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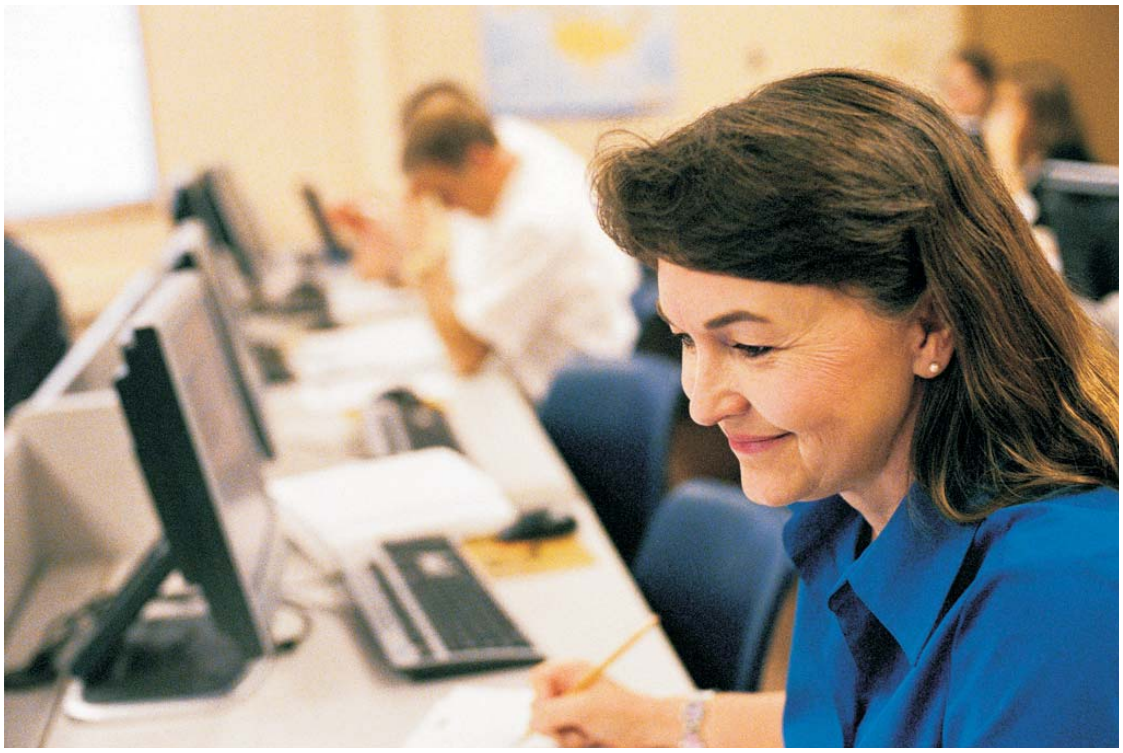
TEACHING IN THE KNOWLEDGE SOCIETY:

THE IMPACT OF THE *INTEL TEACH* PROGRAM IN ROMANIA



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1. FRAMEWORK

In the last years, the European policy documents in the area of education have affirmed once again the statute of teachers as key actors of any strategy aimed at boosting the social and economic development. For example, as part of the European growth strategy up to 2010, the Report from the Education Council to the European Council on *The concrete future objectives of education and training systems* (Brussels, 14 February 2001) places increasing the quality and effectiveness of education and training systems in the European Union and improving the initial and in-service teacher training first in the priority list, with the following basic elements:

- adequate support for teachers and trainers so as to enable them to respond to the challenges of the knowledge-based society;
- developing ICT skills and competence.

Both decision makers and practioners in the field of education are aware of the need to prepare teachers in order to enable them to manage their responsibilities. In-service training providers become interested in the analysis of the needs specific to the school environment and the social and economic emvironment in order to develop appropriate training.

The stage for which the European countries are preparing themselves is *the knowledge society*, which is characterised by knowledge as a basic resource, and as the main source of prestige and wealth. Knowledge is a tool for action for the main social actors, and, at the same time, it is a competition tool. Knowledge means innovation. In this context, the use of ICT has become a major challenge and a landmark for changing the education systems.

In the report of the European Commission, named *Basic Indicators on the Incorporation of ICT into European Education Systems. Facts and figures* (2001), it is emphasised that "*the incorporation of information and communication technology into European education systems is a process that, in the long term, will have major implications for the organisation and methods of teaching*"[1].

The rapid development of ICT over the last years has lead to important changes in the way people communicate and act. These changes have a significant impact on the learning needs, both in terms of content and provision of educational services. As far as the educational policies are concerned, the decision makers took measures to provide schools with computers, train teachers in the use of technology and, moreover, train teachers in the succesful intergration of ICT in their teaching.

[1] European Commission, Directorate General for Education and Culture. *Basic Indicators on the Incorporation of ICT into European Education Systems. Facts and figures.* 2000/01 Annual Report.

In the education process, the computer should not be seen only as a means for informing students, but as a tool for promoting initiative and involving students in the activity and for their autonomous learning. Using computers during lessons allows the creation of individual, independent, learning environments, and also learning environments based on student interactions. The traditional teacher-student relation is completed by other types of interaction (student-student, student-content, student-computer) in which the teacher plays the role of a moderator, or a learning facilitator. The use of the new technologies in education requires new knowledge, skills and attitudes from teachers and the development of an information culture, which is understood not only as a register of specialised skills, but also as a new orientation and consideration of reality.

From this point of view, the *Intel Teach* program offers teachers a new approach to learning. Attending an intensive training program, teachers learn not by passively assimilating information, but through real work. They are both teachers and students at the same time. They work with the computer performing assignments and accepting team work, and they reflect on their own learning. Teacehrs go through a different learning experience, which we expect them to use later on with their students.

By facilitating the use of ICT we are helping teachers to manage their own professional development. According to the *Intel Teach* program, the use of technology by teachers is not a purpose by itself, it is rather a means for an innovative approach to teaching and a tool for continuous professional development.

2. THE *INTEL TEACH* PROGRAM

The *Intel Teach* program is a global initiative which aims at training teachers to efficiently integrate the new technologies in their teaching activity. Developed by specialists in the education sciences, from Intel and the Institute for Computer Technology (USA), the curriculum of the Intel Teach course includes a minimum of 32 hours training and is implemented "in cascade": in every country, teachers who completed the trainer course teach the course to participant teachers.

Over 6 million teachers from more than 40 countries have been trained so far. Intel hopes that, by 2011, 13 million teachers in school education – that is about a quarter of the world's teachers – will have benefitted from the *Intel Teach* program.

Through the *Intel Teach* program o series of resources have been developed and made available to teachers, such as textbooks, teaching tools, methodological resources in an electronic format, on CDs or on the Internet.

A longitudinal evaluation of the *Intel Teach* program, carried out by Deakin University of Australia, showed that the teachers who completed training improved the way they approach the teaching-learning activity. They used the technology more in designing and giving lessons and they also used project-based lessons thus promoting students' initiative and autonomous learning. By creating significant learning experiences, which fall out of routine, teachers aimed at developing the 21st century skills of their students and at preparing them to cope with real life challenges and use technology to their advantage. The results of the evaluation highlighted the fact that the teacher training provided through the *Intel Teach* program had a significant impact in schools. 96% of the teachers who completed the training used more the new technologies in their teaching activity, 82% implemented the *Intel Teach* model when designing lesson projects, and 83% used ICT in a different way than they did before.

In Romania, the *Intel Teach – Teaching in the Knowledge Society* program, which started in December 2007 with help from the company Siveco, was highly appreciated by teachers, with over 3,500 teachers having completed the training so far. The training course was accredited by the Ministry of Education and Research - National Centre for School Education Teacher Training as a long duration module (89 hours), with 25 professional transferable credits and is available in the training provision of the Houses of the Teaching Staff throughout the country.

The *Intel Teach* training is intended to support teachers in their efforts to promote student-centred learning through the integration of technology and project-based approaches to teaching and learning.

The themes covered by the *Intel Teach* training include:

- the effective use of new technologies in the classroom so as to promote the 21st century skills;
- identifying how students and teachers can use computers and the Internet to improve the learning process through research, communication, collaboration, and through productivity tools and strategies;
- providing learning opportunities through practical experiences and through the creation of curricular projects and assessments based on the national standards in the field of education and technology;
- strategies which promote student-centred teaching and learning and the development of higher order thinking skills;
- collaboration with peers to improve the teaching process by solving problems and participating in the improvement of lesson projects.

3. DESIGN OF THE EVALUATION RESEARCH

3.1. Purpose and Objectives of the Research

The purpose of the evaluation of the impact of *Intel Teach* in schools is to analyse the effects of the training, which are identified in the use of ICT resources during lessons, the design and the organisation of lessons, students' motivation to learning etc. It is also an important landmark for determining the teachers'training needs with regard to the use of technology in their educational activity.

The purpose of evaluation is, as Michael Scriven says, to determine the value of the program, while its functions refer to the use of evaluative information as a ground for different types of decisions. In this case too, evaluation has not only an informative function. It is a frame of reference for improving the program and other initiatives in the area of in-service teacher training.

The distribution of indicators provide a comprehensive image of the impact of the *Intel Teach – Teaching in the Knowledge Society* training in terms of participant teachers' innovative approaches to lesssons.

The basic indicators are as follows:

- the use of Intel Teach resources in the teaching activity;
- the implementation of the unit plans developed during training;
- the integration of technology in the teaching activity;
- the challenges faced by teachers while implementing technology-integrated lessons;
- the impact of ICT on students;
- the development of the ICT infrastructure (number of students per computer; the percentage of computers available in school provided with an Internet connection, how often and for what purpose teachers have used an computer);
- the influence of ICT on the teacher's role.

3.2. Objectives of the Evaluation Research

The evaluation research is intended to measure the degree to which the objectives of the program have been met, to determine the effects of the program on the teaching activity, and to make suggestions and recommendations meant to improve and successfully continue the *Intel Teach - Teaching in the Knowledge Society* training.

The research which has been carried out highlights the following aspects:

- the impact of technology-integrated lessons on students;
- the impact of the program on teachers' lesson design and delivery practices;
- the influence of ICT on teachers' roles.

3.3. Evaluation Methods and Tools

The evaluation was based on an analysis of the program's relevant documents and a questionnaire-based survey.

- **Document analysis**: program description, objectives and implementation strategy, intermediate reports, statistical data, previous evaluations carried out in other countries.

- **Questionnaire-based survey**

The questionnaire-based survey was used to obtain information from the program beneficiaries. The questionnaire[2] gathered information about the motivation for using ICT in teaching, the program's impact on personal and professional development, teaching practices, and on students, and challenges related to the use of ICT.

The questionnaire (form and content) is used in all the countries that implamented the *Intel Teach* program. It has been translated and, as far as possible, adapted to the national context in a way which preserves its structure and messages.

3.4. Population Surveyed

The survey sample is made of 505 teachers from the school education system (primary education, middle school education and high-school education), who participated in the *Intel Teach* training. Out of these, 412 have completed the Participant Teacher training and 93 completed the Master Teacher training, but our analysis did not discriminate between the two categories.
The survey lot was created through simple random sampling.

Table 1. Intel Teach Courses

	Sample			*Participants in the program*	
	Numbers	*Percentages*		*Numbers*	*Percentages*
Master Teacher Course	93	18.4%		174	5%
Participant Teacher Course	412	81.6%		3320	95%
Total	505	100.0%		3494	100%

[2] The teacher's questionnaire is included in Annex 1

3.5. Beneficiaries of the Evaluation Research

The research report is addressed to several categories of beneficiaries. First, it is a managerial tool which assures the availability of data on which program decisions can be grounded. From this point of view, the report is useful to the institutions involved in the implementation of the program. Secondly, it is addressed to decision-makers in the field of education – the Ministry of Education, Research and Innovation (MERI), the National Centre for Curriculum and Evaluation in School Education, the National Centre for School Education Teacher Training – that have responsibilities for in-service teacher training. Another category of beneficiary institutions is that of the Houses of the Teaching Staff that organise *Intel Teach* courses, as well as other in-service teacher training providers.

