INVENTORY CASE STUDY

E-Classrooms at Škofja Loka-Mesto Elementary School
Slovenia

This school uses a virtual learning environment (“e-classroom”) to individualize student learning, foster creativity and innovation, and to improve the safe and critical use of ICT in students aged 8 to 15. Students work individually or in pairs on materials and tests that their teachers designed in order to reach goals determined by the official curriculum. The work with the younger students focuses at students’ computer literacy, whereas older students increasingly use the digital tools for subject-oriented learning. Teachers can see when individual pupils performed which activities in the e-classroom, and the classrooms are open to parents who want to check what activities are going on. Communication tools like chat rooms and forums allow interactions between pupils and teachers.
E-CLASSROOMS AT ŠKOFJA LOKA-MESTO ELEMENTARY SCHOOL, SLOVENIA

SVN 005

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I. Aims of the ILE and the Nature and History of the innovation

Ethos

Digital literacy (ability) is defined in Official Journal of the EU (2006) as a safe and critical use of information society technology (IST) for work, free time, and communication. In addition to digital literacy, other important 21st century skills/competences are teamwork and collaboration, creativity, capacity for problem-solving and knowledge transfer to new problems. The majority of these competences are well supported and can be developed by the learning process in e-classrooms, in the form of LMS (Learning Management System), as illustrated by the ILE case at Škofja Loka-Mesto Elementary School. The present case presents the operation of e-classrooms at the subject’s level and whole-school development, based on the needs of the school and its staff.

Contex

Škofja Loka-Mesto Elementary School is a public school that offers a nine-year elementary (compulsory) education programme, divided into three cycles. Figure 1 illustrates the position of elementary school in the education system of Slovenia, and related pupils' age groups.

The school has a population of 777 pupils, with the instructional time offered in the morning in two buildings. The building in Šolska Street provides instruction to the 2nd and 9th graders (29 classrooms, after-school classes and 25 optional (elective) subjects). The instruction in the 1st grade takes place in the building of Novi svet (in case of smaller entry of first graders also one class of the 2nd grade (4 classes and the classes of extended stay)). For the following subjects: Slovenian language, English language and mathematics flexible differentiation is being introduced. The core instruction is provided at one common level, and in certain subjects on three levels of difficulty. The pupils select the level in consultation with their parents, teachers and school counsellors.

In grades 6 to 9 teachers apply flexible differentiation in certain subjects. Extra curriculum activities consist of before- and after-school classes in accordance with the needs of the pupils and their parents, like for example extended stay, morning care, commuter care, supplementary and additional lessons, interest activities, various activities and excursions.
The teachers and head-teacher of Škofja Loka-Mesto Elementary School recognized the potential of e-classrooms early on (first teachers in an experiential way). What are e-classrooms? They are learning environments or systems for managing learning content (Learning Management System – LMS), designed in a virtual space. They have a potential of providing advanced strategies and forms of learning, and of enabling collaboration in "remote" learning groups, to support regular, traditional instruction, as well as out-of-school and special activities. They can be implemented in various environments. Among the most commonly used environments is the open source Moodle program, which supports the functioning of e-classrooms in Škofja Loka–Mesto Elementary school.

Access to e-classrooms is granted to everybody who may be interested via the school web page [http://www.o-sl-mesto.kr.edus.si/moodle/](http://www.o-sl-mesto.kr.edus.si/moodle/) (Figure 2), where they can select e-classroom of their choice, like for example e-classroom for chemistry (Figure 3). Access at the Information Portal of the school is limited only for e-teachers staff room and for e-classroom of Parents’ Council. The e-teachers staff room is accessible only for teachers and school technical staff with certain restrictions due to pupils’ personal data protection. Access to the e-classroom of Parents’ Council is granted only to School Council members.
Figure 2: Overview of E-classrooms Škofja Loka-Mesto Elementary School:
http://www.o-si-mesto.kr.edus.si/moodle/

Classrooms from 1st to 5th Class
Classrooms from 6th to 9th Class
Language and Social Science Subjects
Science-Technical Subjects
Optional Subjects
Interest Activities
Information Portal
Didactic Support to ICT Tools
E-materials
Miscellaneous, e.g., Home-room
E-classrooms at Škofja Loka–Mesto Elementary School provide pupils with various activities that enable them to learn deeply and employ various strategies for the acquisition of knowledge. They contribute to the optimization of the learning environment through differentiation, individualization, and personal approach that can be adapted to gifted pupils and to those with learning difficulties and special needs. The use of ICT facilitates the development of their creativity and inventiveness. E-classroom is particularly useful for the pupils after their long absence due to illness or, for instance, sports activities. In addition to increasing pupil motivation for learning, e-classrooms complement other forms of assessment of knowledge, thus contributing to the new culture of assessment.

E-classrooms enable teachers to gain a complete insight into their pupils' activities: when and how much time they spent in an e-classroom, which sources they were reviewing and which activities they performed. The school presented e-classrooms to the parents, which motivated increasing numbers to start communicating with the school via e-mail. Parents have access to major part of e-classrooms, which enables them to monitor the activities that are in progress in individual subjects, check their children's work, and offer them support.

E-classroom is a live and potentially vivid environment, offering teachers the opportunity to communicate with their pupils, and to pupils to communicate among themselves. Such communication is possible via different forums and chat-rooms. E-classroom enables also individual communication via messaging, which can deepen the relationships between the pupils and their teachers. With varied, interesting, and up-to-date information, which exceeds the prescribed content, e-classrooms offer students broader knowledge, and guide and motivate them toward the acquisition of life-long learning. As such, they present excellent opportunities for a combination of school and home work.
Background and Aims

The main objective that we set in the project e-classrooms, which also serves as a means of contributing to school quality, was the development of digital literacy in both pupils and teachers. Our aim was to follow the education in information society with the focus on blended learning. The more active individuals soon experienced and realized that a proper use of e-classroom could complement traditional teaching in a substantial way, and even more. They saw its greatest advantage in providing opportunities for direct communication with pupils in a learning environment, and for communication among pupils, thus encouraging collaborative learning. The goals of the project are:

- Prioritize the innovative use of ICT in the process of learning and teaching;
- Improve the quality of learning (knowledge) with understanding/teaching; think about different knowledge and skills, which are unavailable without technology;
- Use ICT (e-classrooms) for differentiation, individualization, personal approach – optimization of learning environment and use of varied pathways toward knowledge acquisition;
- Increase the level of motivation for learning, also as acquisition of life-long learning habits, and offer the opportunities for the acquisition of broader knowledge and skills;
- Encourage students (and teachers) to search information independently and get used to safe and critical use of ICT for work, free time, and communication (using critical thinking);
- Develop digital competence and other competencies that are necessary for the life in modern society, like for example, learning to learn, develop self-initiative, social competence, team – collaborative work, creativity, etc.

