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# Research Shows 1:1 eLearning Program Supports Development of "IT Society" in Macedonia

## KEY OUTCOMES

- Teachers are improving student outcomes by integrating information and communications technology (ICT) in primary school classrooms nationwide
- Professional development for teachers has scaled over time, leading to much higher rates of ICT literacy and greater use of ICT in classrooms
- After initial delays, wireless Internet and intranet is now available in all classrooms, including every lower primary classroom in the country

**RESEARCH SUMMARY**
Macedonia

**Intel Education Research**
*Global research that supports education transformation*

This report is based on original data collection and analysis by local researchers—in collaboration with Intel and SRI International (SRI).[1]

Intel conducts longitudinal research on eLearning deployments around the world, and compares results to other programs. Understanding of the successes, challenges, and policy implications of eLearning programs are used to improve existing and future initiatives.

For more information on the Intel Education Research initiative, contact **educationresearch@intel.com**.

## OVERVIEW

In 2008, as part of the Computer for Every Child initiative, the government of Macedonia made a nationwide commitment to distribute Intel® Learning Series solutions to students in grades 1-3 and desktop computers to students in grades 4-8.

The goal of the 1:1 eLearning program is to promote regional economic development by increasing the use of ICT in teaching and learning and thereby increase ICT literacy among teachers and students. Macedonia is the first Balkan country to invest in the Intel Learning Series on such a large scale.

Intel commissioned a study with local researchers to understand the initiative's vision, successes, and challenges. This document summarizes the research findings to share key learnings—what worked, what didn't work, what could be improved—with other interested parties (For additional detail on the methodology, see the Intel Guide to Monitoring eLearning Programs).[2]

## CHALLENGES

- Need to accelerate economic development
- Low historical ranking in the region for Internet connectivity and the use of ICT for economic development
- Traditional teaching practices that need to be restructured to support 21st century needs

## SOLUTIONS

- Purchased 53,000 Intel Learning Series solutions and 22,000 ASUS* netbooks for teachers in 2009 with focus on lower primary schools
- Equipped each school with ADSL Internet connections, peripherals such as printers and LCD projectors, and wireless access points for lower primary classrooms
- Identified, translated into local languages, customized, and installed 43 open-source applications focused on mathematics and science on laptops

## The Vision: Develop an IT Society

The Computer for Every Child began as a core component of the National Programme for Development of Education in Macedonia 2005-2015. Since then, the promise has driven important policy initiatives related to computers in education. One initiative was to distribute Intel Learning Series solutions to all students nationwide in grades 1-3. The Computer for Every Child initiative also included the deployment of desktops to students in grades 4-8.

The government's 2006 strategy document[3] positions ICT in education as a pathway for economic development. It promotes a long-term program of educational transformation designed to ensure that the country's youth acquire 21st century skills, enabling them to compete in regional and global marketplaces. The strategy document also promotes development of an "IT society" characterized by ICT literacy for teachers and students and widespread use of ICT in classrooms.

Consistent with this vision, the goals for the 1:1 eLearning program include

### MACEDONIA EDUCATION SYSTEM

- Macedonia's education system includes 334 primary and 94 secondary schools.

- The government of Macedonia is responsible for all educational legislation and implementation of educational programs.

- Recent legislation promotes a shift to a more decentralized education structure.

- Primary teaching certification requires a four-year bachelor's degree.

immediate advances in the quality of education and ICT literacy for students and teachers. Longer-term goals include participation in the global economy, local economic development, and business growth.

An important trend in education policy is the decentralization of the education system, which has historically been managed nationally by the Ministry of Education and Science. Recent legislation has transferred responsibility for school management to municipalities, which have varying levels of financial resources to support operations. For the 1:1 eLearning program, the government purchases the hardware and software, but local municipalities are responsible for maintenance and ongoing technical support. As a result, while the initial purchase was fully funded, some challenges are expected in financing the ongoing costs of the program.

Foreign organizations have played key roles in supporting the initiative. For example, both Intel and the Academy for Educational Development served as advisors to program planning, and aid organizations such as USAID provided financial support for localizing curriculum and wireless access points for classrooms.

## Planning: Computers Distributed Efficiently, but Oversight Limited

After an initial pilot conducted in 2006-7 by USAID, the rollout of 1:1 computing in Macedonia was executed as a simultaneous program across the nation, in an effort to achieve widespread impact quickly.

While goals of efficient distribution of computers were met, the need to put required infrastructure in place caused implementation delays. Project stakeholders accepted these delays as necessary to ensure successful deployment.

National planning for the program took place without substantial input from stakeholders in local governments and schools, which limited initial buy-in. Organizationally, the State Inspectorate of Education was a logical choice to provide oversight, but with just 70 inspectors to

serve 15,000 primary school teachers, capacity was an issue. Responsibility for maintenance and professional development were also open questions early in the project.

