

ISRAEL

OECD/CERI ICT PROGRAMME

A Case Study of ICT and School Improvement at  
**Ohel Shem High School, Ramat Gan, Israel**  
**Websites-Construction Project**  
**(Web Sites Story...)**

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# Overview

## Pedagogical innovation

*They like ICT combined lessons. They sometimes give up their recess.*

*They say that time flies in these lessons... (Ohel Shem teacher).*

Ohel Shem is a public high-secondary school in Ramat Gan, Israel, with a population of about 1,250 9-12 grades students, divided into 40 classes. In the last three years, teachers and students create and use Websites in many curricular areas in the school (currently 20) as major educational tool for empowering traditional learning and creating alternative didactic models.

The basic idea behind the creation process of the Websites is the usage of innovative technology as means to create innovative pedagogy. The teachers served as the designers of the site, planning the pedagogical issues. The students took the role of the constructors, converting the materials to fit in the site, and advising on several structural issues. This unique model of teaching and learning generated a vital change in teacher-student relationship, during school hours and beyond them.

## Goals and origin of the project

The goals of the project were:

- To Identify the potential features and qualities of ICT-based curriculum.
- To design and develop an ICT-based curriculum, entwined in the existing curriculum
- To encourage teachers' self-regulation, enabling them to express authenticity, needs and wills, and professional considerations.
- To allow students that are interested in ICT to be involved in the creation of new and innovative activities using the Web.

## ICT usage in the project

The school Websites are used as alternative way of studying the high-school subjects, especially the humanistic subjects. The sites contain knowledge and information, as well as a large database of questions, open to all students.

Before the Internet, the process of attaining information was time consuming, and limited to library hours. The Websites include synchronic and asynchronous communication, through discussion groups, chat rooms and e-mail. These features are used across classes and grades, as well as across schools. Via distant learning, barriers of time and place are broken.

# Students

Out of about 1,250 students in the Ohel Shem high school, there are different levels of involvement in the Websites project. The first circle comprises 20 students who were intensively involved in constructing the sites. These students gained a higher status among staff and peers, and were highly valued. About 40 students in the second circle contributed to the materials in the sites. The third circle includes about 60% of the students in the school, mostly grades 10 and 11. These students use the materials in the Websites for studying in class or at home.

# Teachers

Out of 120 teachers in the school, there are about 25 teachers involved directly in the Website project. More than half of the teachers implemented Web-based learning in their curriculum.

# Curriculum

The subject matter domains involved in the school Websites relate mostly to the humanistic disciplines, such as literature, Bible, history, Talmud, foreign languages, and also social and cultural issues stemming from the school folklore. There are also several science subjects included. The sites differ in depth, scope and kind of pedagogical activities.

The curriculum hasn't changed radically, since it is designed and enforced by the Ministry of Education, and as a result of the need to pass national final exams at the end of the 12<sup>th</sup> grade. However, minor changes have taken place, mostly for enriching the students.

The Websites offer a variety of innovative learning activities for students within the school and beyond school hours and place, binding them to higher standards of expressing themselves and to expertise in Web-based learning.

The planning and construction of the site had become an issue for assessment and for grading. Students are even assessed for collection of data from the Web.

# Instructional Organization

The extent and intensity to which the innovation rationale and features were implemented varied among the different subject matters. The planning and design of Web-based activities is an ongoing process, involving teachers, students and other role carriers in the school across grade levels and disciplines. Depending on the teachers' aims, as well as on their ICT knowledge and skills, a large number of didactic solutions were devised and implemented.

# Outcomes

The teacher-student relationship changed in nature: they became more on an equal basis, based on teamwork, rather than on authority. The mutual learning of students and teachers created a special bond between the two populations, based on respect and appreciation. ICT had a vital role in these changes.

The measurable changes in the school are a rise in the numbers of students, a rise in the demand to be received as a student in the school, and a promotion in the school status compared to other high schools in the city.

The project created a different atmosphere among teachers, enhancing their motivation to teach. With regard to students, the excellent ones profit by expanding their knowledge on ICT and by improving their ICT skills. The weaker students become more interested in learning, and the students with special needs have an opportunity to study in an innovative fashion and according to their own pace.