Brief History and Development

The school project leader, Mrs. Marja Pahor, became familiar with e-classroom and its possible use at the training organized for teachers of teachers (for the subject of Chemistry) by the National Education Institute in 2005, which employed Manhattan environment for work. She acquired basic knowledge for the use of e-classroom by 2006 in Moodle environment. Using her newly acquired knowledge, she set up her chemistry e-classroom in Moodle environment on the portal info.edus.si in 2006. She engaged other teachers at her school, and they took part in the training in Moodle environment, which was organized at the school within the framework of computer literacy project. The first seminar entitled ‘The Use of e-classroom Moodle was organized by Consortium MK from September 20, 2006 to October 4, 2006. On the head-master’s invitation, Marja presented her e-classroom to the teachers of the school at a pedagogical conference on October 26, 2006, with which she motivated individual teachers, especially those who had already embedded ICT in their
instruction. In addition, the school organized an internal, two-hour seminar for Moodle (homeroom teachers – Tea Sušnik in Matjaž Pintarič).

The teachers, who were enthusiastic about the possibilities created by the e-classrooms for all phases of the learning process and for collaborative learning, set up eight e-classrooms on the portal in the same year. The following five teachers – moderators took care of e-classrooms:

- 4th grade classroom (Saša Čadež),
- 5th grade classroom (Doris Kužel),
- English (Nika Benedik),
- Physics for 8th grade (Matjaž Pintarič),
- Physics for 9th grade (Matjaž Pintarič),
- Computer Science (Tea Sušnik),
- Bike exam and traffic safety (Saša Čadež),
- Free-of-charge programmes (Matjaž Pintarič).

These teachers used e-classrooms with the purpose of encouraging high-quality learning and motivate pupils for acquisition of additional knowledge. They evaluated how much pupils liked e-classrooms (their level of motivation) by means of surveys in e-classrooms (Figure 4), questions in forums (Figure 5), indirectly through blogs (Figure 6), and through pupil activity in e-classrooms.

Figure 4: Examples of pupils’ feedback about their satisfaction with their work in e-classroom (activity survey). Category: e-classroom
Blog

My experience of learning with the help of e-tools in e-classroom
from Šink Zala – Saturday, 6. December, 2008, 16:11

It was really educational, I think I learned a lot. My feelings about my work: happiness, excitement, wondering. Scared about certain facts. Zala, 4. d
Using such methods of work, the team of teachers became a development team that aimed at encouraging digital and other key competencies, as well as self-initiative and creativity in pupils. Because e-classrooms proved to be a promising means for achieving those aims, and because pupils and their parents (see page 29), embraced them enthusiastically, the teachers on the team were successful in sharing their experience, knowledge and ideas with the whole school faculty. Consequently, the number of e-classrooms increased and started to be used in all subjects and for various age groups of pupils (see Figure 2). In 2007, additional training was organized at the school (within computer literacy project), entitled Using and Familiarizing with Internet Portal Teacher.net (design and use of e-materials) and Fast Set-up of Internet Place. Due to limited capacity of the server (edus.si) that hosts all school's e-classrooms, the school started to consider their own server. In 2007, all the e-classrooms were transferred from edus.si server (http://mdl.skofjaloka.e-podpora.si/) to their home (school) server http://www.os-sl-mesto.si/moodle. At that time, the number of classrooms increased from nine to fourteen. The following e-classrooms were set up:

- Extended Stay Unit
- Civic Education and Ethics
- Math
- Technics and Technology
- Chess

In 2008, the school opened e-classrooms to the wider community on the head teacher’s initiative. The functioning of e-classrooms is extended also to the school portal with three general e-classrooms:

- E-Staffroom
- Parent Council
- School Council

Three new e-classrooms for pupils are starting to operate:

- Classroom for 3rd Grade
- Geography
- History

In addition, an all-Slovene project was set up in this period, and within the framework of this project, a month of e-material distribution was organized, in which the school took part, and which contributed to increased interest in e-classrooms among teachers. A number of classrooms for didactic support of ICT were set up, like for example an e-classroom Advice and Tricks for Moodle, where the e-classroom with free-of-charge computer programs was moved. With broadening of classrooms to the entire school, a need arose for additional refreshment training of teachers. The most active teachers (Marja Pahor, Matjaž Pintarič, Saša Čadež) prepared instructions in spring 2008 (films, written handbooks) for tutor work in e-classrooms, intended for teacher self-education and as a material more skilled teachers could use for offering individual advice (e.g., Little School of Moodle, Video instructions for Moodle, E-materials – possibilities for better quality of instruction, preparation of tests in the e-classroom in Moodle virtual environment, etc., which are accessible at http://www.o-sl-mesto.kr.edus.si/moodle/course/view.php?id=53). The school organized internal seminars for the teachers in the Extended Stay Unit (Moodlu for OPB, Matjaž Pintarič), accessible at http://dl.dropbox.com/u/12360245/ostalo_nujno/Spletna%20u%C4%8Dilnica%20opb%20seminar.ppt.
In 2009, with increased development of digital competence in teachers, further e-classrooms were set up:

- E-classroom with interactive whiteboard
- Sports Education
- Astronomy

In 2010, the school set up a new e-classroom: e-staffroom, which did not start functioning in the old form. Its purpose was to inform teachers and enable their communication. In addition, three e-classrooms for advisory hours for each cycle were set up. Also, the following e-classrooms are being set up:

- Classroom for the 1st Grade
- Science
- Home economics and technical days

This year, a 24-hour seminar for Moodle was organized at the school. The school (the development team and the head-teacher) has paid special attention to didactic aspects of ICT use. The development team of teachers keeps up to date with the latest development of e-schooling, actively participate in the development group of the National Education Institute, and contributes to ICT conferences, like for example International Conference of Internet Education and ICT Research (SIRIKT in 2007 to 2010). They take part in ICT competitions with their materials, exchange experience and keep the faculty informed.

