sent to training courses. She thereafter began training the teachers according to each one s special needs and subject matter. Her being part of the staff contributed to the teachers confidence, as described by one of them: *She knew what we know and what we don t know,*

and started with us from the beginning, like you would with small children. The supervisor also sees in her a leading figure, and next year will give her an instruction position for principals in the region. This will contribute to the transference of the innovation to other schools in the region.

Teamwork: Teachers report close cooperation among staff, including planning, performance and reflection on the processes. According to the teachers, they *always work together, in staff meetings we plan together how to continue the project in the following two weeks, report what we had managed and what we hadn t, and show each other the beautiful products of the students.*

Parents: The parents are involved in all levels of carrying out the innovation, and support it in all aspects (financial, pedagogical and technical).

Team Development for the ICT Innovation

The qualifications needed from teachers who take part in the innovation are acquaintance with ICT and readiness to deal with innovative projects incorporating ICT. All teachers involved in the innovation are acquainted with Office applications, surf the Internet and know how to search for relevant information. The staff trains twice a week as part of an in-house training course led by the computer coordinator and additional training from CET instructors.

The teachers fulfill varied functions: as instructors and partners in discovery processes (in the project Touching the Sky), or socializing processes (in the project Mail me), and even as learners when the children reach information sources unfamiliar to teachers and peers. These roles are different than teachers traditional roles, especially in the religious sector where the teacher still is perceived as the sole source of knowledge. Nowadays the teachers turn to databases on the web, and not only to the Rabbinical authority as a sole source of information. In that, the innovation is an exceptional phenomena within the religious sector.

The interaction between students and teachers is different than the usual, in that it combines traditional with novel ways of learning. Teachers are involved in group assignments, listen to the students, direct their activities and serve as advisors. Sometimes they meet with the students beyond school hours, in joint training sessions given by CET. This causes the students to see themselves as full and equal partners to the learning process, to an extent that if the teachers lack the time to perform the assignments within the projects, they ask the students for help.

The Connection between the Innovation and ICT

The contribution of ICT to the innovation is unique: it expands and enriches the existing curriculum; it enables collaborative and active learning; it supports the building of personal and group knowledge through asynchronous discussions and conferencing among students and between students and experts; it supports the construction of a public knowledge base which is accessible to all for searching data, seeking answers, objecting to information published or adding data.

ICT also supports learning processes of teachers. They collaborate with their fellow teachers in the online forums, learn to use innovative technologies (for example, an application for site construction called Sharvit) and update themselves constantly. One of the teachers expressed it: *I feel younger!*

Outcomes

Infrastructure

As a result of the innovation, the school infrastructure had developed to a great extent: there are a total of 60 Pentium computers equipped with Windows 95/98 operating systems, CD-ROM drives and multimedia utilities. 28 computers -connected to the Internet- are located in two computer labs, 14 computers in the hallways, 16 in classes for specific uses (the library, sciences, English, geography, music), and two in the teachers room.

Peripherals include 4 inkjet printers, 3 scanners, a CD-RW drive, and a video projector. The software in use

is: MS-Office applications, simulation software, site construction software, databases, interactive multimedia encyclopedias, drill and practice software, educational games and software for composing music.

The technical support team comprises the computer coordinator, a technician and 15 computer trustees. The technician visits the school once a week. The computer trustees and the computer coordinator assist the teachers in solving technical problems.