To summarize, the school educational Website project is an innovation in the following terms:

- There are few projects similar to it on a national wide scale.
- The national policy defines the school as innovative.
- The school Websites project changes norms, roles and regulations within the school.

## ***2. The past***

In the year 1995, as a result of a national-wide five-year computerization project, the Ramat-Gan municipality decided to facilitate the computerization of schools on a local basis as well. The Ramat-Gan municipality initiated the project in two leading high schools in the city. The purpose was to construct a web site for the schools, which would contain pedagogical materials in different subject matters (such as English, Arabic, Computer Sciences, Math and Chemistry). The goal was to develop Internet based lesson plans for the use of the school community.

A former high school teacher was put in charge of computerized education in the municipality. His aim was facilitating the computerization of schools: expansion of infrastructure, as well as assimilating ICT in innovative pedagogical processes.

An academic advisor was appointed, and contact was established with a guide of a public pedagogical organization, CET<sup>[1]</sup>, which specializes in ICT-related educational projects. A local committee was assigned the process of construction of a site for all Ramat Gan schools, consisting mostly of data, in a form of a local database.

In Ohel-Shem, English as a foreign language was the first subject to be entwined in the school Internet site. It is now considered an excellent site on a national scale, and designed by a leading student, nowadays a member of an academic committee and a partner in a start-up company.

Next, the mathematics teachers initiated an interactive section based on mathematics riddles for students, to work on at home on their free time.

Two issues had to be taken into consideration in the development of the innovation: one is the usage of existing ICT supplied by the municipality for innovative instructional practices. In resolving this issue, the English teacher's enthusiasm was vital to the success of the innovation. The second issue was the broadening of the innovation beyond the gifted students, which was resolved by joint efforts of additional students in supplying materials for the Websites.

The school Websites project is still under development, so it does not offer a final model for duplication. However, evidence shows success in the present, and a greater potential in the future.

### **3. The present**

## **Evaluation of change**

### ***Diffusion patterns***

Different groups of students became gradually involved in the innovation, in several circles. In the first circle are 20 students, intensively engaged in working with the subject matter teachers and constructing the sites. About 40 students in the second circle contribute materials to the sites. The third circle includes about 60% of the students in the school, mostly grades 10 and 11, who use the materials in class or at home. The fourth circle includes the rest of the students, parents, students from other schools, and outside educators, who enter the Website for general information and for enriching their knowledge.

Out of 120 teachers in the school, about 25 teachers became involved directly in the innovation. More than half of the teachers in each subject matter are active in the project or combine web-based learning in their curriculum.

### ***Staff development & involvement***

The teachers are offered a variety of training courses in the school, among them guidance for teachers who are interested in opening a web site in their field of expertise. Usually the work is done in small professional teams: the gathering of material, the designing of the web site and building up a database of knowledge and assignments. Every year, for the past 6 years, the teachers are offered courses in computer applications.

In the previous year about 30 teachers completed a 112 hours studies in ICT in education, and an additional 56 hours in ICT-aided research. About 20 teachers received training specializing in web- site construction.

Teachers mostly develop new technological and pedagogical skills related to ICT in education. They first learned the basics of computer use. Later on they studied how to create a web page focusing on content. They also learned how to use e-mail, discussion groups and chat rooms.

The pedagogic training was given to the teachers through one-to-one meetings with the CET guide, as a function of their needs and requests. The teachers were exposed to many innovative tools, introduced to forums and discussion groups, analyzed existing teaching units on the web built by others, and eventually construct teaching units.

for the last 4 years, meetings were held mostly at school. Some of the work was done by the teachers and students at their home, via electronic means (E-mail, discussion groups etc.). The meetings of the CET guide with the students were held once a week at the school computer lab.

The teachers were involved in collecting new materials concerning their subject matter, as well as information about the Internet: relevant URLs databases, as well as technical knowledge about Website designing and construction.

As a result of the project, the teachers:

- Learned how to use new technologies, including how to construct a Website and what should appear in it.