II. Structured Patterns and Characteristics of the Learning Environment

Learning Context

Škofja Loka – Mesto Elementary School has 35 classrooms at the moment (see Chapter I, Figure 2), which spread the following areas: classrooms from 1st to 5th grade, subject classrooms from 6th to 9th grade, divided among language-social science area (e.g., English, Geography, etc.) and science-technical area (Chemistry, Math, etc.), optional subjects (e.g., Computer Science), interest activities (Astronomy, Chess, etc.), information portal (e-staffroom, parent council, school council), didactic support to ICT (e.g., interactive whiteboards), e-materials and other areas (e.g., advisory hours).

The pupils are included in a number of e-classrooms at the same time, where they can find backup for instruction through materials, instructions, discussions in forums, or teacher and peer support, do and post their homework and other tasks, learn collaboratively and communicate (forums, chat-rooms, messaging). Their activities in e-classrooms are connected with school and home work (Figure 7).
The use of e-classroom in school can have the following forms:

→ individual (or group) work of pupils within regular instruction in homerooms, computer classrooms and in the library. Pupils do their work independently, and acquire and strengthen their knowledge. The use of ICT enables immediate feedback about acquired knowledge to pupils and teachers. The method of work in the classroom is presented on the internet [http://www.o-sl-mesto.kr.edu.si/joomla/e-gradiva/](http://www.o-sl-mesto.kr.edu.si/joomla/e-gradiva/). Once pupils strengthen their knowledge, teachers prepare tests for grading.

→ frontal form of work in the classroom can be complemented by e-classroom for acquiring and strengthening of knowledge, as well as for assessment. Teachers' learning materials prepared in advance are collected in one place within e-classroom; they may be used directly from the e-classroom without downloading any files, etc. The instruction via e-classroom takes place through an interactive whiteboard and portable tablets (see picture 8 below).

The e-classroom instruction is warmly welcome also in case of teachers' absence (teaching materials and activities are prepared in advance) and in case of replacing a teacher with teacher of other subject or in case of pupils' independent learning.
Pupils can use e-classroom at home for the following:

- look through the materials with which they have already familiarized themselves at school, which helps them strengthen their knowledge and adapt the pace to their individual abilities.
- do various exercises to assess their knowledge (see Figure 12)
- learn collaboratively (see Figure 18)
- communicate and collaborate with teachers and peers long-distance, through forums, chat-rooms, and individual communication via messaging (see Figure 16).

E-classrooms Moodle provide several types of sources and the activities for participants. Individual elements of e-classrooms (sources and activities) are in terms of learning context explained and illustrated in the APPENDIX 1. The applications of different possible e-classroom elements are differently reflected in individual subject e-classrooms at the school. In this reference the most qualitative one is the e-classroom for chemistry. A segment from the e-classroom (see Figure 9), clearly shows what activities and sources are offered to pupils. The e-classroom is (in terms of content) distributed into several topics which are dedicated both to regular as well as additional instruction, which enables internal differentiation in all teaching phases. The topics are classified in the central block, e.g., Contents of chemistry instruction, Useful internet links etc. provide for pupils additional, in depth knowledge. The purpose of the topics in the by block, as for example Joke of the Week, On this Day, Weekly Attractions, Photo of the Week, Non-Chemical Loop and Puzzles is entertainment and distraction, and they at the same time invite to participation in the e-classroom those pupils who do not like chemistry very much.
Joke of the week

Weekly Attractions

Forum: Teacher’s notes

Photo of the Week

Pupils’ survey

Glossary for chemistry

Prize forum for pupils

Pupils’ social forum

Exercise submission

On this Day

Chemical safety
Assessment

E-classrooms offer a possibility of individual feedback after completed work or activity. Such feedback can provide high-quality assessment of work (e.g., posted tasks in e-classroom see Figure 10), messages after the obligatory exercise etc. (see Figure 11) or quantitative grade from the exercise or the knowledge test, which is outlined in the continuation.
Figure 10: Example of teacher’s feedback (qualitative assessment) to the product that the student posted in e-classroom—poem about fire-fighters.

Teacher: You wrote an excellent poem. Your rhyming is smooth and the song has an introduction, main part, and conclusion. Great!

Figure 11: Example of teacher’s feedback information after the submitted exercise by a pupil in e-classroom, giving guidelines to what still has to be corrected and completed.

...Hi, Nika. Thanks for submitting the materials. You really tried hard. I only have one comment: you completed the picture sources, as agreed; however, I would kindly ask you to quote the sources where you got expert information that you have been quoting from. Best regards!
Individual products in e-classrooms can be assessed in a classical way in case a teacher needs a quantitative grade. In addition, e-classrooms enable computer-assisted assessment of knowledge (CAA). In e-classrooms, various quizzes can be designed with e-tools (e.g. Hot Potatoes (programme and opportunities provided are presented in details in APPENDIX 1)), as well as tasks that are designed indirectly, as tests of knowledge. Pupils can get immediate feedback after completing such tests about their success, and they can check their mistakes in case they make them. In their feedback information, teachers can explain mistakes to individual pupils. One of the advantages of such approach to assessment and grading is that it enables automatic data processing, and analysis of a quality of individual tasks. By means of computer analysis of results, teachers can get immediate insight into the knowledge gained at the individual and classroom level, which enables them to identify the areas that cause problems to pupils, and require further work. Example of such analysis is presented in Figure 12:

![Figure 12: Example of automatic analysis of task (% of answers), solved by pupils in e-classroom.](image)

By way of well-conceived and well prepared exercises and knowledge tests, produced as quiz in the Moodle environment, pupils can get »a richer« feedback information and guidelines in case of wrong answer (see Figure 13); they can self-verify several times (tests with random selection of exercises), which is welcome from the point of view of independence and progress in their knowledge (grade) (see Figure 14) etc.
Figure 13: Example of “automatic” feedback information giving instruction to pupil in what document to check again in order to get proper knowledge that the exercise requires.