The Efficiency of the Innovation and ICT

The students exhibit great openness towards teaching and learning innovations. They also have great respect for their teachers, are very enthusiastic towards their studies and are willing to continue learning activities at home. They see in ICT a major factor in *preparation for the world we are living in* , as worded by one of the students. The innovation apparently supports one of the pillars of the Jewish culture: collaborative learning (Hevrutah). Due to the innovation, collaborative learning goes beyond school boundaries: cooperation and exchange of knowledge and learning experiences occurs in ways that don t occur in regular learning activities not using ICT. Collaborative learning between schools is emphasized in all projects. One of the students told us: *I m in the Mail-me project, in which you write to people abroad in the Internet, you write about yourself and talk, and you see how they live there and they know how we live here.*

ICT is grasped by the parents as a means for the child to broaden the knowledge boundaries beyond what he can get within the classroom. One of the parents told us: *My son had to write a paper. He came home, went to the Internet and started searching for materials. He built a paper that I, with all the knowledge I have and the academic titles I ve acquired, could not have done.*

The students are aware of the advantages of the medium compared to other means of communication: *We have to use the Internet, because the letters reach within seconds. If we use regular mail, the letters will arrive much later.* One of the students added: *We had gotten used to writing our opinions and reading others opinions on the Internet. The main affair of the project is to exchange mail and to learn to express oneself in writing. On the phone you just talk, and don t write.*

Academic Strictness

One of the parents ascribes the academic accomplishments to ICT implementation. According to him, the computer gives answers to differences in learning styles:

My son doesn t like learning in general. The computer brought him to a large leap. The computer served as a tool for connecting him with his studies. He did not relate to the teacher, nor to the method or to the class climate. From the moment he felt that his creativity was being expressed, and he s a person that likes to inquire and the computer assists him in that, he s blooming.

The supervisor added: *Children who did not like to write at all, all of a sudden you see them writing.*

Equality

Most of the evidence shows that the students profit from the innovation. However, there are differences among them referring to the extent of these profits. First of all, there are differences in the basic ICT skills to be acquired by students in order to implement the innovation. According to one of the students, *one or two lessons a week are not enough to learn all the ICT functions. Some kids do not have a computer at home, that s why they don t know how to use it so well.*

The parents, who see the computer as a means of *closing social gaps* , are also aware of the fact that in Neot David school every child has to have a computer at home. However, in their opinion, *the kids at Neot David receive more in one hour of working on an online project than they would receive in any other place, due to remarkable attention to the difference between excellent students and low achieving ones.*

According to the computer coordinator *Everybody benefits. The best students can find their niches, and the weak ones   there are all kinds of assignments, that each one of them can find something that is suitable for him or her.*

Among the teachers, some think *especially the weaker students benefit. If up till now they did not succeed in class, by using the computer they seem to succeed much more, of course, according to their level.*

Therefore, when they see that they ve got it going for them, it raises their self esteem. Others claim that *a kid that works less in class, in ICT supported learning he puts in less work as well, each student according to his level. On the other hand, a student that excels in class and contributes to the regular lessons, also bursts into much wider information resources, uses all technologies.*

A partial solution to the inequality in accessibility is that children that lack computers at home (about 20%) *arrive at school earlier and work with the computers in the hallways. They help each other: kids that dominate ICT skills offer on their own initiative help for those who are less in control. They get up and help each other, there is more openness and a good connection between students.*

MAIN HYPOTHESES

The Role of Technology in the Innovation

Most of the evidence supports the claim that technology is a strong catalyst for innovations and improvements in education, especially when the Internet is involved. The school staff does not see itself functioning adequately without ICT. ICT is grasped as a means of developing living skills and adapting to the modern world, for teachers as well as for students. When the teachers were asked what would happen had the computers been taken away from the school, their responses ranged from prospects for deep fear of lack of satisfaction at work, to retreat and stagnation. There was even a sort of personalized reference to ICT, as one of the teachers worded it well: *Just not that. We have gotten used to them, and we became very attached to them. We will miss them very much. It will set us a few steps backwards.*

There is no doubt that ICT triggered the innovation and pushed the school forward, raising self-esteem of teachers, students and parents within the school. According to one of the parents interviewed, who holds a senior position in the ministry of education, *there is no precedent for an integrative school exhibiting such high achievements. I have no doubt that the ICT had a crucial influence.*

Diffusion of the Innovation

According to Rogers (1995), the implementation of an innovation depends on its properties regarding: a relative advantage, agreement with values, easiness to operate, implementation feasibility, and above all, its answer to an authentic problem. Neot David needed a relative advantage with respect to other schools, in order to become an attractive educational institute in the eyes of the community. The ICT projects were an appropriate answer to these needs. But moreover, they supported the fulfillment of the schools educational goals fostering the development of an independent learner able to cope with technology in the modern society.

