INFORMATION TECHNOLOGY

Innovating Education in Croatia

Reforms that are raising the quality of IT in Croatian science and education aim to create a knowledge-based society.

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To make Croatian science and education the most competitive in Eastern Europe by 2010, the Croatian Ministry of Science, Education, and Sport (the Ministry) has undertaken major reforms in the past 4 years (*1*), to develop information technology (IT) as the essential infrastructure for a knowledge-based society (*2*). Since 199/3, IT projects have improved the quality of learning and teaching and have created equal learning opportunities for all students (*3*). As a result, primary and secondary school students can access educational content from their homes or dormitories. The infrastructure for implementing new technologies in the education system has been developed and maintained by the Croatian Academic and Research Network—CARNet (www.carnet.hr). CARNet connects all universities and research institutions in Croatia with access speed ranging from 2 Mbp/s to 10 Gbp/s. It also connects to academic institutions in Bosnia and Herzegovina through cooperation with BIHARNET, the Academic and Research Network of Bosnia and Herzegovina, and throughout Europe via GÉANT, the pan-European data communication network (*4*). CARNet is free for all authorized users and provides each with a unique, electronic identifier.

CARNet equipped all scientific and academic libraries, 650 school libraries, 700 branch elementary schools (of 1367 in total), all secondary school staff rooms (391 in total), and all high school dormitories (54 in total) in Croatia with computer equipment and Internet access (*5*). This includes a room-based videoconference system, with 34 teleconferencing classrooms in 15 cities. Since the 2006–07 school year, 280 of 391 secondary schools have been equipped with SmartBoards, touch-sensitive whiteboards, on which a computer's video output can be displayed. Efforts are focused on using Web-based IT to connect remote parts of Croatia, such as its archipelago of 1000 islands. Croatia's "e-islands" project connects 21 island schools via a videoconference system (see figure).

To promote computer literacy, users have access to electronic content via the "Nikola Tesla" National Portal for Distance Learning (lms.carnet.hr), which includes the European Computer Driving License (ECDL). Courses on information-communication technologies are available, as well as interactive education content for high schools in mathematics, physics, biology, and chemistry. In a step toward computerization of educational resources and records, undergraduates use the Information System of Higher Education Institutions (ISVU) IT system (www.srce.hr/english/isvu.html) to sign up for exams via the Internet, check teaching and exam schedules, access records, and receive other related services. ISVU has been introduced in 82 public institutions in Croatia, and currently contains data on ~80% (around 135,000) of all undergraduates.

Video-conferencing for education.

The e-Matica system, implemented in 2008, is a database of primary and secondary educational institutions, their employees, students, programs, and activities. It contains around 30,000,000 records. E-Matica serves as the base for the Education Management Information System (*6*), a database of standardized data from pedagogical documentation and education statistics. E-Matica is also used in implementation of free textbook distribution through schools.

Starting in 2010, criteria for general secondary school students and 4-year vocational students to attend higher education institutions will include the State Matura Exam (SME). Currently under development is the National Information System for Application at Higher Education Institutions, in which data from e-Matica, ISVU, SME results, and elsewhere will be used to create student ranking lists.

Benefits and Challenges

Investment in development of IT in education and research totaled €133,300,000 (~$184,400,000) over the last 5 years. This amounted to ~2% of the Ministry's budget per year. Although the largest investments were in hardware, the fastest growing investments have been in software and education.

The Croatian government believes that providing access to information via the Internet leads to higher-quality education (*7*), especially in geographically isolated or economically underdeveloped areas. Remote learning should be embraced with traditional education as of equal importance. However, a serious obstacle is the lack of adequately trained staff. To overcome this, in the last 4 years, 20,000 employees in the education sector have completed ECDL training. Future efforts must address fear of new technologies and lack of motivation.

Other small countries that have made heavy investments in science and education (such as Israel, Ireland, and Finland) have shown how a small country can find an efficient strategy to become globally competitive. As Danish Crown Prince Christian VIII said in 1813 [(*8*), p. 242)], when the budget for education was increased despite Denmark's having declared bankruptcy following war with England, "If we now become foolish, we may say goodbye to the idea of surviving as a state."

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References and Notes

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7. National scores for 2007–08 were analyzed in schools that had had computers for student use for 1 to 4 years. A significant correlation was obtained between the number of years computers were available in schools and the national exam scores in chemistry, informatics, and physics. However, a more systematic investigation of these relations is necessary.
8. Croatian Heritage Foundation, *Hrvatski iseljenički zbornik 2007* (Croatian emigrant almanac 2007), (Croatian Heritage Foundation, Zagreb, Croatia, 2007), 368 pp.
9. I thank Z. Stanic, D. Schwarz, Z. Paldi, V. Mornar, A. Marušić, A. Mišak, I. Bošnjak, and. D. Bonacci.

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