Wrong. Check once again the document - ppt presentation: physical states.

Figure 14: Example of multiple exercises solving in the e-classroom and knowledge progress.
Various possibilities of feedback information for exercises solving are described and displayed in APPENDIX 1. Active pupil’s participation in forums of some e-classrooms contributes to the grade. Pupils' opinions on assessment of knowledge are on page 27.

**Teachers and Pedagogical Approach**

More than 20 teachers participate in the project. These are the teachers who lead classrooms for pupils from the 1st to the 5th grade, and different subject teachers (Math, Physics, Chemistry, Music Education, Technics and Technology, History, English, Geography, Civic Education and Ethics, Computer Science). Each teacher is a leader (tutor) of an e-classroom in his/her subject area. The teachers work in teams and equally contribute to the development in the project. In addition to encourage learning in e-classrooms, they often take on the role of confidants, which is especially strong in the so called educational subjects – with the present generation of children, it is often easier to establish a trusting relationship in virtual environment. The number of e-classrooms, e-materials, e-activities, teachers skilful in the independent use of e-classroom, and visits to e-classrooms keeps increasing, which is a good evidence of development. Everything that e-classrooms can offer is shared with the community (open e-classrooms or publicly announced key). While the participants have access to e-classrooms as guests, performing individual tasks requires signing in. At the moment, there are 1,316 participants signed in e-classrooms – which is almost double the number of students (777). The user accounts show that the pupils and teachers from other schools increasingly sign in. On May 13, 2009, the school started to count the number of visits, and their frequency. Until today, 32,826 visits have been detected (e.g., Figure 15).

![Figure 15: Insight into number of visits in e-classrooms between September 27, 2010 and October 10, 2010.](image)

E-classrooms are intended for all age groups of pupils at the school (from age 6 to 15) and for most of the subjects. Some pupils who finished elementary education still participate in e-classrooms. All activities are varied ((see APPENDIX 1 and Figures in this paper).

**III. Nature and Quality of Learning**

Learning or work in e-classrooms goes on within and outside regular hours of instruction. During regular hours, the work goes on in the classroom or computer classroom, depending on the nature or form of planned learning process. The activities (including homework, papers, instructional planning, and other informal activities) in e-classroom can be performed from home since accessing e-classroom is possible any time and from anywhere.
The only condition is internet access. Most of the students have such access at home, and they can also use the computers in the school library and classrooms. Activities in e-classrooms (chat rooms, forums, individual messages) enable good interaction among pupils and between pupils and teachers not only in the area of knowledge, but also in social, pedagogical, and psychological areas, which contribute in important ways to the development of whole personality.

The teacher – pupil message exchange in e-classroom enables individual communication of teachers with pupils. Other pupils and other participants in the e-classroom cannot see those exchanges; thus the messages can be of personal nature and pupils quite often trust matters which they normally wouldn’t tell in the presence of their classmates. This kind of communication does not only contribute to a better knowing the children but also strengthens mutual confidence between pupils and teachers, and it encourages their personal responsibility, etc. That is particularly desirable when teacher gives instruction to a larger number of pupils whom he meets only once or twice per week during regular instruction and that is therefore one of additional opportunities to establish a deepened relationship between pupils and teachers or personalisation.

An example of such individual communication is given in Figure 16, where a teacher in her feedback information gives compliments to a pupil for letting her know about her absence by herself and in Figure 17, speaking of help in solving conflicts.

Figure 16: Example of individual pupil message to her teacher, and teacher's feedback in e-classroom.

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One of the advantages of e-classroom is that it enables different virtual collaboration, collaborative learning. An example of how a forum encourages collaborative learning. Distant assistance is presented in Figure 18.
If you come across a problem in your learning or if you have problems understanding the content, you can pose a question in this forum. I or your classmates will be happy to answer your question. Don't be shy, remember the proverb: "Nobody came learned to this world". If you happen to know the answer to a question posed by one of your classmates, please help them by posting your answer.

Figure 18: Example of a forum in e-classroom: Long-distance support that encourages collaborative learning.

For more on forum activities in e-classroom see APPENDIX 1.

An excellent tool for collaborative learning in virtual environment is wiki activity, provided in some e-classrooms at our school. It is important to note that it depends on the teachers’ engagement and digital competence how much e-classroom and all the possibilities that they offer are used at a school. There are big differences among individual e-classrooms as to the variety of the activities that go on in them, from excellent (e.g., Chemistry subject and in e-classroom for the 4th grade,) to those that are starting to develop. The most attractive consist of the following sources and activities: own contents and other e-materials, forums, surveys-opinion, dictionary, wikis, scorm packages, messaging, chatroom, posting of their work, assessment of knowledge (moodle tests, hotpotatoes tasks), connection to appropriate web pages, etc. Every e-classroom serves to inform pupils (and their parents) and to consolidate and assess their knowledge. Rarely, e-classrooms serve for grading and for deep, long-distance communication with pupils. The school has noticed that the pupils are more and more independent in their use of e-classrooms. Almost all pupils know how to sign in independently, without additional help, and a lot of them can post their work independently, and the quality of their work is better (examples in Figures 19 to 22):

Figure 19: Example of pupil’s product, a crossword puzzle, designed in Hot Potatoes program, on the topic of Oxidation, published in e-classroom for Chemistry.
Figure 20: Example of pupil's work, assessment task designed in Hot Potatoes program, on the topic of an atom structure, published in e-classroom.

Slika 21: Naslovnica filma, izdelka uče

Figure 16: Title of film, pupil's work within English language instruction, program Movie Maker and published in e-classroom.
Figure 22: Example of pupil's work, PowerPoint presentation in History published in e-classroom.