Regarding values, Neot David is an example that allegedly contradicts the claim that even the most updated technology has to adapt itself to the values of the society where it is implemented (Rogers, 1995). Within three years, the innovation was adopted by the surrounding traditional society. There is awareness to the problem of using the Internet as an extra source of knowledge, causing contradictions with inner values. The means of coping with this problem is by restricting the access to the Internet via filtering software, and by teacher supervision and continuous consultation relating to online resources amongst teachers and between teachers and parents. However, the participation in the innovative projects is compatible with central values of the religious society: collaborative learning, reciprocal help, inquiry and study.

Implementation of ICT

There are a number of schools under my supervision with the same resources as the ones in Neot David , but in Neot David the teachers are at the top of their class... In Neot David it s not a project, it has turned into a way of life. These words, of the school supervisor and expressed by all interviewees, support the claim that the adoption of the innovation depends mainly on the staff.

Even when the existing infrastructure was insufficient and only one computer had served the project needs, 6 classes took part in the innovation, displaying flexibility, almost acrobatics , in the effort to complete all assignments, such as participating in online conferences, in forums, performing learning tasks, filling questionnaires and surveys etc.

New teachers to be received at this school will find a skilled staff in regards to the innovation. The new spirit, brought by the principal, is evident in the educational actions of the teachers and the parents. All these see the student as the center of the educational doing. The parents expressed this very well: *the child is the center. The parents and the principal are around him, but the student is in the center, and the computer is the tool.*

Digital Gap

Despite the dramatic increase in students access to ICT, the gap between high and low achievers still persists. All students indeed have access to ICT resources, but teachers claim that each student advances in relation to his or her starting point. As a parent expressed it: *ICT is a means of reducing the gap between edges. It s impossible to close it completely.* Students with general high capabilities display excellent skills in using ICT as well.

The gap is grasped by parents as a national educational problem, not merely a local one. It should be noted that the parents who were interviewed belong to a high SES. As a result of the innovation, the municipality of Petach Tikva acquired 10 PCs for low SES students, recommended by the school management.

Teachers report a rise in the Ethiopian students self esteem as a result of their participation in the literacy project, dealing with analysis of Ethiopian legends. One of the teacher reports: *This brings respect for this ethnic group. I do not have any Ethiopian students in my class, but in parallel classes there are some, and I hear from my friends that this does only good to the soul of the Ethiopian children.*

In the eyes of the inspector, ICT had been of great value for weak students, revealing hidden strength points and strengthening the bond with the parents. The parents feel that their children are advancing in their studies and are highly appreciated. *You discover a lot of kids who don t do so well in class, or who don t express themselves so well, or are sort of absent-minded... you see them by the computer, displaying products that are so beautiful... It also created a tighter bond especially with the parents of the problematic children, because you could find points in favor of these kids.*

Academic Standards

Teachers and parents claim that ICT enhances motivation for learning, and that successful application of ICT will lead to higher standards in students' work (e.g., in aspects such as aesthetics, use of multiple information resources, use of ICT means). However, this does not necessarily mean higher academic achievements: *It gives them enthusiasm and energy to do and to hand out assignments. The aesthetics of the assignments is much better. Whether the their writing standards have become better, I m not sure, but I feel that from stage to stage there is an improvement, and slowly they begin to rise. This doesn t completely solve all wording, writing style and content problems as it should, this requires a lot of work, and we are still at the beginning of the road.*

Academic standards are a function of the teachers and schools expectations, and not of textbook or ICT standards. The teachers at Neot David are aware of that, and they generated alternative ways of assessment, focusing on application and transfer skills. The commonly heard claim that the use of ICT could result in lower academic standards (e.g., time wasted on useless searches, the use of low quality information) is not relevant to Neot David's projects. The reason may be that the students are under strict and continuous supervision while working in the Web.