4. THE IMPACT OF THE *INTEL TEACH* PROGRAM IN SCHOOLS

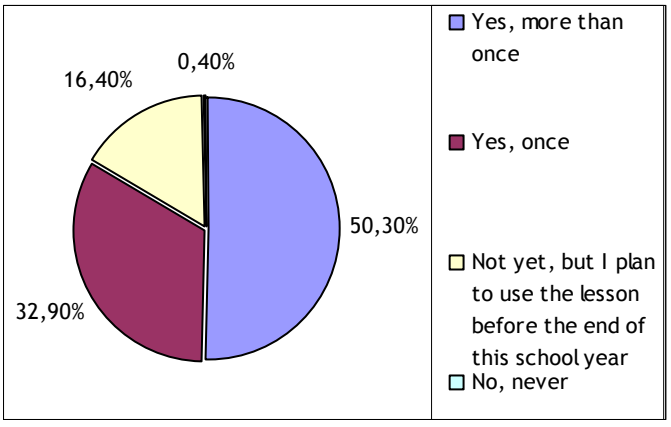
4.1. The Impact of the Intel Teach Program on Teaching-Learning-Assesment

The term "impact" refers to the effects the participation in the training offered within the Intel Teach program has on the participants and the overall educational activity. The situation which is presented reflects the changes in the professional behaviour and educational practices as they are perceived by teachers. The information required relate to concrete situations in the usual activity. To get a complete picture, we have also analysed the teachers' opinions on the influence of ICT on their roles.

4.1.1. Technology-integrated lessons

The implementation of the unit plans developed during the training program becomes a usual activity for half of the teachers surveyed *(50.3%)*. The potential of such courses is enormous when we talk about collaboration and team work, exchange of ideas, learning by doing, group products etc., all these being practiced through participation in the unit plan design activity.

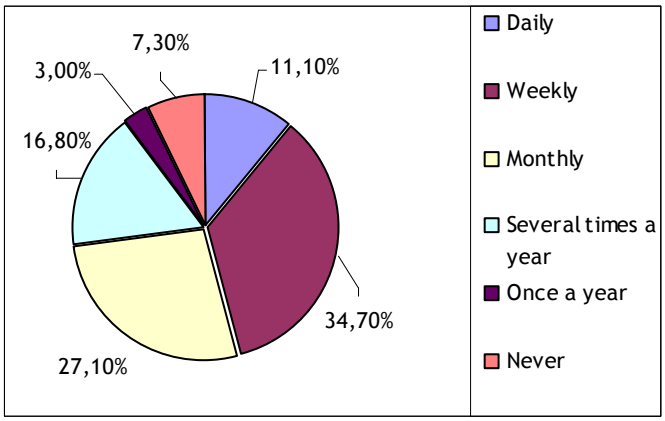
Figure 1. The implementation of the unit plans developed during the *Intel Teach* training program



The impact of the *Intel Teach* training on the activities carried out with students can be analysed by taking into consideration the frequency with which the electronic resources are used and the different ways in which the technology is used. The numerical data which have been extracted allow for some conclusions to be drawn.

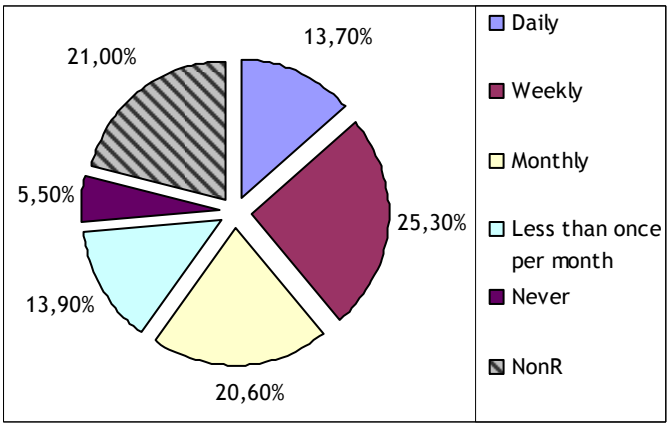
As regards *students' involvement in computer-assisted activities*, the weekly use of electronic resources has the highest frequency, with a percentage of 34.7%, followed by the monthly use by 27.1% of the respondents.

Figure 2. The use of ICT in the activities with students



An ICT-based lesson can take place either in the classroom (20% of the respondents say there are more than 7 computers in their classrooms), or in the school's laboratories which are provided with computers. A quarter of the participants (25.3%) carry out activities in the school's computer labs weekly, and 20.6% on a monthly basis. A percentage of 13.7% of the participants carry out daily activities in the school's computer labs.

Figure 3. The frequency of the lessons organized in the computer lab



Only 7.3% of the participants in the *Intel Teach* training said they hadn't used ICT with their students.

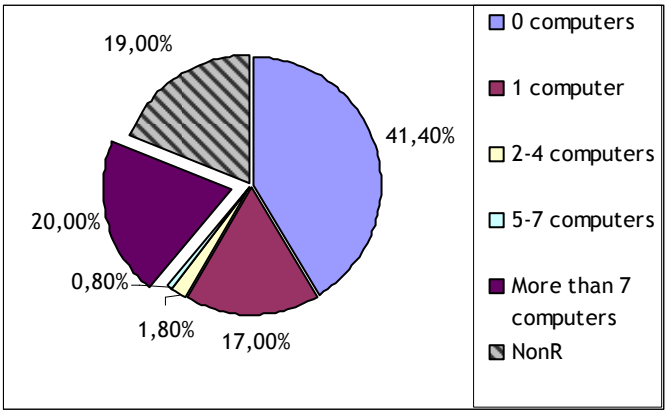
Table 2. The use of ICT in the activities with students

	Percentages
Teachers who used ICT with their students	92.67%
Teachers who didn't use ICT with their students	7.32%

The teachers indicated as reasons for not using ICT with their students the fact that not enough computers were available, a reason mentioned by *35%* of the respondents. *The insufficient material provision* - namely the lack of computers and appropriate software – is the main cause, indicated by most participants. This is completed by the lack of adequate technical and administrative support, as well as the insuffient time for planning and preparation. We could speculate theoretically (the theory of attributing failure to an external cause and success to an internal

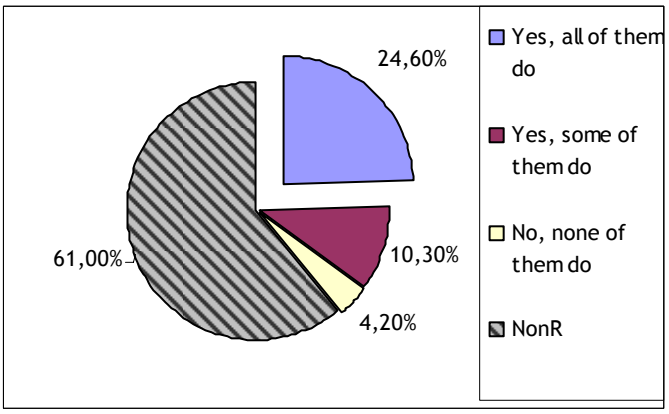
cause) on the fact that the participants tend to indicate mainly external causes to justify their decisions. When we correlate this information with data regarding the provision of technology in schools, we see that insufficient material resources are still a problem for teachers.

Figure 4. The number of computers available in the classroom



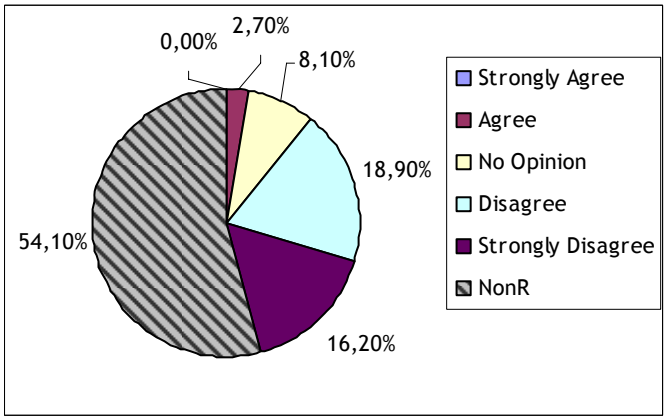
More than half of the teachers did not answer the question referring to the availability of a connection to the Internet for the classroom computers. The high no-answer rate to a question without any connotation of personal values seems to suggest rather the lack of such a connection.

Figure 5. The classroom computers with Internet connection



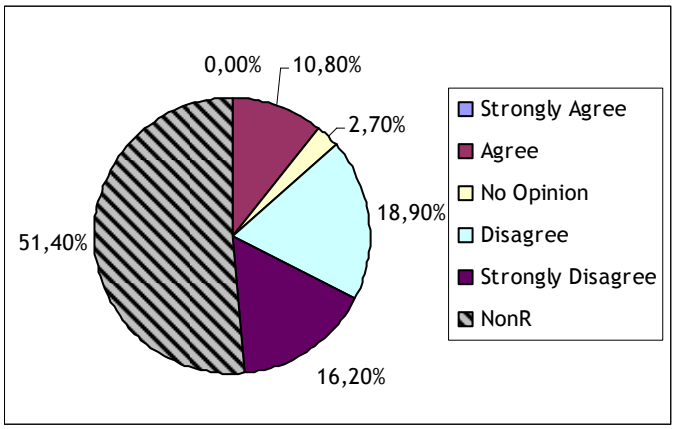
The lack of adequate training for the integration of ICT into lessons, which is often showed by research reports, is not worringly reflected by the data of this research. Only *2.7%* of the teachers said they *did not have adequate instructional support*.

Figure 6. The lack of adequate instructional support



The lack of confidence in one's own technology skills is for approximately 10% of the participants the reason why they did not use ICT in their teaching.

Figure 7. The lack of confidence in one's own technology skills



The table below reflects the situation described in detail. However, the scarcity of the material resources is still a significant obstacle for the use of the new technologies in the classroom.

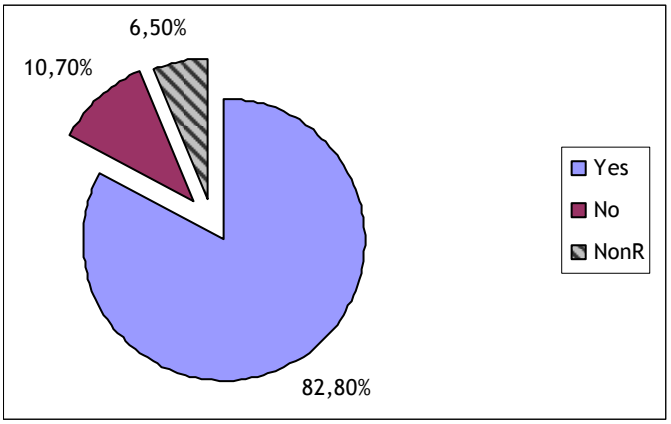
Table 3. Reasons for not using ICT with students

	Strongly agree	*Agree*	*No opinion*	*Disagree*	*Strongly disagree*	*NA*
a) Not enough computers were available.	18.9%	16.2%	5.4%	2.7%	10.8%	45.9%
b) The necessary software was not available.	10.8%	8.1%	16.2%	2.7%	8.1%	54.1%
c) You did not have adequate access to the Internet.	8.1%	2.7%	5.4%	16.2%	13.5%	54.1%
d) The lesson did not fit well into your curriculum.	2.7%	10.8%	5.4%	18.9%	8.1%	54.1%
e) The lesson would not help your students meet required learning goals.	2.7%	5.4%	5.4%	21.6%	13.5%	51.4%
f) You did not feel confident enough in your technology skills.	0.0%	10.8%	2.7%	18.9%	16.2%	51.4%
g) You did not have enough planning and preparation time.	5.4%	18.9%	5.4%	8.1%	10.8%	51.4%
h) You did not have adequate administrative support.	2.7%	16.2%	5.4%	16.2%	8.1%	51.4%
i) You did not have adequate technical support.	5.4%	18.9%	5.4%	13.5%	5.4%	51.4%
j) You did not have adequate instructional support.	0.0%	2.7%	8.1%	18.9%	16.2%	54.1%

An innovative approach to lessons through the integration of the information and communication technology is the main objctive of *Intel Teach*. As regards the different ways the participants have used ICT it is interesting to see the creative and inventive and, why not, innovation potential of such training initiatives. The distance from traditional teaching given by the multiple value contribution of electronic resources may be a challenge for teachers, who sometimes are not fully prepared for such a change of their own teaching.