In e-classrooms, teachers can also evaluate their pupils' attitude toward various activities in e-classroom. The examples below present some of the pupils' answers to the teacher's question about e-assessment, published in an e-forum:

Teacher: I would like to know if you like this kind of writing more than the usual form. What are the advantages/disadvantages? Did you find e-assessment useful and are you using it at home?

Examples of pupils' answers in the forum:

- Yes, I find it useful to have answers available in roulette so you don't have to write them down because you could have made a mistake. Assessment was useful because I did the task at home.
- I found it quite useful. The tasks were not difficult, pictures of acids were in colour... Assessment was a good preparation for the quiz (I would have checked it at home if I had time ... 😊). Otherwise, it was really OK.
- The test was relatively easy. It was interesting doing the test in the e-classroom. Really GREAT. I hope you liked it, too. As much knowledge as possible...
- The test was OK, very good because you can do it fast.
- I don't know, actually knowledge is knowledge, regardless of the way in which you can demonstrate it. Such tests are really animated and such, although you can make serious mistakes with mixed answers. For me it was great although the clock that counted time made me nervous, but I'm satisfied with this kind of work and with the result😊.
IV. Impact and Effectiveness

The development of e-classrooms and the whole process indicate that such approach is effective (See Chapter 1). Currently, the school is trying to provide effective use of e-classrooms to teachers and parents in accordance with their needs. They plan to broaden such approach to include all subject areas, which has already been successfully implemented – from originally nine e-classrooms in 2006; the number has increased to 35 e-classrooms at present. The use of e-classrooms has stretched beyond instruction. During this year, e-advisory hours and especially e-staffroom have been set up. Teachers visit e-staffroom regularly, which helps them develop long-distance communication skills in addition to acquiring information and developing their subject and pedagogical knowledge. In addition to giving parents access to all e-classrooms, the school is planning to unlock Parent Council e-classroom in order to provide access to all the materials to the parents who may be interested and to the local community, thus providing opportunities for broader communication (see also page 2).

The school development team works on increasing the use of e-classrooms for further improvement of communication between teachers and pupils or their parents, optimization of communication among pupils, and innovative use of the opportunities offered by e-environment for learning and collaboration. They plan to broaden their work to support the all-Slovene project of e-schooling (http://www.sio.si/sio/projekti/e_solstvo.html). Based on our conversations with teachers and pupils we can conclude that this approach to learning contributes to high motivation on the part of stakeholders, well-presented information, supported with different multimedia elements, like for example visual materials, film animations and simulations, and better understanding and use of knowledge, prescribed in the curriculum, in students who have been more active in e-classrooms.

The use of e-classrooms can be roughly divided into three areas:

- information – data collections,
- process of learning,
- communication.

The evaluation among teachers on the implantation and the efficiency of e-classrooms at Škofja Loka – Mesto elementary school was carried out by an internet questionnaire (18 teachers respond). The questionnaire inquired about the following:

1. Assessment of e-classrooms efficiency
   (grades from 1 to 5 (5 being the highest value –meaning very effective)):
   - opportunity for knowledge acquisition,
   - independence in learning (also learning to learn),
   - improving digital literacy,
   - disposition of data (data collections, materials...),
   - better motivation for instruction (subject)
   - as a tool for distance learning.
2. How has the implementation of e-classroom affected your teaching?

3. What part of instruction has the use of e-classroom influenced the most?

The results or teachers’ replies are as follows (Figure 23-25):

Figure 23: Results of the questionnaire on the applicability of e-classrooms in reference to 6 criteria (see description above).
2. How has the implementation of e-classroom affected your teaching?

<table>
<thead>
<tr>
<th>#</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>- I can communicate with pupils in distance and offer them professional help, and at the same time I can deepen my relationship with them.</td>
</tr>
<tr>
<td>1</td>
<td>- I use the e-classroom above all for the consolidation of knowledge. Pupils liked doing exercises uploaded on it – it had positive impact on them, plus there was much less photocopying.</td>
</tr>
<tr>
<td>1</td>
<td>- Pupils tended to like solving the dull, monotonous, drill exercises more which helped to be better in being fond of spelling exercises (capitals, difficult words), practising multiplication (arcade games, which demand fact calculating). I started to communicate with pupils in the distance.</td>
</tr>
<tr>
<td>1</td>
<td>- Perhaps we didn’t use it much with pupils in the 1st triad, since I was focused also on other skills, which I had to teach them, but when we went, I was able, by selecting a proper exercise, to upgrade their basic knowledge, motivated pupils' further work, and they learned to use it also at home. In Autumn we are planning in teachers working group to add more contents to diversify and consolidate pupils' knowledge and contribute to the progress of all.</td>
</tr>
<tr>
<td>1</td>
<td>- I regularly use the materials I have downloaded to the e-classroom. And the e-teachers staff room is super, as I can check information right on the spot and get all I need (e.g., on the occupancy of terms for testing, music lessons, mathematical lessons..)</td>
</tr>
<tr>
<td>1</td>
<td>- ...I can communicate with pupils in distance, and offer them professional help, and at the same time I can deepen my relationship with them, ...</td>
</tr>
<tr>
<td>1</td>
<td>- ...I use the e-classroom above all for the consolidation of knowledge. Pupils liked doing exercises uploaded on it – it had positive impact on them, plus there was much less photocopying.</td>
</tr>
<tr>
<td>1</td>
<td>- Pupils tended to like solving the dull, monotonous, drill exercises more which helped to be better in being fond of spelling exercises (capitals, difficult words), practising multiplication (arcade games, which demand fact calculating). I started to communicate with pupils in the distance.</td>
</tr>
<tr>
<td>1</td>
<td>- Perhaps we didn’t use it much with pupils in the 1st triad, since I was focused also on other skills, which I had to teach them, but when we went, I was able, by selecting a proper exercise, to upgrade their basic knowledge, motivated pupils' further work, and they learned to use it also at home. In Autumn we are planning in teachers working group to add more contents to diversify and consolidate pupils' knowledge and contribute to the progress of all.</td>
</tr>
<tr>
<td>1</td>
<td>- I regularly use the materials I have downloaded to the e-classroom. And the e-teachers staff room is super, as I can check information right on the spot and get all I need (e.g., on the occupancy of terms for testing, music lessons, mathematical lessons..)</td>
</tr>
</tbody>
</table>
Figure 25 Answers to questionnaire question: What part of instruction has the use of e-classroom influenced the most?