IMPLICATIONS FOR THE FUTURE

Stability of the Innovation

The innovation has been firmly assimilated in the school. All the teachers involved possess great openness towards ICT and are highly competent in this field, without distinction of background, seniority or age. For them, the use of ICT is a way of life. Their entrance into the ICT-enriched world was not done on a voluntary basis, but as part of the principal's holistic attitude and vision. At first, there were fear and resistance to the change. But with the gradual mastery of relevant skills, the level of anxiety lowered and the level of openness grew higher, as one of the teachers told us: *At the beginning they pressured us: You have to use. regardless of who had prior knowledge and who hadn t. Every teacher, no matter if she s a computer teacher or a Bible teacher... What does she want from me?! I can hardly get along with myself... I couldn t understand why I was being pushed by force. But now I m satisfied.*

It seems that the teachers are enthusiastic and are interested in continuing in different directions also in the long run. They indicated a need for more innovative projects, beyond the existing ones. This experience is a challenge for the principal and for the intervening institute, since the teachers had become wise consumers of ICT, understanding the essence of it and wanting more. Nowadays, the gymnastics teacher also sees the contribution of ICT in teaching the subject: *In gymnastics it can also be implemented. Maybe we can receive information about past contests, about achievements... absolutely possible.*

The stability of the innovation depends on a number of factors. The first is the quality of answers given to the teachers needs, which are the ground in which the innovation grows. Just like soil needs to be fertilized, one needs to invest in the teacher population in pedagogy as well as in technology. Teachers should be supported in updating their knowledge and skills, and in becoming active partners in ICT curricula planning and implementation.

Another factor is the economic aspect. The projects need further funding by the parents, as the municipality does not allocate funds.

The technical support is a complex issue: along with the expansion of the innovation, there is need for intensive technical support. It is important to note that in spite of the less than ideal conditions, there is no delay in the functioning of the innovation.

Transferability of the Innovation

According to the computer coordinator, factors such as *teamwork, openness to change and to a variety of teaching methods, support of the team by weekly in-house training and close guidance by the external factor* will contribute to the implementation of the innovation in the other schools.

The school supervisor supports the computer coordinator, and adds: *There is need for a leading figure of the process within the school, regarding hardware as well as human resources, and it has to be given a soul by the connection to the other schools, through CET or any other means.* The other significant factor, according to her, is *of course, money, and our school does not have any money. The financial support of the parents in the budgeting of the innovative projects is very important.*

One of the parents claims that *the system has not yet defined ICT innovative projects as high priority. The*

more empirical studies on students products and gains will be done, the more public and local systems will adopt it as a way of life.

An additional factor is the acquaintance between the school and the intervening institute, CET. The institute functioned as a change agent, with its experience with 1,200 classes throughout the country participating in their projects.

The CET project coordinator claims that *there are schools that begin feeling that the Internet is nothing but a 'white elephant'. The principals are beginning to understand that it s difficult to teach, develop materials and preserve an active and dynamic community all at the same time.* Therefore, teachers are motivated to join existing projects, like CET's, which constitute ready-made online learning units that do not demand extra investment of time or other resources from the teacher.

Apparently, this model can be transferred to any school. However, as the supervisor claims, the human factor is the most important ones.

In Neot David school the teachers had joined the realization of the vision, along with the principal and especially the computer coordinator. All of them invested voluntarily their free time in an effort to learn individually as well as in groups, in a belief that they are not only contributing, but are also gaining from it as well.

