

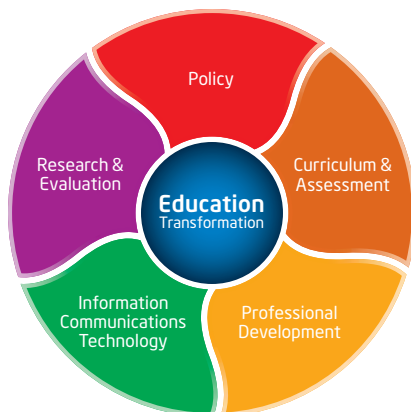


# Macedonia Implements First 1:1 Technology Integration Program in Balkans

**Program distributes 53,000 PCs to students and 22,000 netbooks to teachers.**

*Based on original data collection and analysis by researchers at AED in Macedonia, in collaboration with SRI International and Intel*

Intel Education Integration Research is conducted in regions around the world to understand the successes, challenges, and policy implications of a variety of eLearning programs, and compare them to other programs worldwide. The information in this report is based on original data collection and analysis by researchers at AED in Macedonia, in collaboration with SRI International and Intel.



## Introduction

Macedonia is a Balkan country with a population of about 2 million. Macedonia's government envisions development of an IT society, in which information and communication technology (ICT) is integrated throughout every classroom to enable students to acquire the 21st century skills they need to compete in the global economy. To support that vision, the central government began a 1:1 technology integration program in 2009 with the support of the Intel® Learning Series solution.

To date, Macedonia's technology integration program has distributed 53,000 Intel-powered classmate PCs to students in grades 1-3. In addition, 22,000 Intel® Atom™ processor-based netbooks have been distributed to primary school teachers, with locally relevant math and science applications installed on each netbook. The primary schools also received broadband Internet connections and peripherals such as printers and projectors.

Macedonia is the first Balkan country to invest in the Intel Learning Series on such a large scale. The integration seeks to enhance regional and economic development by increasing computer usage and ICT literacy among students and teachers. The ambitious program has encountered challenges that provide insight into how other countries around the world can implement sustainable eLearning programs that successfully enrich classrooms and communities.

## The Vision: ICT in Education as a Pathway to Economic Development

The technology integration program in Macedonia is aimed at regional economic development. A 2002 report noted that, among the countries of Southeast Europe, Macedonia ranked low in Internet connectivity and, consequently, in the use of ICT for development.<sup>1</sup> Among other strategies, the report recommended that Macedonia integrate ICT into primary and secondary school education to facilitate 21st-century skill development and long-term economic development.

Macedonia's technology integration program began after the 2006 election, in which the majority party promised a "computer for every child" and Internet access in classrooms across the country. The government also issued a strategy document that emphasized ICT in education as a pathway to economic development, and created the vision for development of an IT society.

The overarching goals for the program were to modernize education through the use of ICT and, eventually, to increase economic development and growth. Specific goals included achieving a 1:1 student-computer ratio, increasing ICT literacy among teachers, and giving students access to 21st century skill

development. Over time, the government hopes to see local economic development and business growth spurred by a new, digitally literate generation.

Because the technology integration project was initiated as part of the political platform of the ruling party, the central government financed deployment. Although the government purchased the hardware and software, it is owned by the schools, and local municipalities therefore have to pay for maintenance and ongoing technical support.

## Planning: Federal Government Provides Central Authority

The technology integration program in Macedonia targets students in grades 1-3 in all schools in the country to support the government's vision of achieving the greatest possible impact in the shortest time. The program is the latest in a series of efforts to incorporate ICT in Macedonian schools, and is part of a larger integration program that included deployment of desktop computers to students in grades 4-8, using an N-computing solution.

### CHALLENGES

- Lack of 21st-century skill development in schools
- Low regional ranking in Internet connectivity
- Limited ICT literacy among teachers

### SOLUTIONS

- Government-led 1:1 technology integration program targeting primary schools
- Free netbooks for teachers loaded with customized, locally relevant math and science applications
- Broadband Internet access at all primary schools



The government was the central authority throughout the program's planning phase, and was responsible for implementing the program at the primary schools. Local government authorities, school directors, and teachers were not heavily involved in the planning process.

The State Inspectorate of Education (SEI), which has just 70 inspectors available to serve 15,000 primary school teachers, provided limited program oversight. Additional support is needed from either the local or central government or a local third-party provider to provide care, maintenance, and replacement of hardware, software, and Internet connectivity.

### Implementation: Technology Reaches Primary Students Across the Country

The technology integration program at Macedonia's primary schools is based on the Intel Learning Series, which provides a package of hardware, software, and services. In this case, the hardware included 53,000 Intel-powered classmate PCs for students in grades 1-3 and 22,000 Intel Atom processor-based netbooks for primary school teachers.

In addition, 43 open-source applications that focused on mathematics and science were identified, translated into Macedonian and Albanian, customized for the Macedonian context, and installed on the teachers' netbooks. The Ministry of Education Sciences

provided ADSL Internet connections to the primary schools, with speeds ranging from 1 to 8 MB/s, depending on the number of students in the school. The deployment also included peripherals such as printers and LCD projectors.

Once the classmate PCs were distributed to the schools, the need for wireless connectivity became evident. The government requested technical assistance from USAID to provide 2,087 wireless access points for primary schools, which enabled wireless Internet and intranet in every lower primary classroom.