As the e-classrooms make fast and simple pupils’ surveys possible, the surveys on different subjects of e-classrooms quite often take place. A segment of one of such surveys is presented below where pupils were asked also on the contents of the e-classrooms. The selected questions and the pupils’ answers are given in the Figure 26:

2. What is your gender?
3. Which of the computer equipment do you have at home?
4. What is the average time you spend on the computer?
9. How would you estimate the contents of the school e-classrooms?
10. What do you miss in e-classrooms?
2. What is your gender?
- Male: 39 - 49%
- Female: 38 - 48%

3. Which of the computer equipment do you have at home?
- Computer and internet
- Computer without internet
- Nothing from the list

4. What is the average time you spend on the computer?
- 0 - 1 hour: 33%
- 1 - 2 hours: 29%
- 2 - 3 hours: 11%
- 3 - 4 hours: 4%
- 4 - 5 hours: 1%
- More than 5 hours a day: 5%
- 0 - 2 hours per week: 14%

9. How would you estimate the contents of the school e-classrooms?
(1 = bad, 5 = excellent)
- 1 - bad: 5%
- 2: 5%
- 3: 26%
- 4: 35%
- 5 - excellent: 25%

10. What do you miss in e-classrooms?
- Nothing: 61%
- Solving tests, quiz exercises: 26%
- Writing seminars using internet as a source of information: 5%
- Learning new programmes (e.g., Paintbrush, Powerpoint, Moviemaker, Ciccad): 10%
- Chartrooms and forums in e-classrooms: 21%
- Work with prepared contents and filling in the work list: 5%
- Other: 5%

N.B. The users might select more fields, and so the total percentage might exceed 100%.
Some examples of pupils' answers to the questions about the instruction (work) in e-classrooms and the connection between school and home work, advantages and disadvantages of this way of learning (in comparison with the usual way) or what they liked most/the least:

→ I like working this way because we can look again at all the presentations in e-classrooms, which enables us to go through the content again. I also like it that I can then assess my knowledge by taking a test in the e-classroom, and I like forums with prizes. I think that the advantage of e-classrooms is that I can revise, assess my knowledge, and connect to good internet sites, which help me strengthen my knowledge. I can't think of any disadvantages, each pupil can visit e-classroom whenever they feel like it. I like the most that I can see my teachers' presentations in e-classrooms, which they used during instruction. I also like it that I can assess my knowledge.

→ I find e-classrooms interesting, they help me learn more. But when we are in an e-classroom during Computer Science instruction, we concentrate less, some pupils take learning less seriously. Otherwise, e-classrooms are very useful when we work at home, and we want to learn something new or need additional explanation. The advantages are definitely better insight into content, adapted pace of learning (if you understand, you can continue reading, etc.). The disadvantages are that you don't take this kind of work seriously and so you don't profit from instruction. I like it the most that instruction is much more interesting, especially animations, and that it is more relaxed because everybody does what they do. I like the least that this way of learning ends so fast.

→ I find the way in which school and home work (material) is connected very interesting. The advantages of this way of learning (in comparison with the usual way) are that we can look at certain material in e-classroom a number of times, which helps us revise it many times in case we are interested. The disadvantages are that not every student has internet access from home and so they cannot look at certain things when they want. What I like the most is simple use of e-classrooms, the opportunity to do tests, and communicate with the people who are in the e-classroom at the same time. I like the least that you can do certain tests only once.

→ I think that the school and home work connection is very good. The advantage of e-classrooms is that they make learning more fun; the disadvantage is that some pupils don't have internet access from home. Everything about e-classrooms is fun and OK for me.

→ The advantages are that you can check and revise the content from school at home, make up for what you have missed, and assess your knowledge, which then helps you get a better grade. The disadvantage is that you can't do all that if you don't have a computer or internet access. What I like the most are various forms of assessment and quizzes, and what I like the least are various texts, which we have to read on our own.

Pupils are active in e-classrooms from their homes and during weekends (Figure 27 and 28).
Figure 26: Display of pupils (users) present during weekends.

Figure 27: Display of daily activities (and all activities) pupil has completed in the e-classroom.
Also parents express their satisfaction with the operating e-classrooms at the school occasionally, however, more and more often. Comment and the opinion of a parent on the e-classroom are shown in the Figure 28. In this reference, teachers at the school point out the big significance of adequate awareness of parents, that there are e-classrooms for individual subjects, what they are like and how they operate mostly at the beginning of the school year. From individual communications with parents (e.g., during consultation hours-office hours or parents’ meetings) it could have been noticed that parents quite often do not separate whether pupils’ work on computers at home is of educational nature or a question of pure entertainment.

In our conclusions we can summarise our reflexions on the reasons why the school decided to join the project on the e-classrooms:

- Pupils spend a lot of time behind the computers. By giving them guidelines and making them used to e-classrooms, a part of that time is redirected to educational purposes, to learning by didactic games, to learning the communicational skills, net-ethics, searching for data etc.
- Teachers have found out, that during morning classes they are short with the communication with children, who respond weakly to conversation hours. By using messages in e-classrooms teachers and pupils communicate when they have time for it or when they are able to focus on it entirely. This is particularly welcome for the work with pupils at the beginning of their adolescence (from 7th grade on), who are becoming more and more sensitive on the relationship of their classmates towards them as well as on their comments about school work (quite often also more successful pupils with developed working attitudes become a target of mockery). Such communication gives grounds to a special approach; classmates do not know that a student has asked for advice, asked for help etc.

- Teachers have become more and more burdened with paperwork. E-teachers staff room makes it easier to master documentation; it contains the collection of all documents, forms, reports, teachers need for their work and it enables also the e-filing. This way also the school leadership has an easier task to collect data by submitting the documentation on professional workers in e-teachers staff room, through information and the opportunity of communicating among all the employed staff.

The main objectives of the project have therefore been time saving, individualisation and interconnection of teachers, employees and parents.