The innovation is nowadays an integral part of the school entity, and a source of pride for the community. It is implemented in the different disciplines, in building new criteria for evaluation, and in the pedagogical use of the innovative tools. The school, headed by the principal, sees in the innovation a lever for growth and a tool for helping students adapt to the post-modern world: *This fertilization can cause teachers and students to grow... very much prepares for the post-modern world.*

APPENDIX 1: Methodology

Research Team

The research team included 2 researchers that divided the data collection between them: Maya Tzatzashvili, the team coordinator, and Tali Gertman, team member. The interviews of the focus groups were usually held in pairs. The personal interviews: computer coordinator, CET project coordinator, school supervisor, and school principal, were usually held by one researcher. The observations were held in pairs.

Research length

The research was carried out between January and March 2001.

The Data

The chart below describes in detail all the data collected. All interviews were recorded and all observation details were written down. All data were transcribed into digital files and uploaded to the Israeli research Website, at http://muse.tau.ac.il/ict/. The average length of each interview was an hour and a half. The focus group interviews were even longer (an average of two hours). The observations lasted the length of the lesson, usually 45 minutes. According to the material collected, a data matrix was built, which served as a basis for the final report. The matrix and the report were written by the research team.

Interview and Observation Chart for Neot David School

Jan. 2001-March 2001

Research Tool/Action	Date and Hour	Name of Subject	Role of Subject
Phone contact with principal	17. 1.2001	Lea Lagenfeld	Principal
Pre-research meeting	24.1.01, 10:40	Lea Lagenfeld	Principal
Administrator interview	15.2.01, 12:45	Orit Shafrir	CET administrator
	4.3.01	Sara Naaman	School Supervisor
Principal interview	13. 2.01, 12:05		

Principal questionnaire	24.1.01	Lea Lagenfeld	Principal
Coordinator interview	26. 2.01, 11:00	Dorit Haimi	Computer coordinator
Coordinator questionnaire	2.2. 01 sent; 13.2.01 received		
Observations	1	1.3.01, 10:15	Miriam Rottner: Reading-Writing	5th grade teacher
	2	1.3.01, 11:00	Malka Shteinbaum Space Project	Deputy principal + science teacher
	3	1.3.01, 12:00	Rachel Zur: Mail-me Project	English teacher
Involved teachers focus group interview	12.2. 01, 10:00	Orit Karni Malka Gabay Malka Shteinbaum Miriam Rottner Batya Meidani	5th grade teacher Geography teacher Deputy + science teacher 5th grade teacher 3rd grade teacher
Involved teachers focus group interview: part 2	26.2.01, 10:15, 13:00	Batya Meidani Malka Shteinbaum Miriam Rottner	3rd grade teacher Malka Shteinbaum 5th grade teacher
Uninvolved teacher interview	13.2. 01, 11:00	Aliza Bilha Lea	Deputy principal GE teacher Communication Teacher
Involved students focus group interview	12.2.01, 12:00	9 students of the 5th to 6th grades	
Parents focus group interview	13.2.01, 9:00	Eitan Timen Yael Ashush	
Computer skills survey	12.2.01 handed; 1.3.01 returned		School teachers
Documentation	24.1, 12.2, 1.3.01	Brochures, School newspapers, Project web site: http://www.cet.ac.il/	

APPENDIX 2: Teachers Computer Skills

Results of ICT Skills Survey among Teacher Population

For Neot David School

Methodology

The questionnaire was handed out in the teachers room, and filled out by 18 out of 46 teachers on the school staff. Some answered immediately (10), and the remaining 8 handed it to the computer coordinator later on. The teachers who participated in the survey were classroom teachers and subject teachers, teaching 3rd to 6th grades. The results are shown in the following tables.