Considering the overall training, we can see that *82.8%* of the teachers use ICT in a way other than the usual one following their participation in teh training.

Figure 8. The use of technonogy with students in new ways



From a post-modern perspective, the learning strategies based on group work and ICT integration are desirable in the educational practice as they allow each student to express his identity, cultivate tolerance and encourage involvement. The actions envisaged by the teacher must be adequate to concrete learning situations. Based on the degree to which the instructional assignments are structured, the way the students' activity is organised and the amount of the contents, learning strategies need appropriate time. Referring to a lesson in which they used ICT, over 30% of the teachers say the *class time or lab time that was available was too short*. In some cases, difficult time management is explained by the fact that *students did not have strong enough computer skills*.

	Strongly agree	*Agree*	*No opinion*	*Disagree*	*Strongly disagree*	*NA*
a) It was difficult to manage your students on the computers.	1.5%	16.0%	6.4%	37.6%	12.8%	25.6%
b) Not enough computers were available.	7.3%	20.1%	4.9%	23.1%	19.7%	25.0%
c) You did not have adequate access to the Internet.	3.6%	9.2%	3.6%	27.8%	29.5%	26.3%
d) The class time or lab time that was available was too short.	4.5%	32.7%	7.3%	21.8%	8.1%	25.6%
e) You did not have strong enough computer skills.	0.9%	6.8%	5.8%	31.6%	28.6%	26.3%
f) Many students did not have strong enough computer skills.	1.9%	21.8%	6.8%	33.5%	9.6%	26.3%
g) You did not have adequate administrative support.	1.5%	7.3%	9.4%	33.1%	22.9%	25.9%
h) You did not have adequate technical support.	1.1%	9.4%	7.3%	32.5%	23.3%	26.5%
i) You did not have adequate instructional support.	0.2%	0.6%	2.6%	30.1%	40.4%	26.1%

Table 4. Challenges faced while implementing technology-integrated lessons

4.1.2. Changes in the educational practices

After completing training, it is very important to analyse its formative effects from an intelectual, action-related, managerial and other points of view. We are going to see how this "face of the change" resulted from the participation in the *Intel Teach* training looks like by analysing the data presented in Table 5.

It is worth noticing that 50% of the teachers say they use more the technology while preparing and teaching lessons. Moreover, the approach to assessment has changed too with certain activities that became more frequent. The products of the students' activity are more often assessed with the help of rubrics. Besides the quality of a product, teachers also assess the quality of its presentation to the class. Students develop product review behaviours more than they used to.

The use of a textbook as a primary guide for instruction is less frequent for 29.3% of the respondents, which is a natural consequence of additional instructional resources.

Table 5. The impact of the *Intel Teach* training on educational practices

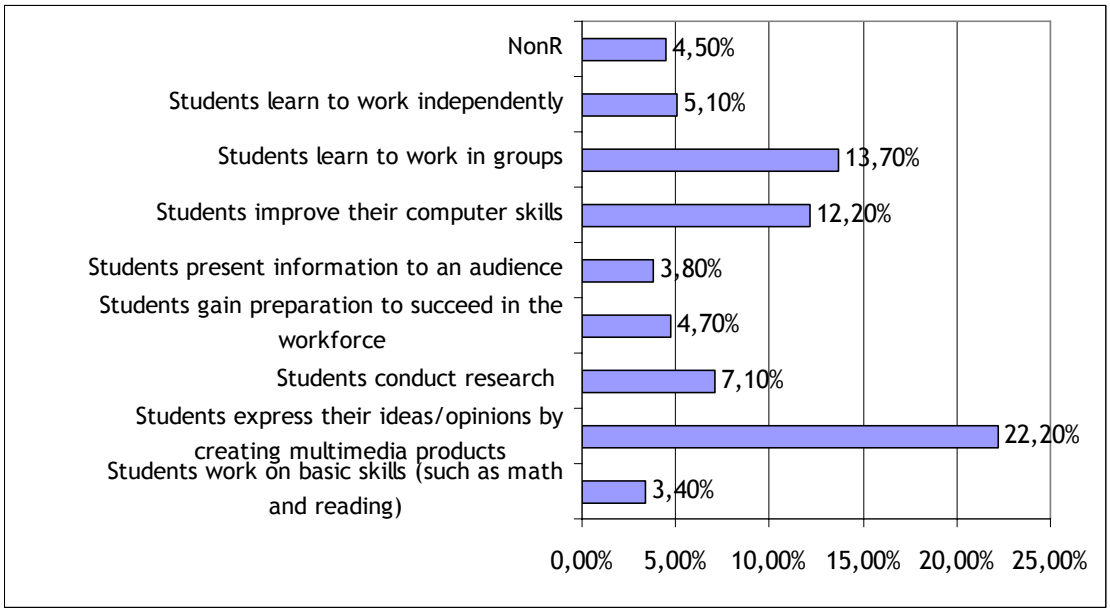
	Do This More	*No Change*	*Do This Less*	*Not Applicable*	*Not Answered*
a) Use a textbook as a primary guide for instruction.	21.2%	25.5%	29.3%	6.1%	17.8%
b) Use Essential Questions to structure lessons.	59.2%	15.4%	5.7%	1.8%	17.8%
c) Access the Internet to aid in developing lessons or activities.	60.0%	19.2%	2.0%	1.0%	17.8%
d) Use a computer for administrative work (for example, grading, attendance, creating handouts).	51.7%	23.6%	4.4%	2.6%	17.8%
e) Present information to students using computer technology.	50.9%	21.6%	6.3%	3.4%	17.8%
f) Use rubrics to evaluate student work.	50.5%	24.0%	6.5%	1.2%	17.8%
g) Have students review and revise their own work.	52.7%	18.2%	7.9%	3.4%	17.8%
h) Have students present their work to the class.	58.6%	15.4%	5.5%	2.6%	17.8%
i) Have students engage in independent research using the Internet.	53.7%	16.4%	6.1%	5.9%	17.8%
j) Have students work on group projects.	54.5%	17.2%	7.3%	3.2%	17.8%
k) Have students choose their own topics for research projects.	34.5%	20.8%	16.6%	10.3%	17.8%

4.1.3. The role of technology in learning

With regard to *the specific activities for which they used ICT*, most teachers pointed to lessons where the objective was for students to express ideas/opinions by creating multimedia products (22.2%). There was also a high percentage for

lessons where students tried to improve their ICT skills (*12.2%*), and lessons where students learned to work in groups (*13.7%*). **The use of technology in a lesson supports the development of team work and technology skills.** Working with a computer allows for active, participative learning to take place, and it encourages students' initiative and autonomous learning. Teachers used ICT in a variety of lessons, which proves that they see technology as a useful tool for the development of the 21st century skills, and not in a limited way as a means to develop computer skills.

Figure 9. The use of technology considering the most relevant objective of the lesson



4.2. The Impact of the Intel Teach Program on Teachers

4.2.1. Use of the *Intel Teach* resources in teaching and learning

The use of the information and additional resources offered to the teachers who participated in the *Intel Teach* program is a suggestive indicator for estimating the impact of the program on the participants. The documentation opportunities are the provision of *Intel Teach* manuals and CDs with curricular resources, as well as access to the *Intel Education* website.

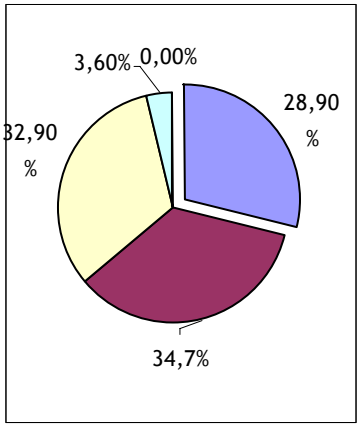
Documentation and the use of multiple information resources is a usual practice among teachers. The percentage of teachers who used the resources provided in the program (over 60%) is higher than that of those who used very little or not at all these resources while preparing their lessons (over 30%). The percentage of teachers in the second category is not significant because the sample also included teachers who completed the course recently.

Table 6. The use of the *Intel Teach* resources in teaching and learning

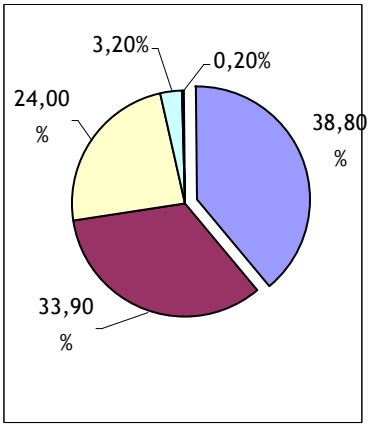
	More than 10 times	*4-10 times*	*1-3 times*	*Never*	*I haven't received them*
1. The Intel Teach Manual	28.9%	34.7%	32.9%	3.6%	0.0 %
2. The Intel Teach CD with curricular resources	38.8%	33.9%	24.0%	3.2%	0.2%
3 The educational website	23.0%	29.5%	35.4%	12.1%	0.0 %

Figure 10. The use of the *Intel Teach* resources in teaching and learning

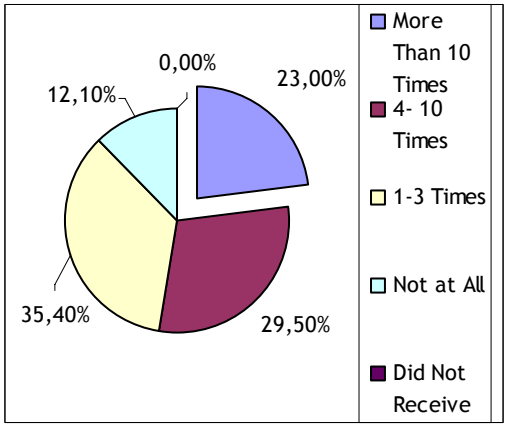
The Intel Teach Manual



The Intel Teach CD with curricular resources



The Intel Teach website



The expectations with regard to the teachers' behaviour following their participation in the training have to do with the way they manage to use the new gains in their everyday teaching activity.

4.2.2. The influence of ICT skills on teacher's roles

The roles of the teacher are extending and they are continuously re-defined, ICT being one of the influencing factors. With regard to the impact of ICT courses, most of the teachers (more than 75%) think that ICT has a significant influence on their professional development in the sense that it helps them develop new competencies useful for their activity.
Teachers consider that ICT stimulates communication and collaboration within the pedagogical community. Moreover, it helps them to accomplish administrative tasks.

ICT has a major contribution to the establishment of online learning communities, a relatively new concept which involves providing development opportunities for all the members of the community.