In summary, the benefits of effective technology use which are well reflected in the reasons which were at the school put forward as the reasons for the project of e-classrooms (Crawford, 2007) are:

- Efficiency: Greater efficiency right across the system, delivery, management
- Productive time: More time for teaching and learning - different organisation
- Choice: Increased learner choice, opportunity and quality of learner experience
- Raising standards: Teachers report that their use of technology over the last 3 years has improved student achievement.

The school has within the frame of the project and also in general evidently discovered the first three advantages of e-classrooms application. And the last advantage – raising standards is the area where we lack qualitative data, proofs and research results and would in future seem necessary to study it systematically and in well planned way, which indeed, is not true only for this project.

**Further information**


School’s motto: We grow together in knowledge and respect.
APPENDIX 1:
E-CLASSROOMS AT ŠKOFJA LOKA-MESTO ELEMENTARY SCHOOL, SLOVENIA

SVN 005

EXPLANATION OF ELEMENTS (SOURCES AND ACTIVITIES) IN THE e-CLASSROOM:

E-classrooms at the Elementary School Škofja Loka-Mesto operate in an open source environment (programme) Moodle [http://www.moodle.org]. These are learning environments or systems for managing the learning contents (Learning Management System - LMS), created in a virtual space. They dispose of a potential for advanced strategies and learning forms and they give opportunities for participation in the »distant« education groups, as a support tot regular, traditional instruction as well as in out of school and extracurricular activities.

E-classrooms give opportunities for a target and systematic acquisition of knowledge, since teachers make a target classification of certain teaching materials and organise activities. The acquisition of knowledge and skills as well as the knowledge assessment is through a well drawn structure of the classroom well organised.

Within the Moodle environment of the e-classroom we can set various:

1) sources, to be looked at by pupils, and we can organise several
2) activities, in which pupils actively participate.

A LIST OF POSSIBLE SOURCES IN THE e-CLASSROOM:

Add a resource...
Add a resource
Insert a label
Add a lightbox gallery
Compose a text page
Compose a web page
Link to a file or web site
Display a directory
Add an IMS Content Package

A LIST OF POSSIBLE ACTIVITIES IN THE e-CLASSROOM:

Add an activity...
Add an activity...
Assignments
  Advanced uploading of files
  Online text
  Upload a single file
  Offline activity
Chat
Choice
Database
Forum
Glossary
Hot Potatoes Quiz
Journal
Lesson
Questionnaire
Quiz
SCORM/AICC
Survey
Wiki
Workshop

Figure 1: Sources and activities provided by e-classroom Moodle
SOURCES:

- **Links to file:** We can establish links to any proper documents as for example Word documents, PP presentations, PDF files... which had been otherwise prepared for regular instruction and pupils get acquainted with them already at schools, whereas at home they have an opportunity to take a look at the them again and they can adjust their overview to their own interest, their tempo and abilities. It makes them much easier to consolidate their knowledge.

- **Links to web pages:** enable students to access interesting and applicable web pages directly from the e-classroom prepared or selected by teachers according to suitable criteria.

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**FOR ALL GEOGRAPHY ETHUSIASTS**

**Figure 2:** Links to various forms of materials and documents (see type of icon).

**Figure 3:** Links to different web pages.
- **Compose a page with the text or a web page:** Teachers can format those pages directly in the e-classroom and provide for pupils additional information, make them acquainted with attractions or publish something else. Example: Joke of the week:

![Joke of the week](http://www.testprogram.org/wp-content/uploads/2012/06/4-polar-bear-hungry.jpg)

A: If a bear in Slovenia, and one in Alaska fell into water, which one would dissolve faster?

B: The bear in Alaska because it’s polar.

Figure 4: Web page composed directly in the e-classroom.

2) **ACTIVITIES:**

- **Quiz:** enables computerised testing of pupils’ knowledge or evaluation of their knowledge - CAA (Computer Assisted Assessment). With this tool we can produce different types of exercises (exercises of elective type (multiple selection), exercises of observation and classification (matching exercises), exercising of completing and giving short answers, exercises of alternative type (true/false selection), exercises for clarification and interpretation (description exercises) etc.); we include various pictures, not only in colours but also animated. Tests can be limited in time, we can determine the number of solution attempts (one, multiple or unlimited) and we can define optional criteria for assessment for each exercise or for the entire test. Some examples of exercise are displayed in the Figures from 5 to 7.
Figure 5: Example of an exercise for completion and short answers.

Figure 6: Example of exercise for connecting and organising (matching exercise).
Teachers can adjust the test settings so that pupils can, after the submission of their test, immediately see how many points they collected and what grade they got (success), and they can check possible mistakes.

Figure 8: Example of feedback information that pupils get, after they have finished solving their exercise and they have submitted their tests. Exercises can also be prepared in the way that pupils get in case of wrong answer an explanation for their mistakes. Even if the answer if correct and additional explanation is desirable.
The advantage of such method of knowledge evaluation is the automatic data processing and the analysis of the test or individual exercises. Computer analysis of results enables a fast insight into the presented knowledge, both of each individual and the entire class, which gives the opportunity to teachers to recognise those areas of knowledge which are causing problems to pupils and need to be consolidated.

<table>
<thead>
<tr>
<th>Text of question</th>
<th>Text of the answer</th>
<th>Number of answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>z aprico</td>
<td>(-0.33)</td>
<td>1/23 (4%)</td>
</tr>
<tr>
<td>z raztopino kuhirske soli</td>
<td>(-0.33)</td>
<td>0/23 (0%)</td>
</tr>
<tr>
<td>z raztopino citroske kisline</td>
<td>(0.50)</td>
<td>15/23 (65%)</td>
</tr>
<tr>
<td>s kscm za vlaganje.</td>
<td>(0.50)</td>
<td>13/23 (57%)</td>
</tr>
</tbody>
</table>

Figure 9: Example of exercise analysis.