- Practiced teamwork among themselves and with the students.
- Began using new sources, such as databases and the Internet.
- Began communicating through e-mail, discussion groups and chat.
- Reduced the use of educational software, and shifted towards generic applications.

Teacher interactions with students changed as a result of the project based more on equality. They saw the students as partners due to their ICT skills. Teachers and students worked in teams to decide on the content of the site. The teachers ceased being the sole source of knowledge, and became partners to a cooperative task. The relationship became much closer. The teachers were dependent on the students' cooperation and the students feel that they are essential for the success of the project.

*It is impossible to compete with the students' technical knowledge. We've learnt so much from them, even more than from the teachers' training.*

*We've learnt a lot from the students. We sat with them for hours, I know that today.*

*I enjoyed immensely the innovative graphical ideas offered by the students.*

The computer had been considered a source of endless knowledge, and the role of the teacher changed accordingly to a specialist in organizing the huge amount of information into meaningful units. As a result of this, there had been changes observed in the teaching methods: less traditional lessons, and more lessons combining ICT.

Some lessons changed their form, and were uploaded to the Websites. In addition, the main issue of next year's training for teachers will be to construct interactive learning units, which would be qualitatively different than the traditional teaching units observed in some classrooms.

## ***Role of leadership***

The principal has an enormous influence on the existence and on the continuity of the project. He urges teachers to participate in training, and pushes discipline coordinators to construct Websites.

There is a rewarding system in the school, developed by the principal, according to the person's input to the project. The school organizes scholarships for students, and students are given extra credit for their contribution to the project.

## ***ICT-reform connection***

Technology plays a vital role in changing the curriculum and its components. But the vision of independent e-learning, without constraints of time and space, is possible to materialize only by systematic and efficient assimilation of ICT.

In lessons that combined ICT, students studied in one of the computer labs. Most of the lessons dealt with issues that appear in the formal curriculum and the students are tested about in the formal state exams. However, students reported on substantial progress as they worked in the Website: as designers, programmers or users. In this sense, the lesson included reflective processes, as well as curricular issues.

*We, the group that built this Website, did not sit one day and build a site. Rome was not built in one day as well. ... The combination of past and present knowledge with novel means, enabling interactivity between future citizens is meaningful to the learning process... We hope that our work is appreciated,*

*and that we have contributed to the Internet, for present and future generations .*

Most of the work was done outside school lessons: In recess times, during free lessons, in the afternoons, in the library and the computer labs in school, and at home. The process was accelerated by the publicity it received, and more inside people were inclined to help, including the pedagogical and technical staff.

The project encourages computer usage in class as well as at home. The sites expand the boundaries of the classroom and enables contact with other schools on a regular basis, as in the virtual seminary in the Talmud site. In addition, the amount and nature of the users varies: for example, families can find traveling routes (experienced and recommended by the students), or the Memorial Site which is aimed as a service to the community.

According to the students involved in constructing the Websites, technology was used for multimedia effects and illustrations (sound, animation etc.), for searching for information and surfing the Web, for Website designing and administration, for publishing personal papers on the Web, and as a means of cooperative learning.

As reported by the students:

*I have an e-mail address, which I work with at home as well as in school...I correspond with people that need help or that can help me solve my problems in the field of Web designing and construction. It is all much easier to manage it all by e-mail .*

Students ascribe great value to the discussion groups. Participation is considered an educational challenge to them, developing creativity and enabling every student to respond at the time and place he chooses.

*Students reacted at 03:00 a.m., from abroad, from kibbutzim in Israel, from outside the school framework...In a traditional lesson, not every student can express what he feels, some are embarrassed. There are some participants who express themselves better in electronic forums...it s fun!*

## **Outcomes**

### ***ICT infrastructure***

The ICT resources in the school comprise 124 computers for 1,250 students. There is a possibility to attain Internet usage, by the hour. After school there is a possibility to use ICT in the library, which is open till 15:00, and in the near future, until 17:00. in addition, there are printers (laser and inkjet), a video projector, a scanner, LCD projector, and varied software packages and courseware.

The equipment is located mostly in 3 computer labs, scattered throughout the school. There is access to ICT every hour during school, in free hours as well. Some computers are located in the classrooms, and some in the library. Some computers are available to students at the sciences and arts community center.