Table 7. The role of ICT for teachers' professional activity

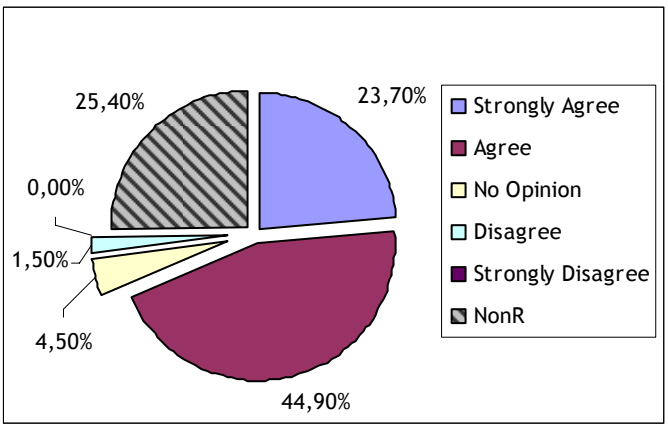
	Strongly agree	*Agree*	*No opinion*	*Disagree*	*Strongly disagree*	*NA*
ICT contibutes to my professional development through the adition of new competencies, useful for the activity with my classes.	44.4%	34.5%	1.4%	0.4%	0.0%	19.4%
ICT stimulates the communication and collaborative activities within the teachers' community.	35.0%	38.4%	6.1%	1.0%	0.0%	19.4%
ICT helps me in accomplishing administrative tasks I have at school.	35.2%	37.6%	6.9%	0.8%	0.0%	19.4%
It would have been useful to have such courses within pre-service teacher training programme.	39.4%	32.9%	6.7%	1.0%	0.2%	19.8%

4.3. The Impact of the Intel Teach Program on Students

4.3.1. The impact of technology-integrated lessons on students

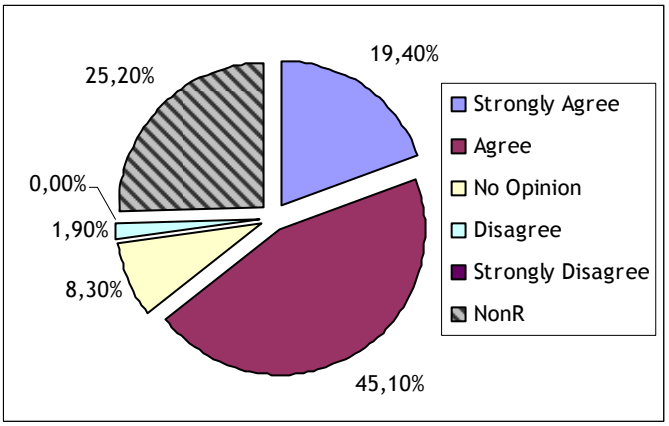
In order to be succesful in a dynamic context characteristic of contemporary society, students should develop a series of key skills. Formal learning experiences have a decisive role for this purpose. Collaboration, team work, as a premise for participation in socially heterogenous groups, is one of the "life skills". Working in a team, students take a variety of roles, contribute to the group's activity, and achieve a balance between personal and group needs. Working together with others is for every student a source of learning. According to the observations of the teachers who completed the *Intel Teach* training, **the use of technology generates an opportunity for involving students in collaborative activities.** Over 65% of the respondents said that their students worked together more than they used to, while only 1.5% didn't agree to this.

Figure 11. Students worked together more often



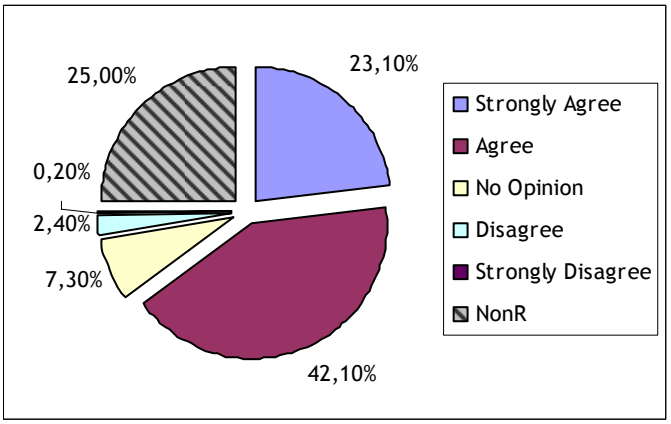
The learning contents, as organised and pedagogically structured information support, are an essential tool for the development of students' skills. **More than 60% of the respondents think that technology-integrated lessons facilitate the understanding of the learning contents.**

Figure 12. ICT faciltates a deeper understanding of content



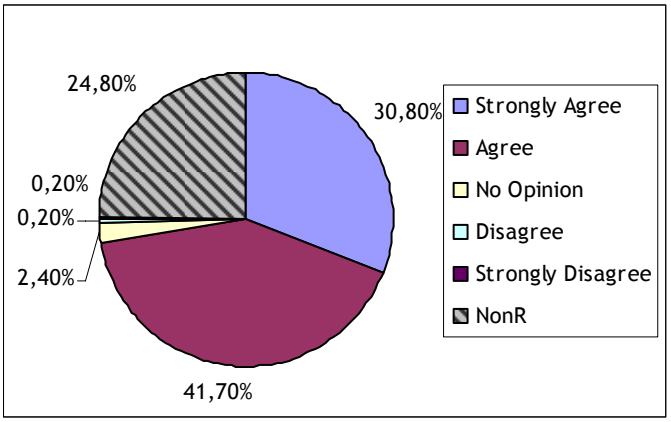
Schools need to identify their students' individual profile and encourage personal development taking into account this unique combination. Individualised instruction based on each student's learning characteristics is a major challenge for teachers. The teachers' perception of the role the technology has in learning is reflected in their behaviour related to the use of its potential. Over 65% of the respondents said that **the technology-integrated lessons addressed students' different learning styles.**

Figure 13. Technology-assisted lessons better address students' different learning styles



Besides a more attractive presentation of contents, **ICT facilitates the approach of active-participative learning strategies**. In more than 70% of the cases, teachers indicate that their students are actively involved in performing learning tasks in technology-integrated lessons. A very low percentage of the teachers – 0.4% - expressed a negative opinion about the role of ICT for motivating and involving their students in the lesson. It is true that the simple use of the new technologies in a lesson does not directly leads to an increase in efficiency. It is important how well a teacher manages an ICT-based activity.

Figure 14. Students are motivated and actively involved in the lesson



The use of technology for communication purposes is essential in nowadays society. Over 70% of the participant teachers considered that **during the technology-integrated lessons their students showed more confidence to communicate their opinions and ideas.** This can be explained by the fact that it is easy for students to put a message in this form and the confidence they have in their own technology-related skills.

Figure 15. Students easier communicate their ideas and opinions

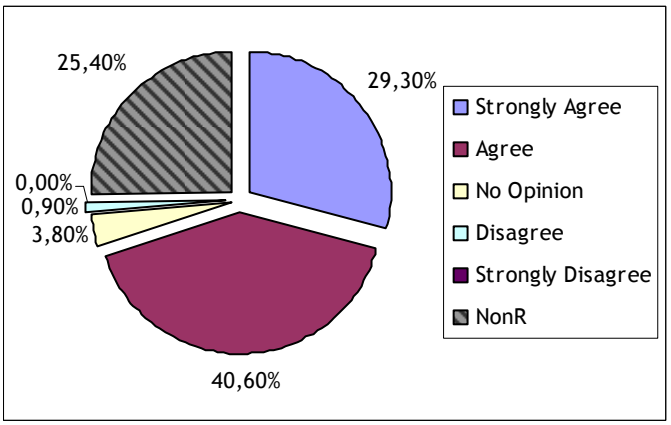
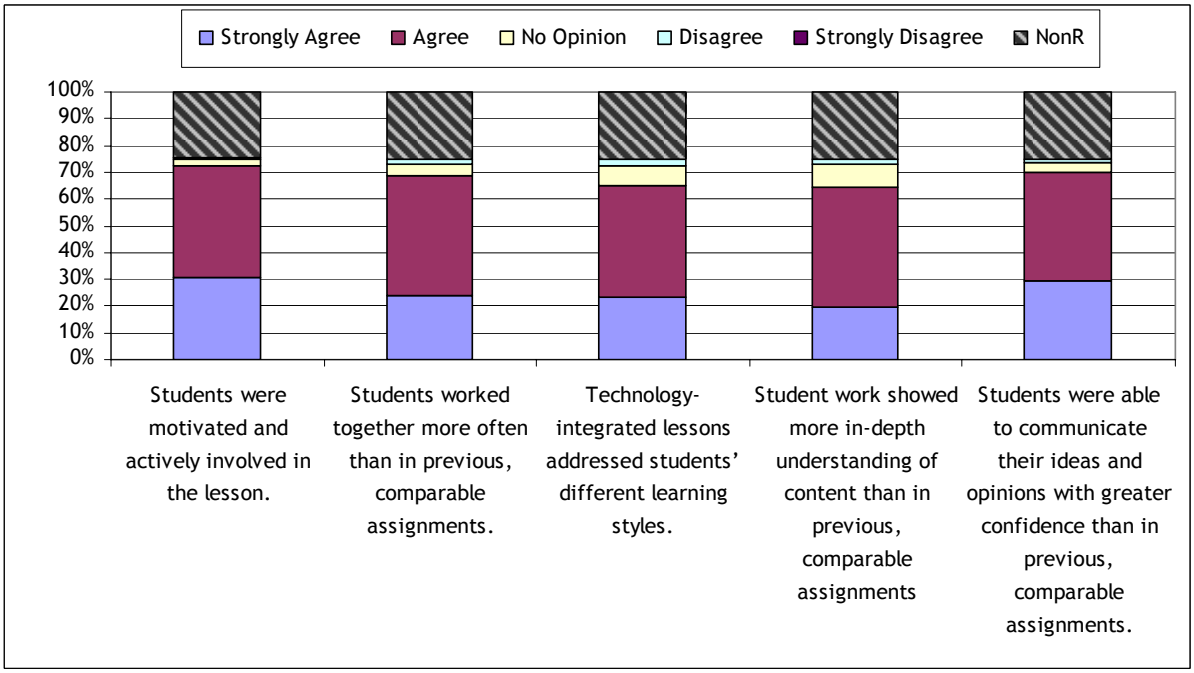


Figure 16. The impact of technology-integrated lessons on students



4.3.2. The effects of the change of educational practices on students

Comparing their activity before and after the participation in the *Intel Teach* training, teachers can assess the effects it has on their students' behaviour.
In order to stimulate autonomous learning, teachers involved their students more often in reasearch activities and collaboartive activities. **More than half of the teachers think their students do more independent research on the Internet than before.** Half of the teachers also say that **their students work more on group projects than before.** However, a low percentage of teachers say their students do these activities less than before.

Figure 17. Students engage in independent research using the Internet

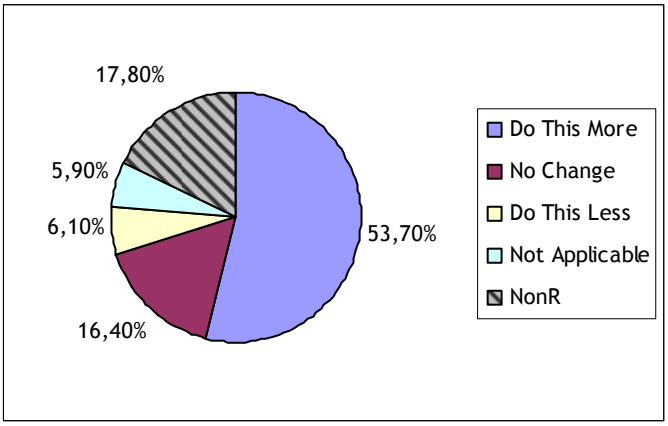


Figure 18. Students work on group projects

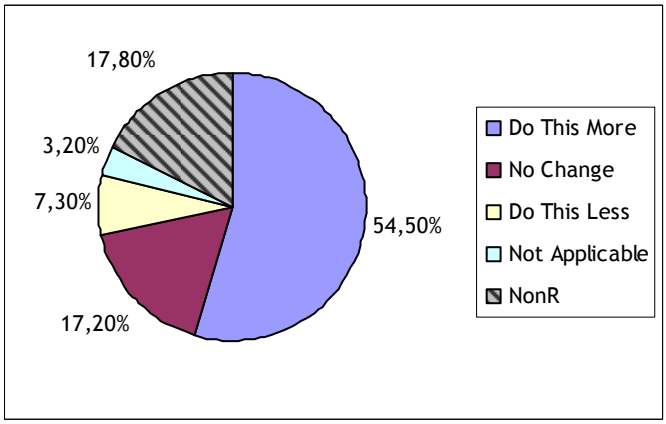
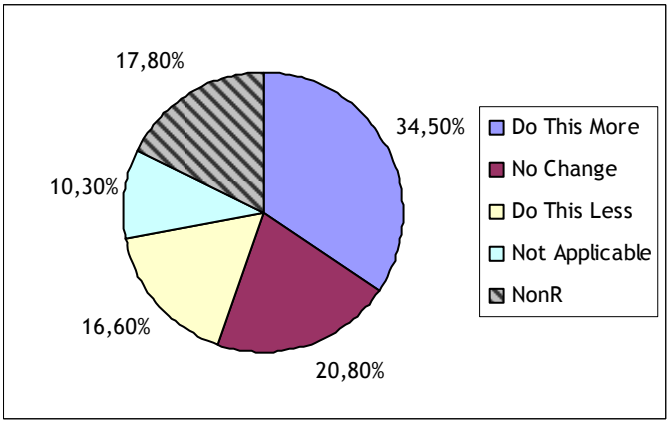


Figure 19. Students choose their own topics for research projects



Teachers helped their students become responsible for the products of their activity by encouraging them to present their products to the class, and to review these products themselves. In over 50% of the cases, the frequency of such activities has increased.