The weaknesses of computer supported evaluation are that it enables above all the implementation of objective type exercises which many times verify only the factual knowledge; many times this decreases a lot the taxonomic level of tests. However the problem may be reduced by implementing adequately posed questions and by reaching higher in the taxonomic scale; in this case the computer supported evaluation has to be used simultaneously with the traditional forms of assessment. From this reason we combine the computer supported assessment in the e-classroom with the classical written knowledge test. At that type of assessment half of pupils first of all write the written test of knowledge on the chemistry classroom, and the second half in the computer classroom, i.e., the e-classroom. In the meantime pupils exchange their places. Pupils therefore collect half of their points by written test of knowledge, and the second half by solving written tests via computer. We have found out that pupils are highly motivated for this kind of assessment and quite like it. The expressed their opinions on that in the forum after the completed testing. (Example: »I like this method of assessment very much, and it would be the best if we did the whole test via the e-classroom«).

Various types of e-classroom exercises can also be prepared in an open source programme HotPotatoes (exercises of elective type, word insertion, connecting concepts, crosswords puzzles). All exercises can also be transferred to html form an imported into the e-classroom. While solving the exercises pupils get feedback information on the correctness of their answer. Figures from 10 to 12 display certain types of exercises produced in the HotPotatoes programme.
**Figure 10:** Example of crosswords puzzle produced in the HotPotatoes programme.

**Figure 11:** Example of exercise in completion produced in the HotPotatoes programme.
Figure 12: Example of exercise produced in the HotPotatoes programme, where pupils by clicking on a certain word recognise its wrong spelling.

- **Glossary**: is the activity providing opportunity for preparation and fast, alphabetical searching for different concepts from a certain field. The picture substantiation, particularly if it is equal to the one that pupils have already seen during their regular instruction, makes them possible to memorise and to understand different concepts much more easily.

The Glossary offers the explanation for the principal chemical concepts and you will be able to find quickly the explanation for the concepts you meet during regular instruction. You can look the concepts up by inserting the word or by clicking on the appropriate word of the alphabet. Pictures will help you to understand.

Figure 13: Example of glossary for chemistry in the e-classroom.

- **Exercise submission**: is the pupils’ activity of submitting their products to teachers in the e-classroom: at any time, also from home, without any fear for transferring viruses which can happen in case of e-mail or by using USB-key. Teachers can also comment and assess the pupils’ products.
Wiki: is a more advanced activity enabling pupils to do the cooperative learning. In a draft, prepared in wiki, all the participants of the e-classroom may put down their information and data etc. This way they build and exchange their knowledge and develop at the same time their mutual interaction. Wiki gives opportunities for internal links (e-classroom) and external links (web) within the selected topic.
Chat-room: is the activity which enables a simultaneous e-conversation of unlimited participants from a distance. We can use it also for consolidation of knowledge.
Figure 17: Example of chat-room dedicated to the preparations for the competitions in chemistry, performed on Saturday when there is no school instruction.

- **Forums**: ensure different modes of teachers’ communication with pupils. Pupils are free to communicate also among themselves. They want that kind of communication themselves, which is clearly seen from the Figure 18.

Figure 18: Example of forum discussion: Ideas for the improvement of e-classroom where pupils express their wishes.
Figure 19: Examples of forums open by pupils on their free choice (e.g., why do you like chemistry, national competition, the best song, method of work in e-classroom in the class time, etc.).

The purpose of Prize forums is to answer the questions and to gather additional percentage or points which can be considered for the final grade of a certain subject at the end of the year.
Within the forum Help from Distance pupils can ask different questions about learning contents which they do not understand well or they would like to know more about it. They get answers form their classmates or from their teachers.

So, my dear eighth graders! This is your prize forum, where you can, just as last year, collect additional % which are taken into account when completing your grades. Four correct answers bring you 1%, and you can improve your final grade for maximum 5%. This does not mean that you can’t participate in forum afterwards. Your answer will still be welcome.

The answers of your classmates may be read only after you have submitted your answer. Indeed, you can still correct it after the submission. However, do not forget that your teacher is watching you and controlling you, and she will not take into account your corrected answers. And now, back to work and stretch your brain.

Figure 20: Example of prize forum in chemistry instruction.

Figure 21: Example of forum Help from Distance in the e-classroom for chemistry, where a pupil answers to another pupil.

The purpose of the News Forum of and Notices Forum is to communicate various information.
- **Survey**: is the activity where we can very quickly get feedback information for wide range of contents. It provides possibilities to as many types of questions, and by additional settings we can determine parameters to which questions the surveyed people are obliged to answer (those questions are marked with an asterisk) and to what questions not. The survey analysis is performed automatically.

Survey on your nutrition habits

In the question below select the possibility which seems the closest to your habits. Where possible, please, give your proposals.

1. How often do you have breakfast before you go to school?
   - Every day
   - Never
   - 2-3 times a week
   - 1-2 times a week
   - I have breakfast only on Saturday and Sunday

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**Figure 22**: Example of a survey for the pupils from the entire school in three different e-classrooms in the frame of the class time related to nutrition habits.

Results were used by the school for the planning of school meals.
Figure 23: Example of survey analysis related to nutrition habits of pupils from the school (analysis can be done for all the pupils form the school or for individual grades, which is a large advantage of the survey in the e-classroom Moodle (survey is an activity that is not basically included in the environment Moodle and it is necessary to download an additional module. First of all we implemented for surveys the Google doc).

- **Possibility**: is an activity which enables a different „survey“ – a selection of given possibilities where it is recorder who selected a certain possibility (see Figure 24).
Figure 24: Example of surveying pupils about what they like the most in the chemistry instruction. Items in the individual columns are as follows:

- Experimental exercises performed in pairs
- Demonstration if experiments
- Watching computer presentations
- Composing models
- Independent work in computer classroom
- Implementation of interactive whiteboard.

**Messages:** sending messages teacher – pupil provides opportunities for individual communication with pupils. As other pupils, participants of the e-classroom cannot see those exchanges, they may be very personal and pupils quite often trust certain matters, which they would not tell in the presence of their classmates. This type of communication does not only contribute to a better understanding of children, but also strengthens mutual trust between pupils and teachers. This is particularly welcome when a teacher gives instruction to a lot of pupils and meets pupils only once or twice a week; this is then another opportunity to establish a more adequate relationship between teachers and pupils, to maintain individualisation and personalisation. Examples of messages are given in the materials (pages 17-18).