In all computers are installed Windows OS and the Office package. There is also software for Websites construction, software on statistics and mathematics, accountancy, educational games and other recreation programs, CD-ROM encyclopedias, and MBL. All the computers are connected into one local network, as well as to the Internet. The school has 115 IP numbers.

The school has a technical support team, a network technician, two laboratory assistants and science computer teachers who help when necessary. The school finances all the computer support. The technical team deals with hardware, software and communication. In addition, a group of about 20

students, computer trustees, supports teachers in the computer lab on a regular basis.

The school appointed a computer coordinator, responsible for coordination of all the staff that deals with computers. In addition, the school has an Internet coordinator, who is in charge of the school web site and coordinates teachers training in that field.

## **Effectiveness**

The advantages of the project lie in a number of factors:

- The process boosted the status of the school to a level equal to the leading school in the city.
- There is great appreciation of the project in the Ministry of Education, especially in the Administration of Science and Technology, although not always translated into additional resources.
- The position of the school as a leader in combining innovations in learning processes is one of great prestige. From this point, there is no going back.

The Ohel Shem School Websites reveals innovations not only in the mere existence of a web site, but in the dynamic and innovative nature of the 20 Websites contained in it, in many aspects: content, graphics, designing ideas, technical aspects and pedagogical setup.

### Student outcomes

The school Websites project had a significant impact on students, according to the Internet coordinator:

- Students were able to express hidden talents, which were not revealed prior to the project.
- Students participating in the project received special attention from the principal. It was considered prestigious to be a part of the project.
- Students felt their contribution and skills were necessary for the success of the project.

Teachers account for a greater interest in homework and papers, therefore, meaningful learning. When the school staff offers innovations in learning processes, assimilating technology, the notion is that it makes students want to learn. The learning process is far more attractive.

Most students had previous knowledge in computer programming, but still, had an opportunity to expand their knowledge in different areas, including Website construction, computer sciences, and in the subject matters. Some of the students have been spotted by hi-tech companies, and have started working for them on their free time. One of the students told us:

*Today I work in a Web construction company, and most of the knowledge I gained was here, at school...*

At this point of the project, it is difficult to determine an improvement in academic achievements. The students directly involved in the construction of the sites learned a great deal more than other students did, as they were exposed to learning materials, and were involved in the designing of the site. They take upon themselves different roles as learners, and therefore built their world of knowledge in the course of their work. The student is no longer a passive learner rely solely on their teachers for knowledge. He or She is an independent learner seeking for new knowledge using ICT.

According to the principal, ICT raises the motivation, reduces dropouts of the students involved, and has contributed greatly to the registration to the school, which has grown in 5 years from 900 students

to 1,250 students. However, the main influence of the project is on the students directly involved in the Websites construction.

### Teacher outcomes

The effects the innovative project had, and still has, on the teachers involved were immense. Teachers improved their professional ability, broadened their fields of interest, and were inclined to train themselves throughout the year. Their self-confidence in front of their students grew stronger as a result of matching up to them in the field of ICT.

Teachers that took part in the project were partners to a unique creation. One of the teachers expressed her feelings:

*Every person that creates something feels that he s part of a creation. Even if he wrote a song, and the song was uploaded to the school Website. ... if something of your own is published on the Web, you feel good about it... it s contagious .*

According to the Internet coordinator, the school Websites project added interest to teaching. They see the project as a new way of teaching and learning, which opens new learning options for students.

The teacher became an instructor. He is not grasped as someone who knows all that is known in his subject matter. He discovers new information together with his students, and serves as a mediator. The teacher does not have superiority over the student in information, but in the knowledge and its unique construction in the specific discipline. The teacher supplies the maturity, while the students are the dynamic part of the staff, supplying the most far-fetched ideas possible.