Table 8. Changes in students' behaviour

	Do This More	*No Change*	*Do This Less*	*Not Applicable*	*NA*
a) Have students review and revise their own work.	52.7%	18.2%	7.9%	3.4%	17.8%
b) Have students present their work to the class.	58.6%	15.4%	5.5%	2.6%	17.8%
c) Have students engage in independent research using the Internet.	53.7%	16.4%	6.1%	5.9%	17.8%
d) Have students work on group projects.	54.5%	17.2%	7.3%	3.2%	17.8%
e) Have students choose their own topics for research projects.	34.5%	20.8%	16.6%	10.3%	17.8%

Learning does not take place only at school. This is why it is important to look at what is beyond the classroom and the school lab. Teachers are aware that computer-assisted learning activities which extend to learning environments other than the school are an important factor for autonomous learning. 68.7% of the respondents say their students use a computer at home, while 12.1% say their students don't use a computer at home to do their homework. 47.5% of the teachers say that their students also use computers in other places (libraries, resource centres etc.) to do their school assignments.

Figure 20. Students use the computer at home for doing their homework

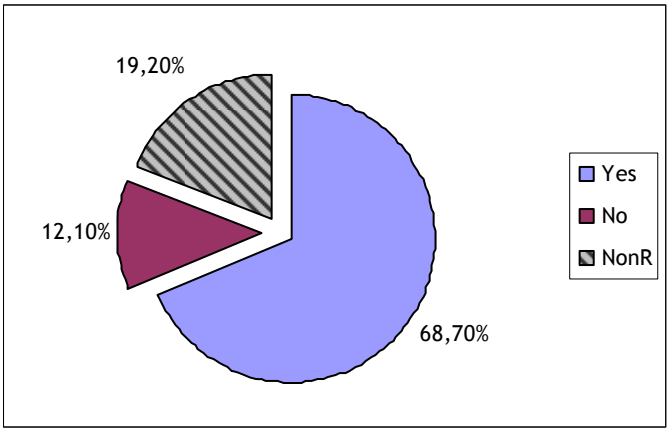
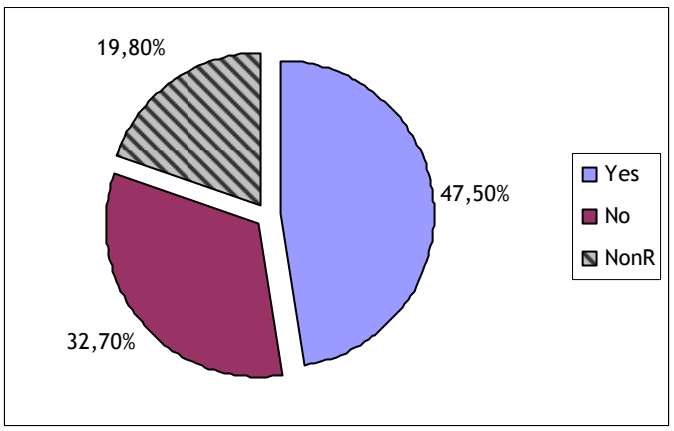


Figure 21. Students use computers in other places for doing their school assignments



5. EXTERNAL FACTORS INFLUENCING THE USE OF ICT IN LESSONS

Our survey has also included the aspect of the resources existing in a school, both in quantity and in point of their availability, access to the Internet etc. Besides the significance of the data presented for explaining the teachers' approach to a lesson, the data can also have a prospect-related role, meaning they can help school managers decide what other material resources they should purchase in the furure.

5.1. The Size of the Class

When asked to refer to a concrete classroom experience, in order to see the real characteristics of a learning situation, more than half of those who participated in the training said they worked with groups of 21-30 students. In a lower percentage (19%), there are groups of 11-20 students.

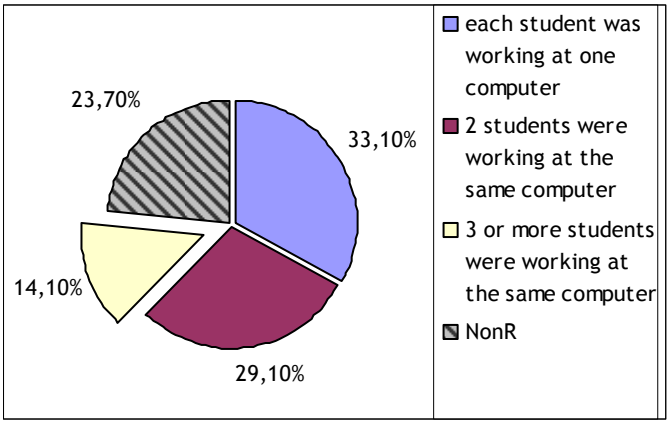
When carrying out computer-assisted activities, the size of the class is a problem that needs to be taken into consideration given the difficulties of managing classes of students during activities which require the teacher's assistance.

Table 9. Size of the class

Size of the class	*Number of respondents*	*Percentage of respondents*
1-10	11	2,4%
11-20	89	19,0%
21-30	251	53,6%
31-40	5	1,1%
NonR	112	23,9%
Total	468	100,0%

With reference to the availability of computers for all the students in a class, over 60% of the teachers say that their students had an opportunity to use a computer during the lesson, with one or two students working on a computer. In 14.1 % of the cases, three or more students worked together on a computer.

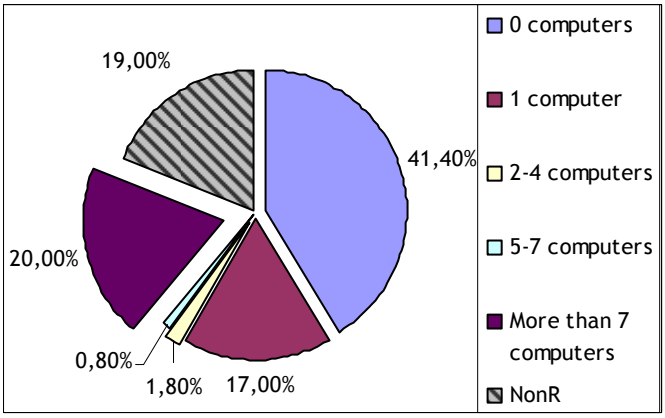
Figure 22. The number of students who were working at the same computer



5.2. The Number of Computers in the Classrooms

The integration of technology into teaching, learning and assessment depends on the availability of computers in laboratories and classrooms. In 41.4% of the cases, there is no computer in the classrooms; approximately 20% of the teachers say there are at most 7 computers in their classrooms, while 20% say they have more than 7 computers in their classrooms. The adequate provision of computers in the classrooms is more often explained by the efforts made by school managers. With regard to the number of computers with an Internet connection (figure 5), in only 24.6% of the cases all the computers are connected to the Internet. 4.2% of the respondents say that no computer in their classrooms is connected to the Internet.

Figure 23. The number of computers available in the classroom



5.3. The Number of Computers in the Labs

Over three quarters of the teachers surveyed (79.4%) say that there are computer laboratories in their schools, while 1.4% say there are no such laboratories in their schools. In 61.4% of the schools provided with laboratories, all the computers are

connected to the Internet, and in 13.1% cases only a part of the computers have access to the Internet.

Figure 24. Computer labs or media centres in school

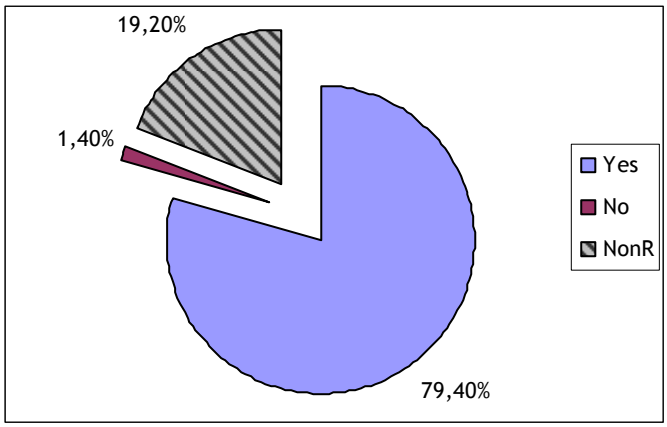
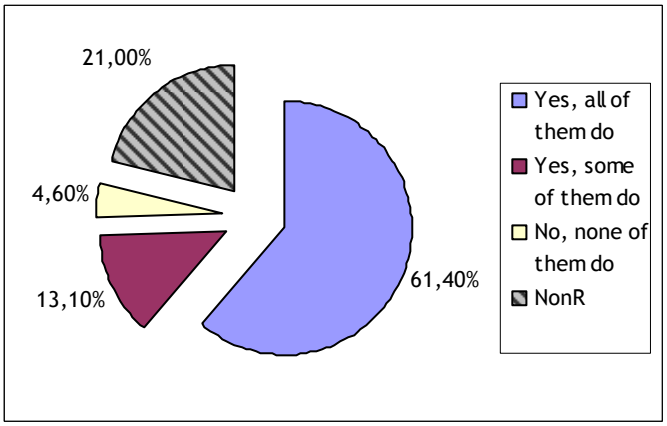
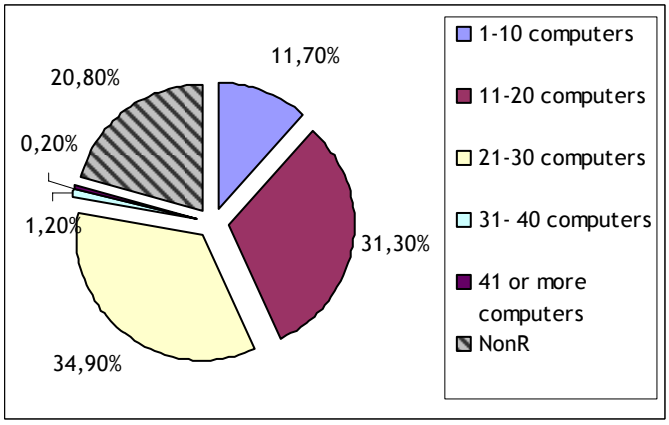


Figure 25. The computers in the labs/ media centres with Internet access



The availability of computers in laboratories is another important aspect; the laboratory, a room where specialised equipment is placed, is generally provided with computers. *34.9 %* of the teachers surveyed have 21-30 computers in their labs, and *31.3%* between 11 and 20 computers. More computers, 41 or even more, are found in only *0.2%* of the cases.

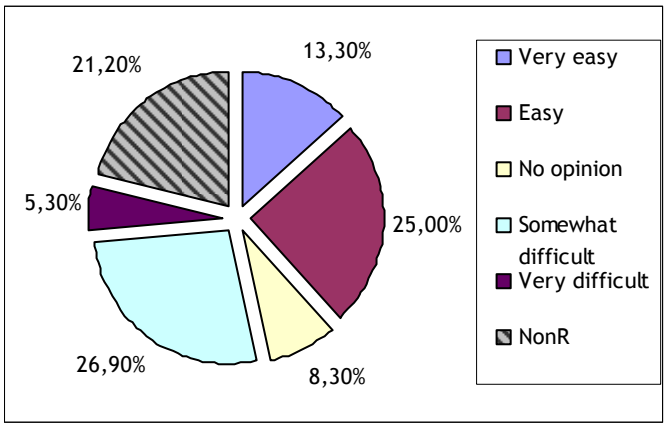
Figure 26. The number of computers available in laboratories



With reference to the lessons taking place in the laboratories, data show that the access to the school's computer labs is rather difficult for *26.9%* of the respondents

and easy for *25.0%* of them. Over *30%* of the teachers say scheduling the access to the school's computer labs is a problem.

Figure 27. Difficulty in scheduling time in the computer lab/ media center



5.4. Technical and Administrative Support

A successful ICT-based lesson depends on the ability to solve the technical and administrative problems that teachers may encounter. The lack of technical support and adequate administrative support is for some of the teachers the main cause for adopting the traditional way of teaching instead of an innovative lesson.