The process of upgrading the infrastructure for electrical wiring and Internet connectivity took almost two years, delaying rollout, but eventually enabling the integration of ICT into primary school classrooms across the country.

### Research and Evaluation: Identifying Areas for Improvement

Technology adoption is viewed as a pathway to modernize classrooms, improve teaching and learning, and ultimately spur economic development across Macedonia. However, the current technology integration program does not specify a process for evaluating and assessing the program results.

At this point, program planners and implementers do not have a systematic way to identify limiting factors and make revisions to the program. Processes also need to be established to conduct and summarize evaluations. Until such steps are taken, the program's achievement of its short-term and long-term goals cannot be tracked effectively.

### Conclusion

The success of Macedonia's ambitious 1:1 technology integration program depends on all of the steps shown here, including establishment of a strong vision, extensive planning, a systematic implementation process, and ongoing evaluation and monitoring.

Other countries can learn from Macedonia's successes and challenges to identify ways to improve their education systems and develop successful eLearning programs. By working with Intel and other public and private partners, countries can create sustainable technology integration programs that will provide social and economic benefits for years to come.

## EDUCATION TRANSFORMATION PROGRESS

Macedonia's technology integration program shows progress in all five of the areas that have proven essential to education transformation efforts in more than 70 other countries.

#### 1. POLICY:

- The "Computer for Every Child" initiative was the primary driver of technology-supported education reform in Macedonia
- The program extends the government's strategy document, *National Programme for Development of Education in Macedonia 2005-2015*
- Macedonia's government funds hardware and software, with local funding of maintenance and technical support

#### 2. CURRICULUM AND ASSESSMENT:

- The Bureau for Development of Education (BDE) is responsible for defining the needs of the educational system and developing curricula and programs

- Systematic content, curriculum, and assessment is in progress

#### 3. PROFESSIONAL DEVELOPMENT:

- 2008-2010: AED-Intel provided a planned professional development program based on the Intel Learning Series technology for primary teachers; 50 master teachers (including members of BDE) were trained, at least one from each region. This was followed by teacher professional development in each region with cooperation from AED. Approximately 7,000 primary school teachers were trained

#### 4. INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT):

- 53,000 Intel-powered classmate PCs were distributed for students in grades 1-3

- 22,000 Intel Atom processor-based netbooks were distributed to teachers

- 2,087 wireless access points created for primary schools, which enabled wireless Internet and intranet in every lower primary school

#### 5. RESEARCH AND EVALUATION:

- Need to establish a process for conducting and summarizing evaluations

## THREE BEST PRACTICES

The ongoing success of Macedonia's education transformation depends on several best practices that other countries can follow to achieve similar success.

### BEST PRACTICE 1: Integrated technology deployment

Macedonia's technology integration program benefits from the Intel® Learning Series, which provides a combination of hardware, software, and other services. The package provided to Macedonian schools includes Intel-powered classmate PCs, which are designed specifically for young students. Teachers also received Intel® Atom™ processor-based netbooks, which arrived loaded with 43 math and science applications, customized to local languages. The combined technology solution gives students and teachers the tools they need to improve the learning experience in schools across the country.

### BEST PRACTICE 2: Early focus on infrastructure

An important and sometimes overlooked issue is that every school has to have the infrastructure in place to support ICT deployments. Ideally, infrastructure concerns are identified and addressed before rollouts begin, although in Macedonia, these issues were addressed during and after the initial rollout. Officials found, for instance, that some schools did not have the wiring necessary to support increased electrical demands. In addition, officials realized that wireless Internet access was needed to take full advantage of the new computers.

### BEST PRACTICE 3: Collaborate with nonprofits and other partners

The government found much-needed support for wireless Internet access from businesses and nonprofits, demonstrating the importance of collaboration. USAID eventually underwrote a project called "Macedonia Connects," which has made Macedonia the first all-broadband wireless country in the world, reportedly connecting 461 primary and secondary schools to the Internet. In addition, an Internet service provider has created a MESH Network to provide Wi-Fi services in the 11 largest cities in the country.

## Achieve Your Vision

What's your vision of the world ahead? Intel's model of education transformation can help governments improve the quality of the education system, leading to greater economic and social opportunities. Contact your local Intel representative to discuss how you can implement a sustainable, technology-based education program in your country.

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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.

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Intel Learning Series, based on years of ethnographic research, is designed specifically to support 21st century student learning. It is a package of hardware, software, services, and support—delivered by local vendors to meet local needs—designed to work reliably together. At the heart of the Learning Series is the Intel-powered classmate PC—a purpose-built netbook with full PC functionality. Built to advance education, the Learning Series enables more personalized and comprehensive eLearning solutions for students K-8.

Learn more about:

- Intel Education programs, including the Intel Guide to Monitoring eLearning Programs and Education Transformation Research Reports at: [www.intel.com/education](http://www.intel.com/education)
- The Intel Learning Series at: [www.intelllearningseries.com](http://www.intelllearningseries.com)

Or contact: [educationresearch@intel.com](mailto:educationresearch@intel.com)

<sup>1</sup> Malloy, E. (2002). Integrated ICT for Development Program: Recommendations for USAID Macedonia focused on education and workforce training. Washington, D.C.: USAID/EGAT/EIT.


<sup>2</sup> For more information, see "Policy for Education Transformation: An Educational Policy Brief."

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