Teachers who did not take part in the project seemed eager to do so, but could not find the time for it. These teachers had a very tight schedule, due to the final exams. Still, there were some of them who discovered (using their term) the project, and contributed to it. Even teachers who were passive in the project highly complemented their fellow teachers who were more active:

*There is a feeling of pride in every discipline team. Teachers are proud to display the Website, and to say: this is our site .*

*...one tries it and sees that it s not as bad as you think to begin with...*

Although the principal thinks that the teaching method of a teacher did not change as a result of the project ( *whoever was used to teamwork continues to work accordingly, and whoever worked alone still does* ), most of the work was done in teams. The innovation became a model for fellow teachers from other schools.

The major benefit of the project was in the different atmosphere created by it among the teachers, their greater motivation to teach and the equality between teachers and students in most aspects of the project and beyond it.

## **Academic rigor**

The curriculum final goals, in terms of assisting the students towards their final exams, did not change as a result of the innovation. However, the contents did change, in accordance with the characteristics and the advantages of Web-based learning: access to knowledge-bases, discussion groups, opportunities for collaborative learning in the school and between schools (for example, a public trial on a Bible related topic) and a grater opportunity for examining and dealing with interdisciplinary issues.

The Websites-construction project offers both new materials (for example, the French site, in which there are songs by Cellin Dion) as well as new ways of learning. For example, the public trial, as reported by the computer coordinator:

*The curriculum has changed ... expanded and updated. The public trial project in the Bible Website was based on the formal curriculum for the 11th grade, adjusted to the final exams. ... the issue was: who is responsible for the division of King David s kingdom?*

*There were 5 defendants in the trial. In past years the trial was held in class, and lasted three 45-minute lessons. On the Web, the trial lasted half a year, while learning simultaneously other issues from the Bible. Studying occurred in class, as well as outside the classroom and school hours. Teamwork was a major learning strategy. Each group was assigned to prepare a lawsuit against one of the defendants in the issue of the division of King David s kingdom... assignments were divided in a way that each student specialized in a different field, in a kind of jigsaw method: experts in searching for information, subject matter experts, and technology experts who designed the display of the gathered information.*

*The exchange of information within and between groups took place spontaneously, without prior guidance. The aim of all groups was to construct Web pages for displaying all lawsuits in the school Bible-Website. The idea that their product will be exposed to everyone on the net brought about interesting processes. There were collaborative learning and work, endless debates, an ongoing process of improvement and refinement of the lawsuits, and identification with the figures involved in the biblical story, as well as with all contextual event in that epoque.*

Curricular outcomes were assessed in new ways, in addition to the old traditional ways. While in the past assessment was accomplished by exams or papers, web based learning enables alternative assessment as well, such as voting in polls, reflections in discussion groups, and Websites designing and performance. There were also self-evaluation, peer evaluation, an expert evaluation and a teacher evaluation. The final evaluation reflected the total state of the student s progress.

## **Equity**

ICT has a significant role in supporting innovations and adding value to them with regard to all students. The excellent students profit by expanding their knowledge on ICT and by improving their ICT skills. The weaker students become more interested in learning, and the students with special needs have an opportunity to study in an innovative fashion and according to their own pace.

## **4. Main hypotheses**

# Technology & reform

Technology plays crucial part in the current project. The computers supplied by the national wide computerization project, and the Internet connection delivered by the municipality, all serve as a ground for the growth of the project. The entrance of the World Wide Web and the appointment of an ICT coordinator even catalyzed the process.

Nevertheless, the technology did not create the reform. There were other forces that drove it, like the competition between high schools, and the need to pose the school as advanced and innovative. As the principal said:

*There was an issue of pride. We are, for years now, competing with ...a bigger and wealthier school. The Internet site was a booster for the school, so when the project developed to its current scope, there is great respect for our school .*

It seems that ICT is combined in existing learning processes, and while it enhances these processes, it does not create them. For example, teamwork had become more intense, but there still are teachers that work alone. The drive for excellence had become more visible, but it had always existed in the school climate. The search for innovations, as evident in the school culture before, spread to the new field of ICT.

## Diffusion of the innovation

The diffusion of the innovation had followed the traditional diffusion pattern, as outlined by Rogers (1995), in the following manners:

1. *The communication by personal influence* - The project is a grass-root initiation that grows mainly due to the enthusiasm and influence of the English teacher and Internet coordinator, and the support of the principal.