In addition, national planning for the program took place without substantial input from stakeholders in local governments and schools, which limited initial buy-in.

## Implementation: Integrating ICT in Classrooms Across the Country

The 1:1 eLearning environment for grades 1-3 at Macedonia's elementary schools is based on the Intel Learning Series, a solution that consists of hardware, software, and services.

As part of the solution, the government purchased 53,000 Intel Learning Series solutions for students, and each primary school teacher was issued a school-owned laptop. Forty-three open-source applications focused on mathematics and science were identified, translated into Macedonian and Albanian, customized for the Macedonian context, and installed on the laptops, along with local-language versions of the operating system. In addition, the program equipped each school with ADSL Internet connections, peripherals such as printers and LCD projectors, and wireless access points for each lower primary classroom.

Lack of technological readiness in many schools challenged the implementation. For example, existing wiring in older schools required upgrades to support the increased electrical demand of the technology. These infrastructure enhancements slowed implementation by almost two years, but eventually resulted in wireless Internet and intranet in every lower primary classroom in Macedonia.

Another early challenge was teacher readiness to integrate ICT into instruction. Because only slightly more than half the households in Macedonia possess a computer, many teachers were not familiar with using technology, and their instructional use was limited to presentation software and activities that could

be conducted without ICT. Early in the deployment, professional development was ad hoc and there were concerns about the capacity of the responsible agency to reach all teachers.

As the program continued, a number of training options for teachers were developed. These training modules address a number of instructional topics in addition to ICT skills, including classroom management, student assessment, and improving language skills among teachers. A train-the-trainer model now supplements in-house capacity, with trained Educational Technology Support Teachers based in each school who provide professional development and routine technical support for their colleagues. Teachers also have access to online communities that allow them to share experiences and exchange instructional strategies. Education in Macedonia is characterized by a shift toward a continuous culture of teacher learning, with donor communities and corporations playing a large role in professional development.

A nationwide policy mandates that 30 percent of each teacher's instruction must incorporate technology. While government officials see this as an effective means of motivation, teachers tend to respond with minimum efforts to comply rather than motivation to transform instruction.

After nearly three years, the initiative has produced positive changes in classrooms. All teachers interviewed for this research indicated that they use ICT in instruction at least once per week in all subjects. Teachers report using ICT to:

- Prepare documents and multimedia presentations, and enable students to conduct Internet research and collaborate with other schools virtually.

- Expand learning beyond the classroom, on field trips or by using videoconferencing to connect to other classrooms or expert mentors.

- Produce positive student outcomes, including higher levels of engagement in learning activities, self-regulation by students, more time on task, more independent work, and a greater percentage of tasks completed on time.

- Allow students more opportunities to experiment, learn by discovery, and express themselves in different ways.

- Provide a differentiated approach toward student learning, with targeted attention to individual needs.

## Re-informing the Vision: Identifying Areas for Improvement

Several studies of the deployment in Macedonia have been conducted by the donor community, including an early study of infrastructure and a later evaluation of a professional development program by USAID, and an evaluation by university students of the patterns of teacher integration of technology into teaching and learning. So far, more comprehensively designed studies and tracking of key indicators are lacking.

Based on research for this report, a number of significant challenges persist. While rural schools in remote areas comprise only 5 percent of the student population in Macedonia, electrical supply there is

inconsistent and Internet connections are unreliable. This requires teachers to have an offline "plan B" for every lesson. The battery life of the PCs has proved to be a challenge, particularly in schools that work two shifts, with limited time to recharge between shifts.

In addition, content management systems are lacking in the local languages, and there is limited availability of educational content, applications, and testing software. Some parents remain concerned about technology's effects on schoolwork and the overuse of computers as toys despite after-school classes in some areas to educate parents about the potential educational benefits of ICT for their children. Clear lines of oversight are still missing in many areas, hindering ability to implement meaningful strategies.

## Conclusion

After overcoming initial challenges related to infrastructure development, 1:1 eLearning has become commonplace in primary school classrooms across Macedonia. The Computer for Every Child initiative provided federal support for integrating ICT in classrooms, and young students now benefit from hardware, software, and services that are preparing them for life and work in the 21st century economy.

Other countries can develop successful 1:1 eLearning programs that build on the challenges and successes identified in this project. By working with Intel and other public and private partners, governments can create sustainable, cost-effective 1:1 eLearning programs that will provide social and economic opportunities for years to come.

Intel has helped to implement more than 200 education programs in over 70 countries, and has invested more than USD 1 billion in the last decade to improve teaching and learning environments.

Working with governments, policy makers and local vendors, Intel helps to implement eLearning solutions that provide professional development to teachers; support student achievement and development of 21st-century skills; and enable access to relevant, localized digital content.

The education transformation model developed by Intel helps governments improve the quality of their education systems, leading to economic and social opportunities for their citizens.

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