Figure 28. The lack of adequate administrative support

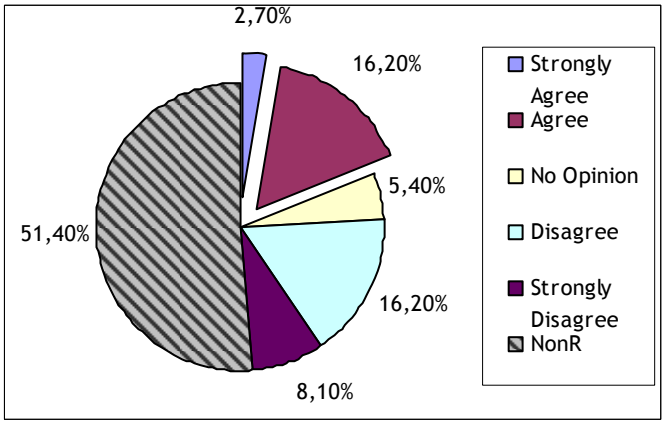
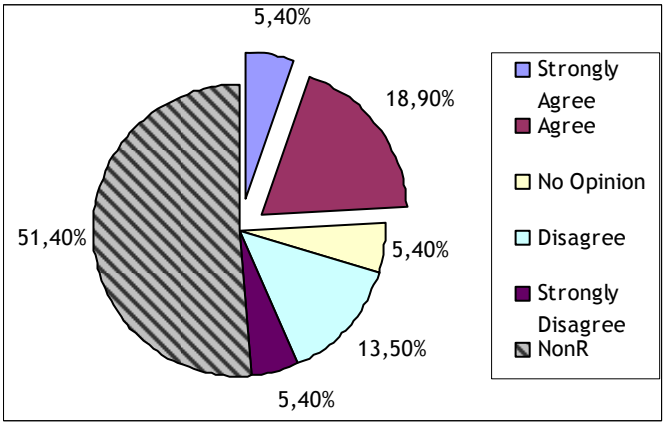


Figure 29. The lack of adequate technical support



6. CONCLUSIONS

The evaluation study showed that most teachers see the new information and communication technologies sometimes as learning **means**, and sometimes as learning **resources**.

Despite the close meanings given in dictionaries, the terms "**means**" and "**resource**" reflect however two conceptions of the pedagogical potential of modern information and communication technologies: one that considers that the role of the new information and communication technologies is to distribute contents, to be means, tools or vehicles that improve the access to information and the quality of its presenation, and another one that see them as resources or **learning environments** capable of influencing the way an individual builds his own learning. The differences between the two are the differences between learning **through** ICT and learning **with** ICT.

The same positions are found in educational practices: the majority is that of the teachers who consider themselves successful because, for example, they use Power Point presentations or because their students use the Internet services in their learning or in their everyday life. Less teachers, but their number is growing, realize the huge educational potential of the new technologies, which is still not fully used, in terms of curricular design, class management and school organisation, evaluation or facilitation of face-to-face or virtual interaction for each function of education. Tha latter category is that of those who try to discover **how to learn with ICT.**

When educational softs are developed, these positions are reflected by the shift from softs designed to check knowledge to more complex softs that encourage the active building of knowledge, use cognitive organisers which structure and catch the essence of the learning contents promoting reflection and critical thinking. These

softs reduce the routine and the boredom at school, increasing the degree of cooperation and the joy of learning.

Another consequence is the shift from the single use of a particular technique for practicing elementary skills to tutorial systems with proved contributions to the development of higher order intellectual and socio-professional skills.

Seeing ICT not only as tools but also as resources and **learning environments** imply the creation of a new relation between teaching strategies and autonomous learning strategies, the encouragement of learning in different places, at different times and in all stages of life, and learning in school or extra-school "networks".

Real or virtual, the learning space, although more and more technologically-supported, needs dialogue and negotiation between student and teacher. The personal learning experience is still a problem solving and social construction issue no matter the multimedia support of the learning materials.

The teacher is responsible for solving the relation between the two theoretical approaches. The teacher is and remains a necessary and desired presence.

The contemporary challenges simultaneously addressed by three very important forces - new types of students (not only children and young people, but adults too), new technologies and new learning, teaching and assessment models - generate a wholly new universe of problems. Teachers are required both to learn how to use technologies and to develop efficient strategies for promoting them as learning environments or to choose the most appropriate means at the right time.

Reality shows us that we have to distinguish two large categories of professional skills. Developing the skills for using different multimedia tools does not necessarily lead to the development of skills for integrating these tools in one's own way of designing, conducting and evaluating teaching. For institutions providing initial or in-service teacher training, the digital technology requires that their students are familiar with both the technological platform (equipment, access, content, services) and the way it is used to develop three basic types of abilities for teachers: technical, social and conceptual. The technical abilities can be developed

relatively more easily than the social and conceptual ones, the latter requiring more attention, more time and adequate learning contexts.

The research showed there is a high level of interest and receptiveness among teachers towards the use of the new technologies in the teaching-learning activity. These can be translated into the joy of exploring the ICT possibilities, even into the experiencing capacity and pedagogical innovation. Moreover, teachers themselves act in a way so as to fill in the (possible) gaps in their theoretical or procedural knowledge in the area of computer-assisted learning.

Actually, the implementation of ICT in education will be successful only with teachers who are motivated to participate in complex training sessions like those provided by the *Intel Teach* program.

The *Intel Teach* impact study confirms several aspects highlighted in the specialised literature too[3] - the processes for the successful implementation of the new technologies depend on the following factors:

- favourable organisational conditions (pedagogical vision, educational policy and school culture);
- transparent collaboration between different professional categories (teachers, the management, technical department etc);
- adequate material conditions (infrastructure, material endowment).

In schools, the access to technology is still a problem for teachers. The insufficient number of computers and the lack of an Internet connection, in some cases, make it difficult, if not impossible, the technology-integrated lessons. On the other hand, it is good to see that there are many schools provided with enough computers for their laboratories and classrooms, and there are many schools where teachers have appropriate administrative and technical support. Therefore, in many schools, the best conditions for the learning process are created. Making a diagnosis of existing material conditions is one of the objectives of the *Intel Teach* study, but surely its prospective character will be considered equally important for decision-makers in the field of education. The relevance of the study must involve its practical aim.

[3] Ten Brummelhuis, 1995; Voogt en Odenthal, 1998

If in the previous stages the use of technology by teachers was limited to preparing lessons, planning activities, recording students' progress, after their participation in the *Intel Teach* training, teachers have changed their educational practices. În the classroom, the use of technology was not restricted to lessons during which the students presented the products of their activity in an electronic format. Teachers used ICT in various lessons, and that proves they see technology as a tool for developing the 21st century skills and not in a limited way as support for developing computer skills.

Referring to the challenges they faced when they used the technolgy with their students, teachers named mainly external causes. For few of them, the lack of confidence in their own computer skills or of adequate instructional support was an obstacle to technology-integrated lessons.

To students, the lessons during which they use a computer are more attractive and allow them to understand the contents better. With regard to students' individual characteristics, the lessons where ICT is used respond to their different learning styles allowing self-adjustment and autonomous learning.

It seems we need to show teachers, if this is still necessary, that the efficient use of ICT helps them get more time. The educationalists know the Apple thesis according to which there is an increase in the external pressure on teachers when they have to deal with more tasks, more diverse and more complex ones, and whithout having enough time or resources. Using the new technologies, teachers can play their learning facilitator role, getting more time for other non-instructional activities: time to prepare, to design and time for analytical thinking, self-evaluation, professional improvement, exchange of ideas, inter-disciplinary approaches etc. The various roles of the teacher in the new education model might shape the capacity of the students in the learning process on their way to active, authentic learning.

The most significant efefcts of the ICT included in the learning strategies are those related to the students' intellectual and attitude aquisitions.

Students collaborate during their learning tasks and this can encourage collective products, which is many time superior to individual work. These are some of the merits of *cooperative learning* as they are synthetised in the specialised literature – ideas which teachers should assume:

- The intellectual stimulation during the task is improved due to the presence of others.
- The group resources (memory, stock, attention etc.) are richer than the individual ones.
- There are greater chances that an individual among the group members to be able to find a solution.
- Random errors are compensated: despite their occurance, the group's general result will be more precise than that of an individual.
- "Blank spots" are corrected. "It is easier to see the others' errors than your own."
- The stimulation of new ideas is a result of cumulative interaction, because each member develops the other's ideas.
- We can learn from the experience of other people. There are many proofs, some confirmed by the promoter of social learning, Bandura, that one of the most common and an efficient form of learning is observing the others' activity when they solve problems.

Most part of the teachers who participated in the *Intel Teach* course consider the ICT skills as very important for their teaching activity and think it is necessary for the ICT course to be introduced in the initial teacher training. In their opinion, the ICT skills help them to perform their roles within the school organisation. For example, it facilitates communication with peers, helps them with activitities related to their managerial roles, and contributes to their professional development.

The various roles of the teacher in the new constructive education model could shape the students' capacity in the learning process on their way to active and authentical learning. The usual educational practices prove that the school universe is continuously changing in an era of globalisation. The processes of globalisation have a sound impact on teachers' activity and their professional development.

These are some changes related to the profession:

- the provision of courses and training programs with an emphasis on the needs of teacher-clients (a term already used in the school managerial discourse);
- the promotion of a continuous improvement culture;

- more confidence in the new technologies for solving instructional and managerial and administrative tasks;
- more possibilities for increasing the use of technology in education.

The study shows that the effects of the participation in the training are found in the micro-universe of a class of students. Teachers who completed the *Intel Teach* training have therefore become "agents of change" in their school.

Such a course can generate new initiatives, new collaboration projects between schools, based on a common language and motivations and shared professional interests.

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ANNEXES

Annex 1. The Questionnaire Used for the Evaluation

Intel Teach Impact Survey – Romania

1. Which Intel Teach training did you complete?

- ▫ *Master Teacher training*
- ▫ *Participant Teacher training*

2. When did you complete your training?

- ▫ *July-Sept., 2007*
- ▫ *Oct.-Dec., 2007*
- ▫ *Jan.-March, 2008*
- ▫ *April-June, 2008*
- ▫ *July-Sept., 2008*
- ▫ *Oct.-Dec., 2008*

3. Since completing your Intel® Teach training, how many times have you used your:

	More Than 10 Times	*4-10 Times*	*1-3 Times*	*Not At All*	*Did Not Receive*
a) Intel® Teach manual?					
b) Intel® Teach CD-ROM?					

4. Since completing your Intel® Teach training how many times have you visited the Intel® Innovation in Education website?

- ▫ *More than 10 times*
- ▫ *4-10 times*
- ▫ *1-3 times*
- ▫ *Never / Don't know*

5. Since your training, have you implemented some or all of the unit plan you developed in your Intel Teach training?

- ▫ *Yes, more than once*
- ▫ *Yes, once*
- ▫ *Not yet, but I plan to use the lesson before the end of this school year*
- ▫ *No, never*

6. Since completing your Intel Teach training, how often have you had your students engage in technology-integrated lessons?

- ▫ *Daily*
- ▫ *Weekly*

- ▫ *Monthly*
- ▫ *Several times a year*
- ▫ *Once a year*
- ▫ *Never* **(Skip Question 7)**

7. Have you used technology with your students in new ways since you participated in the training?

- ▫ Yes
- ▫ No

Question 8 is only for teachers who DO NOT use technology with their students

8. Did any of the following reasons influence your decision not to use technology with your students? Please indicate the extent to which you agree or disagree with each statement.

	Strongly Disagree 1	*Disagree 2*	*No Opinion 3*	*Agree 4*	*Strongly Agree 5*
a) Not enough computers were available.					
b) The necessary software was not available.					
c) You did not have adequate access to the Internet.					
d) The lesson did not fit well into your curriculum.					
e) The lesson would not help your students meet required learning goals.					
f) You did not feel confident enough in your technology skills.					
g) You did not have enough planning and preparation time.					
h) You did not have adequate administrative support.					
i) You did not have adequate technical support.					
j) You did not have adequate instructional support.					