The Internet coordinator took charge of this project because it interested her and improved her status amongst the school staff. Later, it became a matter of peer pressure: *if you want to keep up, you must joint the innovation (the principal).*

All teachers involved received support from the Internet coordinator. Later, they passed the knowledge on to other teachers on the staff. As one of the senior teachers told us:

*At first it was very difficult, because the teachers were light-years away from the direction of the innovation. They didn't understand what I was talking about. I had to take teachers to my lessons, to show them what I was referring to when I talked about web based learning .*

1. *The adoption process* - the project started from one site to 20, from one teacher to more than 25, and from 2 students to more than 40.

The process of uploading pedagogical sub-sites, according to the different subject matters, was contagious , as reported by the school principal. The teacher and student web-site s teams can be divide to the main categories of adopters: the English teacher and her first two students as *innovator*, the next 3 - 4 teams (such as French and Bible) as *early adapters*, and the rest as *early majority*.

According to the computer coordinator, many students who were not involved in the project this past year made use of the materials in the Websites, even if their teachers did not assimilate ICT in their classes. After carrying out the bible project concerning moral dilemmas, additional Websites implemented projects concerning moral values.

As one of the teachers told us:

*Whoever is involved in the innovation says that when you involve yourself in it there is no going back.* However, the innovation showed different diffusion patterns as well, especially in the nature of the innovation:

1. *Innovation that develops in the course of its usage* the initial objective of the innovation changed in the course of the participants' needs and ICT resources.

The school's Websites innovation does not fit one specific type of innovation, but shows mixed characteristics of *continuous* and *discontinuous innovation*. Technology supports traditional pedagogical paradigms (such as use of databases supplying relevant materials for matriculation exams), as well as innovative pedagogical paradigms, enabling students to construct their knowledge via innovative means of communication. The characteristics of ICT force teachers as well as students to constantly examine goals and the means for incorporating the technology in teaching and learning processes.

1. *Innovation that changes the environment to fit itself*, changing some of the teachers and students roles.

As opposed to the idea of *compatibility* between the innovation and the adopter's values and culture, the innovation changes the environment to fit its own nature and needs. For example, the role of the students handling the core of the project (designing and constructing the Websites) shifted from being learners to being experts: they are needed, consulted with, teachers depend on them, and they are partners to every stage of the project.

Students indicated a change in their status as a result of the project, especially due to the changes in the teacher-student relationship:

*A different relationship developed between students and teachers. We can see that a teacher knows less than we know, and learns from us. This doesn't happen in a regular lesson.*

The role of the teacher definitely changed from a teaching teacher to a studying teacher, as reported by the teachers themselves. Even the relationship between school and municipality changed. As expressed by the principal:

*The city can supply the school with computers, with teacher training courses, but what the school does with the infrastructure and the staff is a result of the school initiatives.*

## Successful implementation

The innovation is considered (by the principal, Internet coordinator, Municipal Internet Project Manager) so far as successfully implemented. The success depends upon the teachers, ICT academic value, student ICT competence and technology infrastructure.

The gradual implementation enabled teachers to join the innovation when they felt ready to do so. The joining of 4-5 new teachers every year, altogether 25 teachers out of 120, supports this claim.

Although the teachers were the ones exposed to the possibilities of assimilation of technology in the curriculum, and of the curriculum into the web site, the students were the ones that carried out the technical application of the project.

Students felt that the teachers responsible for the Websites were not professionally competent for the mission. They were interested in working with teachers who received appropriate training in the fields

of administration and technology.

*It would be of help if teachers were more knowledgeable. As it is now, a lot of the pressure is aimed at a minority of the students...Teachers aren't receiving enough training and guidance. That way, they could understand much better what we students are dealing with .*

## Gaps between students

There is evidence of diminished gaps between high and low poverty students as a result of teamwork. Students report having fruitful teamwork amongst themselves and between them and outside students.