Results

	To what extent do you feel comfortable using ICT in performing the following tasks? 1 very comfortable 2 comfortable 3 somewhat comfortable 4 - not comfortable at all				
		1	2	3	4
1	Writing a document	12	3	2	1
2	Searching information in the Internet	6	10	1	1
3	Forming web pages and maintenance	1	1	6	4
4	Using databases	7	5	3	2
5	Developing databases	1	2	7	5
6	Sending/receiving e-mail	3	4	7	4
7	Writing plans on the computer	2	6	2	5
8	Preparing pictures, diagrams or charts	6	4	3	0
9	Organizing information in a presentation	7	5	4	2

	To what extent are the following computer skills important in your education work? 1 very important 2 important 3 somewhat important 4 - not important at all				
		1	2	3	4
10	Writing a document in a word processor	12	3	1	2
11	Searching information in the Internet	10	7	0	1
12	Forming web pages	1	4	7	0
13	Using databases	10	4	2	1
14	Developing databases	2	4	7	3
15	Sending/receiving e-mail	4	7	4	3
16	Writing plans on the computer	6	4	4	2
17	Preparing pictures, diagrams or charts using graphic software	7	8	3	0
18	Organizing information in a multimedia presentation	7	8	3	0

	How often do your students use the following computer in assignments you handed them during the previous year? 1 a few times a week 2 a few times a month 3 sometimes 4 - never				
		1	2	3	4
19	Using the Internet	8	8	1	0
20	Forming web pages	0	0	5	8
21	Sending/receiving e-mail	1	4	5	7
22	Using a word processor	5	8	2	2
23	Using computer games	5	7	5	1
24	Using electronic charts	0	0	8	7

25	Using graphic software	0	1	12	4
26	Joining a virtual forum or virtual discussions on the Internet	2	5	9	2
27	Using software for a multimedia presentation of information	1	3	10	3
28	Using drill and practice software (including simulations)	0	2	6	5
29	Other computer uses (please specify)				

		Good	Mediocre	Weak
30	How would you define your ability to use computers?	6	11	1

Answer the following questions relating to your prior experience or to ICT implementation in teaching\learning during the past year.			
		Yes	No
31	Had there been assessment of computer usage among students?	9	7
32	Can you create or alter a web site with one of the classes you teach?	2	15
33	Do you participate in a virtual course on the internet as a student or tutor?	12	6
34	Do you involve your students in collaborative learning on the Internet with students from other classes in other places?	18	

		All of it	A large part	A small part	A minor part
35	What part of computer usage during the lesson is aimed directly at the lesson content?	1	13	3	
36	What part of the computer-related assignments is for individual usage?	1	13	3	

		No limitations	Some limitations	Distinct sites only
37	Do you assign your students to search the web? What is the degree of freedom you allow your students while doing so?	2	6	10

		A few times a week	A few times a month	Once in a while	Never	I don t own a computer
38	Do you own a personal computer? How often do you use it for your work?	7	5	3		3

		Yes	No
39	Do you use technology to collaborate with other teachers? (professional chat rooms, forums etc.)	9	5

		More than 12	6-11	1-5	None
40	How many messages (average) do you send a week by e-mail?			10	7

How many of the following activities can you perform?		
41	Altering hardware	0
42	Updating/upgrading applications, such as word processors, graphic software etc.	2
43	Restoration of files	2
44	Site construction	3
45	Developing databases	3

APPENDIX 3: Glossary

5-year Computerization Program (Tomorrow 98): a national master-plan beginning in the year 1993/4, 5 years prior to Israel s 50th anniversary, with the goal of facilitating the achievements of the educational system in Mathematics and Sciences.

 A Computer for each Child : a national project beginning in the year 1997, aimed at supplying a computer, software and instruction for children from deprived homes.

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[1] 2 **A public-religious school** the state of Israel provides religious education to the children of its citizens who are interested, via religious state institutes, who lead a religious way of life, implement a religious curriculum and have a religious staff (including supervision).

[3] **Beehive (Kaveret)** a general name for ICT projects of the CET non-profit organization.

[4] **CET C**enter for **E**ducational **T**echnology the organization supporting the project technically and pedagogically. The center operates the ICT projects as part of the web site activities; URL: http://www.cet.ac.il/