(Skip to Question 13)

Questions 9 to 12 are for teachers who HAVE used technology with students

Think of a class in which you implemented a particular technology-integrated lesson or activity. Please answer the following questions about that experience.

9. How many students were in that class?

- ▫ *1-10*

- *11-20*
- *21-30*
- *31-40*
- *41-50*
- *51 or more*

9b. How many students were working at the same computer?

- *each student was working at one computer*
- *2 students were working at the same computer*
- *3 or more students were working at the same computer*

10. Below are some possible objectives of that lesson. Please mark an "X" beside the ONE goal that was most relevant or important for that lesson.

- *Students learn curriculum content*
- *Students work on basic skills (such as math and reading)*
- *Students express their ideas/opinions by creating multimedia products*
- *Students conduct research*
- *Students gain preparation to succeed in the workforce*
- *Students present information to an audience*
- *Students improve their computer skills*
- *Students learn to work in groups*
- *Students learn to work independently*
- *None of the above*

11. Please indicate the degree to which you agree or disagree with each statement about the impact of this technology-integrated lesson on your students.

	Strongly Disagree 1	*Disagree 2*	*No Opinion 3*	*Agree 4*	*Strongly Agree 5*
a) Students were motivated and actively involved in the lesson.					
b) Students worked together more often than in previous, comparable assignments.					
c) Technology-integrated lessons addressed students' different learning styles.					
d) Student work showed more in-depth understanding of content than in previous, comparable assignments.					
e) Students were able to communicate their ideas and opinions with greater confidence than in previous, comparable assignments.					

12. The following statements are about challenges you may have faced while implementing this technology-integrated lesson or activity. Please indicate the extent to which you agree or disagree with each statement.

	Strongly Disagree 1	*Disagree 2*	*No Opinion 3*	*Agree 4*	*Strongly Agree 5*
a) It was difficult to manage your students on the computers.					
b) Not enough computers were available.					
c) You did not have adequate access to the Internet.					
d) The class time or lab time that was available was too short.					
e) You did not have strong enough computer skills.					
f) Many students did not have strong enough computer skills.					
g) You did not have adequate administrative support.					
h) You did not have adequate technical support.					
i) You did not have adequate instructional support.					

13. In addition to its focus on technology skills, the Intel Teach training suggests strategies that participants might use to incorporate project-based lessons into their teaching. Please indicate whether the teaching strategies presented in the training were new or relevant to your teaching.

	Not True At All 1	*Somewhat True 2*	*Very True 3*
a) The teaching strategies were new to me.			
b) The teaching strategies were relevant to my teaching goals.			

14. Since completing your Intel Teach training, has there been a change in how frequently you do the following?

	Do This Less 1	*No Change 2*	*Do This More 3*	*Not Applicable 4*
a) Use a textbook as a primary guide for instruction.				
b) Use Essential Questions to structure lessons.				

c) Access the Internet to aid in developing lessons or activities.				
d) Use a computer for administrative work (for example, grading, attendance, creating handouts).				
e) Present information to students using computer technology.				
f) Use rubrics to evaluate student work.				
g) Have students review and revise their own work.				
h) Have students present their work to the class.				
i) Have students engage in independent research using the Internet.				
j) Have students work on group projects.				
k) Have students choose their own topics for research projects.				

15. How many computers are in your classroom (the room(s) in which you primarily teach, not the school computer lab)?

- ▫ *0 computers* **(skip to question 17)**
- ▫ *1 computer*
- ▫ *2-4 computers*
- ▫ *5-7 computers*
- ▫ *More than 7 computers*

16. Do the computers in your classroom have Internet access?

- ▫ *Yes, all of them do*
- ▫ *Yes, some of them do*
- ▫ *No, none of them do*

17. In your school do you have computer labs or media centers?

- ▫ *Yes*
- ▫ *No* **(skip to question 22)**

18. Do some or all of the computers in the labs/media centers have access to the Internet?

- ▫ *Yes*
- ▫ *No*

19. In total, how many computers are available in the computer labs or media centers? (Please give a combined total if your students have access to multiple labs or media centers.)

- ▫ *1-10 computers*
- ▫ *11-20 computers*
- ▫ *21-30 computers*
- ▫ *31- 40 computers*
- ▫ *41 or more computers*

20. How often do you work with your students in the computer lab or media center?

- ▫ *Daily*
- ▫ *Weekly*
- ▫ *Monthly*
- ▫ *Less than once per month*
- ▫ *Never*

21. How easy or difficult is it to schedule time in the computer lab/media center?

- ▫ *Very difficult*
- ▫ *Somewhat difficult*
- ▫ *No opinion*
- ▫ *Easy*
- ▫ *Very easy*

22. Do you have your students use computers at home to do their schoolwork?

- ▫ *Yes*
- ▫ *No*

23. To do their schoolwork, do you have your students use computers outside of school at a community center, library, or public technology center?

- ▫ *Yes*
- ▫ *No*

24. From where did you find out about the Intel Teach course?

- ▫ *From CCD (House of the Teaching Staff)*
- ▫ *From ISJ (County School Inspectorate)*
- ▫ *From a colleague*
- ▫ *From the school management*
- ▫ *From the Internet (forum/ educational portals)*
- ▫ *Other source*

25. The roles of the teacher are extending and continuously re-defined, ICT being one of the influencing factors. Please indicate the extent to which you agree or disagree with the following statements:

	Strongly Disagree 1	*Disagree 2*	*No Opinion 3*	*Agree 4*	*Strongly Agree 5*
ICT contibutes to my professional development through the adition of new competencies, useful for the activity with my classes.					
ICT stimulates the communication and collaborative activities within the teachers' community.					
ICT helps me in accomplishing administrative tasks I have at school.					
It would have been useful to have such courses within pre-service teacher training programme.					

Annex 2. Intel Teach **Curriculum**

Module 1: Teaching with Projects

Activity 1: Getting Started
Activity 2: Examining Good Instructional Design
Activity 3: Looking at Projects
Activity 4: Planning a Publication to Explain Projects
Activity 5: Creating My Publication
Activity 6: Reflecting on My Learning
Planning Ahead: Beginning the Planning Process

Module 2: Planning My Unit

Activity 1: Addressing Standards
Activity 2: Developing Curriculum-Framing Questions to Engage Students
Activity 3: Considering Multiple Methods of Assessment
Activity 4: Creating an Assessment to Gauge Student Needs
Activity 5: Creating a Presentation about My Unit
Activity 6: Reflecting on My Learning
Planning Ahead Activity: Broadening My Understanding of Essential Questions

Module 3: Making Connections

Pair and Share: Presenting My Unit Portfolio
Pedagogical Practices: Meeting Standards in a Student-Centered Classroom
Activity 1: Targeting 21st Century Skills
Activity 2: Modeling and Teaching Legal and Ethical Practice Related to Technology Use
Activity 3: Using the Internet for Research
Activity 4: Communicating with the World through the Internet
Activity 5: Considering Web-based Collaborative Learning
Activity 6: Reflecting on My Learning
Planning Ahead: Incorporating the Internet

Module 4: Creating Samples of Learning

Pair and Share: Incorporating the Internet into Units
Pedagogical Practices: Helping Students Adapt to a Project-Based, Student-Centered Classroom
Activity 1: Examining Student Samples
Activity 2: Planning My Student Sample
Activity 3: Looking at Learning from a Student Perspective
Activity 4: Revisiting My Unit Plan
Activity 5: Reflecting on My Learning
Planning Ahead: Reflecting on My Student Sample

Module 5: Assessing Student Projects

Pair and Share: Using Feedback to Improve My Student Sample
Pedagogical Practices: Involving Students in the Assessment Process
Activity 1: Examining Assessment Strategies
Activity 2: Creating Student Assessments
Activity 3: Revising My Student Sample and Unit Plan
Activity 4: Reflecting on My Learning
Planning Ahead: Reviewing My Student Sample and

Module 6: Planning for Student Success

Pair and Share: Sharing Student Samples and Assessments
Activity 1: Creating Accommodations for All Learners
Activity 2: Supporting Student Self-Direction
Pedagogical Practices: Supporting the Diverse Needs of Learners
Activity 3: Creating Support Materials to Facilitate Student Success
Activity 4: Revisiting My Unit Plan
Activity 5: Reflecting on My Learning
Planning Ahead: Pre-Planning Facilitation Materials

Module 7: Facilitating with Technology

Pedagogical Practices: Using Questioning to Promote Higher-Order Thinking and Engage Students
Activity 1: Designing Facilitation Resources
Activity 2: Implementing a Successful Project
Activity 3: Reflecting on My Unit as a Whole
Planning Ahead Activity 1: Revising My Unit Portfolio
Planning Ahead Activity 2: Reflecting on Professional Development

Module 8: Showcasing Unit Portfolios

Activity 1: Completing Your Portfolio
Activity 2: Planning a Showcase
Activity 3: Showcasing My Unit Portfolio
Activity 4: Evaluating the Course
Activity 5: Concluding the Course

Module 1
Teaching with Projects

Objectives

Participants will:
- Discuss the Intel® Teach Essentials Course goals and expectations
- Create Portfolio folders for saving unit materials
- View the Unit Plan Template, Portfolio Rubric, and sample Unit Portfolios
- Review research on unit planning and a project-approach to learning
- Create publication to explain projects to others
- Reflect on their learning
- Begin planning technology-enhanced units that target higher-order thinking and 21st century skills

Module 1 Summary

Module Questions:

How can projects help my students meet standards and develop 21st century skills?
How can I use projects to enhance student learning?

Key Points:
- Research on learning and teaching indicates the importance of:
- In-depth coverage of important subject matter
- Big ideas to organize understanding
- Ongoing assessment
- Purposeful, authentic tasks

Projects concentrate on scenarios that provide rich learning opportunities. They involve students in problem solving investigations and other meaningful tasks. Projects establish connections to life outside the classroom and address real world concerns.

The steps for designing projects include:
1. Determining specific learning goals (from standards and 21st century skills)
2. Developing Curriculum-Framing Questions
3. Making an assessment plan
4. Designing activities

Module 2
Planning My Unit

Objectives

Participants will:
- Identify standards for units
- Create objectives for units
- Discuss and develop Curriculum-Framing Questions
- Discuss and brainstorm assessment methods and strategies
- Create assessments that gauge student needs
- Create Unit Portfolio presentations
- Reflect on their learning
- Refine standards, objectives, and Curriculum-Framing Questions for units

Module 2 Summary

Module Questions:
- How can Curriculum-Framing Questions help support my students' learning?
- How can I plan ongoing student-centered assessment?

Module 2 Key Points:

Curriculum-Framing Questions encourage students to use higher-order thinking skills, help students fully understand essential concepts, and provide a structure for organizing factual information. Curriculum-Framing Questions consist of:
- An *Essential Question*, which is a broad and open-ended question that addresses big ideas and enduring concepts. Essential Questions often cross disciplines and help students see how subjects are related.
- *Unit Questions*, which are open-ended questions tied directly to a project or unit and support investigation into the Essential Question.
- *Content Questions,* which are fact-based, concrete questions that have a narrow set of correct answers.

Assessments for project-based units should:
- Be embedded throughout the learning cycle
- Assess the important objectives of the unit
- Engage students in assessment processes
- Use a variety of assessment strategies that:
- Gauge student needs
- Encourage self-direction and collaboration
- Monitor progress
- Check for understanding and encourage metacognition
- Demonstrate understanding and skill

Module 3
Making Connections

Objectives

Participants will:

- Share Unit Portfolio presentations and gauging student needs assessments
- Discuss how to meet standards with projects
- Examine and discuss copyright laws and fair use guidelines as they pertain to education
- Create Works Cited documents
- Explore Internet resources for use in research, communication, and collaboration
- Evaluate Internet resources
- Modify their Unit Plans
- Reflect on their learning
- Plan how to use Internet collaboration and communication tools in units

Module 3 Summary

Module Questions:

- How can I use the Internet to support my teaching and students' learning?
- How can I ensure responsible and appropriate use of the Internet?