As a result of the teamwork, new social contacts were formed:

*In a team of two, connections are built beyond the project. That is one of the best parts of the project .*

Some of the students manage the site, and others participate in the broader process: collection of information, data processing and entering materials into the site. All students involved in the project were taught how to work in teams and how to elicit information they needed using the Internet. One of the teachers added:

*The excellent students pull the weak ones forward...when I let the weak students enter the Website, on-line or through uploading their materials, they simply blossomed .*

The principal says that competent students profit most from the innovation, as it is a question of talent. Basically, if you came from a disadvantaged home, with a low start, the computer will not be of any assistance in the learning process. According to the principal, the advanced students, the quick ones and those considered ICT experts gain skills, prestige, interest and motivation for learning new things. The students who have difficulties, such as special education students, gain computer literacy, as well as writing skills and an opportunity to express themselves in new and creative ways.

## Academic standards

The implementation of ICT in Ohel Shem School seems to lead to higher academic standards, even though students spend time searching and browsing the Web. E-learning means building up a new personal body of knowledge, internalizing experiences, as opposed to memorizing facts and figures in the past. The Internet coordinator expressed her view as to curricular goals as a result of the project:

*Learning assignments teach one to learn and to know how to react. It's a kind of a skill: to know how to express one's opinion and to react to others' opinions... The project enabled summarizing topics and displaying one's ideas by entering the discussion groups, expression of one's opinions about others' ideas, and brainstorming.*

*All these were alternatives to traditional assessment. ... The success of working via the Web indicates great improvement in ICT literacy, on the one hand, and a dynamic learning environment content wise, on the other hand .*

Students themselves expressed having learned content as well as technology skills:

*If I had to read material for the History Website, I attained background on the subjects I dealt with, in this instance, a few past settlements. When I helped constructing the Arabic Website, I learnt how to*

*type in Arabic .*

Students also reported a high degree of expertise in Web construction skills. However, this activity encouraged them to continue their work, independent of the subject matter involved:

*If my help is needed, the teachers use my services not only for specific purposes, but also for permanent assistance. For instance, for the French Website I was summoned, although I don't learn French .*

All in all, students who were directly involved in the innovation studied more about the subject matter because of their involvement in the planning and creating of the Web pages. In spite of, it seems from the teachers' reports as if the ICT integration does not raise students' grades significantly. It does influence the learning atmosphere and brings about greater motivation for studying. It also does not have any bearing on the curriculum.

## **5. Projection to the future**

### **Sustainability**

There is some evidence supporting the sustainability of the project:

- The readiness of the school and the municipality to continue allocation of resources for the project.
- The enthusiasm of the Internet coordinator to expand the project beyond its present size.
- The potential of the project as a connection between the school and the hi-tech world.
- The competition and the pressure to excel, and the prestige of the innovation encourages more teachers to join the project.
- competition with other local high schools enforces the school to offer innovative projects.
- Granting the participants with extra credit, encourages students to join the innovation.

However, the implementation of ICT in the curriculum is still incomplete, due to lack of satisfactory accessibility to computers, lack of teaching hours and the prolonged time needed for web site construction.

### **Scalability and Transferability**

The project uses mostly existing resources (teaching hours, manpower, computers etc.), so the chances are that it could be duplicated to a certain extent in schools interested in innovations.

The municipality is expected to allocate resources for the maintaining of the Websites: a municipal body centralizing all activities involving the Websites and the supplying of all necessary equipment and infrastructure to interested schools. The mayor is in favor of this course of action.

Other schools from across the country manifested their interest in the project, intending to implement the idea in their school. The principal expressed his opinion that there are quite a few schools similar to the Ohel Shem School, containing teaching forces as well as talented students. However, the teachers are the major obstacle to be overcome.

Next year additional local schools intend to use the model developed in the Ohel Shem School. They

have already approached the intervening agency (CET) assistance (training hours for teachers and students). These schools are aware of the need for adequate computer infrastructure, special training for teachers and students, and management support.

According to the innovation teachers, its existence, sustainability and transferability depend on adequate technology, as well as on the principal, and on municipal budget possibilities for rewarding teachers and students on their achievements and hard work. Compliments are not enough, as one of the teachers said:

*We are not free workers...pay us...until now, everything was done on a voluntary basis. We did not receive any hours for any of our work. This is the reason why teachers don't want to get involved in the project.*

Some of the teachers feel that in order to pass on and to apply the innovation to other schools there is a need for public relations, for marketing of the project and for advertising it correctly. Also they recommend training courses and meetings between teachers from different schools. Students find the expansion of the innovation exciting idea, and are willing to become mentors, on the basis of previous experience.

The principal recommended the formation of a local principals forum, an ICT coordinator forum, and a forum of Municipal ICT Project Managers for exchange of relevant information, accumulated and used for future initiatives.

## Appendix A Methodology

Size of research team: 5 researchers

**Amount of time spent at the school:**

	Date(s)
First contact	16.5.2000
Data collection period	22.5.-15.6.2000
Follow up contact	16.6.2000

**Amounts and types of data collected**

Contact points and lists of activities:

Date/time	Who	What	Remarks
25.5.2000, 10:00	Other teachers	Interview	Included 5 teachers
25.5.2000, 11:15, 12:00	Students	Interview	4 students in the 11 <sup>th</sup> and 12 <sup>th</sup> grade, accomplished in 3 separate interviews
25.5.2000, 12:15 15.6.2000, 10:00	IPPUT teachers	Interview	Included 4 teachers; accomplished in 2 separate interviews
28.5.2000	Internet coordinator	Interview	These two functions are both central to the project, therefore, both were interviewed.
28.5.2000, 11:00 30.5.2000, 10:00	Computer coordinator	Interview	
28.5.2000, 12:30	Internet coordinator	Coordinator questionnaire	These two functions are both central to the project, therefore,

28.5.2000, 14:30	Computer coordinator	Coordinator questionnaire	both filled a questionnaire
29.5.2000, 12:00	Web-based learning: English as a foreign language	Observation	Carried out by 3 team members
29.5.2000, 13:30	Web-based learning: Moral dilemmas	Observation	Carried out by 3 team members
30.5.2000, 12:15 11.6.2000, 9:00	Principal	Interview	Carried out by the SITES M2 and the OECD research coordinators
30.5.2000, 13:45	Principal	Principal questionnaire	
4.6.2000, 13:00	Municipal Internet Project Manager	Interview	Carried out by the OECD research coordinator
11.6.2000, 17:00	Parent	Interview	Head of the parents committee

The data collection was divided between the team members, so that all of them would experience the data collection process. Each interview or observation was recorded by at least 2 team members, so as to broaden their experience. The responses were recorded on audio-tapes, in addition notes were taken by one or more of the team members.

On May 22nd we witnessed a contest among all Websites created within the project under the title The best school Website, in which we met, for the first time, some of the IPPUT teachers. We were impressed by some of the teachers who were active in the project. The Internet coordinator, in accordance with our requests, selected the IPPUT teachers to be interviewed.

#### ***Problems during the data collection and case write-up***

Most interviews lasted much longer than expected. Therefore, these interviews were split into 2 parts, preferably on the same date; there were a few instances, where there wasn't any other choice but to schedule a separate date.

The school principal was anxious regarding the parents' interview. He felt the need to decide which parents should be interviewed, although he was aware of the problematic aspects of his intervention.

The focus group interviews were problematic, especially when approaching parents, who felt the need for confidentiality. Therefore, at some points we divided the interview, so as to protect the interviewees' privacy and to enable fluent answers, free of any group influences.

#### ***Changes in the instruments or data collection procedures***

Some of the instruments include repeated or redundant questions. Therefore, some of the interviews last much longer than expected, and are quite tiresome.

In addition, we also arranged a short informal interview with the teacher of the class being observed, in order to attain some background on the particular lesson and on the innovation as a whole.

#### ***Conclusions***

The data collection, on the whole, was accomplished to our satisfaction. The research team worked as an integrated unit, helping one another and giving advice to fellow researchers.

Before entering school grounds, we held a couple of instruction meetings, to enable the research team members to express their apprehension and for instructions. We had another meeting once all the data was collected, in order to learn from each other's experience.

We used e-mail quite frequently during the preparations for the pre-pilot case study. We also used our national site, for the needs of the research team members: downloading the translated instruments, uploading data, and so on.

The URL is: <http://muse.tau.ac.il/ict/>

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[1] CET stands for Center for Educational Technology