Module 3 Key Points:

- The Internet can be a powerful tool for research, collaboration, and communication with others.
- Fair Use guidelines describe how copyrighted materials can be used legally by teachers and students in the classroom.
- Works Cited documents can be created in a variety of formats for students of all ages.
- The skilled use of search strategies enables students and teachers to find useful information efficiently on the Web.
- A variety of factors must be considered when determining the credibility and value of a Web site.
- E-mail, online chats, instant messaging, and Voice Over Internet Protocol technology allow students to communicate with people all over the world on the Internet.
- Blogs, wikis, and online collaborative documents allow students to collaborate on projects by sharing and responding to each other's work online.

Module 4
Creating Samples of Learning

Objectives

Participants will:

- Share ideas for incorporating the Internet into units
- Discuss ways to ensure students use the Internet safely and responsibly
- Create and assess student sample presentations, publications, wikis, or blogs
- Modify Unit Plans
- Reflect on their learning

Module 4 Summary

Module Questions:

- How can the creation of a student sample help me clarify unit expectations and improve my instructional design?
- How can I ensure students will achieve the learning objectives when creating their student projects?

Module 4 Key Points:

- Planning and developing a student product requires:
- Answering the unit's Curriculum-Framing Questions
- Demonstrating understanding of concepts, skills, and knowledge
- Demonstrating higher-order thinking and 21st century skills
- Creating real-world connections for students
- Using technology appropriately and effectively
- The decision to use a particular technology should be based on its strengths in supporting the desired content and learning objectives. Examples of tools appropriate for student projects are:
- Presentations—for oral presentations, enhanced with pictures, graphs, charts, sounds, video, and hyperlinks to other resources
- Publications—for text-based communication, enhanced with pictures, graphs, and charts
- Wikis—for web-based, text-oriented content that allows multiple editors
- Blogs—for web-based, text-oriented journals that encourage responses from readers

Module 5
Assessing Student Projects

Objectives

Participants will:
- Share student samples
- Discuss ideas for involving students in the assessment process
- Reflect on their current assessment practices
- Refine Assessment Plans
- Create summative assessments
- Revise and assess student samples
- Modify Unit Plans
- Reflect on their learning

Module 5 Summary

Module Questions:
- How do I assess student learning?
- How do I involve students in the assessment process?

Module 5 Key Points:
- Assessments should be integrated throughout a project and address all assessment purposes.
- Student-centered assessments should focus on content as well as 21st century skills, and define what the knowledge and skills look like in the context of the project.
- Rubrics contain traits that identify objectives (the column on the left) and descriptors (the columns on the right) that describe levels of performance (ratings).
- Use summative assessments to determine the quality of products and performances.
- The following guidelines are useful when creating or modifying an assessment (Airasian, 1991):
  - Perform the task yourself
  - Make sure the traits (the column on the left) meet your targeted goals
  - Limit the number of traits
  - Ask colleagues and students for input
  - Write descriptors in student-friendly language
  - Avoid ambiguous words
  - Consider the order of your traits

Module 6
Planning for Student Success

Objectives

Participants will:
- Share student samples and assessments
- Discuss how to help students become self-directed learners
- Research ways to differentiate instruction for all students
- Create assessments for student self-direction
- Create support materials to scaffold student learning
- Modify Unit Plans
- Reflect on their learning
- Begin planning facilitation materials needed for unit

Module 6 Summary

Module Questions:
- How can I help my students become self-directed learners?
- How can I support the diverse needs of learners?

Module 6 Key Points:

Transitioning to a student-centered classroom demands adjustments from both students and teachers:
- Teachers must work with students to help them develop self-direction skills.
- Students must take an active role in their own learning.

Teachers can differentiate instruction in four ways:
- Content
- Process
- Products
- Learning Environment

Teachers can look at learning styles in several ways, including visual-kinesthetic-auditory, left brain/right brain, and multiple intelligences.
Accommodating the needs of all learners requires appropriate scaffolding so that students become confident, independent learners.

Module 7
Facilitating with Technology

Objectives

Participants will:

- Discuss how to use various questioning techniques
- Create presentations, documents, spreadsheets, or web-based resources to support a student-centered classroom
- Plan for and discuss unit implementation ideas
- Create management resources
- Modify Unit Plans
- Reflect on their learning
- Assess their Unit Portfolios
- Locate professional development and technology resources for educators

Module 7 Summary

Module Questions:

- How can I facilitate a student-centered classroom?
- How can I use technology to support my instructional practice?

Module 7 Key Points:

- Questioning is at the heart of good teaching. Good questions spark meaningful connections with what you bring to the classroom from prior classes and your own life experience.
- Teacher behaviors, classroom climate, and project implementation strategies are all important in the creation of a student-centered classroom.
- The details of an Implementation Plan identify the requirements needed outside of the classroom before, during, and after a unit to ensure its success.
- Ongoing professional development is important for sustaining growth.

Module 8
Showcasing Unit Portfolios

Objectives

Participants will:
- Prepare and showcase Unit Portfolios
- Evaluate the Intel® Teach Essentials Course
- Receive Certificates of Completion

Module 8 Summary

Module Questions:

- How can I prepare for and facilitate an effective showcase?
- How can I provide constructive feedback?

Module 8 Key Points:

Events like a showcase allow the greater community to provide input for your students and to celebrate your students' achievements.

Annex 3. Unit Plan Template

Unit Author	
First and Last Name	
School District	
School Name	
School City, State	
Unit Overview	
Unit Title	
A descriptive or creative name for your unit	
Unit Summary	
A concise overview of your unit that includes the topics within your subject that will be covered, a description of the main concepts learned, and a brief explanation of how the activities help students answer the Content, Unit, and Essential Questions	
Subject Area	
The subject area you are specifically targeting for the unit (addressed in the standards, objectives, and procedures)	
Grade Level	
The targeted grade level(s) for the unit	
Approximate Time Needed	
Example: 8 50-minute class periods, 6 weeks, 3 months, etc.	
Unit Foundation	
Targeted Content Standards and Benchmarks	
Paste your standards here. After refining and reducing the list of standards for this specific unit, the resulting standards in this section should include prioritized, targeted standards that your students will meet (not just lightly address) and which you will assess by the end of this unit.	
Student Objectives/Learning Outcomes	
Enter a prioritized list of content objectives that will be assessed and students will master by the end of your unit.	
Curriculum-Framing Questions	
Essential Question	*A broad, overarching question that can bridge several units or subject areas*
Unit Questions	*Guiding, open-ended questions for your unit*
Content Questions	*Content area or definitional questions*

Assessment Plan

Assessment Timeline

Before project work begins		Students work on projects and complete tasks		After project work is completed	
Enter brief descriptions of assessments that will help determine a student's background, skills, attitude, and mis-conceptions	*Enter brief descriptions of assessments that will help determine a student's background, skills, attitude, and mis-conceptions*	*Enter brief descriptions of the on-going assessment strategies used to gauge student needs, monitor progress, check for understand-ing, and encourage metacognition, self-direction, and collaboration.*	*Enter brief descriptions of the on-going assessment strategies used to gauge student needs, monitor progress, check for understand-ing, and encourage metacognition, self-direction, and collaboration.*	*Enter brief descriptions of assessment strategies used to demonstrate understanding and skill, encourage meta-cognition, and gauge student needs for future instruction.*	*Enter brief descriptions of assessment strategies used to demonstrate understanding and skill, encourage meta-cognition, and gauge student needs for future instruction.*

Assessment Summary

Describe the assessments that you and your students use to gauge needs, set goals, monitor progre provide feedback, assess thinking and processes, and reflect on learning throughout the learning cyc These might include graphic organizers, journal prompts, anecdotal notes, checklists, conferences, questioning, and rubrics. Also describe the artifacts of student learning that you assess, such as proc presentations, written documents, or performances and the assessments you use. Describe in the Instructional Procedures section who uses the assessments, how they are used, and where they occu

Unit Details

Prerequisite Skills

Conceptual knowledge and technical skills that students must have to begin this unit

Instructional Procedures

A clear picture of the instructional cycle. A description of the scope and sequence of student activities and an explanation of how students will be involved in planning their own learning.

Accommodations for Differentiated Instruction

Resource Student	*Describe accommodations and support for students, such as extra time for study, adjusted learning objectives, modified assignments, grouping, assignment calendars, adaptive technologies, and support from specialists. Also describe modifications in how students express their learning (example: oral interview instead of a written test).*
Nonnative English Speaker	*Describe language support, such as English Language Learner (ELL), instruction and tutoring from more able bilingual students or community volunteers. Describe adaptive materials, such as first-language texts, graphic organizers, illustrated texts, dual-language dictionaries, and translation tools. Describe modifications in how students express their learning, such as first language rather than English or an oral interview instead of a written test.*

Gifted Student	*Describe the various ways students may explore curriculum content, including independent study, and various options through which students can demonstrate or exhibit what they have learned, such as more challenging tasks, extensions that require in-depth uncoverage, extended investigation in related topics of the learner's choice, and open-ended tasks or projects.*

Materials and Resources Required For Unit

Technology – Hardware (Click boxes of all equipment needed)

☐ Camera	☐ Laser Disk	☐ VCR
☐ Computer(s)	☐ Printer	☐ Video Camera
☐ Digital Camera	☐ Projection System	☐ Video Conferencing Equip.
☐ DVD Player	☐ Scanner	☐ Other
☐ Internet Connection	☐ Television	

Technology – Software (Click boxes of all software needed.)

☐ Database/Spreadsheet	☐ Image Processing	☐ Web Page Development
☐ Desktop Publishing	☐ Internet Web Browser	☐ Word Processing
☐ E-mail Software	☐ Multimedia	☐ Other
☐ Encyclopedia on CD-ROM		

Printed Materials	*Textbooks, curriculum guides, story books, lab manuals, reference materials, etc.*
Supplies	*Essential items that have to be ordered or gathered to implement your unit and are specific to the course of study. It is not necessary to include everyday items that are common to all classrooms.*
Internet Resources	*Web addresses (URLs) that support the implementation of your unit*
Other Resources	*Field trips, experiments, guest speakers, mentors, other students/ classrooms, community members, parents, etc.*

Annex 4. Resources for Participant Teachers

Designing Effective Projects

http://educate.intel.com/en/ProjectDesign
http://educate.intel.com/ro/ProjectDesign

The *Designing Effective Projects* resource includes a collection of exemplary Unit Plans that integrate technology into classroom projects. Most of the units were developed by teachers participating in the Intel® Teach professional development program. The program emphasizes curriculum development that aligns to standards and promotes higher-order thinking using Curriculum-Framing Questions, authentic project tasks, effective instructional strategies, and performance assessment. *Designing Effective Projects* provides a foundation for good planning and supports you in adapting these project-based units or developing your own from scratch.

Assessing Projects

http://educate.intel.com/en/AssessingProjects
http://educate.intel.com/ro/AssessingProjects

Assessing Projects helps teachers create assessments that address 21st century skills and provides strategies to make assessment an integral part of their teaching and help students understand content more deeply, think at higher levels, and become self-directed learners.

Other useful tools for teachers

http://www.intel.com/education/tools

Free tools and resources for educators support collaborative student-centered learning. Online thinking tools are active learning places where students engage in robust discussions, pursue investigations, analyze complex information, and solve problems.

Intel Teach 2009

Real or virtual, the learning space, although more and more technologically-supported, needs dialogue and negotiation between student and teacher. The personal learning experience is still a problem solving and a social construction issue, no matter the multimedia support of the learning materials.

The *Intel Teach* program is a global initiative which aims at training teachers to efficiently integrate the new technologies in their didactic activity.

Over 6 million teachers from more than 40 countries have been trained so far. Intel hopes that, by 2011, 13 million teachers in school education - that is about a quarter of the world's teachers - will have benefitted from the *Intel Teach* program.

The research showed there is a high level of interest and receptiveness among teachers towards the use of the new technologies in the teaching-learning activity. These can be translated into the joy of exploring the ICT possibilities, and even into the capacity of pedagogical innovation. Moreover, teachers themselves act in a way so as to fill in the (possible) gaps in their theoretical or procedural knowledge in the area of computer-assisted education.

Actually, the implementation of ICT in education will be successful only with teachers who are motivated to participate in complex training sessions like those provided by the *Intel Teach* program.

The study shows that the effects of the participation in the training are found in the micro-universe of a class of students. Teachers who completed the *Intel Teach* training have therefore become “agents of change” in their school.

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